RENEWABLE ENERGY PRACTICES TOWARDS POVERTY REDUCTION IN THE LEGAL AND GOVERNANCE CONTEXT

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Abstract

Poverty is one of the most vital issues negatively impacting livelihoods in South Africa. Central to addressing basic human needs towards poverty eradication lies the provision of renewable energy (Chen, 2024). Poverty can be addressed through access to energy sources that are modern, clean, and affordable (Lu et al., 2023). Energy is relevant for addressing fundamental human needs and is a prerequisite for economic growth. The study investigated the extent to which a move towards clean energy for poor communities contributed towards poverty reduction in an urban context. The study was carried out in two phases using a mixed-method research design. Phase 2 was a qualitative study based on information gathered from in-depth interviews, while Phase 1 was a quantitative study that included an online survey. According to the study's findings, the adoption of renewable energy technologies in Soweto township, will contribute to a decrease in poverty, improve the socio-economic status of citizens, enhance economic growth, and save the environment. To achieve poverty reduction, the researchers concluded that, the government should provide the citizens with affordable renewable energy equipment, such as solar panels to those that are regarded as poor and provide incentives to those that install solar panels in their household.

Keywords: Poverty Reduction, Renewable Energy, Clean Energy, Economic Growth, Socio-Economic

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1. INTRODUCTION

Energy is necessary for economic growth and the achievement of socioeconomic goals, as well as achieving basic human needs. Access to reliable and sustainable energy services is essential to modern living and has a big impact on social progress, economic growth, and environmental sustainability (Mukumba & Chivanga, 2023). Energy use in households raises living standards because refrigeration improves health, lighting, and communication improves education, productivity boosts income, and less strain on conventional energy sources protects the environment (Njiru & Letema, 2018). Furthermore, access to modern, affordable, and clean energy services has a favourable impact on living standards and is an essential element in a poverty reduction strategy.

Electricity availability is a crucial component that could help in reducing global poverty. It improves social services, employment, and economic growth, which may delay poverty and foster sustainable economic growth (Asghar et al., 2022). Without increasing energy consumption and substituting more practical and efficient energy and technology sources for human labour, no country has been able to significantly reduce poverty. The availability of modern, affordable, and clean energy for everyone is necessary to improve basic aspects of human welfare, including the ability to live long and productive lives, enjoy good health, have access to knowledge and education opportunities, and have the potential to earn enough money to meet their basic needs for food, shelter, and other material and aesthetic necessities (Hussein & Filho, 2012). Energy poverty is a result of the failure to adopt more affordable and environmentally friendly energy sources (Njiru & Letema, 2018). Energy poverty is characterized by a strong dependence on conventional fossil fuels for cooking and an inability to access clean energy and efficient facilities (Lu et al., 2023).

It is therefore essential for sustainable development and poverty alleviation to have readily available energy services in the form of renewable energy resources that are sufficient, reasonably priced, dependable, high-quality, safe, and ecologically friendly. Careful energy resource management is a supplementary strategy that helps alleviate poverty and foster economic expansion, improve socio-economic conditions, protect the environment, and provide trade opportunities (Njiru & Letema, 2018). Additionally, it creates extra revenue and advances food security through the use of contemporary irrigation and water-pumping technologies (Chilundo et al., 2019). It contributes to the expansion of both formal and informal employment opportunities, increasing worker productivity. Globally, renewable energy has grown quickly among other energy sources and is thought to have enormous potential for societal advancement (Lu et al., 2023). Future urban and rural energy demands depend heavily on renewable energy (Batool et al., 2023). Energy production generated from renewable energy resources has recently gained attention both worldwide and within South Africa. This trend is highlighted by Sustainable Development Goal (SDG) 7, which targets "Ensuring access to affordable, reliable, sustainable and modern energy for all" (United Nations, 2015). Therefore, this paper aims to investigate renewable energy practices in contemporary Soweto township, through a survey in which the interview and questionnaire are used to gather data to enhance economic growth and better socioeconomic position of the people residing in the South African townships. The study used a mixed-method approach to examine the phenomenon, utilizing both qualitative and quantitative research techniques.

The research is significant to several stakeholders which include but are not limited to the Soweto community, the government, the energy sector, and the researcher. For the empirical work, in the Soweto community, this study would create new data about a neighbourhood and its salient features, in terms of the study, and would open a window (an observatory) into the lives of residents living within a community characterised by chronic urban poverty (the consumers). In many regions of the world, renewable energy sources are the least expensive new power generation technology, and prices are still going down. In particular, in middle-income cities and low-income like Soweto, the only way to increase energy access for all residents is through renewable energy, especially those who reside in informal settlements and urban townships in the suburbs and remote areas. This study contributes to knowledge of the lives of people in Soweto and in a larger population of South African township residents, and to government and non-governmental organizations (NGOs) township development policies. The study adopted the adopters categories model as its main theoretical framework taken from the main theory, popularly known as the diffusion of innovations theory.

