



## Development of Electric Network Impact on Socio-Economic of Ghazni Province, Republic of Afghanistan

Mustafa Rahime  

*Department of Physics, Faculty of Education, Ghazni University, Ghazni, Afghanistan;  
Faculty of Physics and Technology, Al-Farabi Kazakh National University, Almaty, 050038, Kazakhstan*

K.B. Rashitovich 

*Faculty of Physics and Technology, Al-Farabi Kazakh National University, Almaty, 050038, Kazakhstan*

Shir Agha Shahryar 

*Department of Physics, Faculty of Education, Kunduz University, Kunduz, Afghanistan;  
Faculty of Physics and Technology, Al-Farabi Kazakh National University, Almaty, 050038, Kazakhstan*

Rafiqullah Hamdard 

*Department of Physics, Faculty of Education, Wardak higher education Institute, Wardak, Afghanistan;  
Faculty of Physics and Technology, Al-Farabi Kazakh National University, Almaty, 050038, Kazakhstan*

Yama Aseel 

*Department of Physics, Faculty of Education, Farah higher education Institute, Farah, Afghanistan;  
Faculty of Physics and Technology, Al-Farabi Kazakh National University, Almaty, 050038, Kazakhstan*

### Suggested Citation

Rahime, M., Rashitovich, K.B., Shahryar, S.A., Hamdard, R. & Aseel, Y. (2024). Development of Electric Network Impact on Socio-Economic of Ghazni Province, Republic of Afghanistan. *European Journal of Theoretical and Applied Sciences*, 2(2), 334-345.  
DOI: [10.59324/ejtas.2024.2\(2\).29](https://doi.org/10.59324/ejtas.2024.2(2).29)

### Abstract:

The research paper investigates about the development of Electric network which influences on socio-economic scenario of the Afghanistan particularly on Ghazni region. It is one of the southeastern province of Afghanistan, where the rate of energy consumption is comparatively low. Thus, 70 % urbanized people have an access of using electricity and rest of humanity does not have any kind of facility there. The main focus of electricity contains use of solar system as an energy source. The purpose of this research is electrification in other areas points to benefits for healthcare, education, and economic development as well as agriculture poverty

and quality of life of the Ghazni province. In this way, using renewable energy, which has become more popular recently, is a superior choice. In this paper the researcher would discuss how the growth of electricity promote socio-economic advancement in Ghazni. Nonetheless, cost and fair distribution are important factors to take into account. Examining case studies from different countries, we examine the macro- and micro-economic benefits, emphasizing the advantages for healthcare, education, and other aspects of quality of life as well as the issues associated with costs for households. In order to wrap up, the research analyzes how electrification may affect Ghazni's socio-economic growth in a number of ways, including job creation, economic stimulation, quality of life, healthcare and education, poverty alleviation, and agriculture. The only solution to electrify the entire province and raise the economic and social status of the people is to create electrical plants using renewable energy, especially solar panels. The researcher would assess that expanding electrical networks is one of the current alternatives for the socio-economic development of Ghazni bucolic areas.

**Keywords:** *Ghazni, socioeconomic development, quality of life, agriculture, poverty reduction.*

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## Introduction

Afghanistan's Ghazni province is a significant region with unique historical and cultural value. With the development of basic infrastructure, such as electrical networks, this province can achieve economic and social prosperity due to its abundance of natural and people resources. Ghazni city, fed by diesel generators before connected to the (NEPS), it for the first time on 2016 connected to national grid or (NEPS), and provided electricity to Ghazni people (Danishmal, M., et al., 2022). As per (DABS), Ghazni Breshna, 70% of Ghazni urban's population has government-supplied electricity. While, this urban area uses imported electricity, with a potential capacity of 6 MW (Danishmal, M., et al., 2022, Danishmal, M., et al., 2023). The Challenges faced in the initial stages is the shortage of power lines, means that some places in Ghazni don't have electricity, this lack can lead to unequal socio – economic growth. Infrastructure parts are a big problem for making sure that everyone in Ghazni can get electricity fairly. Reducing poverty and closing the development gap may be possible with wise investments in power grid infrastructure and grid improvements (Yang, F., et al., 2016). In a study between households with and without electricity in a rural area of the state of SNNPR in Ethiopia, factors such as lighting usage hours, elementary school students' hours of study at home, family income, energy consumption per household member, and energy consumption per capita were taken into consideration as survey impact indicators. Consequently, it was discovered that homes with electricity have better social and economic conditions than households without electricity (Singh, P., et al., 2020). According to a study on the socioeconomic effects of power provision in Tanzania's rural areas, where the availability of electricity has been slow to develop, a solar mini-grid with a battery storage system was erected in 2019 and find that having access to electricity has a significant positive impact on people's quality of life, healthcare, education, and economics (Falk, J., et al 2021). Based on According to a research study done show that, there be a long-term equilibrium

