

**KNOWLEDGE, ATTITUDE AND SOCIO-ECONOMIC ASSESSMENT FOR
IMPROVED COOK STOVES, ROMBO DISTRICT, KILIMANJARO REGION**

Ngaromba Dennis, MD,

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**KNOWLEDGE, ATTITUDE AND SOCIO-ECONOMIC ASSESSMENT FOR
IMPROVED COOK STOVES, ROMBO DISTRICT, KILIMANJARO REGION.**

By

Ngaromba Dennis

A dissertation submitted in partial fulfilment of the Requirement for the degree of
Master in Public Health from Muhimbili University of Health and Allied Sciences.

Muhimbili University of Health and Allied Sciences

October 2013

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for examination by Muhimbili University of Health and Allied Sciences, a dissertation entitled ***“Knowledge, attitude and Socio-economic assessment for improved cook stoves, Rombo district, Kilimanjaro region”***, in partial fulfilment of the requirements for the degree Master of Public Health of Muhimbili University of Health and Allied Sciences.

Dr. Simon Mamuya

(Supervisor)

Date _____

Miss Idda Mosha

(Supervisor)

Date _____

DECLARATION AND COPYRIGHT

I, Ngaromba Dennis, declare that, this dissertation is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature.....

Date.....

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DEDICATION

This work is dedicated to my beloved children: Edina, Leonard, Raphael, Stephen and Eliza for missing my company when I was doing my study;

I do also dedicate this work to my late grandfather, Mr. Dennis Ngaromba and My late grandmother, Edina Elia. May your soul rest in peace, Amen.

ABSTRACT

Introduction:

Indo or air pollution resulting from cooking, using poorly ventilated stoves is responsible for increased morbidity and premature deaths caused by pulmonary, eye, and cardiovascular diseases; Improvement in stoves and cooking practices may protect health of millions of women and children in developing countries and protect environmental deterioration. However, health benefits of cook stove interventions on community acceptability and use of appropriate stove technologies in exposed populations.

Objective

This study, intended to assess knowledge, attitude and socio-economic status towards the use of improved cook stoves, among households in Rombo district, Kilimanjaro region.

Methodology

A cross-sectional study with qualitative and quantitative components was conducted. A total of 276 households using three stone cook stoves, were randomly selected from 11 randomly selected wards. A person with the age of 18 to 49 years old, from each household who agreed to participate was enrolled into the study. A total of 236 households members were interviewed, and other 40, took part in focus group discussions. Quantitative data were processed and then analyzed using SPSS statistic package, version 15.0, while content analysis method was used to manually analyze the qualitative data.

Results

Ninety three percent of participants (N = 276) took part in the study. Majority of them 157(66.5%) had primary education, with mean monthly income of 275,614 Tsh. Most respondents (64%) had low socioeconomic status (SES). Majority of respondents

224(94.9%) and 154(65.3%) had, positive attitude and high knowledge towards the use of improved cook stoves respectively.

Both SES and Knowledge on importance of using improved cook stoves, have significant association ($P_{\text{Fisher's exact test}} = 0.028$ and 0.001 respectively) with readiness to purchase and use improved cook stoves.

From the qualitative study majority of respondents had high knowledge and positive attitude towards the use of improved cook stoves. They also mentioned challenges encountered when using improved cook stoves. These were the need of dry firewood for improved cook stoves, difficulties in lighting the stove, the fact that, the improved cook stove is immovable and it is difficulties to warm themselves and their house using the improved cook stoves.

Conclusion and recommendation

Knowledge on the health effect caused by the use of three stone cook stove and household socio-economic position, had effect on the willingness to purchase and use the improved cook stove. Therefore, when planning for any intervention in promoting the use of improved cook stoves, emphasis must be put in, provision of knowledge, about the new innovation and improve the household socioeconomic status, by either providing loans to those with low SES, through existing financial institutions, so that they increase both uptake and sustainable use of the improved cook stoves.

Key Words: Knowledge, attitude, socie economic assessment, improved cook stoves, Rombo Tanzania.

