

BINDURA UNIVERSITY OF SCIENCE EDUCATION
FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE
DEPARTMENT OF ENVIRONMENTAL SCIENCE

AN ASSESSMENT OF KNOWLEDGE, ATTITUDE AND PRACTICES (KAP) OF HOUSEHOLDS TOWARDS SOLAR ENERGY SOURCES, BINDURA URBAN, ZIMBABWE.



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A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF A BACHELOR OF ENVIRONMENTAL SCIENCE HONOURS DEGREE IN NATURAL RESOURCES MANAGEMENT.

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DECLARATION

To be compiled by the student

Registration number B1953439

I Blessing S Nyanhete do hereby declare that this work is entirely the product of my own findings and has never been presented with any academic award. Any reference to previously published work has been clearly indicated.

Signature of the student.....Date.....

To be compiled by the supervisor

This dissertation is suitable for submission to the faculty and has been checked for conformity with the faculty guidelines.

Signature of the supervisor.....Date.....

DEDICATION

This study is dedicated to my family for their prodigious love, care, and support

ACKNOWLEDGEMENTS

Firstly and foremost thank God for granting me the strength to carry on even during hard times. Secondly, I thank my loving parents for their never-ending support and encouragement. My appreciation also goes to my siblings, Sandra and Kudzai. My utmost gratitude to my supervisor Mr. Tendayi Nyamugure for all his support, intellectual guidance, and encouragement throughout the course of the study. I appreciate the amount of dialogue that he allowed between us during which I was able to profit from his experience and knowledge of research.

Abstract

The purpose of the study was to examine the knowledge, attitude and practices of urban households towards solar energy with regards to the possible contribution solar energy could give to the energy sector in Zimbabwe. It is in light of the ongoing power crisis which is being faced by Zimbabwe as a nation. Data was collected using questionnaires. 90 households were chosen randomly from the residential areas of Bindura urban (medium, high and low density). This study considered different factors related to the respondents which include age, gender, religion, education level, relationship status, residential area, household position and occupation. Descriptive test and binary regression model was used and all statistical tests were performed at alpha 0.05. This study found that an average of 84% of the households have knowledge towards solar energy. A mean total of 89.6% of the households have a positive attitude towards solar energy. Also a mean total of 69.6% of the households are using solar energy. It was found also that education, sex and age determine one's attitude, knowledge and practices towards solar energy. The educated ones and young ones tend to be aware of solar energy and have positive attitude towards the type of energy leading to its adoption in their homes. The government should capacitate households about solar energy through trainings and also give incentives to those who wish to install solar energy at home to curb her power woes.

Key words: Attitude, Knowledge, Practices and Solar Energy

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LIST OF ACRONYMS

- ATR - African traditional religion
- KAP - knowledge, attitude, practice
- MEPO - The Ministry of Energy and Power Development
- MW - megawatts

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CHAPTER 1: INTRODUCTION

1.0 Background to the study

The demand and significance of solar energy has been on rise due to rising worries of global warming and restricted supply of fossil fuels (Kuijk, 2012). Solar energy has arisen as one of the sustainable sources of energy embraced throughout the globe (Zeru and Guta, 2021). The challenges associated with the already available sources of energy which involves greenhouse gases generation and inadequate supply on earth led people to search for alternative sources of energy (Kuijk, 2012).

Zimbabwe has been facing energy woes since late 2000s, causing power cuts or blackouts for nearly sixteen hours per day (Makonese, 2016). The country relies on thermal power station and hydro-power stations, which have passed its lifespan and the equipment is now old resulting in frequent breakdowns (Zimbabwe Energy Situation Report, 2015). Kariba hydro power station is being impacted by climate change and perennial droughts which are negatively affecting the lake's carrying capacity thereby affecting power generation (Zimbabwe Energy Situation Report, 2015).

Thermal power stations are not sustainable ways of generating power as it increases toxic gases in the atmosphere (Njenda, 2020). In a bid by Zimbabwean government to achieve sustainable development goal number seven which targets achieving affordable and clean energy, through The Ministry of Energy and Power Development (MEPD) has devoted itself to the growth and acceptance of solar energy in the country (Zimbabwe Energy Situation Report, 2015). Most households in Zimbabwe are using solar energy as an alternative due to continuous power cuts.

