

The Acceptance and Perception of Alternative Energy Sources for Cooking of Visiting Groups to NaDEET Centre

Final In-Service Training I Project Report

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I. INTRODUCTION

This report covers my research project conducted at the Namib Desert Environmental Education Trust (NaDEET) Centre, "The Perception and Acceptance of Alternative Energy Sources for Cooking of Visiting Groups to NaDEET Centre". The main aim of this project was to find out reasons as to why visiting groups at NaDEET Centre, as representative of the Namibian community, make use of or not use of alternative energy sources for cooking (i.e. solar cookers, solar ovens and fuel-efficient stoves). In Namibia, energy used for cooking comes from a variety of sources including firewood, gas and electricity. Fire is the main source of heat for cooking in rural and poor urban situations in Namibia. As the population is increasing, there is a high demand for wood as a fuel for cooking thus leading to economic, environmental and health problems e.g. deforestation, high cost to obtain wood and respiratory problems (M.M.E, 2003). Namibia's need to find an alternative source of power is becoming more urgent than ever. It is predicted that energy consumption will increase by 40% in the near future. In addition the supply from South Africa, from which it imports up to 60% of its supply during winter, could prove problematic by 2007 as South Africa is also pressed by its own domestic energy demands (Dentlinger, 2004). Also traditional fuel sources are becoming less, as many areas around bigger and smaller settlements are already bare of any fuel providing vegetation (www.polytechnic.edu.na).

Namibia has excellent conditions (perhaps the best in the world) for the use of solar energy. However the high capital cost of solar products have been a barrier to large-scale use of this renewable energy resource (Mika, 2001). It is suggested that these alternative stoves are actually not available either due to their cost or distance from the supply source. Thus there does not seem to be the necessary incentive to cause people to switch to alternative forms of energy technologies (Matthew, 2001). Solar energy is under-utilised in Namibia especially if one consider how many days of sunshine we receive each year. The potential to generate electricity, heat water and cook with the energy from the sun is enormous (Du Toit and Sguazzin, 1995). The Women Action for Development (WAD) promotes equipment to make substitute wood from scarp paper "firebricks" which is an idea of low tech or low-cost ways to decrease reliance on firewood. Unfortunately the idea is not so useful in rural areas because scrap paper is not easily available. But it could be very important for those in urban areas like Windhoek where houses and offices generate lots of paper that usually just goes into rubbish bins (M.M.E, 2003). According to the Ministry of Mines and Energy report on Biomass Energy Conservation. These are some of the reasons why people do not use alternative energy sources for cooking:

- The tradition and habit of cooking on open fire is very difficult to change
 - People use open fire for socialising, fuel-efficient stoves does not fulfil this function
 - The marketing of these stoves is very poor, if people know about them and see them demonstrated they would like to use them more
 - The saving in time and effort to collect wood would make them desirable
 - Cost is a major factor
 - The technology that is good and practical will be accepted if it is affordable
- (M.M.E, 2003)

NaDEET aims to increase the use of alternative energy sources for cooking by addressing some of these problems, through education. At NaDEET Centre the participants are using alternative energy sources for all their cooking needs. Current domestic energy needs and solar energy are explored through a variety of hands-on activities. The activities aim to heighten the participant's awareness and understanding of the current energy consumption practices and viable alternatives that are sustainable (Keding, 2003). The motivation for my project was to find out whether the NaDEET activities actually make the participants want to use solar and fuel-efficient stoves.

II. OBJECTIVES

PROJECT OBJECTIVES

My project had the following objectives:

- i. To determine how participants apply their knowledge and skills about alternative energy sources (i.e. solar cookers, solar ovens and fuel-efficient stoves) for cooking in their lives
- ii. To determine whether learners and teachers perceive solar and fuel-efficient cooking as helping the environment?
- iii. To determine whether the NaDEET programme and activities influence the participant's perception and acceptance of alternative energy sources for cooking
- iv. To determine what "acceptance of solar and fuel-efficient cooking" means to them

PERSONAL OBJECTIVES

Through this project, I hoped to achieve the following:

- i. To acquire more skills and knowledge about environmental education (EE)
- ii. To enhance my communication skills and to create a good relationship with people
- iii. To learn how to conduct interviews and analyse data
- iv. To improve my computer skills
- v. To work independently

III. METHODS AND MATERIALS

The primary method for my project was to conduct personal interviews with visiting groups from March to June 2004. A simple random sampling method was done to select the participants for the interviews. From each group that visited the Centre a total of four learners (2-girls, 2-boys) and two adults were selected to do the interview on the first and last day of their visit. The interviews were conducted using a written pre and post visit questionnaire that was done orally (see appendix 2 and 3 for questionnaire). A tape recorder was used for the interviews as a back up tool to ensure that the information provided was not left out while note taking. I also conducted interviews with two schools that participated in the NaDEET Centre programme in 2003. I only did a post visit questionnaire with them, otherwise the methods and materials used for data collection was the same. An Energy Monitoring Table- Food that is hanging up in the NaDEET Centre kitchen and that is in the participants living journals was used to keep record of the food they cooked, what stove they used and how long it takes the food to cook. This record keeping aims to give the participants a greater understanding as to why and how alternative energy sources work (see appendix 4 for more details). A weather chart was also used to record the weather everyday to explain to the participants why weather is important when it comes to solar cooking (see appendix 5). The primary material used for the interviews was the pre and post visit questionnaire. After the group departed, the interview was re-heard and the questionnaires were fully completed. Below the project objectives are listed together with the relevant questions from the questionnaires.