The remainder of the paper is organized as follows. In Section 2, the pertinent literature is reviewed. In Section 3, the approach taken to carry out empirical research is examined. In Section 4, the findings of the study are shown. In Section 5, the results are discussed. In Section 6, the study's conclusion is drawn.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. Renewable energy as a poverty reduction strategy

South Africa's high levels of poverty and emissions are still fuelled by the energy sector's historically developed structures (Mutombo & Numbi, 2019). Poverty is regarded by Hussein and Filho (2012) as one of the most important and urgent problems facing the world, which requires socio-economic development. Nnaji et al. (2010) claim that poverty is the inability of an individual (or family) to pay for necessities like food, housing, fuel, clothing, safe water, sanitary conditions, medical care, and education. Hussein and Filho (2012) conceptualise material poverty as the inability to obtain sufficient amounts of food, water, clothing, shelter, sanitation, medical care, and education, which translates into a lack of income. According to Ivanovski et al. (2021), there are numerous ways that contemporary energy services improve the lives of the impoverished. Poverty can be addressed through access to energy sources that are modern, clean, and affordable. Chen et al. (2020) state that inadequate access to sustainable energy sources negatively impacts people's quality of life, health, and capacity for productive endeavours. Enhancing the availability of energy resources is the most essential prerequisite for reducing poverty and promoting economic expansion (Khobai, 2021).

According to Zhao et al. (2022), energy is a crucial component of both social and economic development. Nnaji et al. (2010) argue that the basic development challenge of providing enough food, shelter, clothing, water, sanitation, medical care, education, and information access depends heavily on energy services. Energy is essential even though it is one factor that determines poverty and development. Fatona et al. (2013) argue that people, usually women, are compelled to devote the majority of their time and physical energy to

subsistence activities if they do not have access to basic energy services for lighting, cooking, heating, pumping, transportation, communication, and other productive purposes. Nnaji et al. (2010) further argue that basic necessities like cooked food, a comfortable temperature, lighting, appliances, piped water or sewerage, vital medical care (emergency and critical care, vaccines kept in a refrigerator), educational tools, communication (radio, television, electronic mail, the internet), and transportation are all made possible by energy.

This study conducted by Khobai (2021), investigates the connection between South Africa's economic growth, poverty reduction, and clean energy consumption. Thiam (2011) states that a preliminary definition of poverty is necessary in order to link energy access to poverty reduction. Given the monetary definitions of poverty, a causality analysis could be used to determine how energy access and poverty reduction are related. Energy use has several connections to poverty alleviation, including enhancing social well-being. Szabo et al. (2013) argue that lack of access to adequate and clean energy sources can lead to situations where people are "trapped" in poverty and has a number of negative effects on people's living conditions, health, and capacity to participate in productive activities. Khobai (2021) argues that economic growth and the use of clean energy have a substantial and detrimental effect on poverty over the long and short terms. Therefore, Ouedraogo (2013) recommends that providing people with access to affordable and clean energy sources serves as a crucial tool in poverty reduction policies. Numerous empirical studies have been carried out using econometric tools to investigate the causal link between energy consumption and economic growth (Mutombo & Numbi, 2019). The bidirectional trend of causality suggests that energy consumption influences economic growth and, conversely, economic growth causes energy consumption to increase. Thiam (2011) concludes that if the multidimensional aspect is considered, socio-economic analyses yield more accurate results regarding the correlation between energy access and enhancements in the quality of life.

Modern, clean, and affordable energy source plays a vital role in poverty reduction such as improved health care and better socio-economic status (Zhao et al., 2022). The evolving literature highlights the correlation between energy access and poverty reduction (Avato & Coony, 2007; Maiga et al., 2008). According to Thiam (2011), the aspiration to enhance access to energy continues to be a powerful motivator for alleviating poverty in both rural and urban regions of developing nations. This was also supported by Fatona et al. (2013) who indicated that energy services play a vital role in driving growth, enabling developing countries to overcome poverty and the conditions of poverty. Hussein and Filho (2012) consider energy as a crucial element in the quest for sustainable development, aiding in endeavours such as poverty alleviation. Fatona et al. (2013) state that the absence of energy services is closely linked to key aspects of poverty, such as insufficient healthcare, low education levels, and restricted employment prospects. Poverty and lack of access to modern energy services are frequently intertwined. The absence of modern energy access can worsen poverty by restricting opportunities for individuals to improve their circumstances (Mutombo & Numbi, 2019). Mutombo and Numbi (2019) also mention that access to modern, reliable, and affordable energy is vital for promoting socioeconomic development and reducing poverty. The limited availability of modern energy significantly affects socioeconomic development. As a result, women are forced to travel long distances in search of wood for cooking (Fatona et al., 2013). Maradin et al. (2017) argue that energy plays a substantial role in poverty reduction.

This study, therefore, investigated the significance of renewable energy, which is clean, affordable, and environmentally friendly as a means of reducing poverty and used as a strategy in South African townships. Considering the above problem statement, the lead research question for this study is:

RQ: To what extent can affordable renewable energy technologies contribute to a poverty reduction strategy in the community of Soweto that promotes socio-economic and climate change benefits?

2.2. Hypothesis development

The Chi-square test of independence was used for hypothesis testing to evaluate if there was a correlation between variables. This study only addresses one hypothesis:

H1: There is no correlation between access to affordable renewable energy and poverty reduction in urban areas.

As a rule of thumb, after assessing the validity and reliability of a questionnaire, the next step is to assess the fitness of the structural model of a study. This was done with the help of the SmartPLS 4.0 version. The hypothesised theories of the study were modelled as a causal relationship with the endogenous factor and estimated. The variance (R^2) of each dependent factor indicated how well the model fitted the data of the study as R^2 shows the amount of variance in a dependent factor that is explained by a model. Therefore, the R^2 and path coefficients indicated the models' fit (effectiveness) to demonstrate the model performance.

