Joint Study conducted by Institute of Happiness and Gedu College of Business Studies

Institute of Happiness

Hydro Power in Bhutan as a Source of Cross Border Electricity Trade – Community Experience and Perspective

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Executive Summary

Over the past decade, Bhutan has made an immense amount of progress when it comes to economic growth and development. One of Bhutan's five crown jewels, hydropower brings in the most revenue. This research was conducted to better understand how electricity affects residents' daily lives and how hydropower projects have impacted the immediate localities. Since no country is completely self-sufficient, trading electricity with neighbors has several advantages. Being able to use one country's resources can help another's economy expand and develop. In addition to creating new trade opportunities, establishing electricity trade strengthens bilateral and, in certain circumstances, multilateral links between adjacent nations are essential for fostering international collaboration and develop a sense of community.

The current study examines the benefits of hydropower in Chhukha Dzongkhag, particularly in Bjagchhog and Darla gewog, regarding social development, gender, and youth participation. The study was conducted through a public survey of the two gewogs and youth perception survey from students of Gedu College of Business Studies. The results showed that most respondents claimed to have benefited from hydropower plants in their vicinity and that having access to energy and a continuous supply had a favorable impact on women's lives. The study also revealed that young respondents believed electrification has improved education for students and provided a 24-hour electricity supply for the neighborhood. More education and awareness on cross-border electricity trade were recommended.

Chapter 1: Introduction

1.1 Background of the study

In South Asia, Cross Border Energy Trade (CBET) has created shared benefits and prosperity. Trade facilitation measures improve the trading environment by lowering transaction costs and increasing trade benefits (Taneja, Joshi, Prakash, and Bimal, 2018). Given the importance of investment in any infrastructure project, the participation of Indian investors in a hydropower project in Bhutan could be viewed as a significant point of cooperation with India.

The commencement of Chhukha hydropower in 1986, Bhutan has been exporting electricity to India (Mehta and Tiwari, 2018), and the Tala hydropower plant was commissioned in 2007, being the largest hydropower plant and the subject of this study. Since the Tala hydropower project completion, it has not only met domestic power demand but is also capable of generating surplus energy for export. Furthermore, surplus power is exported to India through cross-border electricity trading (CBET) interconnections.

This research, however, intends to find out, what have been the other impacts of CBET in Bhutan, especially on socio-economic, youth and gender, beside revenue generation. Light represents socio-economic development, whereas darkness is a significant concern for sustainable development (Berga, 2016). Access to cheap hydroelectricity was thought to be a driving force behind industrial growth and the provision of clean energy to households and commercial entities alike (Yangka, 2015).

This present research aims to build on previous studies by looking into how cross border energy trade (CBET) impacts livelihood, gender, and youth in Chhukha Dzongkhag. The rationale for focusing on Chhukha Dzongkhag is mainly due to three reasons. Primarily, the first hydropower plant was established in Chhukha, operating for more than ten years and is suitable for ex-post study. Secondly, because the college youths are located near the Tala and Chhukha hydropower plants, this research will assess the knowledge of youths studying in the Chhukha district. And as youths are aware about the hydropower developments and benefits but they do not know about CBET so this paper lays out whether the youths are aware about the CBET. Thirdly, data collection was comparatively easy and fast, making it an ideal subject for study. The study will shed light upon how the adaptation of cross border energy trade has consequently changed the economy in the neighboring communities.

1.2 Problem Statement

Bhutan is a landlocked country with 787,963 population (Bhutan Population, 2022). It has just 3% of its hilly terrain arable and has insignificant industrial base. Bhutan relies heavily on trade; in 2020 it imported $829 million worth of products while its GDP was worth 2.41 billion US dollars (Trading Economics, Bhutan GDP 2020). India was and continues to be the largest trade and development partner of Bhutan. Planned development in Bhutan began in the early 1960s (Sangay, 2016). Trade in energy, driven by electricity, remains the essential and the largest component of trade (exports) for Bhutan.

However, of late, electricity sector of Bhutan has started facing big challenges such as considerable escalation in costs and prolonged delays in the construction completion of projects; it has alarmed Bhutanese citizens as much as the government authorities. And more so, the influences of social media “When all one’s eggs is energy export” (2015), and “The Possible Risk of Putting All Eggs in One Basket: A Case of Bhutanese” (2014), instigated further debates leading to increased mistrust in the sector. As a result, major sections of Bhutanese Society are beginning to develop cold feet for hydropower development. Therefore, providing complete and accurate information to convince the public has become critical at this juncture should Bhutan continue developing hydropower projects and thereby trade electricity with India. Moreover, Royal Government of Bhutan has also committed in maintaining 60 percent forest cover for all time to come (National Forest Policy of Bhutan, 2009).

The topical issues and concerns in every heart of the Bhutanese are social impact, environmental impact and sustainable development visa-a-vise the sustainability and advantages of hydropower projects. Therefore, this study is an effort to explore whether the benefits outweigh the harms of the Hydro-Power Projects. We strive to provide substantive and right information on the benefits of having mega hydropower projects and electricity trade between India and Bhutan. To this end, this study explores social development, gender equality, and youth engagement opportunities brought about by hydro-power projects in Bhutan while paving the path to modernization, and industrialization. This study is therefore deemed necessary at this point of time.

1.3 Research Aim and Objectives and

- To create awareness in the country's youth on the cross border energy trade and examine youth engagement with energy.
- To study the impact of socio-economic benefits on the local community and impact on local livelihood and gender in the community.

1.1 Research Questions

- Are there positive impacts on socio-economic development and gender by cross border energy trade in the nation?
- Are there differences in the livelihood before and after the establishment of cross border energy trade?
- What percentage of the country's youth are aware of and involved in the energy sector?

1.2 Research Scope and Significance

This research will benefit the researchers to build knowledge and facilitate learning. In addition, researchers will be able to understand more about CBET. While only a few studies show how CBET benefits local communities socio-economically in South Asia, there is little emphasis on the impact of CBET on youth, and gender.

The results of this study will assist that CBET is not limited to electricity exchange and revenue generation; it will show how such projects are impacting people. As a result, there is a need to effectively assess the benefits of cross-border energy trade in the region and build a compelling narrative in its favor. This will contribute to increased advocacy for CBET.

Moreover, through this study, we wish to highlight the hydropower sector's usefulness in Bhutan and bring awareness of the existence of this methodology to the nation's youth.

Chapter 2: Literature Review

In this paper, a systematic literature review was conducted to comprehensively search articles relating to CBET. The research papers selected were narrowed down to those primarily relating to CBET impact on social development, youth engagement, and gender. This systematic literature review synthesizes prior research and draws deeper insights into the research topic. The review is essentially a preliminary search of current research articles performed in other countries that will aid in the development of a critical viewpoint on the topic of our study. The SLR (Systematic Literature Review) is also carried out to identify or speculate on possible modes of research methodology, as well as to compare and contrast the findings of various papers to reach a common conclusion that will help narrow down our intended search for the research aims and questions in our research paper.

Social Impact

Hydropower contributed to meeting primary electricity needs, and the commissioning of the 336 MW Chukha hydropower in 1986-88 provided much-needed revenue to support socio-economic development in the country by exporting over 75% of the generation to India (Tshering and Tamang, 2004). According to Mehta and Tiwari (2018), in addition to job creation due to increased energy access, various services like primary health units, transportation and communications, has dramatically improved. Furthermore, large infrastructure projects benefit the local community if mitigation measures are in place to manage the negative environmental impact. The direct benefit comes from job opportunities for the local community and project investments in education and health facilities, among other things, in and around the project sites.

Youth Engagement

According to The Global Forum on Sustainable Energy, the young generation has enormous potential to contribute to the energy transition, including participation in local and international decision-making processes and as skilled labor supporting the development of renewable energy, energy efficiency, and clean mobility value chains. The study by Saputra, Akmal, and Wahyuni (2021), on the perceptions of local youth in developing renewable energy in West Sumatra Province found that local youth do not fully understand renewable energy. Therefore, the state (government) should actively disseminate energy information to the younger generation. For this, internet and social media can be used as socialization media because they are the most effective media to reach young people and because they are an educated community group that can network and advocate for policies (Saputra, Akmal, and Wahyuni, 2021).

Gender

Gender is a specific component of individual identity in Western society. It has a tremendous impact on our lives from birth, and we execute its social and cultural implications at every level. Gender refers to the socially created roles, behaviours, and identities of women, men, and persons of mixed gender. It impacts how individuals view themselves and others, behave and interact, and how power and resources are distributed in society (Heidari, Babor, De Castro, Tort, and Curno, 2016). Most of the research on gender and the impact of hydropower development has focused on the betterment brought in women's lives and behavioral changes. The above statement states that hydropower projects have significantly influenced the lives of the people who have seen life before the development of the project in the area. Relying on this theory of reasoned action, most hypotheses above include CBET to influence gender positively. Weeratunge (2016) presented the same idea and found that the project amplifies the activity in rural areas. It also saw robust growth in females taking up more business and supporting the household decision-making processes. Similarly, SARI/EI Secretariat (2018) study found that access to electricity benefited women significantly by reducing the burden of household chores, including cooking time. Moreover, the use of electric rice cookers, curry cookers, and other kitchen appliances also minimizes exposure to smoke from traditional ovens and improves women's health.

Chapter 3: Research Methodology

3.1 Research Design

The research structure glues that ties all pieces in a research project together; in brief, it is a blueprint of the planned study endeavor (Akhtar, 2016). The research uses a mixed-method approach using both quantitative and qualitative methods. Quantitative data is typically descriptive data since it describes something precise to collect data. In this research, the quantitative study is used to indicate the project area. In contrast, qualitative research is used to provide exploratory insight to form a perception regarding the impact of the hydropower project on the livelihoods of the people in the selected region.

The primary purpose of all surveys was to see the positive role played by CBET on socio-economic development, gender, and youth engagement in Chhuka Dzongkhag. Chhuka Hydropower plant and Tala Hydropower plant are located under Darla and Bjagchhog Gewogs under Chhukha Dzongkhag respectively. Moreover, data gathered for the research is a mixture of primary and secondary data, and the primary data was collected through questionnaires. However, existing journals with similar keywords and books were used to determine the suitable variables.

Study Area

This study focused on two Gewogs in which the hydropower plant is located. In total, under Darla, there are 17 villages with 672 households and under Bjagchhog Gewog, there are 12 villages with 238 households. Similarly, 100 respondents from 1493 students from Gedu College of Business Studies.

Population and sample frame

The main targeted population was from two Gewog in which the hydropower plant is situated, mainly Darla and Bjagchhog Gewog under Chhuka Dzongkhag. The sample adapted in this study is the convenient sampling technique.

The respondents for household surveys were chosen using a convenience sample technique due to remote location of the study area. Purposively sampling method was used to select the respondents for the residential surveys. Judgmental sampling is based on the study's objectives and the population's knowledge. When a specific sample must be reached rapidly and sampling proportionality is not the major issue, judgmental sampling is most helpful.

We used Taro Yamane techniques for sample calculation, and it was formulated by the statistical Tare Yamane in 1967 when it had a known population with a confidence level of 95%.

n = N/ (1+N$e\mathbf{2}$)

Where;

n= sample size required

N= Population known

E= margin of error

Confidence level = 95%

Table 1: Total households in each gewog under Chhukha Dzongkhag

Name of the Gewog	Population (Household)
Darla	672
Bjagchhog	238
Total	865

Determining the sample size by using Taro Yamane

n = N / (1 + Ne2)

n = 865 / (1+ 865*0.052)

n = 865/ 3.1625

n = 273.5

The population size of 865 at 95% confidence level the sample size is approximately 274.

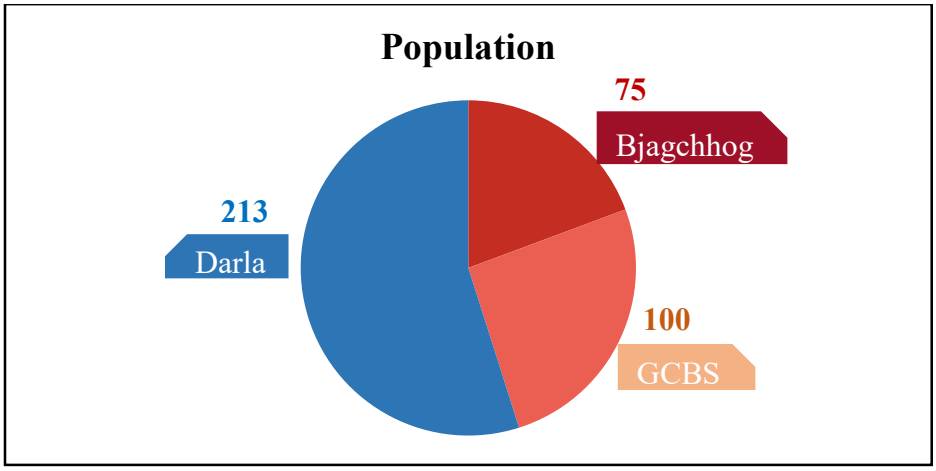

Figure 1: Respondents Distribution

3.2 Data Collection

A structured questionnaire was used to collect the information on the Hydropower in Bhutan: Community, Youth Experience and Perspective (Annexure 1). The survey questionnaire consisted of 23 questions for the community, 11 questions for youths and had sections on demography, socio-economic development (Individual Level), socio-economic development (Community Level), and gender equality.

Figure 2: Survey Enumerators

Figure 3: Survey in Bjagchhog Gewog

Figure 4: Survey in Gedu College of Business Studies

Figure 5: Survey in Darla Gewog

3.2 Data Analysis

Instrument

Research instrument refers to tools used by researchers to obtain, measure and analyze data. Statistical Package for Social Science (SPSS) was used to analyze data. SPSS statistics can read data input files from a variety of external sources such as excel and SPSS data files created on other operating systems (Aljandali, 2016). In order to gain deeper insights, it was employed to evaluate the survey's obtained numerical data.