Objective 1: To determine how participants apply their knowledge and skills about alternative energy sources (i.e. solar cookers, solar ovens and fuel-efficient stoves) for cooking in their lives

This objective is accomplished by a comparison of all questions from both the pre and post visit learners and teachers questionnaire (see appendix 2 and 3)

Objective 2: To determine whether learners and teachers perceive solar and fuel-efficient cooking as helping the environment?

This objective is accomplished by question 2 of the pre-visit questionnaire and question 5 of the post-visit questionnaire:

Q 2 pre-visit learners and teachers questionnaires: Which energy sources in question 1 are the best for the environment? Give your own opinion to support your choice
Q5 post-visit learners and teachers questionnaire: What kind of energy sources do you think are the best to use in terms of environmental friendly for cooking after your visit at the NaDEET Centre. Circle two energy sources and explain why you think they are the best.

Objective 3: To determine whether the NaDEET programme and activities influence the participant's perception and acceptance of alternative energy sources for cooking

This objective is accomplished by question 6, 7, 8 and 9 of the post-visit questionnaire. The questions read as follows:

Q6 post-visit learners and teachers questionnaires: What have you learned this week at NaDEET Centre that makes you feel this way?

Q7 post-visit learners and teachers questionnaires: What are your challenges to implement solar cooking at home?

Q8 post-visit teachers questionnaire: Will you encourage the learners to use solar cooking or not? Why?

Q 9 post-visit teachers questionnaire: Will you encourage the learners to use fuel-efficient stoves or not? Why?

Objective 4: To determine what "acceptance of solar and fuel-efficient" means to them

This objective is accomplished by question 1, 2, 3, 4, 8, 10 and 11. The questions read as follows:

Q1 post-visit learners and teachers questionnaires: Explain how you feel today about solar cooking after your visit at NaDEET Centre

Q2 post-visit learners and teachers questionnaire: Does solar cooking fit with your lifestyle? If yes, give a detail answer and if no, say why not.

Q3 post-visit learners and teachers questionnaires: Explain how you feel today about fuel-efficient stoves after your visit at NaDEET Centre

Q4 post-visit learners and teachers questionnaires: Do fuel-efficient stove fit with your lifestyle? If yes, give a detail answer and if no, say why not.

Q8 pre-visit learners and teachers questionnaire: Will you implement solar cooking? Why/Why not?

Q 10 pre-visit learners and teachers questionnaire: Will you use fuel-efficient stove? Why/Why not?

Q11 post-visit teachers questionnaire: Will you buy the person that prepares your food a solar cooker to use?

IV. RESULTS

A total of 95 interviews were conducted of which 42 were 2004 pre-visit, 42 were 2004 post-visit and 11 post-visit for 2003 participants. To date a total of 11 groups visited NaDEET Centre. All of the 2004 groups were interviewed but only 11 participants from last years groups were interviewed of which one group was combined. One group was left out due to travelling and financial constrains. The results of the 2003-2004 participant interviews are presented in different categories (Female vs. Male, Urban vs. Rural and Age group) to compare their answers. Basic information about the interviewees is also presented in three sections below to give a context to their responses.

SECTION ONE

Rural participants-2004

A total of 18 participants were interviewed and they indicated the following:

Energy source used at home for cooking:

Electricity: 4 male =22.2% (22%)
5 female =27.7% (28%)

Open fire: 5 male =27.7% (28%)
3 female =16.6% (17%)

Gas: 1 female =5.5% (5%)

Where their family lives:

Town: 4 male =22.2% (22%)
4 female =22.2%(22%)

Village: 5 male =27.7 (28%)
5 female =27.7% (28%)

Age groups a total of the 18 participants interviewed:

Age 10-15: 2 male = 11.1%
4 female= 22.2%

Age 16-22: 4 male =22.2%
2 female=11.1%

Age 23+: 3 male=16.6%
3 female=16.6%

URBAN PARTICIPANTS-2004

A total of 24 participants were interviewed and they indicated the following:

Energy source used at home for cooking:

Electricity: 13 male= 54.1% (54%)
11 female=45.8% (46%)

Where their family lives:

City: 9 male=37.5% (38%)
9 female=37.5% (38%)

Town: 4 male=16.6% (17%)
2 female=8.3% (8%)

Age groups of the 24 participants interviewed:

Age 10-15: 7 male = 29.1% (29%)
6 female=25% (25%)

Age 16-22: 1 male =4.1% (4%)
2 female =8.3% (8%)