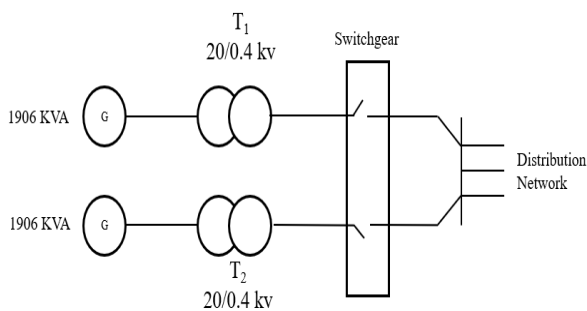
between energy consumption and economic growth, with electricity consumption driving economic growth (Ali, S., et al., 2020). Growing concern over climate change and understanding of clean energy sources has led to the discovery that both renewable and nonrenewable electricity generation have favorable effects on economic growth (Atems, B., et al., 2018). The study demonstrates the non-trivial detrimental effects of electricity disruptions on employment. The effect is caused by a decline in skilled employment and employment in non-agricultural industries (Mensah, J. T., et al., 2024). The number of jobs generated by nuclear and renewable energy sources differs, with renewable energy producing six times the employment opportunities as nuclear energy (Arvanitopoulos, T., 2020). Contrary to expectations, studies in African countries have shown that energy consumption has 1 percent positive impact on quality of life but electricity consumption has 10 percent negative impact on quality of life (Muhammad, S., et al., 2021). Children study hour 8 percent reduces with household access to grid electricity (Olanrele, I. A., et al., 2020). The functionality of medical facilities as well as the caliber, accessibility, and dependability of the healthcare services provided can all be enhanced by having access to electricity (Shastri, V., et al., 2021). The majority of academic literature concurs that having access to electricity is essential for reducing poverty (Rachmawatie, D., et al., 2021, Omoju, O. E., et al., 2020). Electricity is needed to increase agricultural productivity and facilitate structural changes in the labor sector and in the socioeconomic outcomes of rural poor communities and the growing source of income is created by the increased agricultural output and poverty reduction (Omoju, O. E., et al., 2020, Falchetta, G., et al., 2021).

The development of electricity networks is necessary to supply power to all sectors of society, both in rural as well as urban areas. As a result, People's socioeconomic lives can experience deep changes. The author in first has an overview of Ghazni's current electrical networks. then, it is explored how electricity

impacts social-economic development, taking into account its effects on the economy impetus, Creation of Job Opportunities, Quality of Life Enhancement, Enhanced education and healthcare services, and Poverty reduction and agriculture. and we found that the only solution to electrify the province Ghazni and raise the socio - economic status of the people is to create electrical plants using renewable energy, especially solar panels.

## Overview on History of Electric Network in Ghazni Province

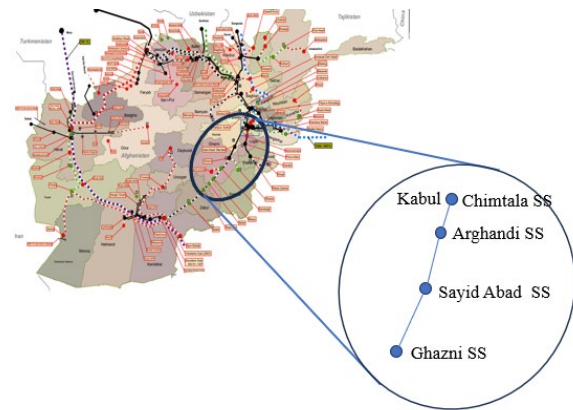
Ghazni city is fed by 1906 KVA two-stage diesel generator before connecting their network to North Electric power system (NEPS) as see in figure 1, which is shown in figure1. These diesel generators provided electricity to only 2000 families, the price of each kWh of which was from 35 to 40 afghanis and depended on the price of petroleum products. For first time Ghazni city connected to North Electric power system (NEPS) on 10/Sep/2016 (Danishmal, M., et al., 2022).