Although solar energy has been widely adopted as the sustainable source of energy, the actual adoption rate has not been good in the households of Zimbabwe. The objective of this study was to assess knowledge, attitude and practice of households towards solar energy in Bindura, Zimbabwe.

1.2 Problem statement

The adoption levels of solar energy by households in Zimbabwe have not been satisfactory. Households continue to exert pressure on hydro power and thermal power which is in short supply due to aging of infrastructure thereby causing power shortage. The reason of slow adoption of solar energy by households is not known. It have not been established if it is the knowledge, attitude and practice of households towards solar energy which is affecting the adoption.

1.3 Aim

The aim of the study is to find out knowledge, attitude and practices of households on solar energy.

1.4 Objectives

- I. To assess knowledge of households on solar energy.
- II. To assess households attitude towards solar energy.
- III. To assess households practice towards solar energy.

1.5 Research questions

- I. Do households have knowledge on solar energy?
- II. What is the attitude of households towards solar energy?
- III. What are the practices of households on solar energy?

1.6 Justification

The knowledge, attitude and practises of households towards should be studied to establish the reasons behind slow adoption of solar energy in Zimbabwe. The information will help the ministry of energy to have methods of motivating households to adopt solar energy since it is trying to achieve the seventh sustainable development goal of achieving affordable and clean energy. Also this study will add to the body of knowledge on the knowledge, attitude and practices of households towards solar energy.

CHAPTER 2: LITERATURE REVIEW

2.0 Solar energy

Solar energy is the heat and light that is produced by the sun and it can be harnessed by humans through activities which involves solar installation to generate electricity (Devabhaktuni *et al.* 2013). Solar energy is an important source of renewable energy and its technologies are categorized as passive solar or active solar basing on how they take in solar energy and change it into solar power (Devabhaktuni *et al.* 2013). Active solar techniques comprise the use of photovoltaic systems, concentrated solar power, and solar water heating to harness the energy. Passive solar techniques embrace positioning a building to the sun and opt for materials with positive thermal mass or light-dispersing properties (Devabhaktuni *et al.* 2013).

2.1 Solar energy policy in Zimbabwe

Following the Paris Agreement of 2015, a noticeable progress had been made by the government of Zimbabwe in endorsing the use of solar energy as a means of reducing emission of toxic gases in the atmosphere (Njenda, 2020). Ndlhovu (2019), argued that the administration of Zimbabwe made an important effort to endorse the use of solar energy. The efforts encompassed slashing of import duties of all products of solar energy systems (Njenda, 2020).

2.2 Renewable energy

Renewable energy is defined as natural energy sources that can be used repetitively and the examples includes solar and liquid biofuels (OECD 2010). Renewable energy sources are viewed as clean and modern energy sources. Martinot *et al.* (2002) argues that, firewood and crop residues are renewable energy sources. However, in this study firewood is not being considered as a renewable energy bearing in mind the rate of deforestation which is not in line with eco-friendly harvesting.

2.3 The benefits of solar power

According to the World Bank (2015) report, estimates indicated that energy demand is anticipated to rise by nearly 60% by the year 2030. Due to the predicted increasing energy demand, the necessity to multiply solar energy systems is a priority. Solar energy can expand energy security by decreasing reliance on hydropower electricity.

2.4 Economic benefits of solar power

Renewable energy industries are a major source of employment. It is projected that investing in solar energy is expected to create jobs (UNEP Report 2011). Heggie (2017) argues that,

Africa has the ability to generate off-grid renewable energy through solar power. Solar energy offers reliable, clean, cost-effectiveness and independent sources of electricity in both rural and urban areas.

2.5 Environmental benefits of solar power

Some people in developing countries fail to have funds for new fuels and energy competence technologies (Norman 2011). The use of solar energy technologies can lessen the percentage of greenhouse gas emission, thereby lessening depletion of ozone layer whilst generating solar power (Njenda, 2020).