Age 23+: 5 male =20.8% (21%)
3 female =12.5% (13%)

RURAL PARTICIPANTS-2003

A total of 11 participants were interviewed and they indicated the following:

Energy source used at home for cooking:

Electricity: 4 male =36.3% (36%)
Open fire: 4 female =36.3% (36%)
3 male =27.7% (28%)

Where their family lives:

Town: 1 male =9.0% (9%)

Village: 4 male =36.3% (36%)

1 female =9.0% (9%)

Farm: 3 female =27.7% (28%)

2 male =18.1% (18%)

Age group of the 11 participants interviewed:

Age 10-15: 2 male =18.1% (18%)

2 female=18.1% (18%)

Age 16-22: 2 male =18.1% (18%)

2 female =18.1% (18%)

Age 23+: 3 male =27.2% (27%)

SECTION TWO

A total of 42 participants were interviewed using these questions from the pre-visit questionnaire. Examples of the responses given by participants are with each question. If the same answer was given multiple times it was only recorded once.

Which energy source in question 1 do you think are the best for the environment and give you own opinion to support your choice.

Solar energy, it does not cause air pollution

Electricity, it cooks very fast then all the other sources

Explain how you feel about solar cooking as an alternative energy?

It is a good energy source for the people and the environment

No idea of what solar cooking is

Do you think solar cooking will fit with your lifestyle? If no, give a detailed answer as to why not.

I have never done it before so I don't know whether it will fit

No, it will not because we are already used to electricity

No, it will not fit because there is no time to do it

Explain how you feel about fuel-efficient stoves as an alternative energy?

No idea of what fuel-efficient stove is

Do you think fuel-efficient stove will fit with your lifestyle?

No, it will not fit because it is dangerous

When the fuel leaks out it can cause some health problems and accidents

Have you heard of solar cooking before?

No, this will be my first time here at NaDEET Centre

Yes

On TV

At school

Read about it in the magazine

Will you use solar cooking? Why/Why not?

Yes

Because it will save my time and far distance walked to collect wood in the field

It will save money that would have been used to pay the electricity bills and buying gas

It is free of charge

No

Because there is no time to do it

We are already using electricity at home that fits perfectly with our lifestyle

Have you heard of fuel-efficient stove before?

No, it will be my first time

Yes, on TV

Will you use a fuel-efficient stove? Why/Why not?

Yes

Because it decrease the number of trees that are chopped down

It saves wood because you do not put a lot in like you would for open fire

No

Because it cause air pollution

It can be very dangerous for the children

SECTION THREE

A total of 53 participants from 2003-2004 were interviewed using the post-visit questionnaire. Examples of the responses given by participants are given with each question.. If the same answer was given multiple times it was only recorded once.

Explain how you feel about solar cooking after your visit at the NaDEET Centre, (Today?)

I feel very good, because it is a good way to utilise the natural resource and it can stop the destruction of environment and save many animals that depend on the vegetation for food and shelter

Does solar cooking fit with your lifestyle? If yes give a detail answer and if no say why not.

A total of 53 participants of 2003-2004 were interviewed. Of which 42 were from 2004 and 11 from 2003. Here are the results of the response from gender and age groups given in %.

Yes it will fit

Rural-2004

Yes response

Female 3=(17%)

Male 1=(6%)

Age 10-15

No response

Female 1=(6%)

Male 1=(6%)

Age 16-22

Female 2=(11%)

Male 4=(22%)

Age 23+

Female 2=(11%)

Male 3=(17%)

Female 1=(6%)

Urban-2004

Yes response

Both gender 0%

Age 10-15

No response

Female 6=(25%)

Male 7=(29%)

Age 16-22

Both gender 0%

Female 2=(8%)

Male 1=(4%)

Age 23+

Female 1=4%
Male 1=4%

Female 2=8%
Male 4=17%

Rural-2003

Age 10-15

Yes response

Female 2=18%
Male 2=18%

both gender 0%

Age 16-22

Female 2=18%
Male 2=18%

both gender 0%

Age 23+

Male 3 =27%

No it does not fit because there is no time to do it and I am already used to electricity that is fast and fits with my lifestyle

Explain how you feel about fuel-efficient stove after your visit at the NaDEET Centre (Today?)

Good way to recycle paper that would have ended up being burnt while it can be used to boil and cook with

Does fuel-efficient stove fits with your lifestyle? If yes give a detail answer and if no say why not.

A total of 53 participants of 2003-2004 were interviewed. Of which 42 were from 2004 and 11 form 2003. Here are the results of the response from gender and age groups given in %.