**Figure 1. Primary Electrification in Ghazni Province**

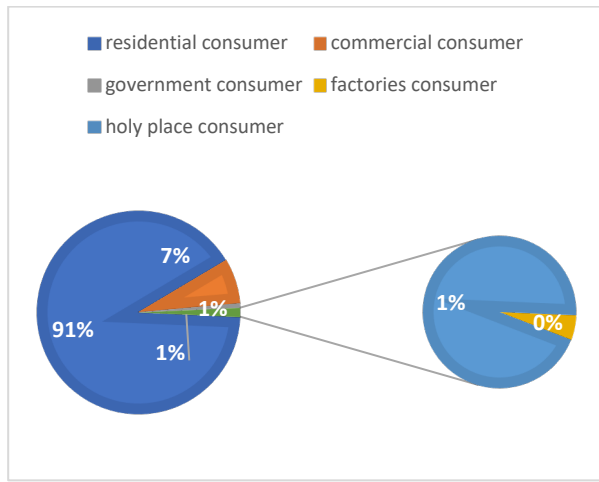
The energy transmission line from Kabul to Zabul, Kandahar and Helmand also pass through this province. Part of the center of Ghazni uses imported electricity. Ghazni

province is connected to the National Power Supply Network of Afghanistan through the NEPS power supply system by a 220kV transmission line from the Chamtalah substation to Arghandi and from Arghandi to the Ghazni shrine substation in 2016 as show in figure 2 (Power, C. D. E. SIGAR., et al., 2010, AEIC., et al., 2019, Danishmal, M., et al., 2022).

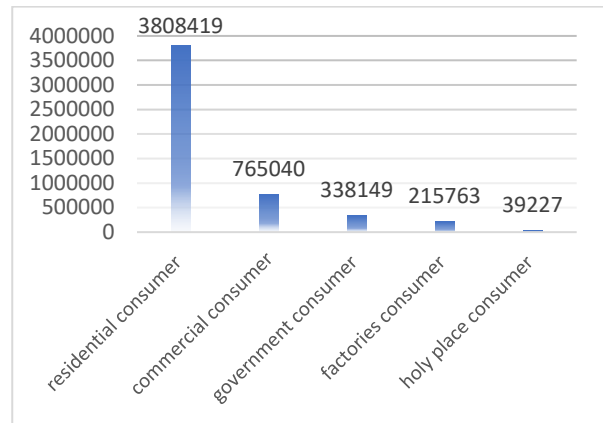


**Figure 2. Transmission Line to Ghazni**

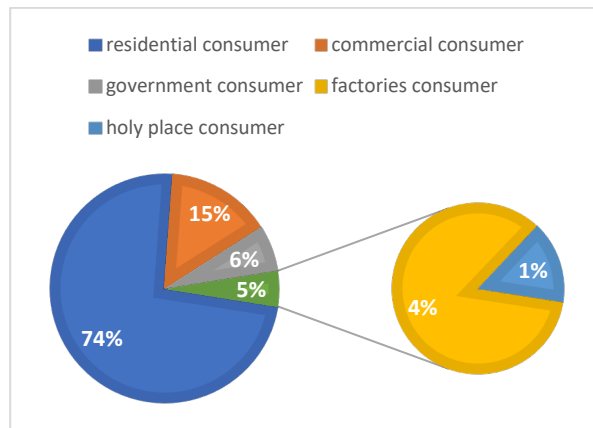
As per (DABS), Ghazni Breshna, the electricity provider, serves 18,171 subscribers in 2023 these subscribers are including 16494 residential consumer ,1310 commercial consumer, 118 government subscriber, 13 factories subscriber and 236 holy place subscriber and approximately 70 % of Ghazni city's population has access to government-supplied electricity. The central part of Ghazni province uses imported electricity. The electricity distributed to the center of Ghazni province through Breshna is about 30 MW. If the power transmission network is extended to the center and districts of the province, a capacity of about 100 MW of electricity is needed(Danishmal, M., et al., 2023). Unfortunately, Ghazni province lacks any domestic sources of electricity production. This situation deprives the people living in the city and villages of this province of benefiting from it.