3. RESEARCH METHODOLOGY

This section presents the paradigm of the study and the design that was employed to conduct the study. According to Gonyora (2021), research design refers to the systematic approach taken to address the various considerations involved in formulating and implementing a research strategy. Willard (2020) regards research design as the comprehensive framework that links theoretical research issues to relevant empirical investigations. Research design constitutes a systematic approach and framework for conducting research, transitioning from broad concepts to detailed methodologies for data collection (Gonyora, 2021). Willard (2020) further argues that research design serves as a foundational element that connects and aligns with global expectations and attributes, asserting that design plays a crucial role in shaping the research paradigm.

The design chosen for this study is both an explanatory research approach, carried out through a comprehensive literature review and

qualitative interviews and a descriptive research approach carried out through quantitative surveys. This procedure consists of two phases, with quantitative data being gathered in the first phase from the chosen population of Soweto residents; the results were examined and subsequently utilized to strengthen phase two, which was qualitatively conducted from selected interviews of ten families chosen from Soweto township and five energy industry expects. The objective of this approach is to utilize qualitative data to explain the specifics of the preliminary quantitative findings. Therefore, a multi-method research approach was employed in this study. The reason for employing a multi-method social scientific research approach was that it allowed the researcher to produce a case study of one South African township, and to incorporate both quantitative and qualitative research methodologies to enhance the study's scope and depth.

This study primarily employs an inductive approach rather than a deductive approach. The researchers employed an inductive methodology by examining and interpreting the opinions of the respondents, which facilitated a deeper comprehension of the experiences being investigated. Thus, deductive research involves the application of various hypotheses derived from established theories (Mazibuko & Mutambara, 2023), whereas the inductive approach entails formulating a theory or factual conclusion through the collection and analysis of data.

3.1. Research area

The study explores the relationship between access to modern, cost-effective, and clean renewable energy as an alternative energy source and its role in strategies aimed at alleviating chronic poverty in South African townships. In part, the results and recommendations derived from the study are relevant to all townships in South Africa. The study focused on building a case study of a neighbourhood within a South-Western township (Soweto) situated in Gauteng province, the primary reason for choosing Soweto is the distinctiveness of this township, in the context of a broader discussion of the evidence we have about energy and utility transformations in supply and demand and chronic urban poverty worldwide. Soweto is made up of 32 different neighbourhoods, clustered together, with a vibrant mix of cultures and tribes. It serves as a key center for economic development as identified by the South African government. Soweto serves as a useful indicator of township experiences and attitudes and a useful case of the state of electricity provision in the country (Harrison & Harrison, 2014). Soweto was selected because of its diverse citizenry and there have been calls for the implementation of renewable energy in the very same township.

3.2. Sampling design and population

The study targeted residents from the Dobsonville section in Soweto township. The targeted population is all residents of Soweto who are adults from the age of 18 years and above and who are somehow impacted or affected by energy. In this study, the probability sampling technique was utilised. The study employed a stratified random sampling method to select participants from the population. The stratum units to study comprised Soweto neighbourhood residents, community-based organisations (CBOs), industry experts (utility providers), and local small businesses. This sampling method covered the maximum population, as the researchers had a complete charge over the strata division. A questionnaire was distributed to a stratified random sample of 384 respondents for quantitative study. Further to that, a stratified random sample of 15 units was studied in depth for the qualitative study. The study focused on building a case study of a community within Soweto in the context of a broader discussion of the evidence we have about energy and utility transformations in supply and demand and chronic urban poverty worldwide.

3.3. Data analysis

The process of data analysis encompasses the condensation of extensive data into a more manageable format, the creation of summaries, the identification of patterns, and the utilization of statistical methods (Kabir, 2018). According to Annan (2019), data analysis aims to create a link between existing knowledge and new insights regarding a research issue by reviewing pertinent literature and gathering vital information from individuals, as well as from various elements of both quantitative and qualitative research methodologies. Willard (2020) describes data analysis as segmenting the data into comprehensible themes, patterns, trends, and relationships. Quantitative research employs numerical data as its primary unit of analysis, whereas qualitative research relies on words or visual representations for its unit of analysis. In this research, quantitative data were examined through descriptive statistics utilizing the Statistical Package for the Social Sciences (SPSS version 29) software. In addition, Microsoft Excel was utilized to develop graphs and tables. Qualitative data was examined utilizing conceptualisation and interpretation of data recorded during data collection. The partial least squares-structural equation modeling (PLS-SEM) was statistically utilized in this research to model relationships between variables. The data were recorded from questionnaires and interviews and analysed with the help of the Smart PLS 4.0 and Tableau 4.0 statistical as well as data visualisation software respectively. The former helped with quantitative analysis while the latter dealt with a thematic grouping of words into key words analysis. These findings were confirmed with either method to cater to the shortfalls of each methodology.

4. RESULTS

Out of the 384 research questionnaires that were distributed, 252 were filled out and submitted. Ten families and five energy industry experts were chosen for structured interviews. The subsequent results were derived from the inquiries made in the survey and the comprehensive interviews conducted, which evaluated the relationship between renewable energy practices towards poverty reduction in contemporary Soweto township, South Africa.

4.1. Access to electricity in household

The respondents were asked to indicate the method they were using to access electricity. This was to ascertain what method participants were accessing their electricity. A list of possible methods of accessing electricity was provided to the respondents to choose from as was applicable to their situations. The results indicated that the majority of the respondents (194; 77%) were accessing their electricity through an in-house post-paid meter, while 58 (23%) were using an in-house pre-paid meter system. None of the respondents were using other forms of systems to access the electricity.

