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Impact on Local People's Livelihood through Solar Energy

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Abstract

The entitled study "Impact on Local People's Livelihood through Solar Energy" was done during the summer of 2023 focusing on the people's livelihood after installation of Solar Energy as an alternative resource. This study was done in Belkotgadhi -2, Nuwakot, Nepal where the local people were using solar energy system as an alternative resource for past ten years. To make more comprehensive this study was conducted among the 25 solar energy users whereas 250 households already installed solar energy to uplift their livelihood. Similarly, 6 key informants were taken as a primary key informant where as 4 were females and 2 were males. People of study area are very much satisfied after the installation of solar energy since they have faced many challenges during the installation period. Women of the study area are also beneficial after using alternative resource and they have made some income generating platform because they work after their dinner. The respondents expressed very favorable opinions of solar system and concurred that it had aided in their socioeconomic and other personal development.

Keywords

Impact, Local people, Household, Energy, Solar energy, Alternative resource.

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6

Impact on Local People's Livelihood through Solar Energy

1. Background of the Study

Resources are very important for the existence of human life. Resources can consume naturally and artificially. Since the fire is invented, people started to invent many more useful things for the existence of their life and kept as an asset. In everyday life, people are using resources both modern and traditional methods. This study was carried out from the people of Belkotgadhi Municipality-2 of the Nuwakot district where solar energy has become a significant source of alternative energy over the past ten years. 25 of these users are taken as respondents who are user of a purposive sampling technique.

In this study, both primary and secondary data were used. Data has been gathered from both primary and secondary sources. Key informant users also were taken for the proper information. Among the 6 key informants, 4 females and 2 males were selected.

Currently, Nepal's energy sources are divided into three groups: conventional, commercial, and alternative. Traditional energy sources include dry animal dung, agricultural residues from agricultural crops and fuel wood from forest and tree resources. Commercial energy resources, which specifically include coal, grid electricity, and petroleum products are those that fall under the category of commercial or business practices. Among Nepal's alternative energy sources are biogas, solar energy, and small scale hydropower. These resources are viewed as an addition to the available conventional resources, 12% from commercial sources, and less than 1% from alternative sources (MOF, 2022).

Energy is one of the most important inputs for sustaining life, and reliable access to affordable energy sources is a requirement for Nepal's socioeconomic development. Many Nepalese hill settlements are too far from the electricity grid to have access to facilities for electricity because of this. Due to our country's terrain, poor infrastructure development, dispersed rural households, high

costs associated with centralized national grid power supply, and low purchasing power of the populace, it is difficult to provide basic necessities (WECS, 2020).

In Nepal, there are abundant sustainable sources of renewable energy (hydroelectric power, solar energy, biomass, and bio-waste), so proper exploitation of these resources could undoubtedly supplement the nation's renewable energy portfolio. Renewable energy is environmentally friendly because it reduces greenhouse gas (GHG) emissions, indoor and local air pollution, and the negative effects on the environment's physical, geographical, and natural environments. The quality of life for Nepal's rural population will probably improve with a decentralized renewable energy system (Sapkota & Tamrakar, 2021).

The use of solar energy can offer a frequently more dependable and affordable power source, giving residents of these communities more opportunities to advance and better their lives. When it was anticipated that coal would run out in the 1860s, solar energy was first proposed as a practical alternative source of energy. The 1973 oil crisis renewed interest in solar power's potential as a substitute energy source. In response, developed nations worked diligently to advance solar energy (Status of Solar Photovoltaic Sector in Nepal, AEPC, 2021).

2. Literature Review

Levi identifies three key historical factors that contributed to the development of the modernization theory of development following World War II. The emergence of the United States as a superpower came first (Levi, 1967).

Nepal has cheap, abundant solar energy. Without using any fossil fuels or damming any Himalayan rivers, every Nepali could consume the same amount of energy as people in developed nations with more than enough solar energy. The annual solar potential in Nepal is 50,000 terawatt-hours, which is 7,000 times more electricity than the country currently uses and 100 times more than its hydropower capacity. As a result, solar energy can easily meet all of Nepal's future energy needs and is more affordable than fossil fuels, nuclear power, and hydropower. In the future, one of the main renewable sources for generating electricity will be solar energy. A solar power plant produces reliable, clean, and environmentally friendly electricity.