Rural-2004 a total of 18 participants were interviewed

Yes response

Female 3= 17%
Male 2=11%

Age 10-15

No response

Female 1=6%

Age 16-22

Female 2=11%
Male 4=22%

both gender 0%

Age 23+

Female 3=17%
Male 3=17%

Urban-2004 a total of 24 participants were interviewed

Yes response

Female=0%
Male 1=4%

Age 10-15

No response

Female 6=25%
Male 6=25%

Age 16-22

Both gender 0%

Female 2=8%
Male 1=4%

23+

Female 1=4%
Male 2=8%

Female 2=8%
Male 3=13%

Rural-2003 a total of 11 participants were interviewed

Age 10-15

Yes response

Female 2=18%
Male 2=18%

both gender 0%

Age 16-22

Female 2=18%

Male 2=18%

both gender 0%

Age 23+

Male 3 =27%

What kind of energy source do you think is the best to use in terms of environment friendly for cooking after your visit at the NaDEET Centre? Circle one of the energy sources and explain why you think that is the best.

Electricity Open fire Fuel efficient stove Solar cooking Gas

Solar cooking is the best because you only use the sun energy. No chopping down of trees and gas fumes into the atmosphere that will pollute the air and destroy the ozone layer

What have you learned this/that week that makes you feel this way?

I have learned how to use a solar cooker and to prepare food

I have learned how to make a solar oven and fuel-efficient stove

How to make recycled firebricks with waste paper

What are your challenges to implement solar cooking at home?

The solar cookers are very expensive

The weather pattern in our area does not just allow it

The parents' education of how to use these technologies is poor

The fact that you cannot cook with it in the early mornings and evenings makes it very difficult to use because most of the daytime we are at school

The responses of participants from both genders are listed below.

RURAL-2004

Time: 28% female and 22% male

Weather: 0% both gender

Cost: 22% female and 28% male

URBAN- 2004

Time: 38% female and 29% male

Weather: 8% female and 16% male

Cost: 0% female and 8% male

RURAL-2003

Time: 0% female and 9% male

Weather: 0% female and 9% male

Cost: 36% female and 45% male

Teachers questionnaire

The teachers post-visit questionnaire had the following additional questions:

Will you encourage the learners to use solar cooking or not? Why?

Yes

Because it free energy source, that does not destroy the environment at all

Will you encourage the learners to use the fuel-efficient stove or not? Why?

Yes, both gender form

Because, it is a good way to keep our environment clean by using waste paper that we don't need to make recycled firebricks

It can become an income-generating project for them to buy them selves' school stationery

I will encourage the learners especially those that live in rural areas because I don't think that the ones in the city will really do it

Are you preparing your own food or who does it for you?

Yes 3 female (rural)-50% (50%)
2 male (rural)-33.3% (33%)
3 female (urban)-37.5% (38%)
3 male (urban)-37.5% (38%)

No 1 male (rural)-16.6% (17%)
2 male (urban)-25% (25%)

Will you buy that person a solar cooker to use?

Yes 1 male (rural)-100%
2 male (urban)-100%

V. DISCUSSION

As alternative energy sources for cooking are currently not utilised by interviewed participants due to some major constraints, thus it will take time before their use is fully implemented. Although the participants are eager to implement these energy technologies much is not known about them and their usage. The rural participants have shown much interest in implementing this alternative energy sources because they are faced with several environmental problems like deforestation. They see alternative energy sources are a solution to the difficult conditions they currently have. The urban participants have also shown interest in this energy sources but their access to electricity will contribute to the slow implementation of this energy source because they believe that electricity is much more convenient for them. The following are also contributing to the lack of not implementation of these alternatives: cost to obtain the stoves, weather conditions and education of the elders at home about the usage of these alternatives.

Participants from the rural areas both female and male, are eager to implement these alternative energy source (see figure 1 and 2 in appendix 1). They feel that by using these energy sources, their time currently used to travel far distances to collect firewood, will be better utilised doing homework and other household jobs. They want to implement these technologies because it will mean to them no more cutting down trees that destroys the environment and a reduction of fire accidents at home. The urban participants will only realise the importance of these energy sources for them if they are faced with a shortage of electricity.

My findings show that age, gender and where the participants comes from play an important role in their perception and acceptance of alternative energy source for cooking. The rural people have shown a much more positive feeling of wanting to implement these alternative energy sources for cooking. In most cases in the rural areas the females are the ones that are preparing the food and males are going to collect firewood. Already at a younger age of 15 years, girls are taught how to prepare food at home and boys at that same age have to go into the field to collect wood. The situation is different in most urban backgrounds where the same age groups prepare their food using electricity and most of the time their food is prepared for them. They do not travel far distances to get the electricity but just switch it on/off at any time they need it. In the rural areas they first need to have wood to make the fire which sometimes takes much of their time to collect it. For them only putting the solar cookers outside and having the sun cook the food and or making firebricks from waste paper, is much the days methods.

Cost does not seem to be the factor to why the urban participants do not want to implement solar cooking as shown in figure 3 but the time has shown to be the biggest factor with 67%. Most of them come from wealthy families that can afford to buy these stoves, but it has shown that they are mostly influenced by their living backgrounds, where 100% of the participants use electricity, see section one energy source used at home for urban participants. Whereas cost seems to be the factor for rural participants to why they do not implement solar cooking as shown in figure 3. Most of the rural participants come from families where one parent is the breadwinner for the family. Thus the implementation of these energy sources will take time, because participants think that their elders need to be educated first on the usage of these stoves. Only then will they be able to use them. The participant's belief that alternative energy source for cooking was too expensive surprising to me. I had thought that many people would think it is less expensive. From my interviews I can now see that many people are only considering the initial cost and not the running cost of their cooking equipment. The NaDEET activities do not clearly address this gap in understanding of alternative energy sources equipment costs.