2.6 Challenges of solar energy in Zimbabwe

The growth of solar energy industry in Zimbabwe is not growing as it was anticipated due to a number of factors (Mhizha *et al.*, 2012). One of the major factors involves the initial installation cost which is very expensive and most households in rural areas do not afford to install solar system (Njenda, 2020). Moreover some of the domestic solar panels have competence of 10%-20%, which is another disadvantage of using the solar energy technology. Better panels which have a high efficiency are very expensive to purchase. Moreover, the markets are flooded with fake and cheap solar technology products which are not durable thereby failing within five years period. Another issue of licensing solar installers by the regulatory may end up hindering growth of the solar energy industry if it is not handled properly (Njenda, 2020)

2.7 Energy in the context of Zimbabwe

Zimbabwe as a nation is relying on hydroelectric power and thermal power which is being produced from Kariba Dam on the Zambezi River and Hwange thermal power station respectively. However, most people in remote areas depend on firewood and paraffin for cooking. (World Factbook Zimbabwe, 2010).

In Zimbabwe energy supply is one of the big challenges with current stages failing to meet mandate (Mhizha *et al.*, 2012). With only one hydropower plant and four thermal generators producing a total output of 2,240 megawatts (MW), an approximation of only 40% of the total population uses electricity. Due to the scarcity of energy supply, the majority of the people rely on firewood which in-turn increase deforestation rate, particularly in rural communities.

The use of thermal power stations to generate electricity which uses coal adds to greenhouse gas emissions in Zimbabwe. However, Zimbabwe as a nation has devoted to endorse clean

energy as part of its response to climate change (Zimbabwe National Climate Change Strategy, 2015).

2.8 Knowledge towards solar energy

Knowledge towards solar energy is defined as understanding of solar energy technology or information about solar energy system (Zeru and Guta, 2021). The information about solar energy can be acquired through trainings or even through following social media blogs which posts information related to solar energy. Knowledge includes information on generation of solar energy, the cost of installing solar energy and the gadgets which can be operated using solar energy.

Lack of knowledge towards solar energy affects the adoption of solar energy by households and business sector. A study was conducted in Zimbabwe to assess knowledge, attitudes and practices on the contribution of solar energy to sustainable tourism development by Mhizha *et al.*, (2012). The research documented that there was need to disseminate correct information regarding the huge benefits of adopting solar energy in the tourism sector. This shows that the leaders in the tourism sector were lacking knowledge towards the use of solar energy. Almost all the leaders in the Zimbabwean tourism sector indicated that there was no adequate information about solar power options.

In line with the above, another study was conducted in Gaza, Palestine on solar energy implementation at household level (El-Khozondar and El-batta, 2022). The findings of the study included knowledge as a factor which should be considered when assessing adoption rate of solar energy system. According to El-Khozondar and El-batta, (2022), knowledge on renewable energy affect the decision of households to either adopt solar energy or not to adopt. His findings shows that without proper and accurate knowledge concerning solar energy, its adoption rate will continue to be low.

More so, a study by Wyllie, (2018) concluded that knowledge of renewable energy was one of the barriers which was inhibiting its adoption in Barbados a Caribbean island. The main aim of his study was to assess barriers of solar energy uptake and the potential for mitigation solutions in Barbados. Along with other factors, the author stated that lack of knowledge of solar energy technologies delay the adoption rate and there was need for proper channels to disseminate information about these renewable energy technologies.

2.9 Attitude towards solar energy

It is either a positive or negative assessment of an individual towards the use of solar energy. It affects the behavior of an individual towards the use of solar energy in a positive or negative manner (Zeru and Guta, 2021). It is a feeling or opinion about use of solar energy. Negative attitude towards solar energy can hinder the adoption of such technologies by households. Basing with the findings of Mhizha *et al* (2012), the leaders in the tourism industry had negative attitude towards solar energy. In his study which he was assessing, knowledge, attitude and practices on the contribution of solar energy to sustainable tourism development, he documented that some of the leaders were lacking knowledge regarding the renewable energy source which shows that their attitude was negative as well.

In line with the above, Szakály *at el* (2021) conducted a study which was assessing attitude toward and awareness of renewable energy sources in Hungary. The study findings concluded that, lack of knowledge can cause a major effect on acceptance. The study showed that lack of information affected the attitude of the respondents as well. It turns out that the households do not accept or show positive attitude towards a power option they are not aware of or where little is known. To yield a positive attitude towards solar energy, information about solar energy should reach the households first.

In a study which was conducted by Saini and Devi (2019), titled awareness and attitude towards solar energy in Kurukshetra Haryana concluded that people who are highly educated have high knowledge of solar energy because they easily access the information on internet. The research indicated that education is factor which is affecting attitude of people towards solar energy options. The educated ones had a positive attitude towards the new energy technology (Saini and Devi, 2019).