4.2. Type of energy supply

The respondents were asked to indicate their electricity supplier. A list of possible suppliers was provided to the respondents to choose from as was applicable to their situations. The results indicated that most of the participants (152; 60%) were receiving their electricity from Eskom, while 100 (40%) were receiving electricity from the municipality. In addition, the study found that none of the respondents were receiving electricity from private energy suppliers, off the grid, or other sources.

4.3. Average monthly electricity bill

The respondents were requested to specify the amount of money they were spending on electricity every month. This was to ascertain if using solar energy as an option would be cheaper than the cost they were spending on electricity. A list of possible monthly bills was provided for them to choose from as was applicable to their situations. The results revealed that the majority of the participants (120; 48%) were spending R1001–R2000 to buy electricity monthly, followed by those who spent R2001–R3000 (64; 25%). In addition, the results show that 36 (14%) of the respondents spent R501–R1000 per month, while 32 (13%) spent as little as R100–R500 monthly. Moreover, the study found that none of the respondents were spending R3001 and above on electricity.

4.4. Monthly pay electricity price rating

The respondents were asked to rate on a Likert scale the amount of money they were spending on electricity monthly, whether it was too high or too low. A Likert scale of "far too high" through to "do not know" was used to measure their responses. The results suggested that most of the participants (172; 68%) felt that they were spending too much money on electricity monthly, followed by those who said it was far too high (64; 25%). In addition, the study found that only 16 (6%) said it was about right, while none of them said it was too low or did not know.

4.5. Household reaction to electricity price escalation

The respondents were asked to express their reaction to the recurring increases in electricity prices in South Africa. The results are presented that a substantial number of the respondents (96; 38%) said they utilise alternative energy sources, including paraffin, natural gas, coal, and candles, followed (88; 35%) by those who said they maintained their electricity usage at the same level and incurred additional costs. In addition, the results show that 68 (27%) said they reduced the amount of electricity used. Furthermore, none of the respondents used energy-efficient appliances and other sources.

4.6. Cut back on spending on electricity

The respondents were requested to specify if, within the past year, their household had reduced expenditures on energy for lighting, cooking, or heating to manage their finances effectively. A Likert scale of "very often" through to "never" to measure their responses was employed. The results indicated that most of the respondents (138; 55%) had occasionally cut back on spending on energy for lighting, cooking, or heating in order to make ends meet, in the last 12 months. In addition, the results show that 66 (26%) of the respondents said they rarely cut back on spending, while 32 (13%) said never and 16 (6%) said they often cut back on spending. None of the respondents cut back on spending very often.

Additional insights were revealed through the questionnaire made in the survey and the in-depth interviews conducted, which resulted in the distribution of a questionnaire to a stratified random sample of 252 respondents based on the calculation for determining the minimum sample size for categorical data (Saunders et al., 2016) as follows:

- First, the study determined the satisfactory boundary of error, say +/- 5% = e%;
- Then established a confidence level of 95%;
- It settled on the z-value at a 95% confidence level = 1.96;
- Assessed the split, for example, a 50/50, as the quantity going to the sample = p%, and those not = q%, to the quantified group.

$$n = q\% \times p\% \times (z/e\%)^2$$
$$n = 50\% \times 50\% \times (1.96/0.05)^2 \quad (1)$$
$$n = 385$$

This was altered since the sample size was < 10000 a lesser sample can be used devoid of precision lost, thus:

n^1 = adjusted minimum size sample; n = calculation as per formula above; N = total sample.

$$n^1 = n/1 + (n/N)$$
$$n^1 = 300/(1 + (300/5201)) = 284 \quad (2)$$

Grounded on these least returned sample sizes the data normality was distributed as Table 1 for validity of the study sample.

Table 1. Data normality for the quantitative data

Name	*Mean*	*Median*	*Scale min*	*Scale max*	*Observed min*	*Observed max*	*Std. Dev.*	*Excess kurtosis*	*Skewness*	*Cramér-von Mises p-value*
Gender	1.493	1.000	1.000	2.000	1.000	2.000	0.500	-2.013	0.028	0.000
Age	3.102	3.000	1.000	5.000	1.000	5.000	1.148	-0.692	-0.131	0.000
Living Conditions	1.873	2.000	1.000	4.000	1.000	4.000	1.023	-0.192	0.990	0.000
House Size	2.680	3.000	1.000	4.000	1.000	4.000	0.746	0.017	-0.427	0.000
Family Size	2.433	3.000	1.000	4.000	1.000	4.000	1.207	-1.563	0.025	0.000
Source of Income	1.549	1.000	1.000	4.000	1.000	4.000	0.983	1.756	1.763	0.000
Household Workers	1.239	1.000	1.000	2.000	1.000	2.000	0.427	-0.496	1.228	0.000
Household Income/mth	4.011	5.000	1.000	5.000	1.000	5.000	1.260	0.172	-1.145	0.000
S1Q9	1.250	1.000	1.000	2.000	1.000	2.000	0.433	-0.657	1.161	0.000
S1Q10	4.243	4.000	2.000	5.000	2.000	5.000	0.972	0.816	-1.337	0.000
S2Q11	1.236	1.000	1.000	2.000	1.000	2.000	0.425	-0.439	1.251	0.000
S2Q12	1.394	1.000	1.000	2.000	1.000	2.000	0.489	-1.824	0.435	0.000
S2Q13	2.831	3.000	1.000	4.000	1.000	4.000	0.942	-0.456	-0.597	0.000
S2Q14	1.880	2.000	1.000	4.000	1.000	4.000	0.727	2.732	1.295	0.000
S2Q15	3.655	3.000	3.000	5.000	3.000	5.000	0.783	-1.038	0.693	0.000
S2Q16	2.415	2.000	1.000	4.000	1.000	4.000	1.309	-1.702	0.228	0.000
S2Q17	3.430	3.000	2.000	5.000	2.000	5.000	0.795	-0.274	0.507	0.000
S2Q18	1.229	1.000	1.000	2.000	1.000	2.000	0.420	-0.318	1.298	0.000