Rooftop solar energy is less expensive than grid electricity or thermal power and only requires a one-time investment. If the low-income population's demand for renewable energy is not satisfied, it will be impossible to significantly raise their standard of living in rural areas (AEPC, 2021).

According to modernization theory, the transition from a traditional agricultural economy to a modern industrial economy, society, and civilization is considered the classic modernization course. The Second Modernization Theory suggests that the process of human development can be divided into four stages: the tool age, the agricultural age, the industrial age, and the knowledge age. Each stage has four phases: the start phase, the development phase, the mature phase, and the transition phase. However, according to the second modern theory, a process of transition from a traditional agricultural economy to a modern industrial economy is taking place in the study area (Levi, 1967).

The process of modernization within societies is explained by modernization theory. Modernization is the process of moving from a "pre-modern" or "traditional" society to a "modern" one. The concepts of German sociologist Max Weber (1864-1920), which served as the foundation for the modernization paradigm created by Harvard sociologist, are where modernization theory got its start. The theory takes into account a nation's internal dynamics and makes the assumption that, with assistance, "traditional" nations can be propelled toward development in the same way that more advanced nations have. In the 1950s and 1960s, modernization theory was the preeminent paradigm in the social sciences before it was completely eclipsed. After 1991, it made a comeback, but it is still a contentious fashion (Tipps, 1973).

In addition to attempting to explain how societies evolve, modernization theory also makes an effort to pinpoint the social factors that influence social development and advancement. World systems theorists, globalization theorists, dependency theorists, socialist and free-market ideologies, among others, have all criticized modernization theory. In modernization theory, both the process of change and the responses to that change are emphasized. In addition to discussing social and cultural structures, it also considers internal dynamics and the adoption of new technologies (Levy, 1967).

The system that transforms solar energy into electricity is known as a solar PV home system. It is a system for supplying electricity to a

home that includes a solar photovoltaic panel with a capacity of 5 Wp to 10 Wp or more, a battery, a device to control the battery's charge, and the appropriate number of lights (AEPC, 2021).

According to AEPC (2020), a Solar Home System (SHS) is a system for supplying electricity to a home that includes solar photovoltaic panels with a capacity of at least 10Wp and is connected to a battery, charge controller, and the necessary number of DC lights.

The module, the fundamental building block of the systems, is made up of a number of electrically connected solar cells that are enclosed inside a supporting framework. Solar cells convert 3-14% of the incident solar energy to direct current electricity, with efficiencies varying depending on illumination, spectrum intensity, solar cell design, material, and temperatures. Solar cells are typically in the form of thin films or wafers and are semiconductor devices (typically made of crystalline silicon). The modules come in sizes ranging from 20 to 50 watts. Combining modules allows for high power outputs from a single source (WECS, 2020).

Electrons become excited and begin to move in the metal stripes of the panels when sunlight hits the surface of the panel (modules). The potential is created when the flow is high (peak sun or more sun than average), and since the negative and positive battery terminals are connected to the two terminals of the panel via a charge controller, the electrons or charge are then stored in the battery. This allows the battery to be used at night when there is no sun light.

3. Methodology

A descriptive & exploratory research design has been used for this study. The study's goal is to describe the Impacts on Local People's Livelihood through Solar Energy. Qualitative data were gathered using the descriptive method. The non-quantifiable data have been explained in literal terms. In study area, solar energy has become a significant source of alternative energy over the past ten years.

There are 250 households with solar energy installed in Belkotgadhi Municipality-2, which is in the Nuwakot district with the total population of 7660, 3723 men and 3937 women and 1549 households (CBS, 2023). 250 Solar Home System users from the Belkotgadhi Municipality-2's total of 1549 households make up the study's universe, and 25 of these users are taken as respondents who through purposive sampling technique who are currently using solar system.

In this study, both primary and secondary data were used. Data has been gathered from both primary and secondary sources. Key informant users also were taken for the proper information. Among the 6 key informants, 4 females and 2 males were selected because females are more involved in the consumption of solar energy comparing with males. Using a observation method, interview with the key informant respondents and questionnaire survey with solar energy users, the researcher gathered the primary data from the respondents.