The key findings of the study which was conducted by Nondo (2021), were that that the public was aware of solar energy and its uses, and had a positive attitude towards its adoption and officials too had a positive attitude towards domestic solar energy but did not invest as much effort in promoting its adoption as they did in promoting conventional energy. The study was conducted in Botswana and it is titled comparing official and public attitudes towards solar energy in Botswana.

The study which was conducted by Zeru and Guta, (2021) in Ethiopia, shows that household attitude can be affected by factors such as gender, economic situation and level of education.

The research found that people with education, better economic status, access to media and who were trained have a positive attitude towards solar energy systems.

2.1.1 Practices towards solar energy

Practices of households towards solar energy, is the actual application or use of solar energy by households or individuals (Mhizha *et al.*, 2012). Some of the practices involve the actual operation of home gadgets using solar energy such as charging a phone. It is more of putting the knowledge acquired into real situation. According to Mhizha *et al.*, (2012), the leaders in the tourism sector were not using solar energy at their companies and were not aware of the advantage of switching to solar energy which is environmentally clean and economically cheap. His study shows that most of the leaders who were interviewed were not using solar systems at their work places.

In another study which was conducted by Saini and Devi (2019) in India showed that households who were using solar energy system were present. It is evidenced by the questions which were directed to users of solar energy during his survey. There were questions which were particularly for the solar energy users in the questionnaire. This showed that solar energy was being adopted in the households although the rate of adoption was being viewed as low by many.

Njenda *et al.*, (2020) stated that, there are a number of solar projects which have been completed in Zimbabwe both in the household sector and industrial sector. In his study titled potential, prospects and challenges associated with the implementation of photovoltaic solar energy in Zimbabwe, solar energy installation increased due to the availability of all relevant information towards the renewable energy option. The study showed that different households and companies are adopting the new energy option.

CHAPTER 3: METHODOLOGY

3.0 Study area

The study area is Bindura town which is the provincial town for Mashonaland central province in Zimbabwe. Bindura town has a total population of 201,698 which was projected from the 2022 census population and three universities (ZimStat, 2022). The town has low density suburbs, medium density suburbs and high density suburbs, institutions, light industries and an active central business district with shops and banks. Bindura town is located nearly 88 kilometers northeast of Harare in the Mazowe Valley. The coordinates are 17.3013 S 31.3198 E elevation 1070. Bindura has a moderate climate, with rainfall ranging from 750mm to 1000mm per year with average of 25 degrees. Under agro-ecological region 2b classification. Mining and farming are the major human activities in Bindura.