Note: S — section; Q — question.

The normalcy of this study's data, having been assessed with the sign analysis generated the above results. The mean and standard deviations (Std. Dev.), along with display variables, excess kurtosis, and skewness are displayed in Table 1 for inspection. Out of the total organised measurement model instances, 39 met the validity criteria and these were used for the quantitative analysis. Even though the non-normal circulation of data might cast some questions on the outcome of an examination, Optimum possibility services are durable to skewness with just little impact on the specification estimate as well as standard errors.

Let it be enough by keeping in mind that the PLS-SEM covariance evaluation, which was used in this research study, does not call for generally dispersed information to execute evaluation (Henseler et al., 2016). This as a result removes the outcome of this research from any kind of information misconception or uncertainty. Considering that the regulation of data normality needs kurtosis and skewness to drop within the variety +/- 1.0, the dataset measurements are given for the interested viewers in Table 1.

4.7. Results derived from the in-depth interviews

The qualitative data analysis performed in this study served as a foundation for ensuring that the qualitative data gathered through the interview process was systematically organised and thematically categorised. This approach contributed to the overall dataset and was triangulated with the quantitative data obtained from the questionnaire. The subsequent findings were derived from the in-depth interviews conducted.

Question 1: Do you believe that the price paid for electricity in your neighbourhood is fair?

Participants in the interviews were asked about their perceptions regarding the fairness of the electricity prices they are currently paying, all participants (10) who were interviewed, agreed that the price paid for electricity in South Africa is very high. One of the participants (R9F3) mentioned that *"Current government promised us free electricity for all, but we are getting the opposite of that"* (personal communication, October 22, 2022). This high cost of electricity requires government intervention. Consumers of electricity in South Africa are becoming poorer as a result of the ever-increasing cost of electricity.

Question 2: What did your household do as a result of the increase in electricity prices in the last 12 months?

During interviews, participants were asked about what they did in their households in order to survive the electricity price increase. Some of the responses were as follows:

"Electricity rate has ever been increasing as a result, we have to reduce money to buy food in order to manage our electricity bill" (R1F4, personal communication, October 22, 2022).

"We replaced our lights with energy-saving lights and also changed some of the appliances to energy-saving appliances" (R10F4, personal communication, October 22, 2022).

The participants in the interviews had some creative ideas to survive electricity price increases. These ideas range from changing to energy-saving appliances, changing to gas stoves, replacing geysers with solar geysers, and changing all light bulbs to energy-saving bulbs. One of the families indicated that they had to reduce money for buying food in order to keep the lights on and be able to pay their electricity bill. Some families remain in poverty because of the ever-increasing electricity bills in South Africa.

The study revealed that all participants came from electrified households. The electricity connections are either a post-paid meter or a pre-paid meter. The pre-paid electricity meter is preferred by utilities and municipalities since it assures utility and municipalities with money collection upfront compared to the post-paid meter where consumers of electricity will access electricity for a month without pay and at the end of the month, the consumer will receive a bill on electricity consumption. This usually causes a major challenge for households that are energy-poor and living in poverty. Hughes and Larmour (2021) state that

the expense associated with acquiring electricity can play a substantial role in energy poverty; consequently, initiatives aimed at enhancing energy efficiency can yield significant social advantages for lower-income households in South Africa.

5. DISCUSSION

The research summarises the discussion of the results in relation to the hypothesis (*H1*) of the study and concludes by either accepting or rejecting the *H1*.

When it comes to the method of accessing electricity in the household, the predominant number of respondents were utilizing electricity through an in-house post-paid meter. This situation reflects the strong monopoly held by Eskom that has been in existence for many years. The country is currently experiencing power outages, there has been a serious and constant outcry among many South Africans for the government to approve the inclusion of independent power producers to generate more electricity for the country.

In addition, the research revealed that most participants are spending R1001–R2000 to buy electricity monthly, followed by those who spent R2001–R3000. It is worth pointing out that this is a significant proportion of family income to be spent on electricity monthly because most of the respondents indicated that they were earning not more than R12000 in their households. Interestingly, the majority of respondents were neither satisfied nor dissatisfied with the provision of electricity in their households. This came as a shock given the fact that South Africa is currently and constantly faced with power outages that continue to ravage the economy. Sadly, in some areas of the country, there has been a rise in crime due to load-shedding as the streets turn dark time and again. Criminals are well-known for enjoying performing their criminal acts in the dark. As far as reaction to the electricity hike is concerned, the study found that a significant number of respondents said they utilize alternative energy sources such as paraffin, gas, coal, wood, and candles. Alternative energy sources have been used in many households not only because of electricity hikes but also as the primary energy source. This is because in some communities there is no electricity, and therefore, as a result, community members are forced to use alternative energy sources such as paraffin, gas, coal, wood, and candles.