Chapter 4: Findings

This chapter presents the research findings of the study conducted to explore social development, gender equality, and youth engagement opportunities brought by hydropower projects in Bhutan while paving the path to modernization, and industrialization

4.1 Findings of Public Respondents

4.1.1 Demographic Characteristics

This section mainly highlights demographic characteristics:

A total of 319 respondents were questioned from Bjagchhog Gewog and Darla Gewog in Chhukha Dzongkhag. The gender split was 47.2 percent female and 52.8 percent male, as show in Figure 6 76.2% of respondents are married, followed by 20.7% who were never married. Those respondents who are widows or widowers and separated are the least (0.6% and 2.5%) as displayed in Figure 6. The number of respondents married were 76.2%, followed by 20.7% who were never married. Those respondents who are widows or widower and separated are the least (0.6% and 2.5%).

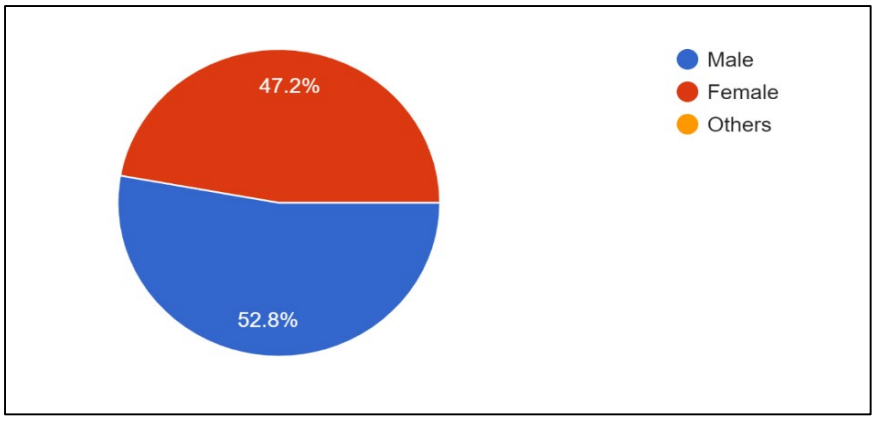

Figure 6: Demographic Characteristics

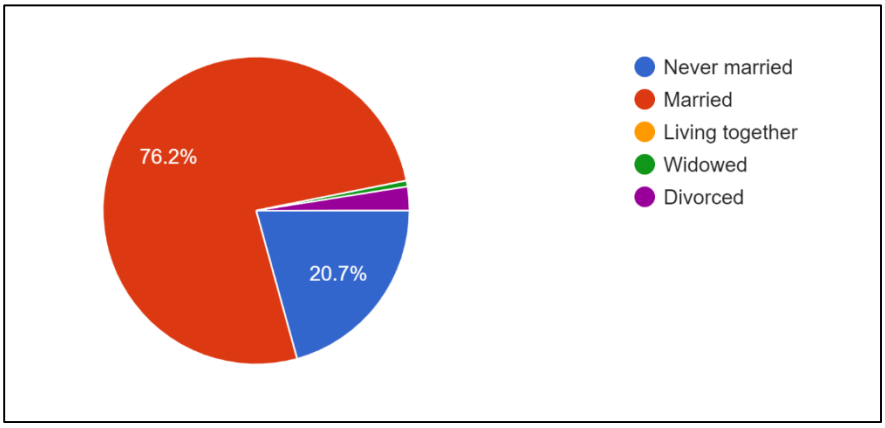

Figure 7: Marital Status

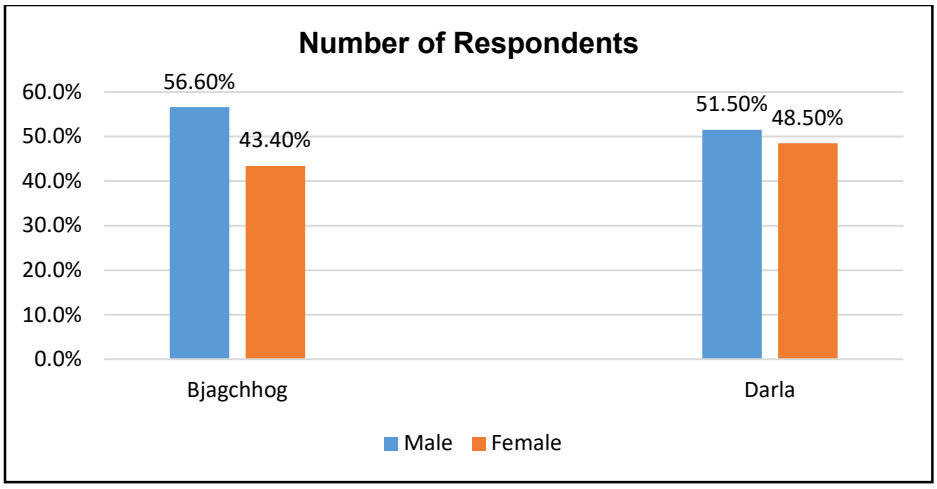

Figure 8: Number of Respondents

*Table 2: Gewog * Gender Crosstabulation*

		Gender		Total
		Male	Female	
Gewog	Bjagchhog	47	36	83
		56.6%	43.4%	100%
	Darla	121	114	235
		51.5%	48.5%	100%

As shown in Table 2, of the 83 respondents in Bjagchhog Gewog, 56.6 percent were male, and 43.4 percent were female. In addition, of the 235 respondents in Darla Gewog, 51.5 percent were male, and 48.5 percent were female.

The majority of the respondents were not educated, consisting (36.5%) followed by middle school completed (18.9%) and a minimum holds the monastic qualification of (0.3%).

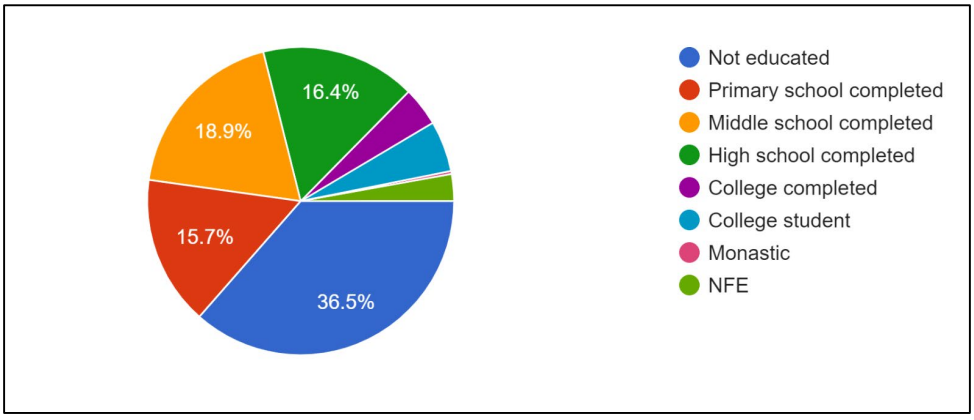

Figure 9: Education Qualification

The majority of the respondents are engaged in the agriculture sector (34.3%), followed by private employees (25.2 %). The least number of respondents are students (1%).

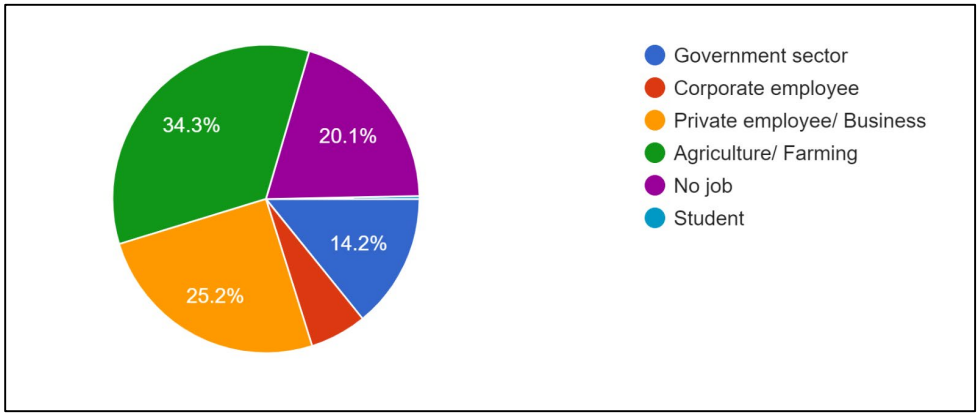

Figure 10: Respondents Employed in Different Sectors

4.1.2 Access to Electricity

Everyone now has access to electricity for the first time in 20 years. Electricity is available to the majority of the household. It was found that 99.4% of houses have electricity in Bjagchhog and Darla gewog as indicated below. However, 0.6% of respondents indicated that they did not have access to electricity because after working in the government sector since they have a primary residence elsewhere and only visit Bjabchhog gewog for agricultural purposes. Similarly, in the Darla gewog, the respondent recently had his greenhouse built, and he visits to watch how it is progressing on weekends.

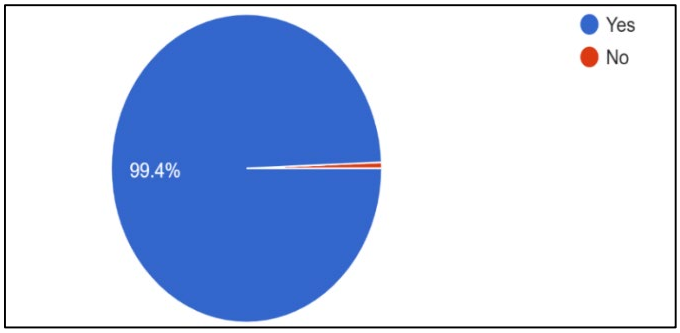

Figure 11: Access to Electricity

Figure 12 below inferred the access to electricity to Bjagchhog and Darla gewog. According to the data, 98.8 percent of the population in Bjagchhog gewog has access to electricity, with only 1.2 percent having no access. Similarly, when looking at the Darla gewog in terms of access to electricity, it can be noted that majority (99.6%) of the polled individuals had access to power, with only 0.4 percent having no access.

*Table 3: Gewog * Access to electricity Cross tabulation*

		Access to electricity		Total
		Yes	No	
Gewog	Bjagchhog	83	1	84
		98.8%	1.2%	100%
	Darla	234	1	235
		99.6%	0.4%	100%

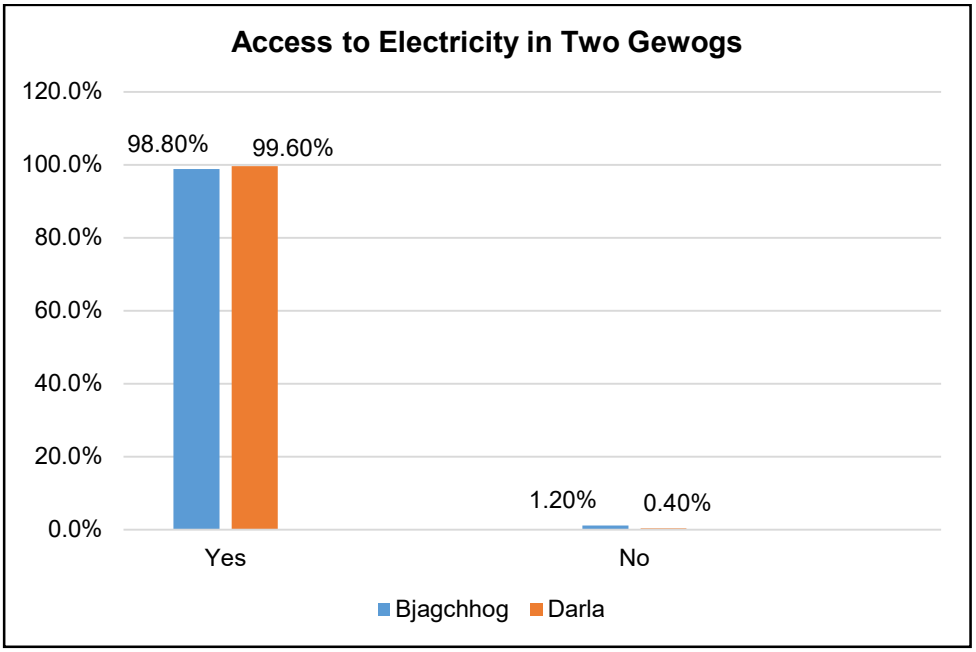

Figure 12 : Access to electricity in two gewogs

4.1.3 Usage of Electricity for Income Generation Activities

Table 8 and Figure 13 reveals that 31.7 percent of respondents from Bjagchhog gewog claimed they use electricity for income generation, while 68.3 percent do not use power for any income-generating activities. On the other hand, 35.3 percent of the respondent from Darla gewog generated revenue via electricity and, 64.7 percent of the respondent did not generate income through the use of electricity. Some of the respondents' income-generating activities included

owning businesses and running restaurants, while some farmers utilized energy to power agricultural machinery such as rice mills.

*Table 4: Gewog * Electricity used for income-generation Crosstabulation*

		Electricity used for Income Generation		Total
		Yes	No	
Gewog	Bjagchhog	26	56	82
		31.7%	68.3%	100%
	Darla	82	150	232
		35.3%	64.7%	100%

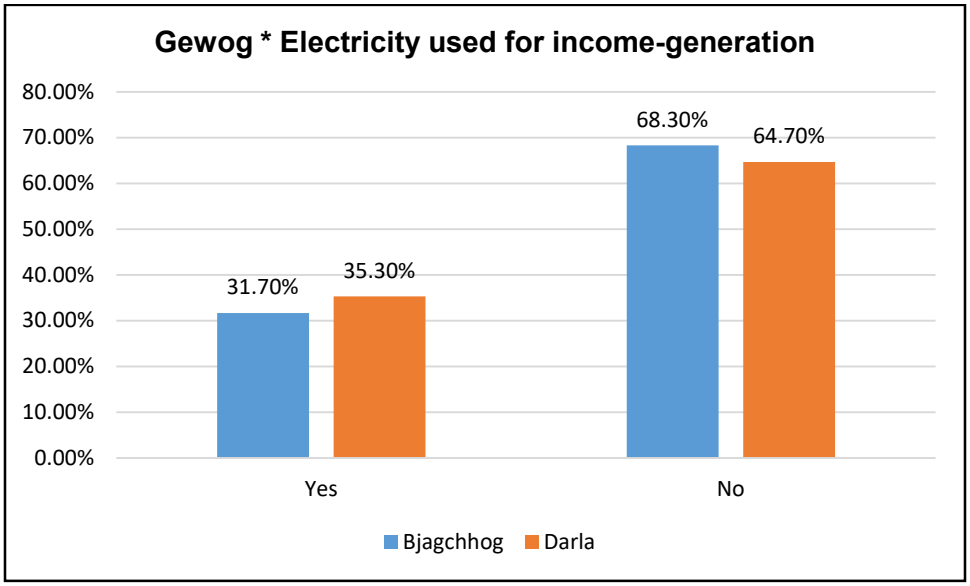

*Figure 13 : Gewog*Electricity used for income generation*

Figure 14 shows usage of electricity based on employment sector, respondents involved in the agriculture sector (26.2%) said that they use electricity for income generation purposes such as doing business, and raising livestock to sell. On the second list, the unemployed people agreed that they were blessed with electricity and had a chance to generate income by using electricity (15.9%). But on the other hand, respondents employed in jobs such as corporates, government sector, and private sector (6.8%, 14.6% and 17.5%) believed that though they have access to electricity, they do not use it to generate income because they are mostly busy with their service life and are not so much involved in other activity which they could use electricity to generate income.