(a)



(b)



(c)

**Figure 3. (a) The Composition of Consumers in Terms of Consumption, (b) Consumption Energy of Ghazni City, (c) The Composition of Consumers According to the Number of Consumers**

### Challenges Faced in the Initial Stages and Overcome to It

First Challenges faced in the initial stages is the shortage of power lines, means that some places in Ghazni don't have electricity. This lack can lead to unequal socio – economic growth(Ardeshiri, A., et al., 2021), with some areas enjoying the gains of having power while others are left all alone without it. Second challenges are substations, Inadequate substations have impeded daily living and business operations by causing power outages, voltage fluctuations, and restrictions on the amount of electricity that can be delivered to customers. we have in Ghazni one active substation with one active feeder from three exit

feeders and the government of Afghanistan plan to create three more substations. And infrastructure parts are a big problem for making sure that everyone in Ghazni can get electricity fairly. According to study o (Yang, F., et al., 2016) Reducing poverty and closing the development gap may be possible with wise investments in power grid infrastructure and grid improvements. It is very important to fix these problems because it helps the social and economic growth. It also makes sure that everybody gets good things from having electricity in their area. Critical infrastructure systems are important because failures in the electric power grid can lead to productivity losses in dependent industries. Da Afghanistan



Breshna Sherkat (DABS) is making efforts to provide electricity to most areas of Ghazni Province and has plans to electrify all of Ghazni Province by 2032. As summarized in the table 1.

These projects lead to equitable development, ensuring that all communities benefit from the advantages of electrification, thereby fostering socio-economic progress in those regions.

**Table 1. Future Plane for Development of Electric Network in Ghazni Province**

No.	Distribution Network Name	Voltage (KV)	Total capacity (MW)	Current status	Customers (Household)	Reference
1	Ghazni Distribution Network	20/0.4	20.268	Active	18494	(AEIC, et al., 2019)
2	Expansion of Ghazni Distribution Network project	20/0.4	10.000	Suspended		
3	5 Distribution Network for Qalat, shajoi , Qarabagh , moqor and Gelan	20/0.4	69.900	Planned	58300	
4	Distribution Network at Deh yak District	20/0.4	9.480	Planned	7900	
5	Distribution Network at Khwaja Omari District	20/0.4	3.720	Planned	3100	
6	Distribution Network at Jaghatoo District	20/0.4	6.100	Planned	5100	
7	Distri1bution Network at Jaghori District	20/0.4	6.000	Planned	5000	

Building and improving the electricity network in Ghazni is a key part of developing infrastructure. With lots of new power lines, transformers and modernized electricity stations, the area has seen a big change in how easy it is to get reliable electricity. This has made a strong base for more progress in different areas. Let's not forget that with three hundred sunny days, Ghazni has 2320867 MW estimated solar power potential and the capacity to generate 5802 MW of solar power and with total wind area of 93 km<sup>2</sup>, an estimated 191 MW of potential wind energy, and a realistic 48 MW wind energy capacity (Slimasnkhil, A. K., et al.,2020, Ludin, G. A., et al., 2016). DABS has plan to give raise mini grid solar project in Nawor whit 1MW and mini grid solar project in Ajristan, Malistan, Jeghatu, Rashidan & Khogyani total with capacity of 24 MW of solar energy.

### Socio-Economic Impact Electricity

Improved electric networks have a significant socio-economic impact. Power sector reforms in developing economies have led to positive economic impacts, social welfare improvements,

and reduced network energy losses (Singh, P., et al.,2020). Electricity use has been linked to improved income, employment, education, and overall quality of life (Falk, J., et al., 2021). However, the benefits of electricity use can vary depending on family circumstances and cost affordability (Ali, S., et al., 2020). In the Ghazni province, almost 70% of individuals lack consistent access to electricity. This is seen as a constraint on the socioeconomic growth of communities, particularly those in rural areas. Many resources have been invested in programs and projects that try to improve people's socioeconomic conditions through access to energy throughout the previous few decades by foreign donors, organizations, NGOs, energy planners, and private corporations (Shoaib, A., et al., 2016).