4. Data Presentation and Analysis

The entitled study 'Impact on Local People's Livelihood through Solar Energy' is done to find out the impact on livelihood after using the solar energy system. After the data collection, it is found that people of the study area are really happy and satisfied by using solar energy system. Before the installment of solar energy, their works were hampered during the power cut off. But, now the alternative resource has made their livelihood more comfortable and accessible to lights. Main reason of power cut off in winter season is the storms leading to electricity poles fall down and then it takes time to maintain due to government procedures.

4·1 Socio-economic Characteristics of the Respondents

Socio-economic characteristic of the respondents are presented under the following sub-heads:

(A) Respondents by Caste/Ethnicity

Caste and ethnic composition factors are related to socio-cultural aspects. Different ethnic groups and castes have unique cultures, customs, and needs that have a big impact on how much energy they use. The respondents' caste/ethnicity is shown in the table below:

Table-1 : Distribution of Respondents by Caste/Ethnicity Composition

Ethnicity/Caste	No. of Respondents	Percentage
Brahmin	13	52.00
Chhetri	2	8.00
Tamang	7	28.00
Others	3	12.00
Total	**25**	**100.00**

Source : Field Survey, 2023.

Table-1 demonstrates that Brahmins (52% of all installers) are the most dominant group in the context of using solar energy system. It's because Brahmins are the region's elite and enjoy good economic health. Tamang people make up the second-largest population in the Belkotgadhi Municipality, which explains why they account for the second-largest share PP (28%) of solar energy installations.

(B) Sex and Literacy Composition of SHS Users

One of the key components of this analysis of the respondent's sex and literacy. The perception, comprehension, and behavior of people toward energy consumption are influenced by these factors both directly and indirectly. In addition, the relationship between sex and literacy composition has an impact on other social and economic factors, such as occupation, income generation etc. Breakdown of the samples of sex and literacy lists are given below:

Table-2: Sex and Literacy Composition of the Respondents

Sex	Literacy				Total	
	Literate		Never attended School			
	N	%	N	%	N	%
Male	10	40	5	20	15	60
Female	7	28	3	12	10	40
Literacy Rate	17	68.00	8	32.00	25	100.00

Source : Field Survey, 2023.

The above table demonstrates that there are slightly fewer women than men in the study area. In the table above, the literacy rate is calculated by factoring in the respondents' literacy levels as well as the proportion of males and females who are currently enrolled in school. Males have a higher literacy rate (40%) than females (28%). The study area's overall literacy rate is 68% in total.

(C) Annual Income that can Support Annual Expenditure

The household income is a significant factor in determining a person's way of life, socioeconomic status, and other factors that have an immediate impact on their ability to access and afford basic needs as well as other needs, including energy needs. Agriculture, employment, business, and services provided in other countries are the main sources of income in the study area. They spend money to satisfy a variety of needs. The following table displays the annual income needed to cover the sample HHs' annual expenses:

Table-3 : Distribution of the Respondents by Annual Income that can support Annual Expenditure

No. of Months	No. of Respondents	Percentage
1-4 months	1	4.00
4-8 months	2	8.00
8-12 months	15	60.00
12+ months	7	28.00
Total	25	100.00

Source : Field Survey, 2023.

According to the table above, 60% of households can afford annual expenses for 8-12 months. This group of HHs consists primarily of people with agricultural and service-related major occupations. 28% of HHs-those with jobs, those engaged in business, and primarily those with relatives working abroad-said they could afford expenses for longer than a year. Only 1-4 months' worth of expenses can be supported by 4% HHs. Because they are all dependent on substantial farming and have no other sources of income, 8% of HHs can only cover expenses for 4-8 months. Some people are discovered installing SHS by borrowing money and imitating others to maintain their social standing.

4·2 Increased Study Hour after Installation of SHS

Most people in Nepal's rural areas (both grid-connected and off-grid) use kerosene as a source of lighting. Students must study in the dim light of kerosene- or dry cell-powered torches or tuki. These lights are inefficient, making it challenging for students to study in them. Solar home systems offer cleaner, more effective lighting that both benefits the family financially by reducing the need to purchase kerosene and allows students to study in brighter light. According to respondents, their kids were studying more, as shown in table below:

Table-4 : Distribution of Respondents by increased Study Hours after SHS Installation

Increased Study Hours Daily	No. of Respondents	Percentage
Increased by 1 hour	13	52.00
Increased by 2 hours	10	40.00
Increased by 3 hours	2	8.00
Total	**25**	**100.00**

Source : Field Survey, 2023.