*Table 5: Employment * Electricity used for income-generation Crosstabulation*

		Electricity used for income generation		Total
		Yes	No.	
Employment	Government sector	15	30	45
		14.0%	14.6%	
	Corporate employee	5	14	19
		4.7%	6.8%	
	Private employee/Business	42	36	80
		39.3%	17.5%	
	Agriculture/Farming	28	80	109
		26.2%	38.8%	
	No jobs	17	45	64
		15.9%	21.8%	
Total		100%	100%	

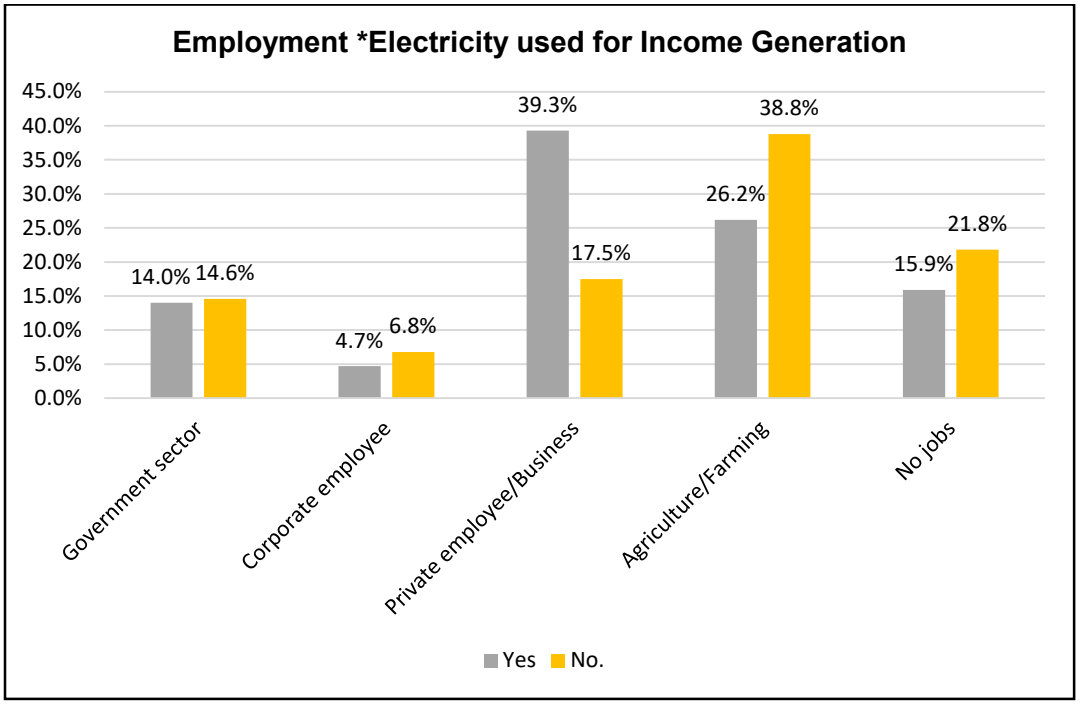

*Figure 14: Employment *Electricity used for Income Generation*

Table 12 and Figure 15 shows that the maximum number of respondents who lived in the region for more than 20 years (53.3%) use electricity for income generation compared to others who have settled recently.

*Table 6: Living duration * Electricity used for income-generation Crosstabulation*

		Electricity used for income generation		Total
		Yes	No	
Living duration	below 4 years	23	39	64
		21.5%	18.9%	
	5-10 years	13	30	44
		12.1%	14.6%	
	11-20 years	14	37	53
		13.1%	18.0%	
	More than 20 years	57	100	157
		53.3%	48.5%	
Total		100%	100%	

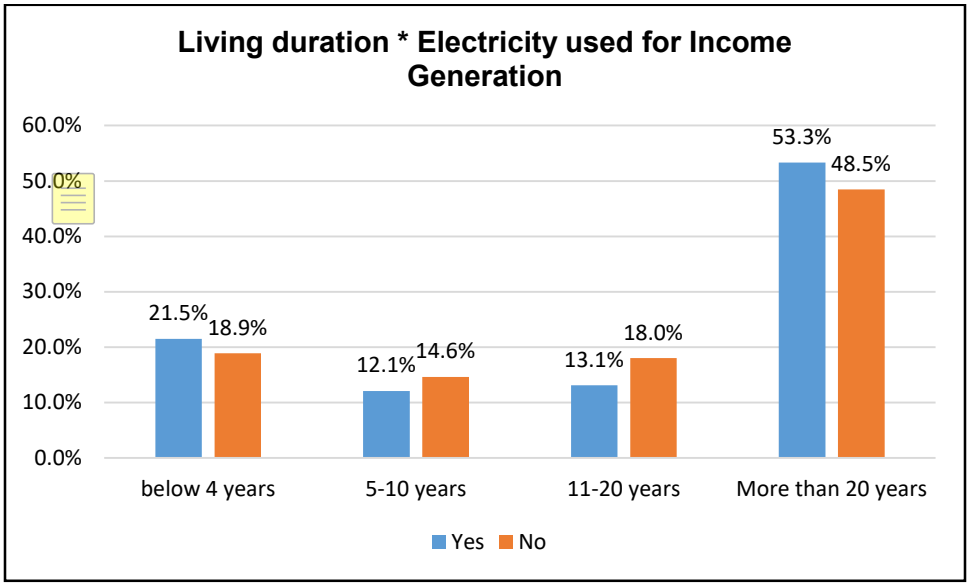

*Figure 15 : Living duration * Electricity used for Income Generation*

4.1.3 Engagement of Respondents in the Collection of Firewood

Figure 16 shows the respondents in percentage who either collect or don't collect firewood from the forest. According to the survey, 63.7% of the total respondents still collect firewood from the forest while 36.3% of them do not collect firewood. Respondents who still collected firewood were asked how was responsible for collecting the firewood. The majority of the people stated that both the gender are responsible for firewood collection as displayed in Figure 17.

Table 13 indicates whether male or female is more involved in collection of firewood on the basis which gewog they belong too. Under Bjagchhog gewog both the gender (male and female) are involved in firewood picking (27.1%). Whereas under the Darla gewog, the 72.9% respondents said that both genders are involved in the firewood collection. Under both the gewog, fewer females are engaged in collecting firewood than males with the advancement of electrification.

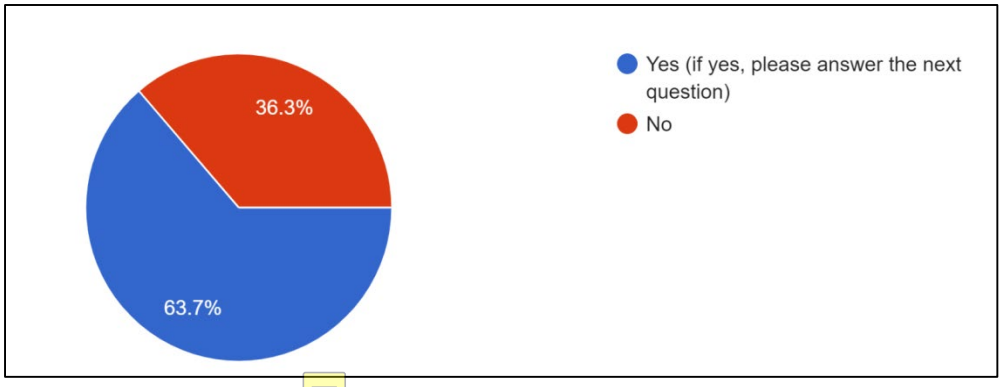

Figure 16 : Engagement of Respondents in the Collection of Firewood

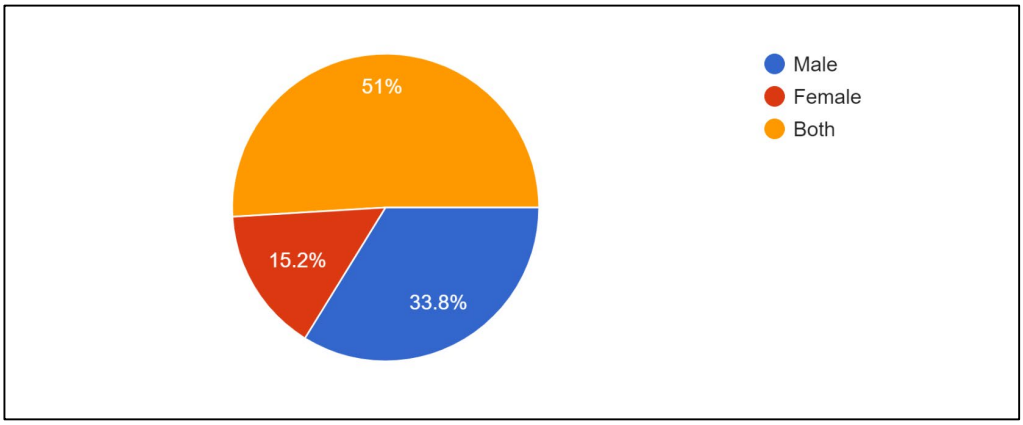

Figure 17 : Firewood Collecting Responsibility

*Table 7: Gewog * Firewood collecting responsibility Crosstabulation*

		Firewood collecting responsibility			Total
		Male	Female	Both	
Gewog	Bjagchhog	23	6	29	58
		32.4%	18.8%	27.1%	
	Darla	48	26	78	152
		67.6%	81.3%	72.9%	
Total		71	32	107	210
		100%	100%	100%	

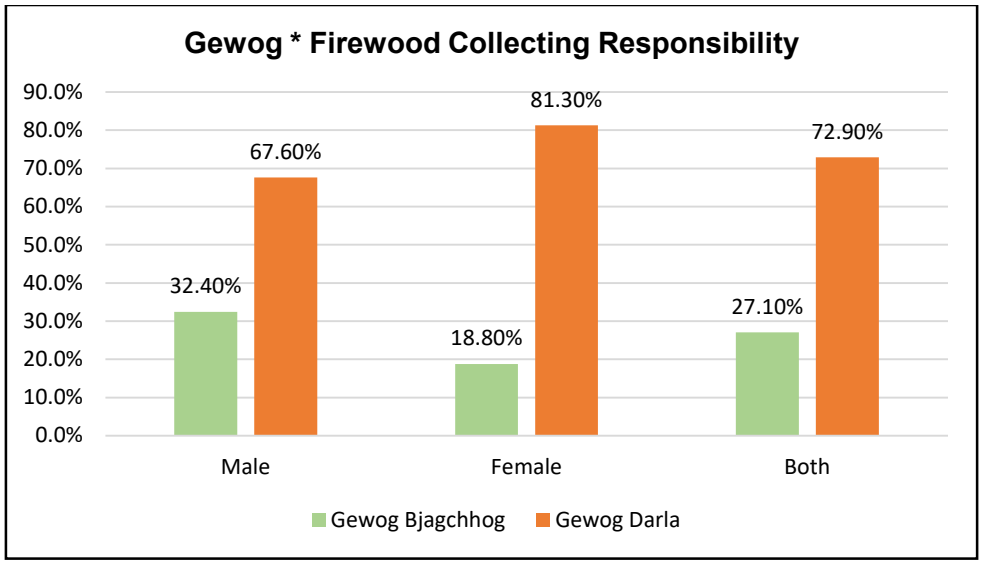

*Figure 18 : Gewog * Firewood Collecting Responsibility*

Table 15 and Figure 19 shows that based on the employment and firewood collection responsibility, 47.2% of the people involved in the agriculture and farming sector are primarily engaged in firewood collection. Similarly, on the list, 20.8% of the people who are not employed are also involved in firewood collection. However, the collection of firewood was the least, among private employee/ business sector, government sector employee, and corporate employee, 17%, 10.4% and 4.7% respectively.