### Economic Growth

In developing countries with limited resources, the consumption of electricity is essential for commerce, industry, and policy matters at both the macro and local levels. As a way to create the world we live in today, many things have changed. All of them are based on a plentiful and largely continuous supply of energy. Since

energy is essential to all area of contemporary economies, it serves as the basis for all of our economic endeavors (Atems, B., et al., 2018). The development of electric networks stimulates the economy significantly by boosting productivity, promoting economic growth, and generating job possibilities. By making investments in power infrastructure results in more people having access to energy, enhanced reliability, and decreased transmission losses (Cozzi, L., et al., 2020). Modern machinery and technology run on electricity, which boosts productivity and production efficiency in a number of industries. Higher economic output and possible GDP growth result from this. For instance, a study discovered that a 1% increase in electricity usage can eventually result in a 0.22% rise in economic growth (Stern, D. I., et al., 2019).

According to the current situation of Ghazni, it is obvious that building strong infrastructure in Ghazni, including communication networks, transportation networks, and medical facilities, requires reliable electricity. This creates an atmosphere that is favorable for economic activity and improves the general ease of conducting business. Ghazni's electricity will serve as a catalyst for the region's economic recovery.

### Creation of Job Opportunities

The impact of electricity on job creation is influenced by various factors. power outages and unreliable electricity have a negative implication for job creation in developing countries. For instance, in Africa, electricity shortages significantly reduced employment rates through three channels, constrained the creation of new businesses, reduced the output and productivity of existing firms, and distorted the business climate (Mensah, J. T., et al., 2024). However, the arrival of electricity in the manufacturing sector leading to rapid and long-lasting labor productivity gains, capital deepening, and an increase in output and employment, particularly in markets with relatively small firms. On the other hand, the accelerated uptake of renewable electricity generation is projected to have a positive impact on job creation in area, with solar

PV, batteries, and wind power being the major job creating technologies. Additionally, renewable energy sources have been associated with higher job creation in the electricity sector and positive economy-wide effects, contributing to both environmental sustainability and decent work for all (Hanna, R., et al., 2023). That a constant 1 GWh increase in the amount of power produced annually from renewable sources produces 3.5 new employment over the long run and 4.7 new jobs in the short term. Therefore, almost 3/4 of the jobs generated by the use of renewable technologies are long-term and sustainable. In terms of nuclear power, a 1 GWh increase results in 0.81 employment in the near term, which is six times fewer than the number of jobs produced by an equivalent growth in renewable electricity (Arvanitopoulos, T., et al., 2020). This indicates that the government of Afghanistan will be able to create employment opportunities for the residents of this province by using renewable energy (photovoltaics and batteries) to generate electricity in a city like Ghazni, which has 300 days of sunshine. Ghazni is a historic province that has been selected as the recurring capital of Islamic culture and civilization by the Conference of Islamic Countries. Better infrastructure and illumination have the potential to draw tourists, generating employment in the travel and hospitality industries as well as guide services. (Baruah, B., et al., 2015) study presents many prospects for female empowerment in the renewable energy industry in India. This study then showed that women specializing in the area not only creates gender equality but fosters economic development, and sustainable production which leads to good socio-economic outcomes.

### Quality of Life Enhancement

Reliable power supply fosters economic growth, social welfare and all-round development, which invariably enhance the quality of life in the country (Alikulovich Fayziev, R., et al., 2021). study's findings demonstrate that there is a strong relationship between consumption levels of energy and quality of life indices. Hence, it is through the creation of green policies that peace, justice, and prosperity will come full circle (Nadimi, R., et al., 2018). Modern developed

societies could not function without electricity. Indeed, "electricity " is typically the one main comfort that are instantly linked to quality of life in cultures when basic human requirements like food, health care, good housing, and education are addressed. Electricity has developed into a vital, all-purpose energy source due to its adaptability, controllability, quick availability, and consumer-end cleanliness (Pasten, C., et al., 2012). Today, it is practically indispensable in kitchens for appliances like refrigerators, ovens, and cookers, dishwashers, and a number of other items, as well as in the rest of the house for cooling, heating, radios, televisions, computers, and the like (Laloux, D., et al., 2013).