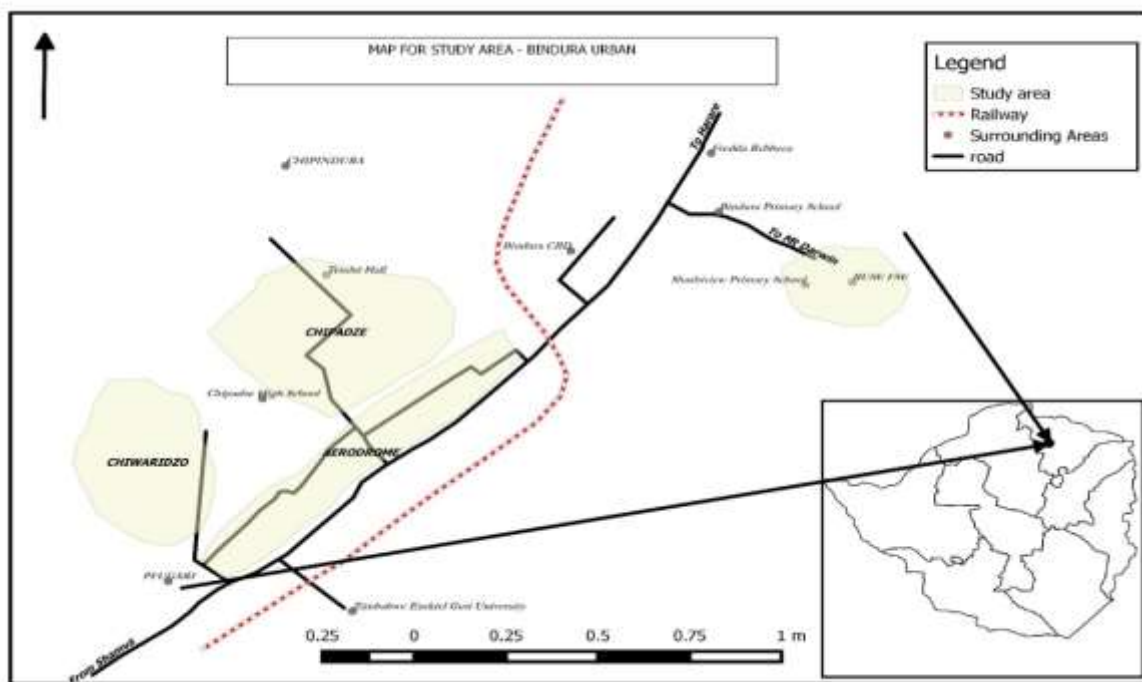


Fig 1. Study area

3.1 Research design

A survey was carried out in three suburbs of Bindura town (high, medium and low density suburbs). A stratified random sampling was used in this study. The population was grouped basing with their location and the perceived living standards, so it was grouped into high density, medium density and low density. Households were selected randomly from the

residential areas of Bindura town. Thirty (30) households were drawn from each stratum. The targeted populations in this study were the households of Bindura town.

3.2 Data collection

Interviews were carried out to gather qualitative data on households' attitude, knowledge and practices towards solar energy. From three suburbs, ninety (90) households were interviewed. The questionnaire had two sections the first part was covering demographic information of the respondents'. The second section had close ended questions which were address the variables of the study, which are attitude, knowledge and practices of households towards solar energy.

3.3 Data analysis

The statistical analyses used in the study have been done using an SPSS program version 21.0. Binary logistic analysis was used to analyse factors affecting the knowledge, attitudes and practices towards solar energy. Results were presented using tables which were created using Microsoft Word.

CHAPTER 4. RESULTS

4.1: Section a demography

Table 4.1: Demography.

Demographic variable	Category	<i>n</i> =90	%=100
Sex	Male	38	42.2
	Female	52	57.8
Age	18-25	16	17.8
	26-33	30	33.3
	34-41	26	28.9
	42-49	10	11.1
	50+	8	8.9
Residential location	High density	30	33.3
	Medium density	30	33.3
	Low density	30	33.3
Marital Status	Married	56	62.2
	Single	21	23.3
	Divorced	10	11.1
	Derived	3	3.3
Religion	Christianity	80	95.4
	Judaism	1	5.74
	A.T.R	9	
Household position	Father	25	27.8
	Mother	37	41.1
	Son	6	6.7
	Daughter	8	8.9
	Other	14	15.6

Highest education level	Primary	7	7.8
	Secondary	62	68.9
	Tertiary	21	23.3
Employment status	Unemployed	34	39.1
	Employed	13	14.9
	Student	40	46
	Self-	3	3.3
	employed		

Table 4.1 is showing demographic information of the respondents. The majority of the respondents were educated, women and they were Christians. The young generation tends to have dominated the respondents.

4.2 Knowledge of households towards solar energy

Table 4. 2 knowledge towards solar energy

Knowledge Variable	Participant response	Preferred		Score
		N	%	
K1. Have you ever heard about solar energy?	Yes	89	98.9	Yes 0.989
	No	1	1.1	
K2. Do you need license to install solar energy?	Yes	1	1.1	
	No	89	98.9	No 0.989
K3. Are solar equipment and resources easily accessible in Zimbabwe?	Yes	67	74.4	Yes 0.744
	No	23	35.6	
K4 Can solar energy be used to operate home gadgets such as refrigerator?	Yes	88	97.2	Yes 0.972
	No	2	3.8	

K5. Is it cheaper to install and use solar energy as compared to ZESA?	Yes	82	91.1	Yes	0.911
	No	8	8.9		
K6. Is it possible to use solar energy, if the weather has clouds?	Yes	71	78.9	Yes	0.789
	No	19	21.1		
K7. Do you pay duty in Zimbabwe when importing solar panels and batteries to install solar energy?	Yes	51	56.7		
	No	39	43.3	No	0.433
K8. Can you still use solar energy during the night?	Yes	84	93.3	Yes	0.933
	No	6	6.7		
K9. Can solar panels be repaired?	Yes	33	26.7		
	No	57	63.3	No	0.633
K10. Can solar panels and batteries last for more than a year before being repaired?	Yes	83	92.2	Yes	0.922
	No	7	7.8		
K11. Is it possible to store solar energy?	Yes	85	94.4	Yes	0.944
	No	5	5.6		
K12. Is it possible to use solar energy and hydro power at the same house interchangeably?	Yes	78	86.7	Yes	0.867