PROJECT LIMITATIONS

The project implementation and design had several limitations. They include:

- Initially I intended to send a post-post visit questionnaire to the schools. I did not send them because time was a limiting factor. I would not have been finished with the analysing of the data to present the results in time.
- Weather conditions at NaDEET Centre, cloudy days as participants attended programmes, which influenced the responses e.g. the solar cooking is very slow, it takes too long for the food to cook.
- Language of interview. Explaining or translating of questions into another language perhaps was leading the participants to give certain responses.
- Groups origin. Most of the schools visiting NaDEET Centre during the period of my study are urban schools. Participants are from wealthy families. The project therefore is not as representative of Namibian society as hoped.
- The age group of 23+ urban participants was more dominated by males and therefore the results are not so accurate as females tend to be the food prepares.

CONCLUSION

Factors such as beliefs, high cost to obtain alternative technologies, weather conditions, time management and lack of awareness will still contribute to the slow implementation of the acceptance of alternative energy sources for cooking. The school curriculum has incorporated this information in the Grade 6 Natural Science syllabus. I personally think that it is a good idea, but it should be taught at all grade levels so that all learners can apply their knowledge and skills into their daily life. It should be each and every person's responsibility to talk and share the knowledge about these energy sources. The period of the research was too short for me to make definite conclusions of whether the participants will implement this alternative energy for cooking in their lives. If I had done this research for the next six months, I think I would have had a good comparison because more groups from rural areas will be visiting the Centre whereas with these groups for 2004 the urban participants were dominating.

RECOMMENDATION

We must make alternative energy sources a top priority rather than an option only than we will influence each other and switch to it without a problem. Let it not be the energy source for rural people only, because firewood, gas and electricity are harmful for the environment. Some pollution is just more visible to the user than others. Participants do not know where and how electricity is produced (i.e. coal-burning). Let it not just be the media's responsibility to broadcast it on TV and radio but every person that has the knowledge and skills to share it with others. I would recommend that someone conducts the research project with the same participants five years from now because most of the participants will then be finished with their school career. Maybe at that time these alternative energy sources for cooking would fit into their lifestyles.

The NaDEET Centre programmes and activities should keep up the good job that it is doing. Although it is done on a small scale, the knowledge and skills are having a great impact on those that visit the Centre. I hope that through more Namibian youth having this experience, it will become a reality.

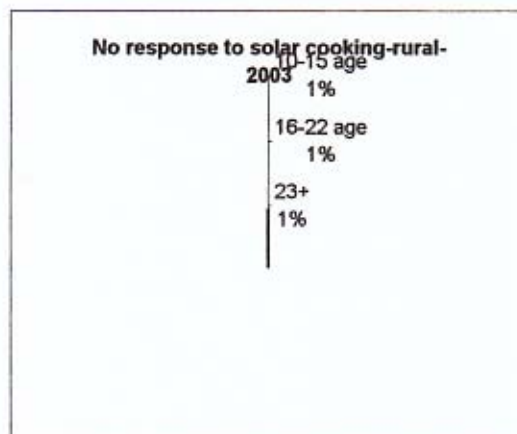
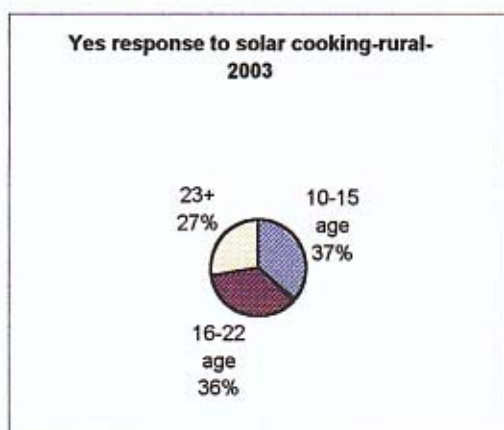
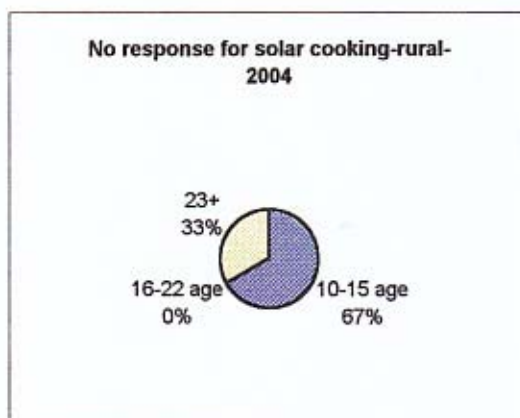
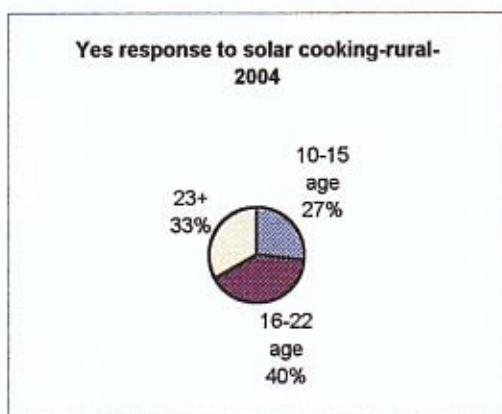
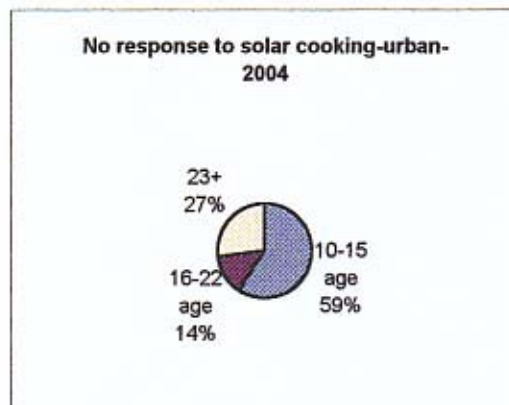
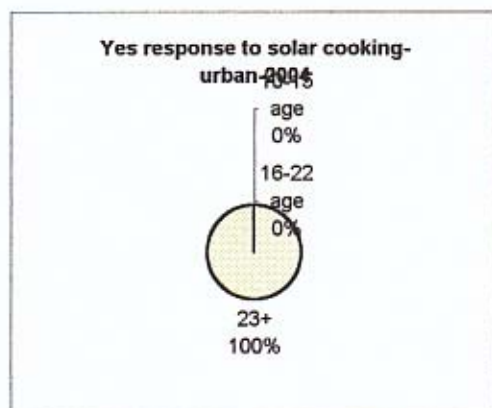
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APPENDIX 1