*Table 8: Employment * Firewood collecting responsibility Cross tabulation*

		Firewood collecting responsibility			Total
		Male	Female	Both	
Employment	Government sector	7	2	11	20
		9.9%	6.2%	10.4%	
	Corporate employee	5	3	5	13
		7.0%	9.4%	4.7%	
	Private employee/Business	19	4	18	41
		26.8%	12.5%	17.0%	
	Agriculture/Farming	33	14	50	97
		46.5%	43.8%	47.2%	
	No jobs	7	9	22	38
		9.9%	28.1%	20.8%	
Total		71	32	106	209
		100.0%	100.0%	100.0%	

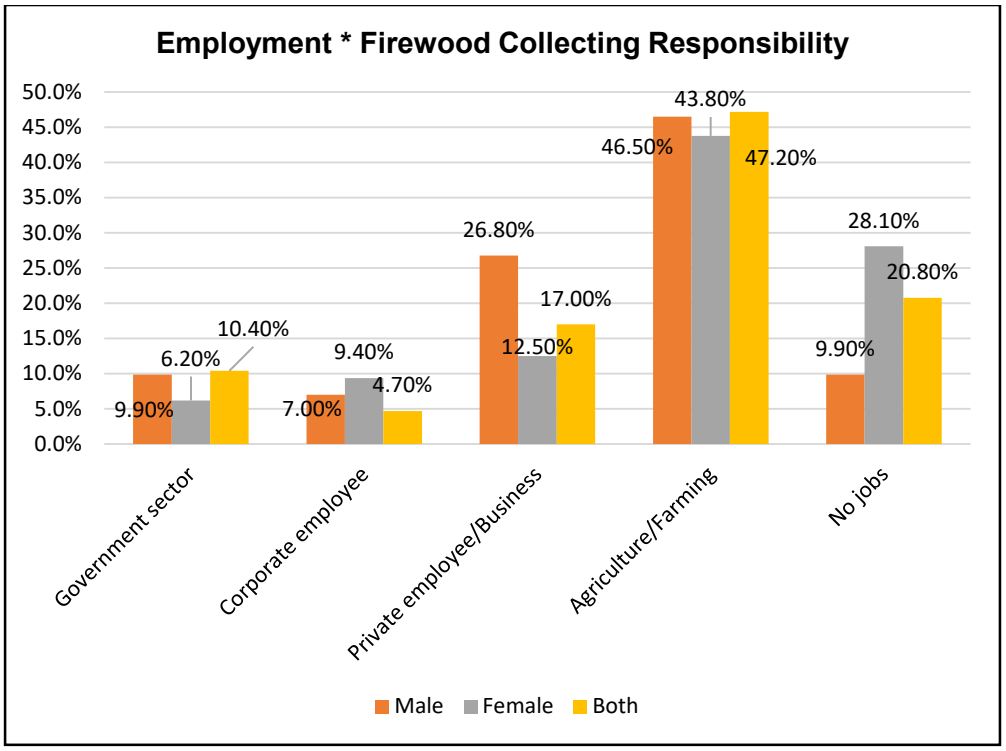

*Figure 19 : Employment * Firewood Collecting Responsibility*

4.1.5 Benefit from Hydropower Project (Individual Level)

The electrification program from the hydroelectric project in the area has helped 95.2 percent of the 314 respondents. Furthermore, 158 men and 146 women believe that electrification program benefitted their household. Benefits was more felt by the males 95.2 percent than the females.

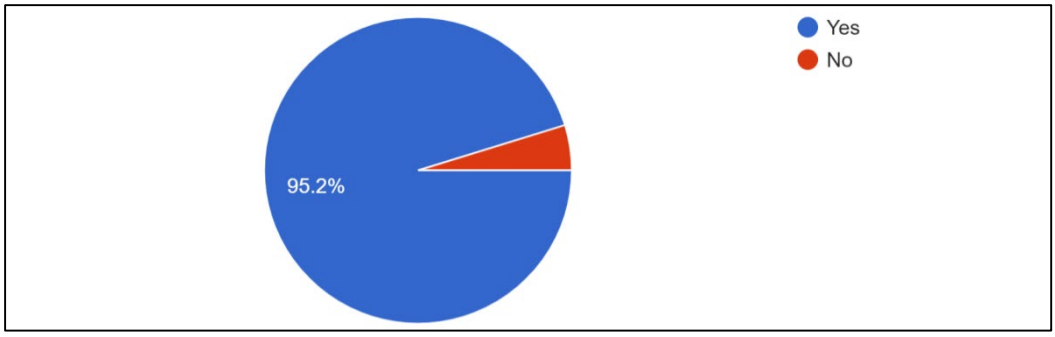

Figure 20 : Benefit from Hydropower Project

Some of the benefits the respondents have experienced are that they can now save time, have cleaner homes and have better connectivity due to access to electricity. For example, most households (278) stated that they are now able to save time due to the hydropower program. And 155 of the respondents claimed that the land value has increased after the electrification program, as exposed in Figure 26.

Table 17 and Figure 21 shows the benefit experienced by the respondents from the hydropower plant in their locality. According to the respondents from Bjagchhog gewog, the 336 MW hydropower project in their area has benefitted their community (100 %). On the other hand, 97.4 percent of respondents claimed that the 1020 MW hydropower plant has benefitted their community in a way such as better infrastructure, good road connectivity and more business opportunity while just 2.6 percent stated that it had harmed their community in a way such as overcrowding, increased in crime rate, and places have become noisy and dirty. Overall, most respondents feel that the hydropower plant has helped their community.

Note: The respondent were allowed for multiple click option as per their opinion.

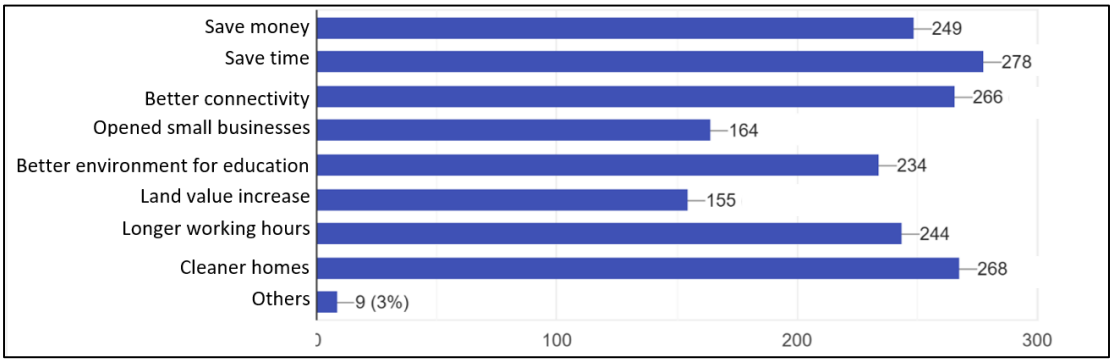

Figure 21 : Benefits from the Hydropower Project the Respondents have experienced

*Table 9: Gewog * Benefits experienced in the community Cross tabulation*

		Benefits experienced in the community		Total
		Yes	No	
Gewog	Bjagchhog	84	0	84
		100%	0.0%	100%
	Darla	228	6	234
		97.4%	2.6%	100%

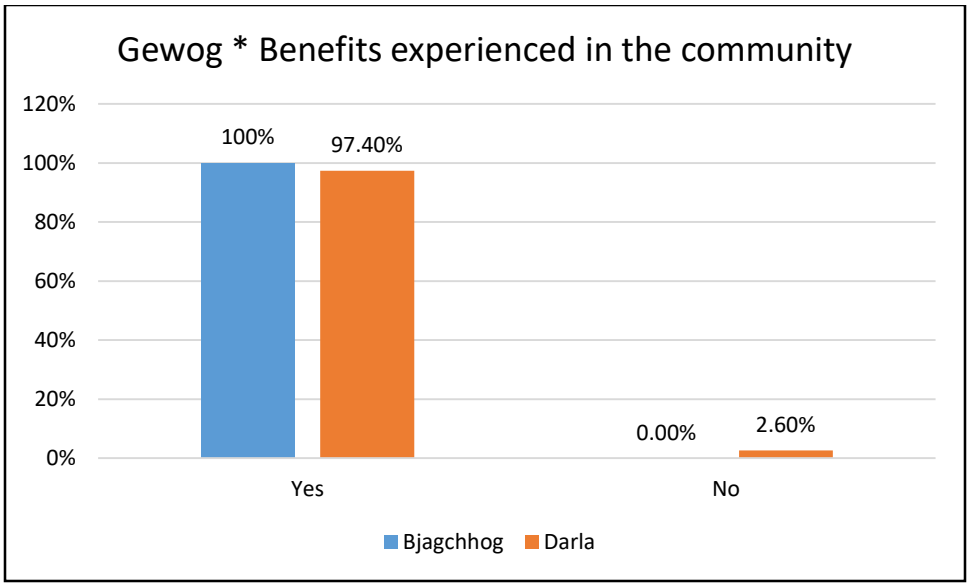

*Figure 22 : Gewog * Benefits experienced in the community*

The responders who have lived in the Bjagchhog gewog and Darla gewog for more than 20 years have reaped the most benefits from the hydropower plant, as shown in Table 18 and Figure 23. Similarly, respondents who lived in the community for less than four years (100 %), 5 to 10 years (100 %), and 11 to 20 years (94.4 %) have all benefited from the hydropower plant. On the other hand, 2.6 percent of respondents said that the hydropower plant had not helped the community who had lived there for more than 20 years. The reason briefed by respondent says, due to hydropower plant they see some of negative impact to the environment and over crowing in their gewog. However, it may be inferred that the community has benefited from the hydroelectric plant in their area at an individual level.

*Table 10: Living duration * Benefits experienced in community Cross tabulation*

		Benefits experienced in the community		Total
		Yes	No	
Living duration	below 4 years	63	0	63
		100%		100%
	5-10 years	44	0	44
		100%		100%
	11-20 years	51	2	53
		94.4%	5.6%	100%
	More than 20 years	153	4	157
		97.4%	2.6%	100%

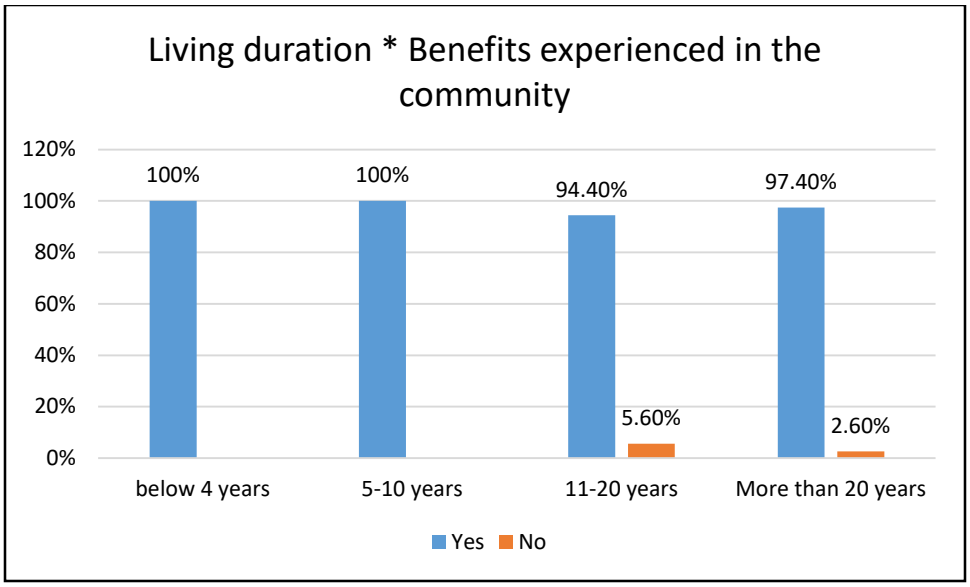

*Figure 23 : Living duration * Benefits experienced in the community*

4.1.6 Negative Impacts the Community have experienced (Individual Level)

With 4.8 per cent of respondents believe the electrification program has not benefitted their neighborhood, owing to a lack of skills (34.7%), which prevented them from using the program and adjusting their lifestyles to the power, as shown below. Even though people had access to electricity, they could not take advantage of electricity and believed that because they did not know how to use electricity in their daily lives, they thought it had a negative impact. Out of the 34.7 per cent, eleven men and six women were unable to participate in the electrification program due to a lack of skills.

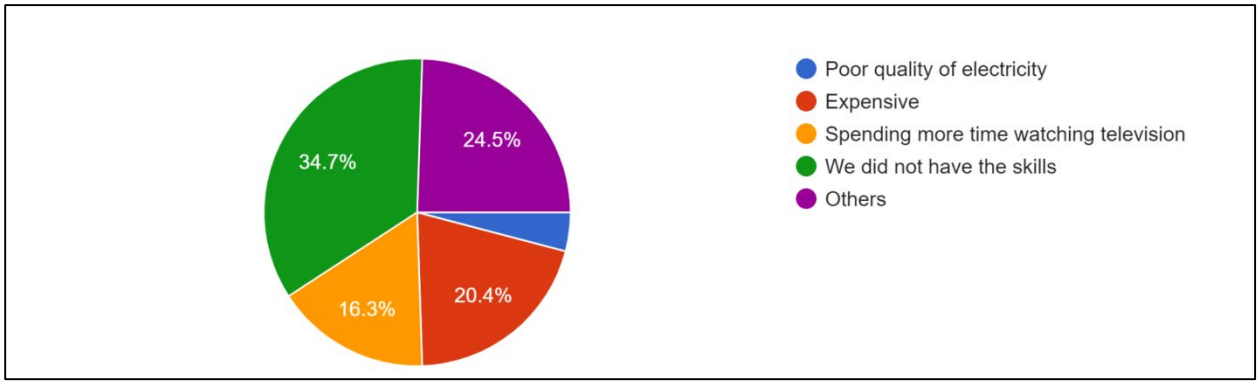

Figure 24: Negative Impacts the Community have Experienced

4.1.7 Improvement of several schools, hospitals, and telephone/internet facilities in the community

The electrification initiative has increased the number of schools, hospitals, and telephone/internet services in the town, according to the majority of respondents (81.6 %). In addition, according to 18.4 per cent of replies, the electrification initiative has not expanded the number of schools, hospitals, or telephone/internet services in the town.

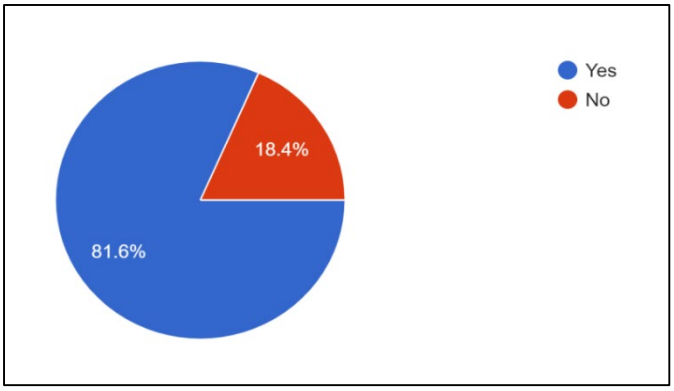

Figure 25 : Improvement of facilities in the community

Table 19 and Figure 26 depicts the advantages of hydropower plants based on gewog. From Bjagchhog gewog, 90.3 percent of respondents said the project has aided in bringing development to their community, such as new schools and improved facilities. Similarly, 78.5 percent of Darla gewog respondents said the 1020MW project has aided in the development of schools and the introduction of new development in their town. In addition, the responders have reaped the benefits of the projects' new Lhakhang, ECD centers, and complimentary transportation services for school-going children. On the other hand, 9.7 percent of Bjagchhog gewog respondents and 21.5 percent of Darla gewog respondents believe the hydropower project has not benefitted their community. On a larger scale, however, most respondents agreed with the point of gaining advantages from the hydroelectric project.