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LIST OF ABBREVIATIONS

ALRI	Acute lower respiratory infection
CI	Confidence interval
CO	Carbon monoxide
CO ₂	Carbon dioxide
COPD	Chronic obstructed pulmonary disease
FGD	Focused group discussion
FGDs	Focused group discussions
HBM	Health believe model
LBW	Low birth weight
MoEVT	Ministry of Education and Vocational Training
MUHAS	Muhimbili University of Health and Allied Sciences
NMB	National Microfinance Bank
SACCOS	Savings and Credit Cooperative Society
SES	Socio-economic status
SO ₂	Sulphur dioxide
TaTEDO	Tanzania traditional energy development organization
TB	Tuberculosis
VEO	Village executive officer
WEO	Ward executive officer

DEFINITION OF TERMS

Attitude

Is a predisposition or a tendency to respond positively or negatively towards a certain idea, object, person, or situation.

Health

Is a state of complete physical, mental, spiritual and social well being, and not merely the absence of disease or infirmity.

A household

Includes all the persons who occupy a housing unit as their usual place of residence and eat from the same pot.

Improved cook stoves (ICS)

Is a cooking device that is designed to consume less fuel, save cooking time, convenient in cooking process by conveying smokes and other particulate matters outside the house. This is built in a house and it is immovable.

Indoor air pollution

Refers to the presence of gas like CO, CO₂, SO₂ and others or air particles into a home atmosphere, business or schools from the indoor sources, hence contaminating the air breath when we are inside such particular environment. In this study I will be referring to the presence of smoke, dust, ashes and soot in the kitchen and living house.

Knowledge

Is the fact or condition of knowing something with familiarity gained through experience or association.

Pollution

Is the introduction of contaminants into the natural environment that cause adverse change and health effect to the living organisms

Socioeconomic status

Is a classification of someone by his or her wealth, educational level, and occupation.

CHAPTER ONE

1 INTRODUCTION

1.1 Introduction and Background

Indoor air pollution has been established as the leading preventable causes of health problem among women and children in both developed and developing countries. Indoor air pollution is the 10th most important risk factor in terms of its global burden of disease. It affects mainly women and children (Garrido, 2011 & Pushpa, 2011). Approximately 5% of annual deaths and diseases in the world are caused by indoor air pollution (WHO- report 2007). Two million of people die annually due to indoor air pollution in developing countries (Pope et al., 2010).

In 11 countries, Afghanistan, Angola, Bangladesh, Burkina Faso, China, the Democratic Republic of the Congo, Ethiopia, India, Nigeria, Pakistan and the United Republic of Tanzania - indoor air pollution claims a total of 1.2 million deaths a year (WHO- report 2007).

Approximately 2.4 billion people depend on wood, dung, charcoal and other biomass fuels for cooking. In countries such as Mali, Nepal, and Tanzania, traditional fuels 'account for as much as 90% of total energy use, while in most developing countries, this dependence lies between the range of 30%-80% and may well be increasing (Fedinando, 2000).



Figure 1: Common source of energy for cooking in Tanzania (firewood approximately, 52 millions tones/year and charcoal 1,000,000 tonnes/year) (TaTEDO report 2011)

The fuel burnt poorly on open fires, leading into low fuel efficiency and high pollution emissions (Ruiz-Mercado et al., 2011).

This contributes to indoor air pollution, hence increases the chance of household members (especially women and children who spent most of their time indoor, mainly at the kitchen cooking) to experience health problems after long exposure to the polluted indoor air.

It has been shown that over half of the world's population, mostly from developing countries, use solid fuel for domestic purposes and are exposed to harmful air pollutants with potential health effects such as respiratory problems, cardiovascular problems, infant mortality and ocular problems (Kurmi, et al., 2012). See figure 1 below;



Figure 2: Pictures showing different types of Traditional cook stoves

Community usually fails to associate some of the health problems they have as to be caused by the indoor air pollution (Pushpa, 2011).

The use of local stove exposes them to air pollutants, due to combustion of solid fuel (open combustion), in the kitchen which is less ventilated (Kariher, 2009; Singh & Saleha, 2011). Although the effects of indoor air pollution have been demonstrated for a long time, less has been done to address viable option to prevent its effects to the people exposed.