Moreover, the study found that for the majority of respondents in the last 12 months during the time period of the data collection, cutbacks on their spending on energy for lighting, cooking, or heating had been essential to ensure financial stability. Furthermore, the study also found that the majority of respondents said they very often experienced load-shedding in their area of residence. This did not come as a surprise at all given the fact that load shedding is currently a hot topic in South Africa. The country is facing unending power cuts that have proved to be stubborn to dismiss. These power cuts suggest that alternative power sources are extremely necessary to alleviate the load-shedding in the country. Recently, the government has been hard at work trying to introduce more renewable energy supplies to address the issue of power cuts in the country.

Renewable energy technology is interconnected with poverty reduction in various aspects. Insufficient access to reliable and clean energy sources adversely affects individuals' living conditions, their health, and their ability to participate in productive activities. This may lead to circumstances in which individuals find themselves trapped in poverty. Urban poverty influences the types of energy utilized, which subsequently impacts health, education, and opportunities for income generation. Therefore, providing individuals with access to affordable and clean energy sources is a crucial component of poverty reduction strategies. It highlights that a considerable segment of the population in South Africa does not have access to even the most fundamental energy supplies and services. The adoption of renewable energy systems in South Africa is expected to contribute significantly to poverty reduction. The government and policymakers in the renewable energy sector need to advocate for the adoption and integration of renewable energy technologies in South Africa, as this will play a crucial role in alleviating the poverty experienced by its citizens. Considering the empirical outcome of this study and the literature cited in the study, this study, therefore, concludes that there is a relationship between access to affordable renewable energy and poverty reduction in urban areas of South Africa. Thus, the *H1* is rejected.

6. CONCLUSION

The research, based on existing literature, demonstrated that renewable energy contributes to saving lives. The well-being of the planet and its entire ecosystem is intricately linked to the lives of numerous individuals within various communities. The research additionally revealed that the involvement and ownership of citizens or community members in a renewable energy initiative generates local socio-economic benefits, creates employment opportunities, stimulates the local economy, and fosters favourable perceptions of renewable energy technologies. This, in turn, enhances the backing of citizens and communities for the transition to renewable energy, thereby furthering the nation's objectives for an optimal energy mix to assist South African communities in mitigating the impacts of load shedding.

In addition, the study revealed that the impact of load shedding and power failures in the community has resulted in most local township businesses closing and some reducing operating hours. The study's contribution to the community lies in the enhanced access to energy resulting from the availability of renewable energy technologies. This improvement translates into extended opportunities for conducting economic activities during nighttime, thereby increasing productivity and generating additional income. Furthermore, it facilitates local job creation by employing community members to install, monitor, and maintain solar photovoltaic (PV) mini-grids, while also ensuring that households and businesses consistently pay for energy services promptly.

Thus, the training and development of community members and staff involved in renewable energy projects should be initiated to empower those who are involved in this project. The study also concluded that deploying solar panels to households will help communities save money in the long run and receive reliable electricity in their households. The implication of the results is that by deploying solar panels, not only communities should save money in the long term, but they should also offer reliable, renewable energy sources for powering all types of activities, from working from home and online schooling to family entertainment. Furthermore, the study, in its review of energy sources, discusses that solar solutions help reduce emissions and combat climate change in communities, while also helping to protect against energy shortages. With so many advantages, there is no doubt that solar solutions can provide an invaluable asset to any household.

The study was confined to residents of a specific neighbourhood in Soweto township, Gauteng, due to constraints related to time and available resources. It would be interesting to understand the opinions of other citizens from other parts of Soweto and further other township experiences outside Soweto and Gauteng, as their profile is different. This could have contextualised the use of renewable energy in Soweto. The study was therefore based solely on the perspectives of a limited number of citizens. Therefore, future studies should focus on the insights, experiences, and opinions of other residents from other townships in South Africa to establish a clearer picture of the role of renewable energy as a tool for poverty reduction.

REFERENCES

Amankwah-Amoah, J. (2015). Solar energy in sub-Saharan Africa: The challenges and opportunities of technological leapfrogging. *Thunderbird International Business Review, 57*(1), 15–31. https://doi.org/10.1002/tie.21677

Annan, D. (2019). *A simple guide to research writing*. Flash Print, Inc.

Asghar, N., Amjad, M. A., Rehman, H., Munir, M., & Alhajj, R. (2022). Achieving sustainable development resilience: Poverty reduction through affordable access to electricity in developing economies. *Journal of Cleaner Production, 376,* Article 134040. https://doi.org/10.1016/j.jclepro.2022.134040

Avato, P., & Coony, J. (2007). *Accelerating clean energy technology research, development, and deployment: Lessons from non-energy sectors* (World Bank Working Paper No. 138). The World Bank. https://tinyurl.com/mvc3ypj5

Batool, K., Zhao, Z.-Y., Irfan, M., & Żywiolek, J. (2023). Assessing the role of sustainable strategies in alleviating energy poverty: An environmental sustainability paradigm. *Environmental Science and Pollution Research, 30*(25), 67109–67130. https://doi.org/10.1007/s11356-023-27076-0

Chen, C. J. (2011). *Physics of solar energy*. John Wiley & Sons, Inc. https://doi.org/10.1002/9781118172841