*Table 11: Gewog * Increase in facilities Cross tabulation*

		Increase in facilities		Total
		Yes	No	
Gewog	Bjagchhog	74	8	82
		90.3%	9.7%	100%
	Darla	183	50	233
		78.5%	21.5%	100%

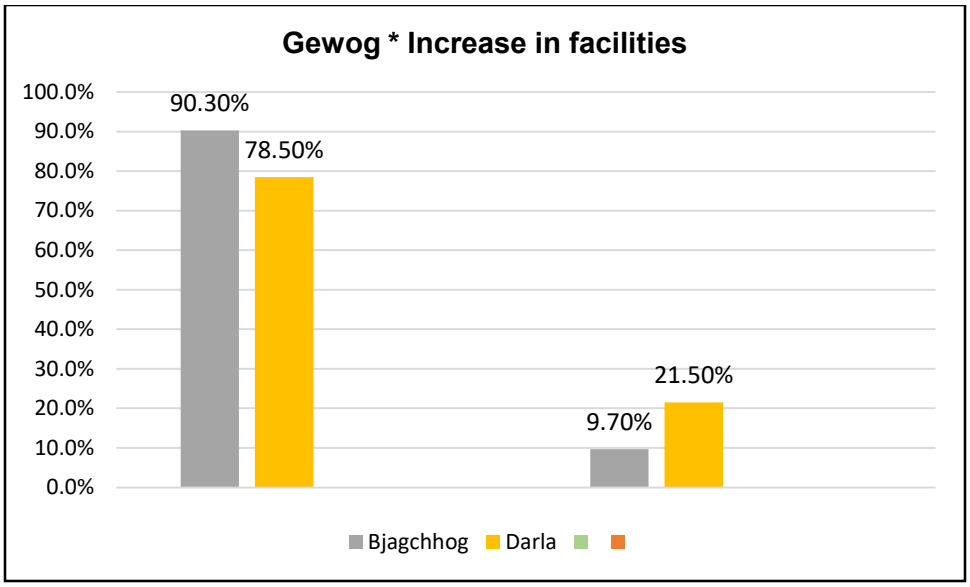

*Figure 26 : Gewog * Increase in facilities*

As shown in Table 20 and Figure 27, most Bjagchhog (88.1%) and Darla (90.2%) gewog respondents feel they are aware of community developments and believe they have helped their community. According to 6 percent of Bjagchhog and 6.4 percent of Darla gewog, the hydropower project did not benefit their village. 6 percent of Bjagchhog residents and 3.4 percent of Darla gewog residents were not sure of the project's influence on their lives. The responder noticed particular progress in improved road connections and increased social corporate responsibility offered to the community by the hydropower plant.

*Table 12: Specific development of hydropower * Gewog Crosstabulation*

		Gewog		Total
		Bjagchhog	Darla	
Specific development of hydropower	Yes	74	212	286
		88.1%	90.2%	
	No	5	15	20
		6.0%	6.4%	
	Not sure	5	8	13
		6.0%	3.4%	
Total		84	235	319
		100%	100%	

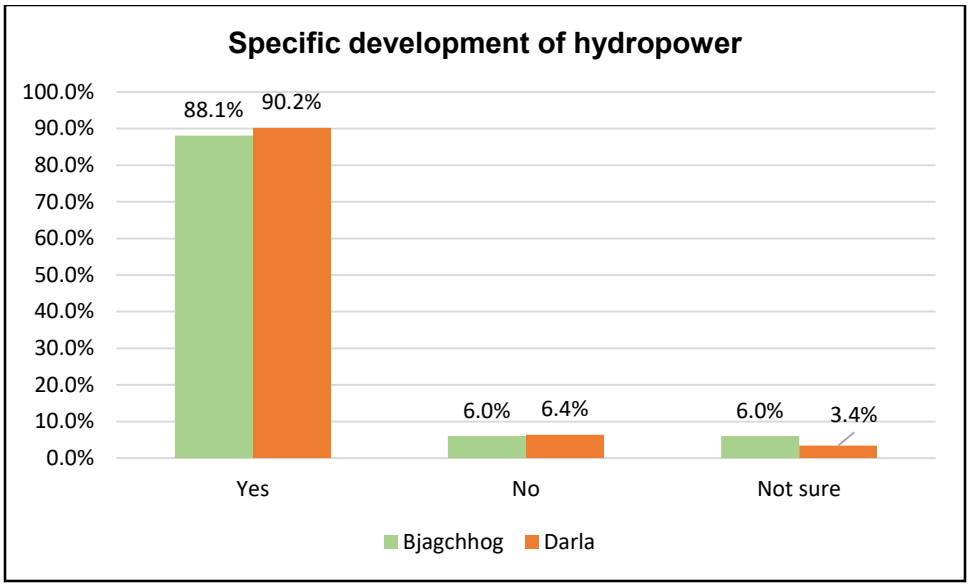

Figure 27 : Specific Development of Hydropower

4.1.7 Benefits observed in the community (Community Level)

The majority of the respondents (273 household) observed that the hydropower project has benefited by increasing the income opportunity. While setting up a hydropower plant in their region, it created job opportunities and started a small business in the locality, which made people earn more income. The minimum respondents (145 household) observed that the project benefited them by building schools and hospitals in the community. The rest (1 household) observed benefited in small ways, as exhibited in Figure 31. (N =298)

Note: *The respondent were allowed for multiple click option as per their opinion.*

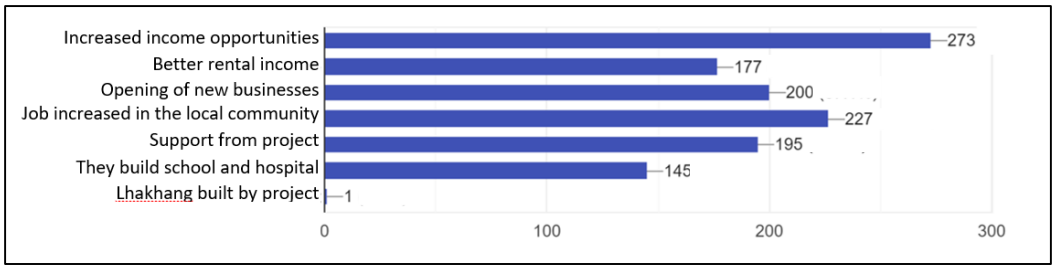

Figure 28 : Benefits observed in the community

4.1.8 Negative impact observed in the community

The majority 155 household observed the hydropower project had caused overcrowding of people and a minimum of 62 household observed the hydropower project brought a negative impact in terms of cultural issues, as shown in Figure 29.

Note: *The respondent were allowed for multiple click option as per their opinion.*

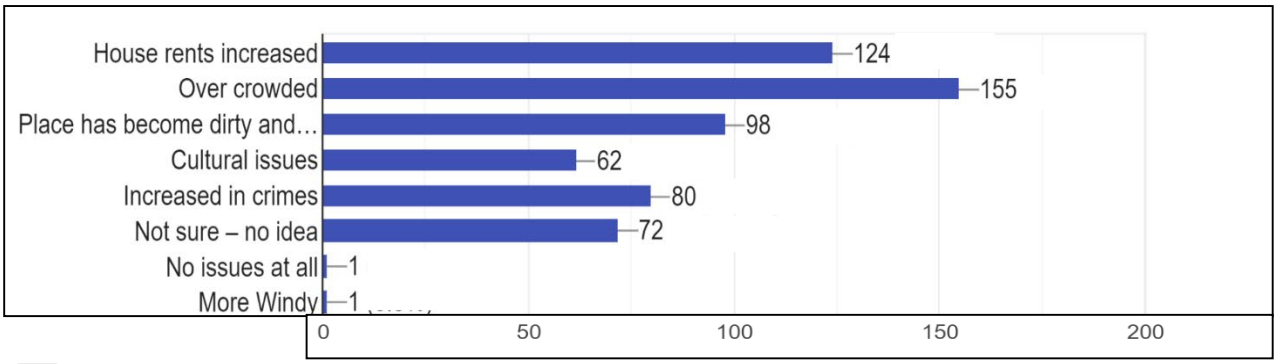

Figure 29 : Negative impact observed in the community

4.1.9 Gender Equality

This section mainly highlights gender equality in the community concerning the electrification program before and after.

Participation of women in economic activities after electrification

In general, about 92.2% of the respondents voted that they are engaged in economic activities while 9.8% of the respondents are not engaged in any kind of economic activities. Out of 317 responses, 90.2 % believe that the electrification initiative has enhanced women's engagement in economic activities, as shown in Table 21 and Figure 31. Only a few people believe that women's lives were the same before and after the electrification initiative.

According to Table 21, the hydropower project has enhanced women's engagement in economic activities in the Bjagchhog and Darla gewog (94%) and (88.9%), respectively. Women's engagement in the economy has not risen as a result of the hydropower plant issue, according to 6 percent and 11.1 percent of respondents, respectively. More women in the community were involved in running businesses in their neighborhoods.

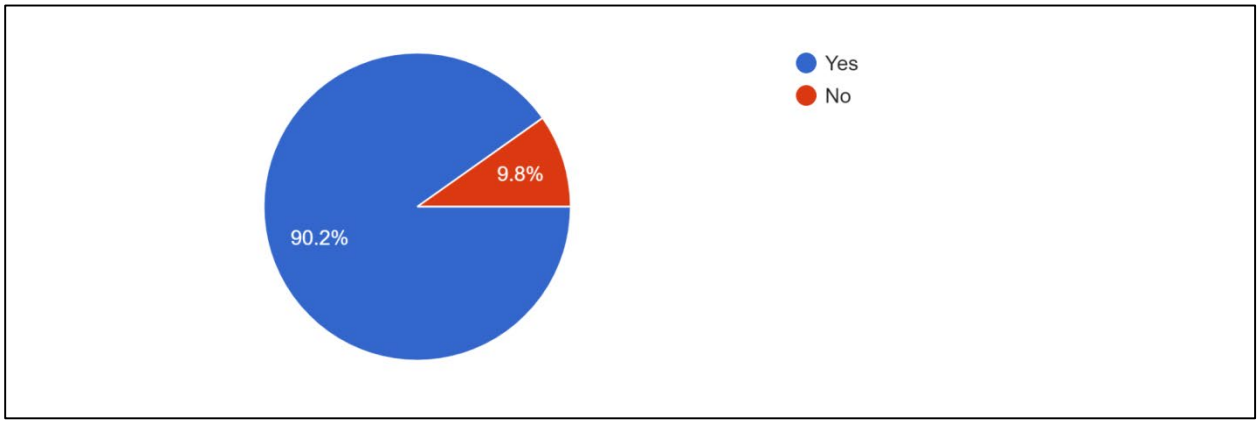

Figure 30 : Participants in economic activities

*Table 13: Women's participation in economic activities * Gewog Cross tabulation*

		Gewog		Total
		Bjagchhog	Darla	
Women's participation in economic activities	Yes	78	208	286
		94.0%	88.9%	
	No	5	26	31
		6.0%	11.1%	
Total		83	234	317
		100%	100%	

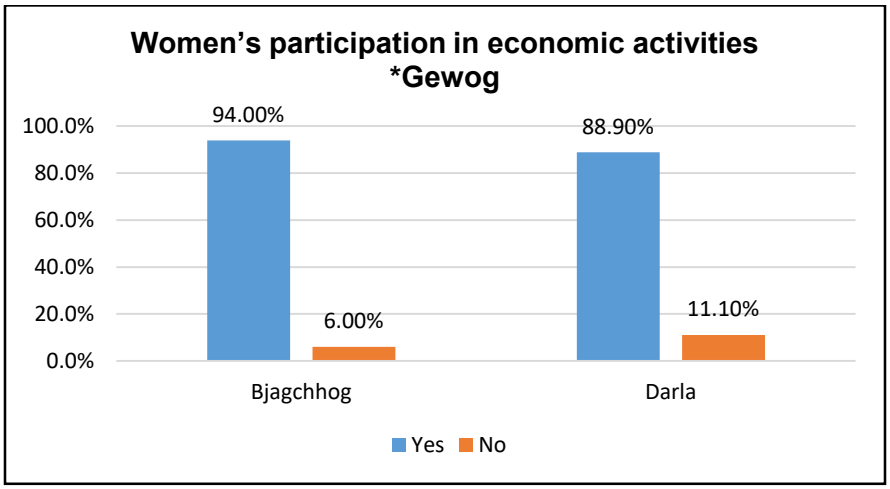

*Figure 31 : Women's participation in economic activities *Gewog*

According to the most significant number of respondents (86.5%), women's engagement in the community has expanded dramatically, who have lived for more than 20 years, as revealed in Table 22 and Figure 32. On the other side, 13.5 percent of those who have lived for more than 20 years have never seen a woman participate in economic activities. Similarly, those who have lived in that region for less than 4 years (95.3 percent) have seen more women participating in economic activities.