RESULTS

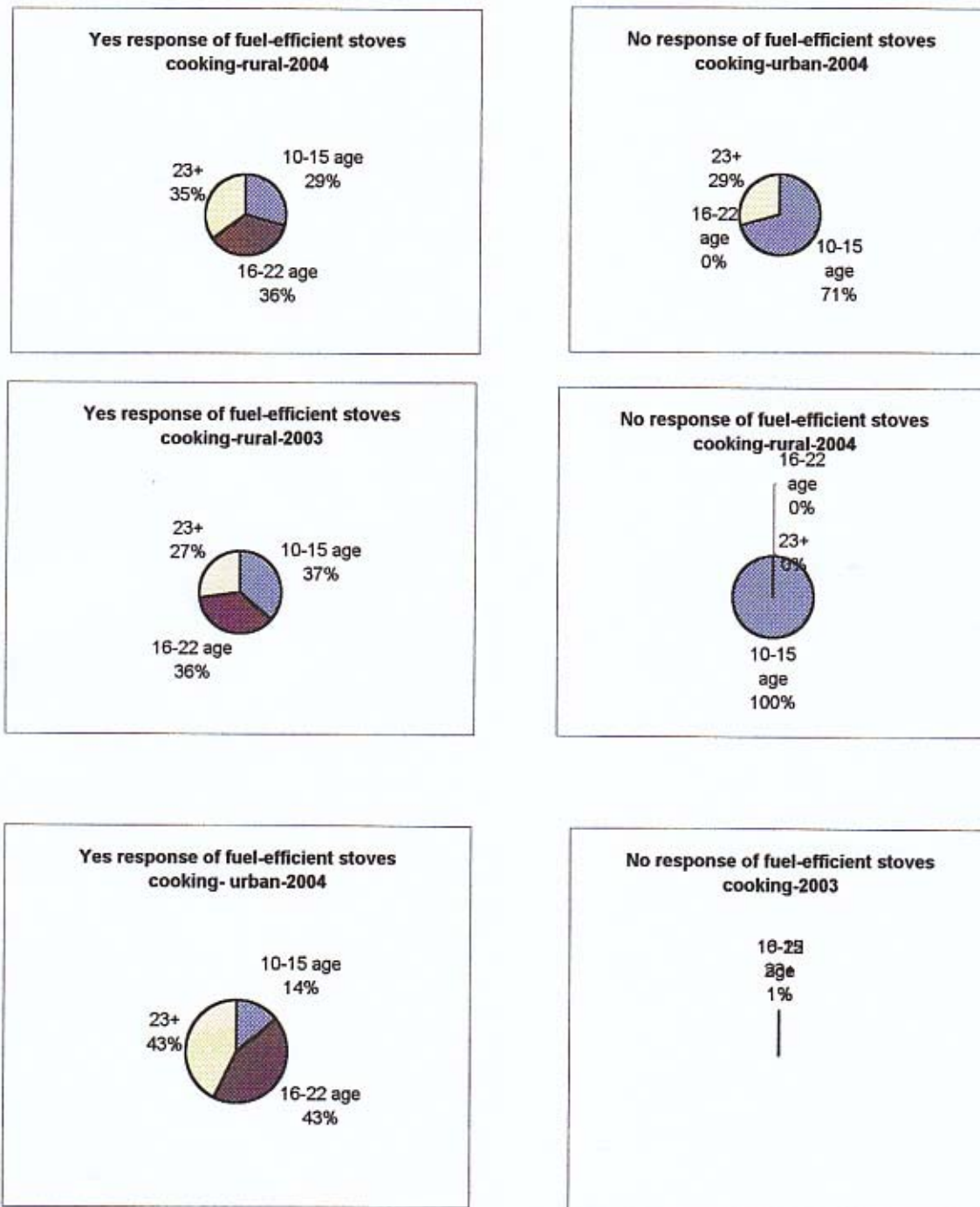
**FIGURE 1 : Responses based on living background
regarding the acceptance of solar cooking**