Promoting optimal technologies into adoption and sustainable use of viable products is one of the most critical elements to realization of public health benefits of interventions.

A lot of people in Tanzania (80% of households), still use traditional cook stoves for cooking as well as for heating themselves and their houses during the cold weather, despite the health effect they have (TDHS 2010 & TaTEDO report 2012).

Traditional cook stoves emits pollutants which pollute the indoor air we breathe, hence a person exposed to the indoor polluted air, will have a chance of encountering health problems like respiratory and cardiovascular diseases (Pope et al., 2010).



Figure 3: Cooking situation in Tanzania (TaTEDO 2011)

A shift towards cleaner and more efficient modern fuels, such as biogas, liquefied petroleum gas (LPG) and kerosene could largely minimize (or almost eliminate) this health risk. In the short-term, the promotion of more fuel-efficient and cleaner technologies, such as improved cooking stoves, smoke hoods and insulated retained heat cookers, could substantially reduce indoor air pollution and bring about many other convenience and socioeconomic benefits (WHO 2007).



Figure 4: Picture showing an improved cook stove in Tanzanian context (TaTEDO report 2012)

Major challenges to implementation and success of interventions to increase uptake of improved cook stoves were social, cultural and financial constraints (Edelstein, et al; 2008) .

Preventable ways of health problems caused by indoor air pollution are known but people don't change why? The only reason could be:-Obstacles for behaviour change has not well addressed.

Therefore, there is a need not only to know but also address factors that hinders uptake of improved cook stoves as well as its sustainability before any intervention.

For people to change their health risk behaviour they need to perceive themselves being at risk and they will encounter negative health consequences if they don't adhere to the proposed precaution measures (Dominici, Peng, Barr, & Bell, 2010).

This study will use diffusion innovation theory to see on what should be done so as to increase adoption of new cooking technology. The theory has four main elements, which explains on how innovation can take place.

These elements include:

Innovation: - this deals with the knowledge, persuasion and decision of adaptors to the new technology. Here the theory emphasizes on the need of telling the adaptors the advantage and disadvantage of the new technology.

Communication channels;-This describes on how to go about when communicating about the new innovation. What ways of communication (be it mass media or interpersonal communication) can be used to make people adopt improved cook stoves. The theory proposes interpersonal communication as the best way of communication to bring behaviour changes.

Time;-the time spent to advocate the new technology has effect on the acceptance of the new technology. The number of people adopting the technology depends on the time spent to spread information about the technology.

Social system;- diffusion of innovation takes place in the social system. The nature of social system affects individual's innovativeness which is the main criterion for categorizing adaptors (Rogers, 2003).

1.2 Statement of the Problem

The indoor air pollution is still a big challenge worldwide. It is estimated that, around 50% of world's population and 75% of those living in developing country rely on biomass fuel (wood, dung and crop residue) for cooking and heating (Zhang & Smith, 2007). These bio fuels are usually burnt in open fire or simple stoves and hence resulting into very high exposure to the indoor air pollution, especially for women and children (Hanna et al., 2012)

It is estimated that over 2 billion of the world's population, living in families which use biomass to cook every day (Maccarty, et al., 2008).

Therefore, the possibility of improved stoves helping to mitigate climate change is generating increased attention.

As stated above most households in developing countries use either charcoal, coal or fire wood as the source of energy. Very few have an access to electricity, solar power and even liquid fuel as their source of energy. Indoor air pollution due to open burning of fire wood, charcoal and coal results into high level of pollutants which has an impact to the health of individuals within such particular household, especially women and children. The extent of exposure to the indoor air pollutants can not only be attributed by the type of the fuel used but also the type of stove used (Hanna et al., 2012; Kurmi et al., 2012) .

Indoor air pollution also causes chronic obstructive lung diseases (COLD) in adult (especially women) and acute lower respiratory infection (ALRI) in children, lung cancer, nasopharyngeal cancer, tuberculosis and eye diseases in adults. More over it has shown to be associated with low birth weight (Dominici et al., 2010; Kilabuko et al., 2007; Kurmi et al., 2012).