*Table 14: Women's participation in economic activities * Living duration Cross Tabulation*

		Living duration				Total
		below 4 years	5-10 years	11-20 years	More than 20 years	
Women's participation in economic activities	Yes	61	42	48	134	285
		95.3%	95.5%	90.6%	86.5%	
	No	3	2	5	21	31
		4.7%	4.5%	9.4%	13.5%	
Total		64	44	53	155	316
		100%	100%	100%	100%	

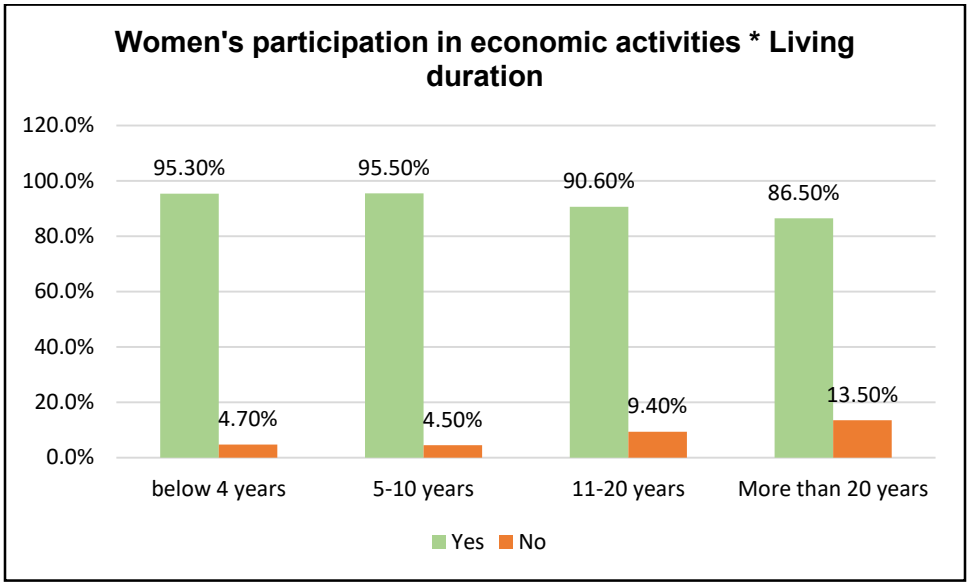

*Figure 32 : Women's participation in economic activities * Living duration*

Gender has played a crucial part in the community for 80.4 percent of male respondents, and 76 percent of female respondents agree that gender has played a critical role in their community. Critical role refers to the contribution made by the respondent to economy. On the other side, 19.6% of male respondents and 24% of female respondents do not believe that gender has significantly influenced the community's growth, as shown in Table 23 and Figure 33.

*Table 15: Critical role in the community * Gender Cross tabulation*

		Gender		Total
		Male	Female	
Critical role in the community	Yes	135	114	249
		80.4%	76.0%	
	No	33	36	69
		19.6%	24.0%	
Total		168	150	318
		100.0%	100.0%	

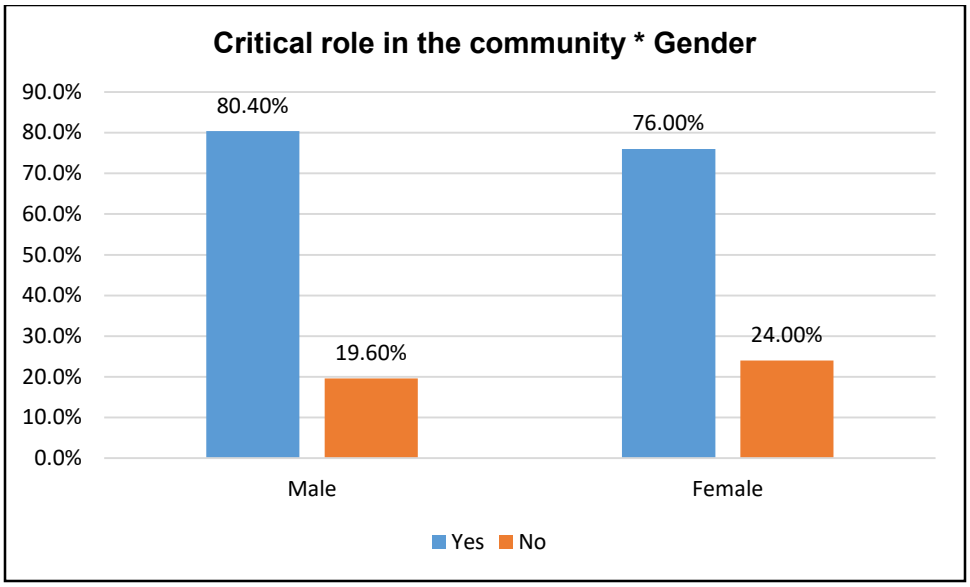

*Figure 33 : Critical role in the community * Gender*

As revealed in Table 24 and Figure 34, in the Bjagchhog and Darla gewogs, gender has played a key part in the development of the community, according to the majority of respondents (81%) and (77.4%) respectively. However, 19 percent and 22.6 percent of respondents said that gender had no impact on the community's growth.

*Table 16: Critical role in the community * Gewog Crosstabulation*

		Gewog		Total
		Bjagchhog	Darla	
Critical role in the community	Yes	68	182	250
		81.0%	77.4%	
	No	16	53	69
		19.0%	22.6%	
Total		84	235	319
		100.0%	100.0%	

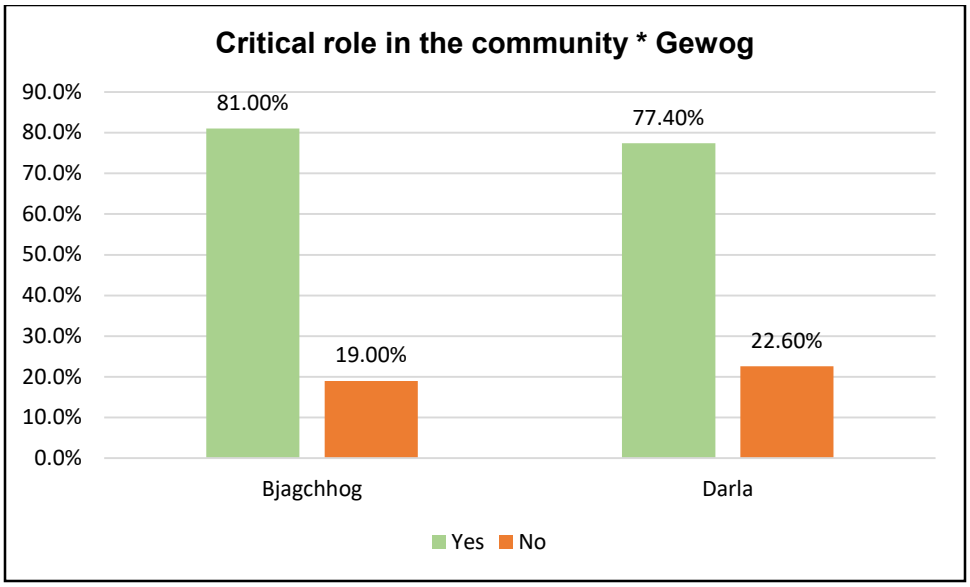

*Figure 34 : Critical role in the community * Gewog*

When comparing the crucial role played by gender in the development of the community based on living length, respondents who have lived more than 20 years (83.4 percent) stated that gender had played a vital role in the development of the community. Similarly, respondents with a living duration of fewer than 4 years (70.3 %), 5 to 10 years (77.3 %), and 11 to 20 years (77.3 %) responded that gender did play a critical role in community development. Gender did not play a significant influence in the growth of the community for respondents who had settled in that region for less than 4 years to more than 20 years (29.7%), (22.7%), (26.4%), and (16.6%), respectively.

4.2.1 Gender

Out of 104 responses, 51.9% are female participants, and 48.1% are male participants of Gedu College of Business Studies, as shown in Figure 39.

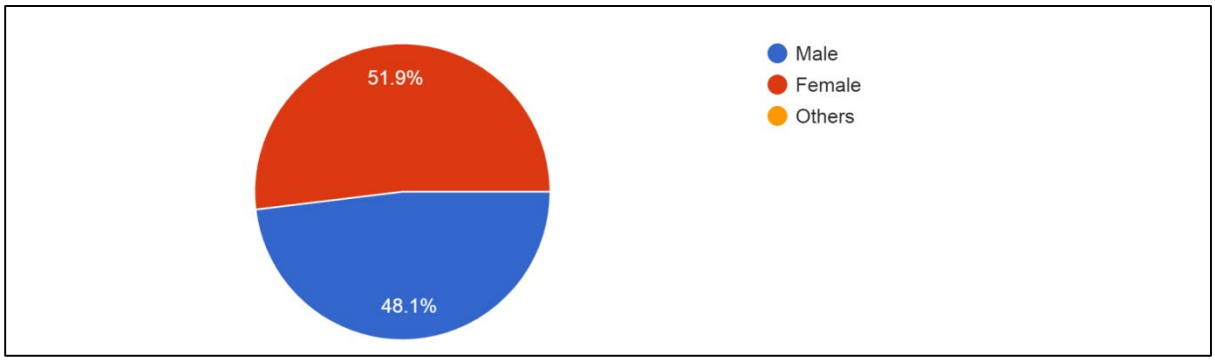

Figure 35: Youth Respondents

4.2.2 Youths' Perception of Hydropower Projects in Chhukha Dzongkhag

The Table 26 and Figure 42 inferred the benefits of cross-border energy trade (CEBT) in developing the country's economy. 47.6% of the male respondent agreed that the development of hydropower and export of its power is beneficial for our country's economy. Similarly, among the female respondents, 52.4% agreed that developing hydropower and exporting its power is beneficial for our country's economy. Some of the benefits the respondents are that the export of energy and CEBT helps to pump the money into the economy ultimately at the end, beneficiaries are the youths and the local community who are the first stage to reap the benefits in terms of employment opportunity for youths and offers an ideal community to live in.

*Table 17: Benefits of hydropower exported to cross border * Gender Crosstabulation*

		Gender		Total
		Male	Female	
Benefits of hydropower exported to cross border	Yes	49	54	103
		47.6%	52.4%	100.0%

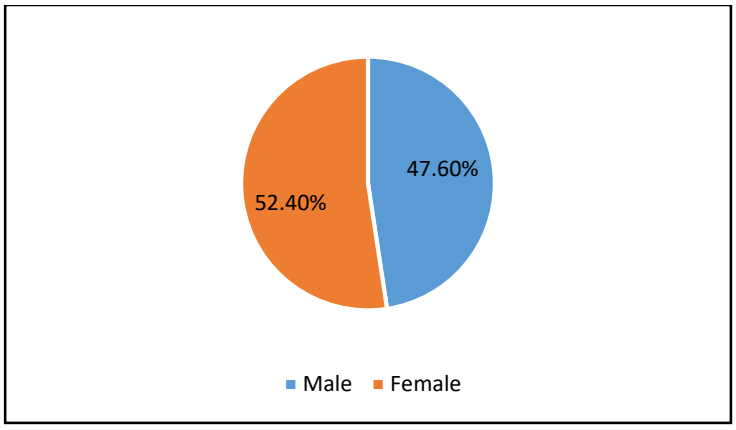

Figure 36: Youths Perception of Hydropower

Figure 42 illustrates youth perception about the development of the hydropower plants in Bhutan. With majority 78 responder, the youths have the perceptive that, the development of hydropower plant is the main export item for the country which simultaneously pumps revenue in the country, Moreover, 60 responder and 41 responder of the youths have the perception that, the hydropower development is environment friendly and one of the cheapest source to generate electricity in county. On the other hand, 20 responder of the youth have this perception that development of hydropower plant is a risky venture to develop in the country. Lastly, 2 responder of the youths says the development of hydropower have actually created noise population and problems such as stress related illnesses and sleep disruption.

Note: *The respondent were allowed for multiple click option as per their opinion.*

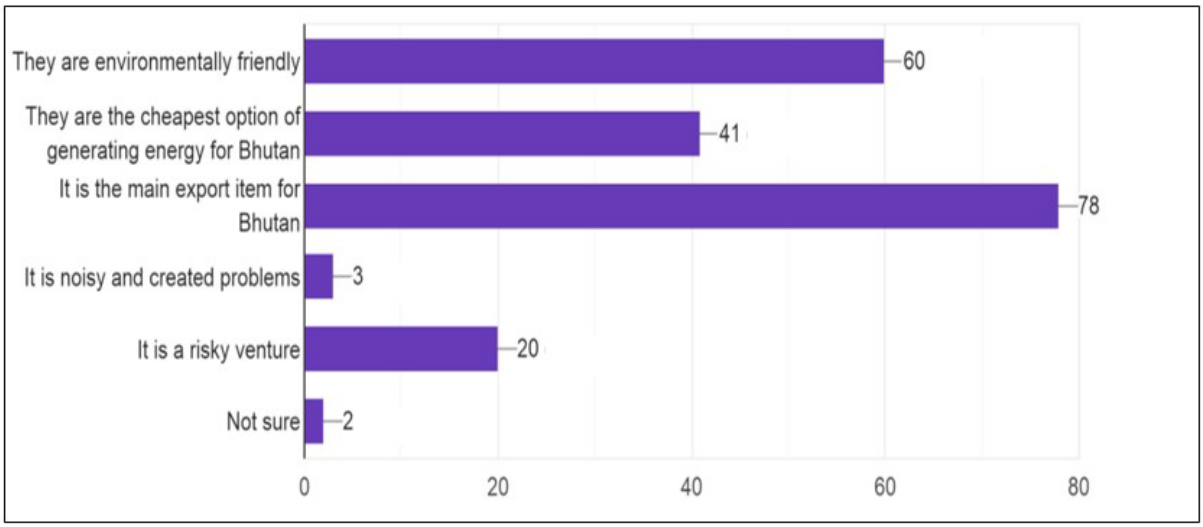

Figure 37: Youths Perception about the development of hydropower plants in Bhutan

Table 27 and Figure 44 illustrates the level of knowledge of the youths on the development policy of hydropower plants in the county. It can be stated that 54.8% of the male respondent said they were aware of the development policy of the hydropower projects. Similarly, 45.2% of the female respondent stated they are also mindful of the development policy of the hydropower projects. The respondent mostly agreed on the common ground that reading the external journals and class project participation about the hydropower sector during their education course has influenced creating the level of awareness of hydropower projects. Nonetheless, 43.5% of males and 56.5% of females did not know about government policies related to the development of hydropower projects.