APPENDIX 1

RESULTS

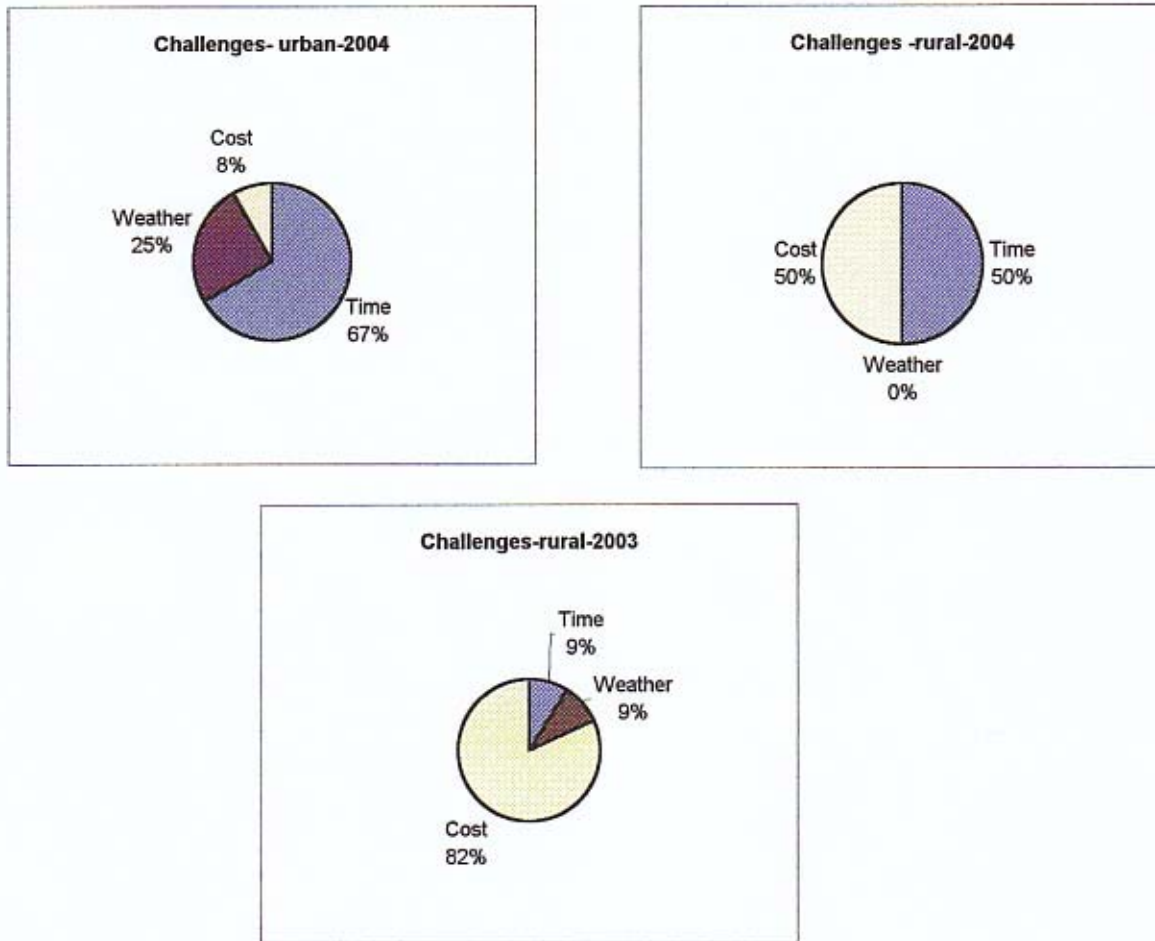
**FIGURE 2: Responses based on living background
regarding the acceptance of fuel-efficient stoves
for cooking**