Data contained in table-4 demonstrates that 25 of the households with solar energy installations have children who attend school. A little over 52% of HHs admit that since SHS was put in place, their kids now study for an extra hour every day at night. After solar energy was installed, about 40% of HHs admitted a 2 hours increase in night study time and 8% of HHs admitted a 3 hours increase.

The truth is that life style of the people of the study area are somehow improved and empowered too. Because students could study at evening and other people also started to do their household chores and pending works at evening.

4·3 Energy Use Situation in the Study Area

Fuel wood is Nepal's largest source of traditional energy, meeting about 77% of the nation's total energy needs in the years 2021-2022. Fuel wood is also the main source of energy used for cooking in the study area.

According to the data, a household that installs a SHS can save at least Rs 1725 annually as comparing to other non-users. It also demonstrates that 25 HHs in the study area, out of 50 SHS users and 10 Non SHS users, use 210 liters of kerosene annually, which is equivalent to NRs 24150.

LPG is only used for cooking by SHS users and non-users in the study area when they are pressed for time while completing household and farm tasks; otherwise, they typically use firewood. Below is a chart showing how much LPG is consumed annually.

The minimum fee up to 20 units is Rs 80 in rural areas. All homes were found to have their electricity needs met for the lowest possible cost. These 25 respondent households collectively use 30628.8 MJ of electric energy per year, which is equal to NRS 48000.

25 HHs in the Belkotgadhi Municipality area are using solar energy. In addition to its general applications, solar energy is frequently used during load shedding. The table below shows the area of Belkotgadhi Municipality's solar energy consumption.

Table-5 : Annual Consumption of Solar Energy

Solar Capacity (WP)	No. of HHs	Energy (KWH)	Energy (MJ)
20	12	90000	324000
32	2	28800	103680
36	5	118800	427680

40	3	72000	259200
43	2	38700	139320
50	2	38700	139320
Total	**25**	**378300**	**1361880**

Source : Field Survey, 2023.

The most favorable days for solar energy production are considered to be 300 days per year when calculating solar energy consumption.

4·4 Information about Solar Home System Use in Study Area

Distribution of SHS by the year of installation in respondents' families is shown in the following table:

Table-6 : Installation of SHS by Year

Year of Installation	No. of Respondents	Percentage
2013	9	36.00
2017	7	28.00
2018	1	4.00
2019	8	32.00
Total	**25**	**100.00**

Source : Field Survey, 2023.

The highest percentage of solar home systems (36%) were installed in the study area in 213 AD. From 2014 to 2016, no installations were noted at all. The number of households installing SHS was at its lowest in the year 2018, at 4%, and then gradually increased to 32% in the following year.

Lighting at night is the primary reason for installing SHS in rural areas like the Belkotgadhi Municipality area. Solar energy is primarily used for nighttime household chores, lighting up classrooms so that kids can read and write, and other commercial uses like lighting up hotels, shops, chicken coops, and other establishments.

4·5 Major Problems Faced with SHS

Utilizing solar energy technology necessitates through knowledge and comprehension of all aspects of it, from its initial installation to its use, operation, and maintenance. SHS has a higher initial cost than conventional energy sources, making it unaffordable

for many people. In addition, appropriate instructions are needed for its upkeep and operation. Table below lists some of the main issues SHS users in the study area have to deal with:

Table-7 : Major Problems Faced by SHS Users

Types of Problems	No. of Respondents	Percentage
Cost	5	20.00
Operation/maintenance	11	44.00
Both cost and maintenance	6	24.00
Less efficient during bad weather	3	12.00
Total	**25**	**100.00**

Sources : Field Survey, 2023.

The table above demonstrates that 20% of households purchase SHS, but that the cost is high for them, while 44% of households experienced operational and maintenance issues, such as battery fuses and changing the water level in batteries. According to 12% of respondents, the energy their SHS produces during the rainy season and when the sky is overcast is insufficient for their needs. Therefore, the cost of SHS should be reduced by providing more incentives to rural low income households, as well as by having awareness programs about SHS and skilled technicians available in the village for its maintenance.