Du to the current condition of Ghazni province we obvious that the living standards of the people of this are very low and access to modern facilities is very limited. For example, only a very small number of people who have a good economic status use electricity for appliances such as refrigerators, washing machines, water pumps, cooling and heating, radios, televisions, computers, and other essential low-consumption devices. On the other hand, people who have a poor economic status or live in the rural area of this province only use electricity for lighting houses, radios, televisions, and charging mobile phones. And they carry out most of the affairs of life in the traditional way. Of course, as we discussed earlier, the rural areas are not connected to the national grid and use solar energy and batteries as a source of energy to meet the basic needs of life. They use wood, coal, and animal residues to heat their homes. Undoubtedly, the people's quality of life will be greatly impacted by Ghazni province's access to affordable and reliable electricity. Electricity improves productivity at work, which has a huge effect on people's quality of life. A 1% raise in energy consumption in African nations corresponds to a 0.5286 % increase in quality of life. However, a 1% decrease in electricity consumption will result in a 0.2161 percentage drop in quality of life (Muhammad, S., et al., 2021).

## Influence on Schools and Educational Facilities

Numerous studies display the remarkable effect of rural electricity access on children's schooling in Nigeria. In the villages, electricity availability is a chief factor accelerating educational achievement by giving opportunity for studying under the light, powering the electric devices for learning and minimizing schools' operating ineffective. This highlights the essential role of electrification programs in the creation of education opportunities and socio-economic development, especially in the rural communities which have limited access to modern facilities (Nano, E., et al., 2022, Daka, K. R., et al., 2011). Access to electricity promotes both health and education by allowing children to study for longer periods of time and reducing indoor air pollution (Olanrele, I. A., et al., 2020). During the COVID-19 pandemic's peak, there were clear benefits to living without electricity. Higher education institutions were inaccessible to students. Unfortunately, the majority of them lived in rural Ghazni province and were unable to take advantage of the online learning environment since they did not have access to electricity or the internet. The students' education suffered greatly as a result of their inability to obtain resources during that time. For a three-month hiatus, the students are also unable to continue their study because of the Ghazni villages' present weak and inconsistent electrical supply, which prevents them from using technologies like the internet, television, and various other electronics. Even so, during my investigation into the Ghazni people, I was unable to locate any publications that directly addressed improved educational circumstances. The use of new media, including computers and the Internet, greatly enhances and advances education. Children that live in electrified homes can also learn outside of their regular schedule, particularly in the nights. The fact that children play a vital role in the family's labor may be one potential obstacle in the province of Ghazni. They are frequently employed, in instance, to gather wood for heating and cooking. Therefore, if electricity produced by a development of grid system took the place of wood as the primary

energy source, kids might be less involved in household chores and have more time for schooling. In the study by Chatterjee, S., et al., (2023), "En-'lightening' children: Evaluating the influences of access to electricity on the learning achievement levels," evidence shows a strong and positive correlation between access to electricity and learning achievement levels among children. With availability of electricity comes no more using flashlights for countless night studies and one can enjoy e-learning materials. This highlights the need for the electrification initiatives in order to heighten educational results and build people's potential especially where there are little chances to get the advanced facilities.

### Healthcare Advancements

Electrification significantly affects health in several of ways. Having access to electricity is essential for bettering healthcare results, especially in underdeveloped nations (United Nations Conference on Trade and Development., et al., 2023). The availability of health services, communication technology, proper vaccination and medication storage, improved health worker motivation, and higher community satisfaction are all correlated with energy access. Obstacles to attaining results in the health system include shortages of medications, inadequate transportation, and subpar facilities. The number of healthcare services provided at primary health centers in rural regions is reduced when there is no electricity available. This has a particular impact on women's access to high-quality, safe healthcare (Shastri, V., et al., 2021). The number of deliveries, in-patients, and out-patients at basic health centers significantly decreases when there is no access to electricity. Women's access to healthcare is disproportionately impacted by lower levels of power access. Health care has benefited greatly from electricity. More thorough treatments are possible using medical equipment that runs on electricity. Medical care and local living circumstances are significantly improved by the capacity to chill pharmaceuticals, hence increasing their shelf life (Irwin, B. R., et al., 2020). lastly, studies have shown that better access to electricity is linked to health impact which entails reduced death rates, good

sanitation, and hence better healthcare. This is the more reason why for the increasing uptake of electrification in public health and well-being in developing countries (Reyes-Elizondo, A., et al 2018).