No 12 13.3

Total knowledge score 10.126

Table 4.2 shows that the average knowledge score was 10.126 divided by 12 questions multiplied by 100 which gives a result of 84% of participants who has knowledge about solar energy. The knowledge was evaluated using 12 questions .The responds to K1 shows that 98.9% have heard about solar energy. On K2, 98.9% indicated that license was not a prerequisite when one intends to install solar energy system. On K3, 74.4% of the respondents showed that solar equipment is readily available and easy to purchase. K4, 97.2% agreed that gadgets such as refrigerator can be operated using solar energy. On K5, 91.1% elaborated that solar energy is cheaper as compared to conventional power considering installing and energy costs. On K6, 78.9% shows that solar energy can still be utilized even if there are clouds. On K7, only 43.3% of the sampled population were aware that solar equipment is duty free. On K8, 93.3% indicated that solar energy can still be used during the night. From the responds on K9, 63.3% indicated that solar panels cannot be repaired. Responding to K10, 92.2% showed that solar batteries can last or have a longer lifespan which is more than a year from the date purchase. Responding to K11, 94.4% supported that energy can be stored and then used some other time. 86.7% concur that solar energy and conventional power can be used interchangeably.

4.3 Attitude of households towards solar energy

Table 4.3 Attitudes towards solar energy

Attitude Variable	Participant response	Preferred		Score
		N	%	
A1. Are you willing to have solar energy if provided freely?	Yes	89	98.9	Yes 0.989
	No	1	1.1	
A2. Do you know the cost of	Yes	63	70	Yes 0.700

installing solar energy at home?	No	27	30		
A3. Do you prefer solar energy to ZESA?	Yes	84	93.3	Yes	0.933
	No	6	6.7		
A4. Do you have plans of installing solar energy at your home?	Yes	82	91.1	Yes	0.911
	No	8	8.9		
A5. Can solar energy be a solution to the power crisis we are experiencing?	Yes	90	100	Yes	1
	No	0	0		
A6. Are you comfortable to use solar energy and ZESA interchangeably at your home?	Yes	74	84.4	Yes	0.844
	No	16	15.6		
Total attitude score					5.377

Table 4.3 shows that an average of 89.6% of the households had a positive attitude towards solar energy. This was calculated by dividing total attitude score with the number of questions that is 5.377 divided by 6 multiplied by 100. On A1, 98.9% of the interviewed households showed that they are willing to have solar energy installed at their houses if it is being installed free of charge. A2, 70% of the respondents indicated that they are aware of the costs of installing solar energy. On A3, 93.3% showed that they are in favour of solar energy as compared to conventional energy. On A4, 100% of the interviewed households viewed solar energy as the solution to the power crisis being faced national wide. On A6, 84.4% indicated that they were comfortable to use solar energy to supplement conventional power.

4.3 Practices of households towards solar energy

Table 4. 4 Practices towards solar energy.

Practice Variable	Participant response			Preferred Response	Score
		<i>N</i>	%		
P1. Do you encourage your friends to use solar energy?	Yes	87	96.7	Yes	0.976
	No	3	3.3		
P2. Have you ever used solar energy?	Yes	74	82.2	Yes	0.822
	No	16	17.8		
P3. Do you use solar energy to light the bulb?	Yes	58	64.4	Yes	0.644
	No	32	35.6		
P4. Do you use solar energy to operate gadgets such as television?	Yes	20	32.2	Yes	0.322
	No	70	77.8		
P5. Do you have gadgets which cannot be operated using solar?	Yes	20	32.2		
	No	70	77.8	No	0.778
P6. Do you use solar to charge your phone?	Yes	57	63.3	Yes	0.633
	No	33	36.7		
Total practices score					4.175

Table 4.4 shows that average of 69.6% of the households are using or they have used solar energy at one point. The average percentage was found after dividing the total practice score (4.175) divided by the number of questions (6) then multiplied by 100. On P1, 96.7% showed that they are willing to encourage others to use solar energy. On P2, 82.2% of the respondents agreed to have used solar energy before. On P3, 64.4% reported that they use solar energy to light their bulbs during the night. On P4, 32.2% showed that they use solar

energy to operate their televisions. On P5, 77.8% showed all gadgets can be operated using solar energy. On P6 63.3% use solar energy to charge their phones.