5. Impact on Local People's Livelihood through Solar Energy

Currently, Nepal's energy sources are divided into three groups: conventional, commercial, and alternative. Traditional energy sources include dry animal dung, agricultural residues from agricultural crops, and fuel wood from forests and tree resources. Commercial energy resources, which specifically include coal, grid electricity, and petroleum products, are those that fall under the category of commercial or business practices. Among Nepal's alternative energy sources are biogas, solar energy, and small-scale hydropower. All three of these types of energy resources are in use in the study area.

The consumption of firewood is very high when compared to traditional resources. i.e. 64% of the total energy consumed in the study area by the sample HHs. From firewood, 3320520MJ, or about 197640 kg, or Rs 32940, is produced. Both SHS users and non-users

use roughly the same amount of firewood each month, primarily for cooking purposes (7 to 10 bhari).

The overuse of firewood as a source of energy is not a recent phenomenon; almost all rural areas of Nepal use firewood as one of their primary and most frequent sources of energy. The study area is surrounded by three community forests, making it simple and affordable for locals to obtain firewood and incorporate it into their daily lives. As a result, firewood is used more frequently than any other resource.

Kerosene is the most widely utilized commercial energy source. In homes with SHS installed, only 1 to 3 liters of kerosene are consumed annually, and this fuel is primarily used to light firewood in rooms without light fixtures. Some homes with SHS installations completely replace their kerosene use with solar power.

The non-users of solar home systems use kerosene primarily for lighting, consuming 18 to 24 liters yearly. By using SHS, households with SHS installed save at least NRS 1725 annually compared to households without SHS. Kerosene consumption in SHS non-user HHs has significantly decreased since the municipality recently acquired grid electricity. Approximately 210 liters, or 7350 MJ of energy, or RS 24150, are consumed by the sample HHs.

LPG consumption has become fashionable in the study area. Nearly 50% of the sample HHs, both SHS users and non-users, were found to be using LPG for cooking. LPG is typically used during farm peak season when there is a rush of activity related to farming. They can consume as few as one LPG cylinder or as many as four cylinders annually. 50 sample HHs in the study area annually derive 33103.04 MJ total energy from LPG, which is equivalent to NRS 79900.

Its rising use may be due to the fact that LPG gas stoves make cooking easier than firewood stoves. They can save time by cooking with LPG during the busy farming season because it is smokeless. Since this VDC is close to Kathmandu and has complete summertime motor road access, transporting PLG is not a challenging task. Remittances, commercial farming, and other factors have increased people's purchasing power, which also encourages people to use LPG.

As already mentioned above, the SHS is a useful replacement that increases people's access to energy and encourages them to adopt a better way of life in remote areas where electric energy and other

sources are less practical and expensive. The advantages of installing SHS are numerous and are covered below. The main benefits after the consumption of solar energy in each household has positive impact which is very effective on Education and Women Empowerment, among the many other social benefits.

Before the construction of SHS, students had to study in the traditional dim light called 'tuki'. The lights coming from that kerosene-powered were too dim, hazy, and painful for kids to study under. Children's study time increased from at least 1 hour per night to up to 3 hours after SHS installation, under the sterile, bright, and smoke-free light. The local school uses solar energy for evening classes, computer operation, etc.

The use of solar powered communication tools like TVs, telephones and other devices has greatly contributed to raising awareness of gender equality in the villagers. People are reminded to enroll their daughters in school as well. Other social advantages have decreased, such as the time and effort needed by women to find fuel wood. In addition, women of the study area perform various household income generating tasks under solar lights at night, such as making thread incent for god, paper plate, woolen bag etc. which has aided in their overall development.

5·1 Benefits to the household after Installation of Solar Energy System

One of the many economic advantages is the money it saves on kerosene, torch light batteries, etc., which helps to improve the economic situation not only of the households but of the entire nation. SHS will lower the amount spent on these oil imports, which aids in lowering the trade deficit.

The study area now has access to a variety of income-generating activities thanks to solar energy. In addition, it has aided in the commercialization and diversification of rural areas. Numerous income-generating activities, including the production of handicrafts, woolen goods, and poultry farming, have been carried out using solar energy.