The majority of people in the province of Ghazni do not think that heating or cooking requires an electricity connection. This indicates that individuals still heat their homes and cook using fossil fuels. High levels of on-site contamination result from this, though. Furthermore, all of these energy sources are costly, ineffective, and the primary contributor to health risks like cancer, heart disease, and lung and breathing problems. Electrically powered substitutes have the potential to greatly mitigate these risks, hence safeguarding public health. The standard of medical care can be raised via electricity. Electricity makes it possible for medical facilities to offer improved medical supply chains, refrigeration, and continuous, high-quality oxygen supplies.

### Poverty and Agriculture

Lack of access to basic necessities of life, such as food, clothing, sanitary conditions, housing, medical treatment, education, and so forth, is referred to as poverty (Rachmawatie, D., et al., 2021). sustainable electricity supply was found to be a key determinant in the development of the poverty reduction strategies. Furnishing stable electric power networks presents opportunities for developing economic activities, improving living standards and empowering communities, hence contributing remarkably on poverty elimination in the country. The prosperity of the impoverished in rural areas is greatly impacted by electrification efforts that reach more households in poverty. Social and economic scholars have been focusing on the function of electrification in reducing poverty and its effects on household spending behaviors. Electrification can lead to a decrease in rural poverty in addition to having a positive effect on household spending (Eseyin, O., et al.,2022). In developing countries, the lack of electricity is considered a major impediment to economic expansion and improved well-being. The majority of research supports that improving



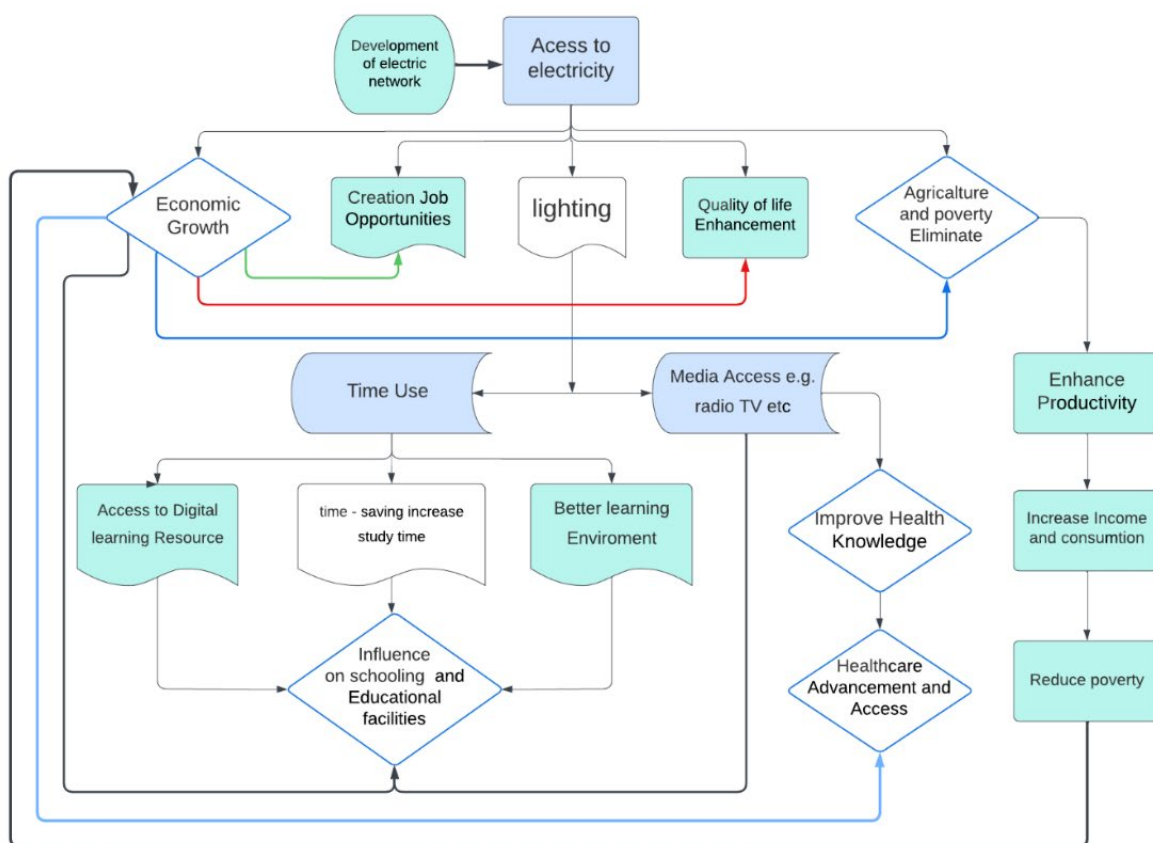
access to electricity is essential to reducing poverty and empowering agriculture (Rachmawatie, D., et al., 2021).