APPENDIX 1

RESULTS

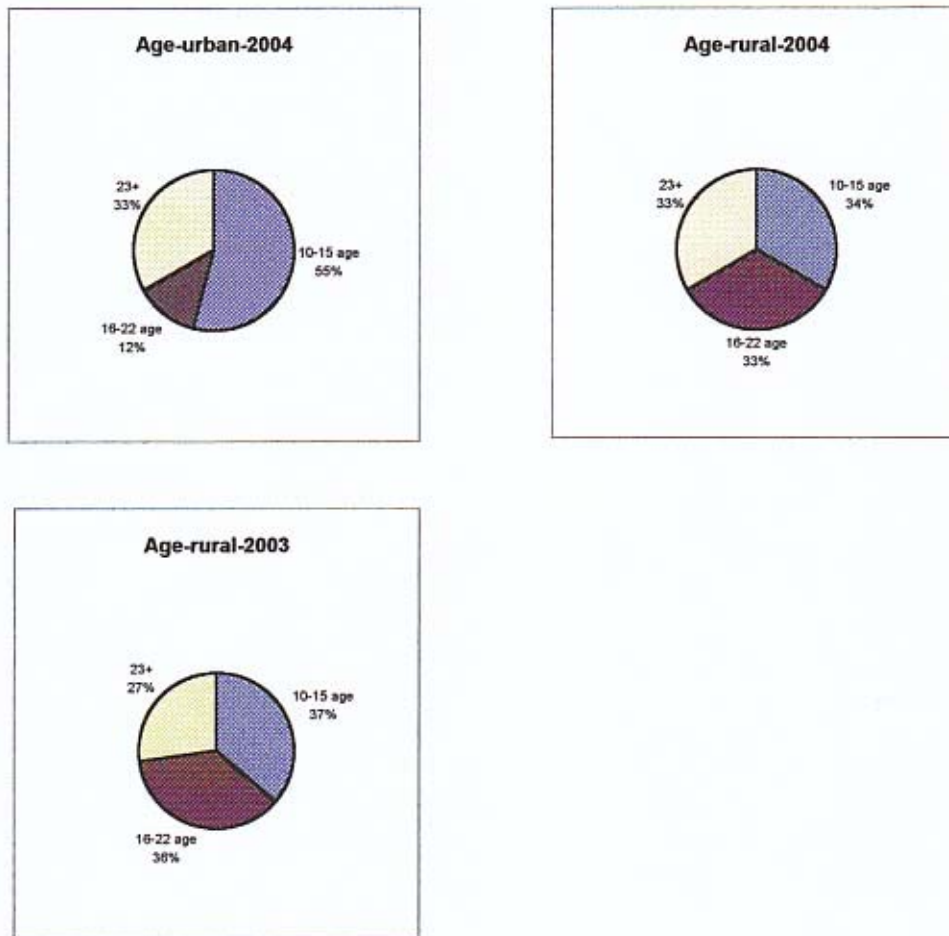
FIGURE 3: Participants responses to challenges for implementing solar cooking



APPENDIX 1

RESULTS

FIGURE 4: Shows the age group of participants



PRE-ALTERNATIVE ENERGY QUESTIONNAIRE

APPENDIX 2

Teachers interview:

Name: _____ School: _____ Subject you teach: _____

Circle one: male female

Circle where you live: city town village farm

Questions

1. **What kind of energy source do you use where you are staying. Circle one you use**
Electricity Open fire Fuel efficient stove Solar energy Gas
2. **Which of the energy source in question 1 do you think are the best for the environment and give your own opinion to support your choice.**
3. **Explain how you feel about solar cooking as an alternative energy?**
4. **Do you think solar cooking fits with your lifestyle? If no, give a detail answer as to why not**
5. **Explain how you feel about fuel-efficient stove as an alternative energy?**
6. **Do you think fuel-efficient stove fits with your lifestyle?**
7. **Have you heard of solar cooking before?**
8. **Will you use solar cooking? Why/Why not?**
9. **Have you heard of the fuel-efficient stove before?**
10. **Will you use the fuel-efficient stove? Why/Why not?**

POST-ALTERNATIVE ENERGY QUESTIONNAIRE

APPENDIX 3

Teachers interview

Name:

School:

Subject you teach:

Circle one: male female

Circle where you live: city town village farm

Questions

1. Explain how you feel about solar cooking and the fuel-efficient stove after your visit at the NaDEET Centre, (Today?)
2. Do solar cooking fits with your lifestyle? If yes give a detail answer and if no say why not.
3. Explain how you feel about fuel-efficient stove after your visit at the NaDEET Centre (Today?)
4. Does fuel-efficient stove fits with your lifestyle? If yes give a detail answer and if no say why not.
5. What kind of energy source do you think is the best to use in terms of environment friendly for cooking after your visit at the NaDEET Centre. Circle one of the energy source and explain why you think that is the best.
Electricity Open fire Fuel efficient stove Solar cooking Gas
6. What have you learned this/that week that makes you feel this way?
7. What are your challenges to implement solar cooking at home?
8. Will you encourage the learners to use solar cooking or not? Why?
9. Will you encourage the learners to use the fuel-efficient stove or not? Why?

[illegible]

NaDEET Centre Weather Report

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