Chen, C., Pinar, M., Stengos, T. (2020). Renewable energy consumption and economic growth nexus: Evidence from a threshold model. *Energy Policy, 139*, Article 111295. https://doi.org/10.1016/j.enpol.2020.111295

Chen, J. (2024, April 19). *What's poverty, meaning, causes, and how to measure*. Investopedia. https://www.investopedia.com/terms/p/poverty.asp

Chilundo, R. J., Mahanjane, U. S., & Neves, D. (2018). Design and performance of photovoltaic water pumping systems: Comprehensive review towards a renewable strategy for Mozambique. *Journal of Power and Energy Engineering, 6*(7), 32–63. https://doi.org/10.4236/jpee.2018.67003

Chilundo, R. J., Maúre, G. A., & Mahanjane, U. S. (2019). Dynamic mathematical model design of photovoltaic water pumping systems for horticultural crops irrigation: A guide to electrical energy potential assessment for increase access to electrical energy. *Journal of Cleaner Production, 238*(20), Article 117878. https://doi.org/10.1016/j.jclepro.2019.117878

Department of Energy. (2018). *Integrated Resource Plan 2018.* http://www.energy.gov.za/IRP/irp-update-draft-report2018/IRP-Update-2018-Draft-for-Comments.pdf

Fatona, P., Abiodun, A., Olumide, A., Adeola, P., & Abiodun, O. (2013). Viewing energy, poverty and sustainability in developing countries through a gender lens. In H. Arman & I. Yuksel (Eds.), *New developments in renewable energy* (pp. 83–98). Intech. https://doi.org/10.5772/51818

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50. https://doi.org/10.2307/3151312

Gonyora, M. A. (2021). *Analysis of open innovation strategy and challenges faced by automotive component manufacturers in KwaZulu Natal, Gauteng, and Eastern Cape in South Africa* [Unpublished doctoral dissertation, University of Kwa-Zulu Natal]. University of Kwa-Zulu Natal.

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science, 40*(3), 414–433. https://doi.org/10.1007/s11747-011-0261-6

Hancke, H. (2024, March 29). Eskom's 12% price hike no April Fools' joke. *TimesLIVE.* https://www.timeslive.co.za /news/south-africa/2024-03-29-eskoms-12-price-hike-no-april-fools-joke/

Harrison, P., & Harrison, K. (2014). Soweto: A study in socio-spatial differentiation. In P. Harrison, G. Gotz, A. Todes, & C. Wray (Eds.), *Changing spaces, changing city: Johannesburg after apartheid — Open access selection.* (pp. 293–318). Wits University Press. https://hdl.handle.net/10539/38448

Henseler, J., Hubona, G., & Ray, P. (2016). Using PLS path modeling in new technology research: Updated guidelines. *Industrial Management & Data Systems, 116*(1), 2–20. https://doi.org/10.1108/IMDS-09-2015-0382

Hughes, A., & Larmour, R. (2021). *Residential electricity consumption in South Africa* (Research Project Report). University of Cape Town. https://tinyurl.com/yu5zrjmy

Hussein, M. A., & Filho, W. L. (2012). Analysis of energy as a precondition for improvement of living conditions and poverty reduction in sub-Saharan Africa. *Scientific Research and Essays, 7*(30), 2656–2666. https://doi.org/10.5897/SRE11.929

Ivanovski, K., Hailemariam, A., & Smyth, R. (2021). The effect of renewable and non-renewable energy consumption on economic growth: Nonparametric evidence. *Journal of Cleaner Production, 286*, Article 124956. https://doi.org/10.1016/j.jclepro.2020.124956

Jordan, B. (2024, February 7). Load-shedding will be over by 2025, predicts top energy expert. *TimesLIVE*. https://www.timeslive.co.za/sunday-times-daily/news/2024-02-07-load-shedding-will-be-over-by-2025-predicts-top-energy-expert/

Kabir, E., Kumar, P., Kumar, S., Adelodun, A. A., & Kim, K.-H. (2018). Solar energy: Potential and future prospects. *Renewable and Sustainable Energy Reviews, 82*, 894–900. https://doi.org/10.1016/j.rser.2017.09.094

Kabir, S. M. S., Aziz, M. A., & Jahan Shathi, A. K. M. S. (2018). Women empowerment and governance in Bangladesh. *ANTYAJAA: Indian Journal of Women and Social Change*, *3*(1), 24–35. https://doi.org/10.1177/2455632718778376

Kalogirou, S. A. (2013). *Solar energy engineering: Processes and systems*. Academic Press.

Kannan, N., & Vakeesan, D. (2016). Solar energy for future world: — A review. *Renewable and Sustainable Energy Reviews, 62*, 1092–1105. https://doi.org/10.1016/j.rser.2016.05.022

Khobai, H. (2021). Renewable energy consumption, poverty alleviation and economic growth nexus in South Africa: ARDL bounds test approach. *International Journal of Energy Economics and Policy, 11*(5), 450–459. https://doi.org/10.32479/ijeep.7215

Lu, S., Zhou, J., & Ren, J. (2023). Alleviating energy poverty through renewable energy technology: An investigation using a best-worst method-based quality function deployment approach with interval-valued intuitionistic fuzzy numbers. *International Journal of Energy Research, 2023*(1). https://doi.org/10.1155/2023/8358799