**Figure 4. Usage of Solar Panels for the Irrigation in Agricultural Sector**

Inadequate access to modern energy services impedes agricultural output and profitability,

because it restricts the use of irrigation systems, mechanization, and post-harvest processing (Falchetta, G., et al., 2021), while the agriculture industry is crucial to the achievement of the Sustainable Development Goals (SDGs), rural and economic development, and poverty reduction (Omoju, O. E., et al., 2020). The majority of people in Ghazni's rural districts work in agriculture, hence electricity supports agricultural activity. In contrast, the majority of Ghazni province's rural residents now irrigate and cultivate their land using electricity (also known as solar power or PV). As in figure 4. This province's adoption of solar systems has resulted in higher agricultural output and more employment prospects for the majority in recent years. This has prompted more individuals to work in agriculture, lowering poverty and raising family and regional economic standards.



**Figure 5. The relationship between socioeconomic status and access to electricity**

## Conclusion

Since electricity is considered the foundation of any economy's growth and prosperity, it follows that it plays a vital part in socioeconomic development. The current power transmission network in Ghazni province is only capable of 6 MW, but in order to reach the district and center, an additional 100 MW of electricity will be needed. As we say before, renewable energy sources have been associated with higher job creation in the electricity sector and positive economy-wide effects, contributing to both environmental sustainability and decent work for all. Therefore, this is the best option for development of socio-economic of Ghazni. In this study, we find that electricity has a significant impact on creating job opportunities, especially the production of electricity from renewable sources, which creates jobs in the long and short term. Ghazni is also a historic city, and the electrification of this province will attract tourists, which will itself create new jobs in the travel, hospitality, and guide services industries. Electricity improves productivity at work, which has a huge effect on people's quality of life. Today's modern cultures are inconceivable without electric power. A 1% raise in energy consumption in African nations corresponds to a 0.5286% increase in quality of life. However, a 1% increase in electricity consumption will result in a 0.2161 percentage drop in quality of life (Mensah, J. T., et al., 2024). By access to electricity, we are able to use from new media, including computers and Internet, which greatly enhances and advances education. The quality and quantity of healthcare services provided in this region are greatly impacted by the major infrastructure and human resource limitations that Ghazni primary healthcare systems face, including consistent access to electricity. The functionality of healthcare facilities as well as the level of care, accessibility, and dependability of the medical services provided can all be enhanced by access to electricity. It makes it possible for vital medical equipment to operate, including vaccine refrigeration and surgical, laboratory, and diagnostic tools. This can help keep people healthy, cut down on missed workdays and revenue, and lessen poverty. The

majority of people in Ghazni's rural districts work in agriculture, hence electricity supports agricultural activity. This province's adoption of solar systems has resulted in higher agricultural output and more employment prospects for the majority in recent years. This has prompted more individuals to work in agriculture, lowering poverty and raising family and regional economic standards.

## Funding

This research received no external funding.

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