*Table 18: Knowledge on government policies * Gender Cross tabulation*

		Gender		Total
		Male	Female	
Knowledge on government policies	Yes	23	19	42
		54.8%	45.2%	100.0%
	No	27	35	62
		43.5%	56.5%	100.0%

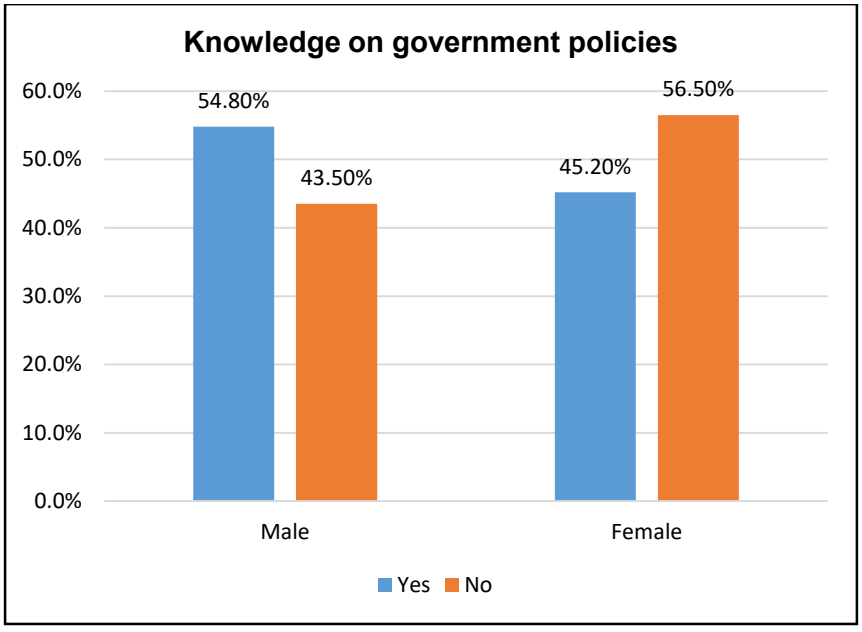

Figure 38: Knowledge of government policies

Table 28 and Figure 45 illustrates that based on the gender and level of awareness, 47.9% of males and 52.1% of females stated that they learn about the hydropower development projects

and policies at the college and high school levels. Alternatively, 46.7% and 53.3% said they are not aware or learned about the hydropower development project and policies at the college and high school levels.

*Table 19: Awareness about hydropower in college/school * Gender Crosstabulation*

		Gender		Total
		Male	Female	
Awareness about hydropower in college/school	Yes	35	38	73
		47.9%	52.1%	100.0%
	No	14	16	30
		46.7%	53.3%	100.0%

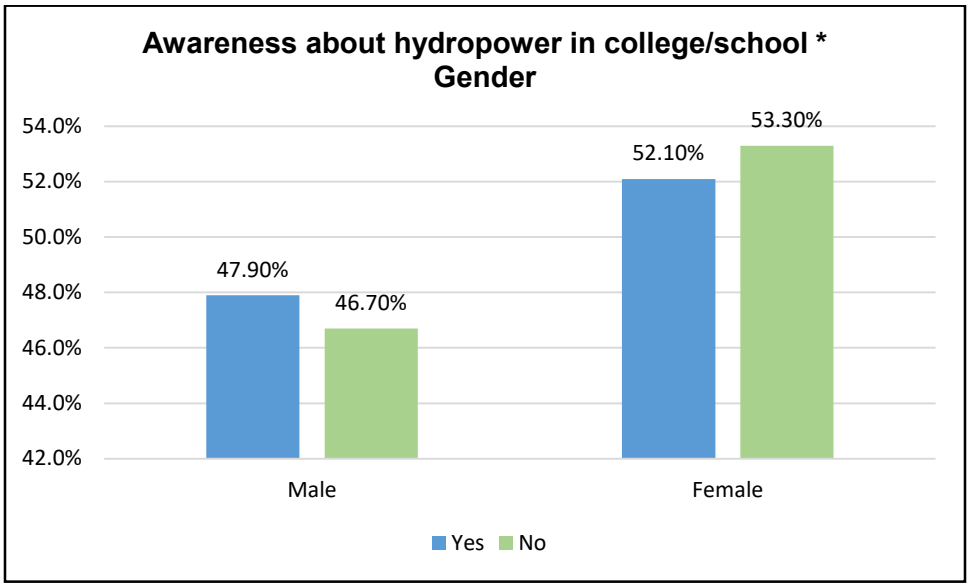

*Figure 39: Awareness of hydropower in college/school * Gender*

Table 29 and Figure 46 is based on the youth knowledge regarding the cross border energy trade. 46.4 percent of male stated that they do have the knowledge regarding the cross border energy trade. Similarly, 53.6 percent of the female stated that they are all at the same pace and have the knowledge regarding the cross border energy trade. However, 48.9 percent of male and 51.1 percent of female youth stated that they do not have knowledge regarding the cross border energy trade in Bhutan.

*Table 20: Knowledge on cross border energy trade * Gender Crosstabulation*

		Gender		Total
		Male	Female	
Knowledge on cross border energy trade	Yes	26	30	56
		46.4%	53.6%	100.0%
	No	23	24	47
		48.9%	51.1%	100.0%

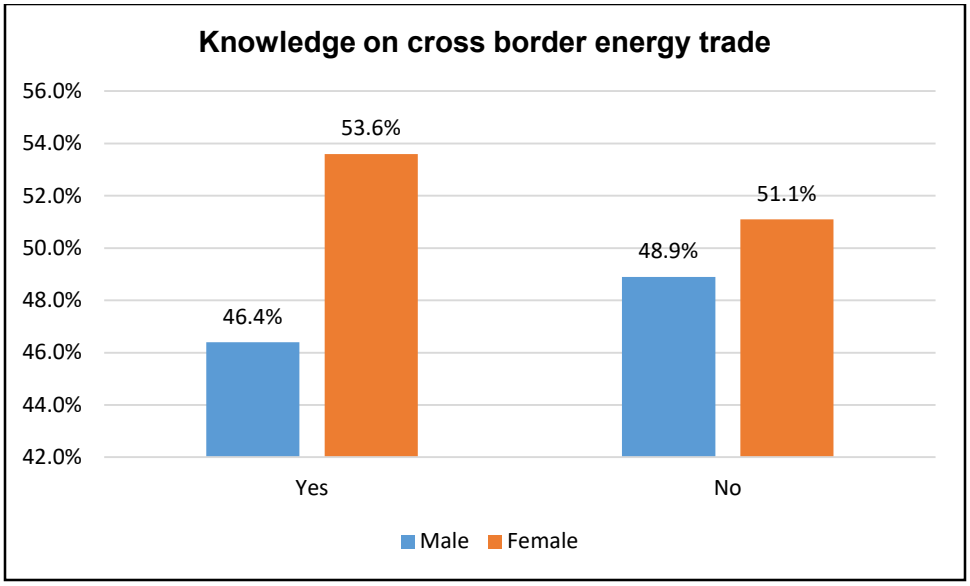

Figure 40: Knowledge on cross border energy trade

4.2.3 Benefits from hydropower to the youth of Bhutan

In a total of 103 responses, given the opportunity to choose multiple options most adolescents (85 responses) feel that the benefits of the hydropower and energy sectors are that it generates jobs for youths and stimulates the economy (81 responses). While few perceive that it benefits the infrastructural development in the project area.

Note: *The respondent were allowed for multiple click option as per their opinion.*

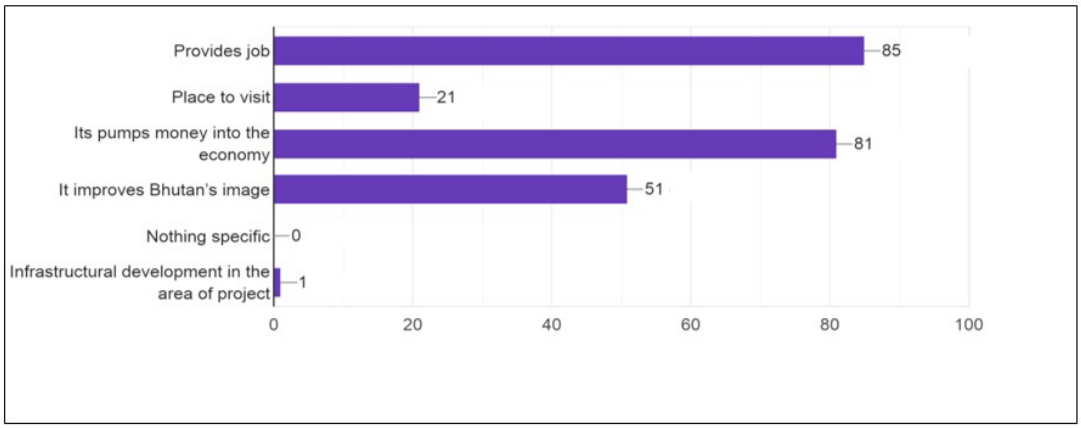

Figure 41: Benefits from hydropower to the youth of Bhutan

Table 30 and Figure 48 shows that 49.4 percent of male and 50.6 percent of females said that colleges and schools should provide courses regarding the cross border energy trade. Whereby, a very less number of the respondent, 16 respondents, 37.5 percent male and 62.5 percent female, said there is no need to hold any courses of cross border energy trade at the college and high school level. But to the majority, more youth backed their statement by stating that the youths must know and study the policies of hydropower projects and the cross-border energy trade.

*Table 21: Course on cross border energy trade * Gender Crosstabulation*

		Gender		Total
		Male	Female	
Course on cross border energy trade	Yes	43	44	87
		49.4%	50.6%	100.0%
	No	6	10	16
		37.5%	62.5%	100.0%

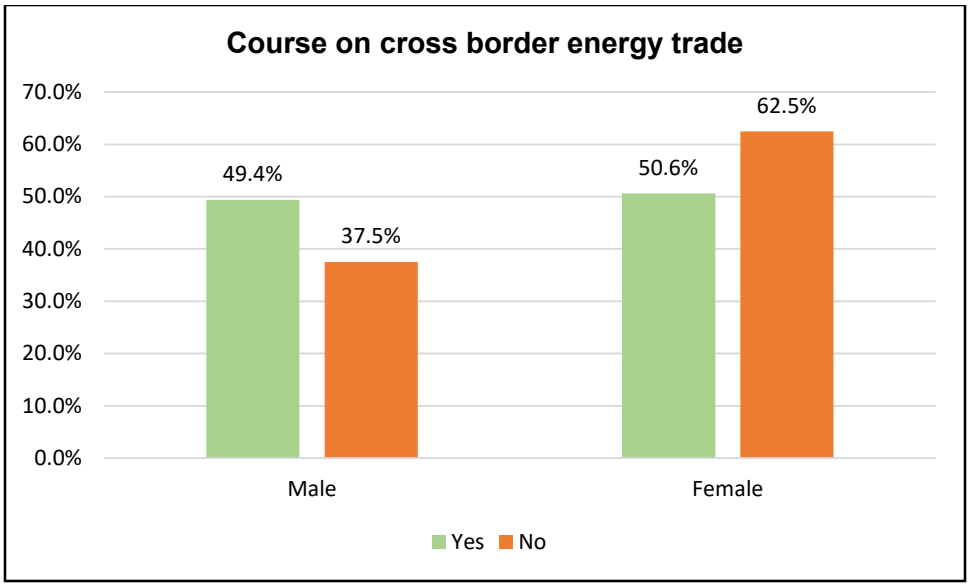

Figure 42: Course on cross border energy trade

Chapter 5: Discussion, Conclusion and Recommendations

5.1 Discussions

5.1.1 Discussions on the impact of social-economic benefits on the local community

Establishing hydropower plants have benefitted the development of the community's livelihood. As most respondents in this study are individuals who have settled near hydropower plants, and believe that electrification has transformed their lives and brought many positive changes to their community. From the survey, 95.2 percent of the respondents believe that the hydropower projects electrification program have helped them by increasing the number of schools, hospitals, and telephone/internet services in the area. The findings are consistent with Mehta and Tiwari (2018), who stated that the positive impact of the energy trade benefits the local economy and the government coffers, and such initiatives have made a substantial contribution to the development of distant areas.

The respondents have reaped the benefits of saving time, having cleaner houses, and opening small businesses due to having access to power. Most households (91.1 %) claimed that the hydropower program had allowed them to save time. Furthermore, Mehta & Tiwari's study from 2018 showed that the Tala hydropower project's construction benefited the local economies by generating employment opportunities. Local authorities and leaders agreed that the Tala hydropower project's most significant benefit to the local economy was the development of local business opportunities. According to research by Mehta & Tiwari, both genders in the home share the responsibility of gathering firewood (2018). Similarly, 51% of the respondents stated that both do the firewood collection in this study.

5.1.2 Discussions on the impact of gender

Electrification also aids in the reduction of gender disparities in communities. At the same time, 90.2 percent of respondents say that electricity has increased women's participation in economic activity. The results were similar to Weeratunge (2016); the project boosts activity in rural areas and has seen a significant increase in females starting businesses and participating in family decision-making processes. Similarly, a research conducted by the SARI/EI Secretariat (2018), access to electricity benefits women by lowering the stress of household chores, particularly cooking time. According to Huq, Haque, Zion, Nasir, and Huq's (2018), electricity can significantly improve both men's and women's quality of life greatly women's since they can now expand their daily chores and participate in more activities.

5.1.3 Discussions on the awareness in the youth of the cross-border energy trade

All the respondents think that the development of hydropower and the export of its power is beneficial for the country's economy. However, 47.9% of males and 52.1% of females stated that they know the cross-border energy trade. Alternatively, 46.7% of males and 53.3% of females said they were unaware of cross-border energy trade. Because more females are unaware of cross-border energy trading, 49.4 percent of males and 50.6 percent of females agreed that universities and institutions should offer courses on the topic. The findings of the study by Saputra, Akmal, and Wahyuni (2021), show the perceptions of local youth in developing renewable energy in West Sumatra Province. They found that local youth do not fully understand renewable energy. As a result, the state should actively disseminate energy information to the younger generation. The internet and social media can be used as socialization media because they are the most effective media to reach young people and because they are an educated community group that can network and advocate for policies (Saputra, Akmal, and Wahyuni, 2021).

5.2 Findings

This chapter presents the findings of the study and discusses them in relation to the research objectives. Moreover, the chapter compares findings from the current study with ongoing stories, public debates, and media house arguments and highlights areas of possible convergence or disagreement. To give a clear view of the findings, this chapter summarizes and minutes the results of the research on Hydro Power in Bhutan as a primary source for Cross Border Electricity Trade, Community Experience, and the future Perspectives. In addition, the chapter contains a compliment to the readers- “The field survey report of the two communities: Bjagchhog Gewog and Darla Gewog, on hydro-electricity and cross-border energy trade.”