In conclusion, this solar energy is promoting and developing local entrepreneurship. The fact that solar energy reduces carbon footprint is one of its most significant advantages. Solar energy is clean, renewable, and doesn't emit any harmful pollutants like carbon dioxide (CO_2). A typical home solar PV system could reduce CO2

emissions by over a tone annually, or more than 30 tonnes over the course of its lifetime.

Solar lighting has the advantage of not polluting indoor air like kerosene lamps do, and it also lessens the risk of unintentional fire hazards. Respondents also noted that community forests have been well preserved as a result of the availability of solar energy and other various forms of energy.

The respondents claim that solar lights won't provide any health benefits, such as protection against respiratory conditions, headaches, or fire hazards brought on by firewood smoke. In the VDC health post, solar energy is used to power a refrigerator to store vaccines and to power emergency lighting in medical facilities at night.

The poverty rate in Nepal is 25.16 percent, according to the Nepal Living Standards Survey (NLSS-III, 2010-11). Rural areas have a poverty rate that is significantly higher than urban areas (15.46%) (27.43%). In general, poor people rely heavily on conventional energy sources. The cost of energy affects energy use (consumer decisions and behavior). Higher human development index (HDI) is indicated by higher per capita energy consumption. Similar to urban development, rural development refers to a method of meeting people's basic needs while preserving their high levels of autonomy and self-respect. In order to reduce poverty and promote rural development, people's access to solar energy and its many positive effects are crucial.

First and foremost, solar energy increases people's access to energy. SHS will be a wise replacement in remote areas where it is highly feasible and less expensive to develop than any other form of energy. Higher human development index (HDI) is indicated by higher per capita energy consumption.

Secondly, solar energy both reduces the consumption of imported fossil fuels and aids in the start-up of locally based income-generating activities. Therefore, paying for kerosene and other fuels is much more expensive than it needs to be. Solar energy can be used to power a variety of income-generating activities, such as handicraft production, tailoring, woolen product weaving, poultry farming, etc., which aids in reducing economic vulnerability in rural and remote areas.

Thirdly, solar energy contributes to the growth of the social sectors such as women's empowerment, health, and education. In addition to using solar energy to run computers at schools, light up hospitals at night, and keep local medications cool in refrigerators, students can read and write well in cleaner, brighter solar light. Other social advantages include a reduction in the time and effort needed by women to search for fuel wood, among other things. The nighttime household and income-generating tasks that women carry out under solar lights, such as "batti kathne", "tapari bunne", and the creation of woolen bags, have contributed to their overall development and empowerment.

Fourthly, it has improved people's access to information via TV, phone, and radio, giving them the chance to learn about and comprehend various socioeconomic and political facets of the entire world. Their way of life has changed to one that is contemporary, competitive, and creative.

As a result of having access to solar energy, rural residents have been able to increase their income, further their education, and generally improve their quality of life. This has helped them become more independent, which is undoubtedly important for eradicating poverty and promoting rural development.

6. Findings

25 out of the total number of households have been discovered to be using solar energy. All of these 25 SHS-using households were used as sample households (100%) along with 10 SHS-unusing households.i.e., the total sample HHs are 25. The average HH size in the study area is 6.98. Belkotgadhi Municipality spans a total area of 28.77 sq km. The study area has the highest percentage of Brahmin (52%) and Tamang (28%) households. The average literacy rate of the sample HHs is 66.19%; the rates for men and women are, respectively, 71.51% and 61.01%.

The sample HHs' top four occupations were agriculture (15%), foreign service (16%), employment (12%), and services (8%) respectively. 60% of the sample households agreed that their income covers expenses for 8 to 12 months, 28% for 12 months or longer, and 10% for 4 to 7 months. Following the installation of SHS, 52% of sample HHs observed a 1 hour increase in the amount of time their kids spent studying, 40% observed a 2 hour increase, and 7%

observed a 3 hour increase. Both SHS users and non-users most frequently use fire wood as a source of energy. In the calculation of per capita energy consumption, it shares the highest value. 25 samples of HHs in the study area use 3320520 MJ annually, which is equivalent to 32940 NRs. While 100% of solar home system non-users use kerosene, only 36% of SHS installed households do.