CHAPTER 5. DISCUSSION

5.1 Knowledge of households towards solar energy

The study shows high percentage of people who has knowledge on solar energy. The mean percentage of those with the knowledge towards solar energy was very high, it might be due to media where a number of solar energy adverts are being produced on daily basis. The findings of this study were similar to what was recorded by Zeru and Guta (2021), who argued that media plays an important role in spreading information about renewable energy. However the findings of this study contradicts with what was recorded by Mhizha *at el*, (2012) who documented that those who were in the tourism sector in Zimbabwe had little knowledge of solar energy.

The percentage of the respondents who were young was high which might be another reason of high percentage of people with knowledge. The young generation have access to internet which makes it easier for them to have new knowledge concerning solar energy options. A study by Saine and Devi (2019) and Zyadin *et al.* (2014) indicates that the young generation gather new information about solar energy on internet. The high number of people with knowledge might be attributed to the age factor. In this study high number of the respondents were between the age group of 18-41. Low adoption rate on solar energy while the respondents shows that they have knowledge of the renewable energy source may be caused by the economic hardships which households are facing (Mhizha *at el*, (2012).

The demographic characteristics table shows that most people who were interviewed were educated. Level of education affects the knowledge one might have towards solar energy. Those who are educated have high chances of having knowledge about solar energy or environmental friendly energy technologies. This is supported by the conclusion which was made by Saini and Devi (2019) who argued that educated people easily access vital information regarding changes in the energy sector on internet.

However the findings of Szakály, (2021) that men have a high probability of being aware of renewable energy than the women contradicts with what was observed in this study. The female respondents were higher than male respondents yet the results showed high percentage of those with knowledge of solar energy.

5.2 Attitude of households towards solar energy

The results shows that more than three quarters of the respondents are in support of the adoption of solar energy. This is not in line with the findings of Mhizha *et al*, (2012) who recorded that the attitude of those who were in the tourism sector was negative. The positive attitude which was observed in this study might be due to the knowledge which households had. One cannot have a positive attitude towards solar energy if that person is not aware of the solar energy option.

Positive attitude towards solar energy which was observed in this study can be attributed to good information dissemination. In support of the above, Szakály, (2021) argued that it is easy for people to have good attitude towards solar energy if they are aware of the renewable energy source. People do not show interest or positive attitude on things they have little information about. The availability of information of solar energy on internet and other social blogs may be adding to the high knowledge households have which will result in positive attitude towards the energy source. In support of the above, a study by Mhizha *et al*, (2012) encouraged the government to cascade information of solar energy as a way of creating positive attitude and increasing knowledge of solar energy. For the solar energy system to be accepted, first there should be good information about the energy option.

More so, those who are educated are said to have a positive attitude towards the new energy option because they will be having vast information about the energy source and also the school curriculum are now involving technologies which are environmentally friendly. A study which was done by Zeru and Guta (2020) in Ethiopia supported the idea that the educated people have high chances of having a positive attitude towards solar energy due to the changes in curriculum which is now in support of renewable energies. The education factor can be said to have affected the attitude of the households in this study because most of the respondents had shown to be educated.

5.3 Practices of households towards solar energy.

Basing with the information presented on table 4.4, it indicated that high number of households are using or they have used solar energy at one point. The number of those who are using solar energy is slightly below three quarters of the total number. The high number of those using solar energy might be accredited to the unavailability of electricity for longer periods which is forcing people to look for alternatives particularly to charge phones and light their bulbs. Although households are using solar energy, they are still facing a big challenge of buying fake solar energy equipment which are not lasting long thereby forcing them to

look for other alternatives such as using generators. In support with the above Wyllie, (2018) argued that lack of knowledge concerning durability of the solar energy equipment can affect practices towards solar energy.

However those who are still not using solar energy are considering the installing costs at their homes and this is causing them to continue using other sources of power. This is in line with the findings of Mhizha, *et al.* (2012), who documented that tourism industries were reluctant to switching from conventional energy to solar energy due to the high costs of installing the system. To increase the number of those using solar energy, the installing costs must be affordable and also the solar equipment should not be fake products (Bouaguel and Alsulimani, 2022).