Summary of key findings

Community experience and perspective: The study revealed that both of the Gewogs (Bjagchhog and Darla) have achieved villages’ electrification rate of 99.4% each. However, there are households which are still not electrified; the two Gewogs do have a 100% access rate despite of being located in Chukha, the hydro-power project hub of the country.

Most of the respondents were agriculturists in both the Gewogs, with a maximum of class 10 qualification. The respondents who have been there in the village for more than 20 years reported that there has been swift change in the community development process since the establishment of hydropower project. They identified fewer community facilities and road connectivity in the pre-hydropower development period. In the post-hydropower development period, the respondents reported that the community witnessed an outburst of development progress such as better road networks, more road access points in the villages and ever more social corporate responsibility. Respondents from Darla Gewog also reported that the projects also helped the community in cultural and religious aspects such as construction of lhakhangs and chortens (monuments) in the village localities. The Project has funded the development of parks in these two Gewogs and given grants for beautification works. The project has constructed schools, hospitals, BHUs, college, day-care centers and recreational facilities such as football fields, archery pitches, and basketball courts. The Project has put bus service for the school students and transportation facilities for elderly and sick. The respondents have given visible evidences of the above establishments, and they have reported that all of these developments in these Gewogs would not have taken place without the aid from Hydro-power projects.

91.6% of respondents reported that the construction of hydropower projects has helped the community in creation of more job opportunities such as construction work, clerical job, and

supervisory jobs thereby raising the income levels of these cohorts. The start of hydro-power projects has given birth to new markets and raised the consumer demand which in turn led to mushrooming of whole-sellers, middle-men, retailers and the farm products in particular witnessed a big boost. This gave a new scope for doing business such as sale, purchase and manufacturing etc. The hydro-power projects created gainful employment opportunities for the people of Chukha Dzongkhag as a whole. Moreover, Electricity boosted their modern life and helped in making their lives civilized; the individuals in these communities started using electricity to operate farm machineries, run hotels and shops, run poultry farms, run saw-mills, etc. The use of electricity not only raised the productivity but set private sector on strong footing. However, it was also found that despite having access to electricity, many individuals lack the technical and intellectual skills to operate electric machines and tools and reap the benefit of electricity. The lack of know-how in people of these gewogs is attributable to the employment of Indian skilled laborers in the hydro-power projects.

The study revealed that the people at the gewog level have improved access to better health care facilities. Similarly, it was found that the communities' security level and sanitation, 82.8% and 87.9% respectively, have improved with the hydro-power project establishment and village electrification.

Electricity and its impact on the life of women: Having 99.6% access to electricity and 24 hours electricity supply has positively impacted women's lives. It has also enabled 90.2% of women folk to participate in economic activities and, gewog level policy making process. Almost eighty percent (78.4%) of the women in these gewogs stated they play a leadership roles in the community such as social activists, planners of household business, and the lead in house making. It was found that better education, skilling up and involvement of women folks can be the key to entrepreneurship development in Bhutan as a whole besides enhancing overall quality of life.

Youth Perspective: All the youth respondents reported that electrification had benefited the community with 24 hours supply of electricity and a better learning environment for students and better teaching environment for teachers. They reported that with electricity, the schools' access to modern methods and techniques of teaching helps holistic development of students and increase their attraction towards learning**.** Access to information and communication technologies (ICTs) methods and imparting knowledge of computer at schools requires reliable electricity connections.

However, all the youth respondents reported the insufficiency of literacy programmes to equip youths to deal with electricity circuits while using this facility in various ways. They said they are exposed to electrical hazards. In addition, the youth respondents identified that quality of overhead lines, electrical installation, circuit assemblies, and cabling and wiring be enhanced to lower risk probabilities.

Similarly, the findings revealed that youths lack the knowledge on hydro-power and electricity trade. They said that monthly reports on units generation and exports visa-a-vise domestic consumption, and all the financial accounts be published so that they stay abreast. It is found that there is a need to educate youths on the cross-border energy trade and the policies that govern it the youths, the future of a Nation, deserve a high awareness level on these topical issues.

5.3. Conclusion

Bhutan has used its hydroelectric resources to propel itself to economic and social prosperity. Hydropower offers potential for cross-border energy commerce despite electricity shortages and seasonal variations in demand and supply at home. Hydropower projects attract foreign direct investment. Cross-border energy trade in generating societal benefits has long been acknowledged. The Indian government always helped and supported the development of hydropower projects in Bhutan. It is evident that as a result of the energy trade, Bhutan reaped immense benefits in terms of employment opportunities for local communities and setting up educational and health facilities.

These efforts of Indian government aided in developing remote areas by encouraging the rural economy, and creating work and income opportunities for the residents. A sufficient flow of investment and timely implementation enabled hydroelectric projects to provide optimal energy supply and development. One can ask those individuals who have lived in both pre and post hydropower project era, and they would tell and appreciate the tremendous benefit the hydroelectric projects have brought to their lives. The hydro-power project have been a boon to Bhutan. It is recommended therefore that the growth of the hydroelectric project has an absolute advantage and beneficial influence on the communities.

5.4. Scope for improvement

Hydropower projects have immensely and positively impacted the people in the village. Nonetheless, the extent of development and conversations with village inhabitants has highlighted some of the challenges they confront and ways to enhance their overall experience.

Discussion with the resident of the gewogs shared that more working opportunities should be given to the Bhutanese labor rather than Indian labor. The people of the gewog looked for assistance in agriculture, but they are still waiting with no response. Other recommendations include expanding the use of electricity to increase community activities and training workshops throughout the village. The respondents said they would like more knowledge and training facilities for better electricity utilization to maximize electricity use and create more significant impacts.

The study concluded that access to electricity is an integral element for uplifting the socio-economic conditions of the people of two gewogs. The project has helped develop the communities and helped improve the lives of women in particular. Village Electrification has brought great convenience to communities in every aspects of life.

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Annexures

Annexure 1: Survey Form

Demographic Characteristics

1. What is your gender? (Please choose one option)

- ◯ Male
- ◯ Female
- ◯ Others

2. What is your marital status? (Please choose one option)

- ◯ Never married
- ◯ Married
- ◯ Living together
- ◯ Widowed
- ◯ Divorced

3. What is your highest education qualification? (Please choose one option)

- ◯ Not educated
- ◯ Primary school completed
- ◯ Middle school completed
- ◯ High school completed
- ◯ College completed
- ◯ College student
- ◯ Monastic
- ◯ NFE

4. In which Sector are you currently employed in? (Please choose one option)

- ◯ Government sector
- ◯ Corporate employee
- ◯ Private employee/ Business
- ◯ Agriculture/ Farming
- ◯ No job
- ◯ Other:

5. How long have you been living in this current location? (Please choose one option)

- ◯ below 4 years
- ◯ 5-10 years
- ◯ 11-20 years
- ◯ More than 20 years

8. Does any of your household members use electricity for any income-generating activities? (Please Choose one option)

- ☐ Yes
- ☐ No

9. Does your household still collect firewood being having connectivity to electricity? (Please Choose one option)

- ◯ Yes (if yes, please answer the next question)
- ◯ No

10. Who in the household is responsible for collecting firewood? (Please Choose one option)

- ◯ Male
- ◯ Female
- ◯ Both

7. What are the usages of electricity in your household? (Please Choose all applicable)

- ☐ Lighting
- ☐ Heating/Cooling
- ☐ Mobile phone charging
- ☐ Office works – computers/ printers
- ☐ Watching television
- ☐ Cooking/ Water Boiling/ Refrigerating
- ☐ Studying at night
- ☐ Farm machiinery
- ☐ Cottage industry
- ☐ Other:

Part B: a. Social-economic development (Individual Level)

6. Does your household have access to electricity? (Please choose one option)

- ◯ Yes
- ◯ No

13) If "No", please give reasons (according to you) for this? (Please Choose one option)

- ◯ Poor quality of electricity
- ◯ Expensive
- ◯ Spending more time watching television
- ◯ We did not have the skills
- ◯ Others

Part C: b. Social-economic development (Community Level)

14) Do you think that the electrification programe has benefited your community overall as a whole? (Please Choose one option)

- ◯ Yes
- ◯ No

15) If "Yes", please give examples of some of the benefits you have observed? (Please Choose all that applies)

- ☐ Increased income opportunities for the community
- ☐ Improved security and safety within the neighborhood
- ☐ Increase the quality of life of women
- ☐ Opening of new businesses such as shops
- ☐ Job increased in the local community
- ☐ Better education opportunity
- ☐ Better Health conditions
- ☐ Cleaner homes in the community
- ☐ Other:

16) Did the number of schools, hospitals and internet/telephones facilities increase after electrification? (Please Choose one option)

- ◯ Yes
- ◯ No

17) Do you think the development of hydropower project in your locality helped your community specifically?

- ◯ Yes
- ◯ No
- ◯ Not sure

18) If "Yes" please give example of some of the benefit you have observed in the community? (Please Choose all the Applied)

- ☐ Increased income opportunities for the community
- ☐ Better rental income
- ☐ Opening of new businesses such as shop/Bar/ Construction
- ☐ Job increased in the local community
- ☐ Support from project to the community
- ☐ They build school and hospital for our children
- ☐ Other:

19) What are some negative impact you have observed in the community due to the hydropower project? (Please Choose all the Applies)

- [ ] House rents increased
- [ ] Over crowded
- [ ] Place has become dirty and noisy
- [ ] Cultural issues
- [ ] Increased in crimes
- [ ] Not sure – no idea
- [ ] Other:

20) Do you have any other comments or suggestion for the area where mega hydropower projects are planned?

Your answer

Part D: Gender equality

21) Has participation of women in economic activities increased after electrification? (Please Choose one option)

- ◯ Yes
- ◯ No

22) Have you ever thought your gender has played a critical role in your community? (Please Choose one option)

- ◯ Yes
- ◯ No

23) What do you think can be done to benefit women more from electrification and hydropower projects? (Choose all applicable)

- [ ] Provide quota for women employment
- [ ] Provide preferences for local women employment
- [ ] Provide preferences for local women businesses
- [ ] Provide more trainings and awareness to both men and women
- [ ] Provide more trainings and awareness to only women
- [ ] Other:

End of Survey- Thank you

Back Submit Clear form

Hydropower in Bhutan as a source of Cross Border Electricity Trade – Youth Experience and Perspective

Warmest Greetings!
Thank you in advance for your time, interest and assistance.
This is in view of our research entitled 'Hydropower in Bhutan as a source of Cross Border Electricity Trade – Community Experience and Perspective'. We are conducting this survey as part of our CEBT research.

1. What is your gender? (Please choose one option)

- ◯ Male
- ◯ Female
- ◯ Others

2. Do you think the hydropower projects In Chhukha Dzongkhag has helped the local community?

- ◯ Yes
- ◯ No

3. What do you think about development of hydro-power plants in Bhutan? (Please Choose all that Applies)

- ☐ They are environmentally friendly
- ☐ They are the cheapest option of generating energy for Bhutan
- ☐ It is the main export item for Bhutan
- ☐ It is noisy and created problems
- ☐ It is a risky venture
- ☐ Not sure
- ☐ Other:

4. Do you think the development of hydro-power and export of its power is beneficial for our country economy? (Please Choose one option)

- ◯ Yes
- ◯ No

5. Do you know about government policies related to the development of hydro-power projects? (Please Choose one option)

- ◯ Yes
- ◯ No

6. How important is hydropower development for job creation in Bhutan? (Please Choose one option)

- ◯ Very important
- ◯ Important
- ◯ Not important
- ◯ Not important at all
- ◯ Not sure

7. Do you learn about hydro-power projects in school or colleges? (Please Choose one option)

- ◯ Yes
- ◯ No

8. Do you know about the cross border energy trade? (Please Choose one option)

- ◯ Yes
- ◯ No

9. What are some benefits from hydropower and energy sector to youth of Bhutan?(Click all applicable)

- ☐ Provides job
- ☐ Place to visit
- ☐ Its pumps money into the economy
- ☐ It improves Bhutan's image
- ☐ Nothing specific
- ☐ Other:

10. Do you think you need to hold a course on cross border energy trade on your campus? (Please choose one option)

- ◯ Yes
- ◯ No

10. Do you think you need to hold a course on cross border energy trade on your campus? (Please choose one option)

- ◯ Yes
- ◯ No

11. Any other suggestions or feedback to support youth from hydropower and energy sector of Bhutan?

Your answer

End of Survey- Thank you

Submit Clear form

Annexure 2: Enumerators

Annexure 3: Enumerators Round 1 (Bjachhog Team)

Sl.NO	Name
1	Jamyang Tenzin (Faculty)
2	Khem P. Gautam (Faculty)
3	Lhawang Yeshi (Staff)
4	Phurpa Tshering (Faculty)
5	Tenzin Dorji (Faculty)
6	Intra Tirwa (Faculty)
7	Yeshi Choden (Student)
8	Leki Norbu (Student)
9	Sonam Choki (Student)
10	Sujan Darjee (Student)
11	Kunzang Lhaden (Student)

Enumerators Round 2 (Youths)

Sl.NO	Name
1	Khem P. Gautam (Faculty)
2	Phurpa Tshering (Faculty)
3	Tenzin Dorji (Faculty)
4	Intra Tirwa (Faculty)
5	Yeshi Choden (Student)
6	Leki Norbu (Student)
7	Sonam Choki (Student)
8	Sujan Darjee (Student)
9	Kunzang Lhaden (Student)

Enumerators Round 3 (Darla Team)

The enumerators were GCBS students and faculty members

Sl.NO	Name
1	Indra Tirwa (Faculty)
2	Khem P. Gautam (Faculty)
3	Lhawang Yeshi (Staff)
6	Hita Nath (Faculty)
7	Yeshi Choden (Student)
8	Leki Norbu (Student)
9	Ranbir Darjee (Student)
10	Sonam Choki (Student)
11	Reena Pradan (Student)
12	Kinley Zangmo (Student)
13	Sujan Darjee (Student)
14	Kunzang Lhaden (Student)