Magubane, K. (2024, June 23). SA rated highly in energy transition progress. *TimesLIVE*. https://www.timeslive.co.za/sunday-times/business/business/2024-06-23-sa-rated-highly-in-energy-transition-progress/

Maiga, A. S., Chen, G. M., Wang, Q., & Xu, J. Y. (2008). Renewable energy options for a Sahel country: Mali. *Renewable and Sustainable Energy Reviews, 12*(2), 564–574. https://doi.org/10.1016/j.rser.2006.07.005

Maradin, D., Cerović, L., & Mjeda, T. (2017). Economic effects of renewable energy technologies. *Journal of Energy, 63*(2), 49–59. https://doi.org/10.1515/ngoe-2017-0012

Mazibuko, S., & Mutambara, E. (2023). Bureaucratic leadership and strategic decision-making at the department of trade, industry and competition. *Corporate Governance and Organizational Behavior Review, 7*(4), 342–349. https://doi.org/10.22495/cgobrv7i4sip12

Mtetwa, T. N. (2019). *Human resource transformation as a strategy for addressing talent management challenges at Eswatini Electricity Company* [Unpublished doctoral dissertation, University of Kwa-Zulu Natal]. University of Kwa-Zulu Natal. https://researchspace.ukzn.ac.za/items/2b94f377-6bc2-47ab-8cf9-bf0bcbd8b867

Mukumba, P., & Chivanga, S. V. (2023). An overview of renewable energy technologies in the Eastern Cape Province in South Africa and the rural households' energy poverty coping strategies. *Challenges, 14*(1), Article 19. https://doi.org/10.3390/challe14010019

Mutombo, N. M.-A., & Numbi, B. P. (2019). Assessment of renewable energy potential in Kwazulu-Natal province, South Africa. *Energy Reports, 5*, 874–881. https://doi.org/10.1016/j.egyr.2019.07.003

Ngcobo, K. (2023, August 10). Significant improvement in load-shedding outlook from end of 2023: Energy Council CEO. *TimesLIVE*. https://www.timeslive.co.za/news/south-africa/2023-08-10-significant-improvement-in-load-shedding-outlook-from-end-of-2023-energy-council-ceo/

Njiru, C. W., & Letema, S. C. (2018). Energy poverty and its implication on standard of living in Kirinyaga, Kenya. *Journal of Energy, 20*(18), 1–12. https://doi.org/10.1155/2018/3196567

Nnaji, C. E., Uzoma, C. C., & Chukwu, J. O. (2010). The role of renewable energy resources in poverty alleviation and sustainable development in Nigeria. *Continental Journal of Social Sciences, 3*(1), 31–37. https://www.researchgate.net/publication/232282799_The_Role_of_Renewable_Energy_Resources_in_Poverty_Alleviation_and_Sustainable_Development_in_Nigeria

Ouedraogo, N. S. (2013). Energy consumption and human development: Evidence from a panel cointegration and error correction model. *Journal of Energy, 63*, 28–41. https://doi.org/10.1016/j.energy.2013.09.067

Saunders, M., Lewis, P., & Thornhill, A. (2016). *Research methods for business students* (7th ed.). Pearson Education.

Schrieber, S. (2023, April 19). 18% electricity tariff increase and 9% for water: Inside Tshwane's 2023/2024 proposed budget. *TimesLIVE*. https://tinyurl.com/zy7v4tf4

Statistics South Africa. (n.d.). *Average monthly earnings in South Africa from November 2018 to November 2023*. https://www.statista.com/statistics/1227081/average-monthly-earnings-in-south-africa/

Sukhatme, S. P., & Nayak, J. K. (2017). *Solar energy* (4th ed.). McGraw-Hill Education.

Szabo, S., Bódis, K., Huld, T., & Moner-Girona, M. (2013). Sustainable energy planning: Leapfrogging the energy poverty gap in Africa. *Renewable and Sustainable Energy Reviews, 28*(5), 500–509. https://doi.org/10.1016/j.rser.2013.08.044

Thiam, D. R. (2011). Renewable energy, poverty alleviation and developing nations: Evidence from Senegal. *Journal of Energy in Southern Africa, 22*(3), 23–34. https://doi.org/10.17159/2413-3051/2011/v22i3a3219

United Nation. (2015). *Transforming our world: The 2030 agenda for sustainable development*. Department of Economic and Social Affairs. https://sdgs.un.org/2030agenda/

van Wyk, M. M. (2017). Exploring the role of the church as a "reformation agency" in enhancing a socially transformative agenda in South Africa. *HTS Theological Studies, 73*(3), Article a4356. https://doi.org/10.4102/hts.v73i3.4356

Willard, N. (2020). *Reconceptualising coaching and mentoring framework to improve operational efficiencies: Case study of Amcor South Africa* [Unpublished doctoral dissertation, University of Kwa-Zulu Natal]. University of Kwa-Zulu Natal.

Zafar, S. (2024, August 1). *Tag: Solar panels: 5 reasons why solar panels are becoming so popular*. Blogging Hub. https://www.cleantechloops.com/tag/solar-panels/

Zawilska, E., & Brooks, M. J. (2016). An assessment of the solar resource for Durban, South Africa. *Renewable Energy, 36*(12), 3433–3438. https://doi.org/10.1016/j.renene.2011.05.023

Zhao, J., Dong, K., & Shahbaz, X. (2022). How renewable energy alleviate energy poverty? A global analysis. *Renewable Energy, 186*(1), 299–311. https://doi.org/10.1016/j.renene.2022.01.005