Although the number of solar projects are still few in Zimbabwe, the number of those installing the system are increasing. It is supported by the findings of Nyenda (2021) who documented that there were a number of solar projects in Zimbabwe.

CHAPTER 6

6.1 Conclusion

The main objective of this study was to assess knowledge, attitude and practices of households towards solar energy. Its findings shows that households have information about solar energy, their attitude is positive towards the use of solar energy and more than half of the households are using solar energy.

6.2 Recommendations

The researcher would recommend the government to promote the use of solar energy through giving incentives and loans to those who are facing financial challenge to install solar energy. Also there should be regulations which promote the selling of original solar equipment so as to avoid negative attitude of households towards solar equipment. Although households indicated that they have information about solar energy, there is need of conducting trainings of solar energy use.

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Appendix

Research Questionnaire

My name is BLESSING NYANHETE, a final year student at Bindura University of Science Education studying in Natural Resources Management (Hons). As part of my studies, I am carrying out a research project with title, an assessment of knowledge, attitude and practice towards solar energy sources, Bindura, Zimbabwe. The questionnaire will be used in this study only and all responses remain confidential. I Blessing Nyanhete will be held accountable for any information that will be leaked.

Date of interview

:.....

Section A. Demographic information

Fill in correctly or tick the corresponding response

Residential area	high	<input type="checkbox"/>	medium	<input type="checkbox"/>	low	<input type="checkbox"/>				
Level of education	primary	<input type="checkbox"/>	secondary	<input type="checkbox"/>	tertiary	<input type="checkbox"/>				
Religion	Christianity	<input type="checkbox"/>	Judaism	<input type="checkbox"/>	ATR	<input type="checkbox"/>				
Relationship status	Married	<input type="checkbox"/>	Divorced	<input type="checkbox"/>	Single	<input type="checkbox"/>	derieved	<input type="checkbox"/>		
Occupation	student	<input type="checkbox"/>	employed	<input type="checkbox"/>	self-employed	<input type="checkbox"/>				
unemployed	<input type="checkbox"/>									
Sex	Male	<input type="checkbox"/>	Female	<input type="checkbox"/>						
Age	18-25	<input type="checkbox"/>	26-33	<input type="checkbox"/>	34-41	<input type="checkbox"/>	42-49	<input type="checkbox"/>	50+	<input type="checkbox"/>
Household position	Mother	<input type="checkbox"/>	Father	<input type="checkbox"/>	Daughter	<input type="checkbox"/>	Son	<input type="checkbox"/>	Other	<input type="checkbox"/>

Section B

Knowledge

1. Have you ever heard about solar energy? YES NO
2. Do you need license to install solar energy? YES NO
3. Are solar energy equipment and resources easily accessible in Zimbabwe? YES NO
4. Can solar energy be used to operate home gadgets such as refrigerator? YES NO
5. Is it cheaper to install and use solar energy as compared to ZESA? YES NO
6. Is it possible to use solar energy, if the weather has clouds? YES NO
7. Do you pay duty in Zimbabwe when importing solar panels and batteries to install solar energy? YES NO
8. Can you still use solar energy during the night? YES NO
9. Can solar panels be repaired? YES NO
10. Can solar panels and batteries last for more than a year before being repaired? YES NO
11. Is it possible to store solar energy? YES NO
12. Is it possible to use solar energy and hydro power at the same house interchangeably?
YES NO

Attitude

13. Are you willing to have solar energy if provided freely? YES NO
14. Do you know the costs of installing solar energy at home? YES NO
15. Do you prefer solar energy to ZESA? YES NO
16. Do you have plans of installing solar energy at your home? YES NO
17. Can solar energy be the solution to the power crisis we are experiencing? YES
NO

18. Are you comfortable to use solar energy and ZESA interchangeably at your home?

YES NO

Practices

19. Have you ever used solar energy? YES NO

20. Do you use solar energy to light up the bulb? YES NO

21. Do you use solar energy to operate gadgets such Television? YES NO

22. Do you have gadgets which cannot be operated using solar? YES NO

23. Do you use solar energy to charge your phone? YES NO

24. Do you encourage your friends to use solar energy? YES NO