By installing a solar home system, the HHs can reduce their annual kerosene costs by at least NRS 1725 and by as much as 100%. The sample HHs (which include both SHs users and non-users) use 210 liters of kerosene annually, which is equivalent to NRs 24150. In the study area, 50% of the sample HHs (both SHS users and non users) use LPG for cooking. Between SHS users and non-users in the study area, LPG consumption is essentially equal. 25 samples of HHs in the Belkotgadhi Municipality area use 33103.04 MJ of LPG energy annually, which is equivalent to NRS 79900.

The study area's monthly electricity consumption ranged from 10 to a maximum of 20 units, falling within the range of the 20-unit minimum charge of RS 80. The study area's 25 sample HHs, which include both SHS users and non-users, use 30628.8 MJ of electric energy each year, which is equal to NRS 48000.

SHS installation in the study area began in 2070 BS with the highest number of installations (36%), and the most recent installation was in 2076 BS by 32% of households. Prices for SHSs with the same capacity varied depending on the company doing the installation. Installation of a 20WP system typically costs between 10,000 and 20,000. Between 20,000 and 30,000 is the average cost of a 32 to 40Wp system, and between 30,000 and 40,000, including subsidies, is the average cost of a 43 to 50Wp system. The most well-known of the five solar energy firms in the Belkotgadhi Municipality is Bio Energy Pvt. Ltd., which has installed more than half (52%) of the total installed SHS. In the study area, 92% of HHs use radio as their primary source of information, 80% of households have at least one phone (mobile or land line), and 48% of HHs use all three media simultaneously. In the study area, 56% of sample households had installed five to eight bulbs, 24% had one to four, and 20% had more than eight. In the study area, 20% of HHs use all three CFL, Tube light, and W/LED while 40% of HHs use CFL and Tube Light, 32% of HHs use CFL and W/LED, 8% of HHs use only CFL. SHS is used for lighting by 48% of HHs for about two hours each day, 32% for three hours, and 20% for one hour. In comparison to

kerosene, all sample HHs agreed that SHS helped them maintain a clean and healthy home environment. While 20% of HHs find it expensive and 12% of HHs complain about its low efficiency during bad weather, 44% of SHS users have experienced maintenance issues.

7. Conclusion

This study interprets about the "Impact on Local People's Livelihood through Solar Energy" which assess the per capita energy consumption, identification of the energy scenario, and effects on the livelihoods in the study area that have solar energy installed. This study primarily relies on primary data, which was gathered using field survey techniques like questionnaires, field observation, and interview with the respondents. There are 250 households with installed SHS that are funded by the government in the Belkotgadhi Municipality area of the Nuwakot district. Out of the total number of households in the Belkotgadhi Municipality area, 250 households that use solar home systems were chosen as the study's universe, and 25 of those households were selected as samples using the purposive sampling method.

Solar energy has been named as an alternative energy source in light of this situation. Due to its advantageous latitude, Nepal receives a lot of solar radiation. Nepal receives 6.8 hours of sunshine on average each day, with a solar radiation intensity of 4.7 kWh/m2/day. The total energy produced would be 80,000 GWh/day using photovoltaic (PV) modules with a 12% efficiency and assuming peak sunlight of 4.5 hours per day. To meet the nation's energy needs, it is therefore wiser to develop solar energy. Lighting, health, education, and communication are just a few of the end uses for solar energy. The 25HHs of the Belkotgadhi Municipality area have benefitted from the cleaner, brighter, and smokeless light thanks to the promotion of solar energy, which has increased the study time for the kids at night. The users are also free from health issues brought on by firewood smoke, such as headaches, respiratory issues, eye infections, etc.

The number of households with TVs, radios, and phones has increased, along with people's access to information, which has led to a rise in public awareness of various social, economic, political, and other issues as well as of way of life. Girls are now being sent to school, and localized female entrepreneurship has begun.

SHS has, on the one hand, reduced household spending on fossil fuels, but, on the other hand, it has increased the likelihood of starting one's own business and income-generating ventures at the local level, such as poultry farming, communication services, tailoring, hotel business, etc., assisting locals to make money and make use of their spare time. Since solar energy is a clean, renewable source of energy, it doesn't pollute the environment with harmful levels of carbon dioxide (CO_2).Therefore, it is an environment friendly and ideal technology for bringing electricity to rural and remote areas.

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