The use of improved stoves not only reduces indoor air pollution but also reduces fuel consumption (Hanna et al., 2012). A study conducted by Edelstein et al., 2008 showed

that women were willing to change cooking practices but were unable to afford cleaner fuels or improved stoves.

There is still a low rate of adoption and use of improved stoves by users to whom the cook stove had been given either for free or at subsidized price.

This unhealthy trend, in the adoption of improved cook stove had to be checked for ensuring success in program implementation (Pushpa, 2011).

Factors affecting adoption and use of improved cook stoves were found to be, attitude towards the use of improved cook stoves, socio-economic status (SES), lack of education and awareness on the health effect associated with indoor air pollution. These also affect the choice of type of stove to be used, cooking fuel, place of cooking and respiratory health (Owusu Boadi & Kuitunen, 2006).

Despite the notable potential of fuel efficient stoves in reducing health risks associated with exposure to biomass smoke, the public health goals of such interventions may not be realized unless technologies are adopted and used correctly by large enough population segments. Stove adoption and use is dependent on complex socio economic infrastructure of specific communities. Understanding of the distribution and social economic infrastructure that may affect stoves adoption and use is a prerequisite for success of any stove promotion program.

One of measures on how to reduce health problems associated with indoor air pollution following the use of traditional cook stoves, is by using improved cook stoves and improved fuels (Clark et al., 2009). Still there is low uptake of improved cook stoves, because most of intervention projects rely on financial support without looking on other causes of low uptake of improved cook stove. Moreover these projects have overlooked the necessity of providing basic information to the people about the use of improved cook stoves and health before any intervention.

In Tanzania it is not well known, as to why people don't want to adopt improved cooking practice.

Is it caused by low knowledge they have on health effect caused by the use of a three stone cook stove? Or their poor socio economic status that they can't afford buying these improved cook stoves? Or low level of education they have?

This study aimed at exploring the reasons as to why people don't adopt improved cook stoves and then propose measures to be taken to ensure sustainable uptake and use of the improved cook stoves.

1.3 Rationale of the study

Rombo is one of the districts in Tanzania, chosen by Tanzania traditional energy development organization (TaTEDO) for improved cook stoves energy intervention project. The district has cold weather most of the time hence, residents use traditional cook stoves for cooking as well as heating their houses. By so doing they have a great chance of being exposed to indoor polluted air.

This study will therefore provide base line information on knowledge, attitude and socio economic status of Rombo residents in relation to the use of improved cook stoves before intervention.

Success of any public health intervention depends on the ability to reach mass coverage, because public health is not about individual but populations.

The study will be focusing on the linkage between choices of household members on domestic cook stove and health. It will identify things like, balancing energy needs for cooking, home heating and public health protection. Moreover, the study will help to see if people can link the type of stoves they use and health problems encountered within the household. We can also understand whether they can adapt to things that have more benefits to their health and longevity.

Therefore one of the key outputs of this study will be to recommend on the type of messages to be used to promote health along with household energy technologies, and the best way to get them through, during intervention.

When planning for energy intervention, it is important to do energy survey in order to have insight on the community energy need, so as to shape certain approaches to energy intervention for that community. We do also need to know the socioeconomic status and educational aspect of house hold members on the type of stoves they use in relation to the health effect.

1.4 Research questions

1. What is the attitude of Rombo residents towards the use of improved cook stoves?
2. What is the socioeconomic position of the Rombo residents in relation to the use of improved cook stoves?
3. How does people's knowledge on the health effect of indoor air pollution affect domestic energy choices for cooking?
4. How can education level influence the use of improved cook stoves?
5. What financial mechanisms can be used to facilitate stove acquisition based on local resources and infrastructures?

1.5 HYPOTHESIS

Null hypothesis

1. Knowledge of people on health effect of indoor air pollution has no influence on type of cook stoves they use.
2. Household socio-economic status has no influence on the uptake of the improved cook stoves

Alternative hypothesis

1. Knowledge of people on health effect of indoor air pollution has influence on the type of cook stove they use.
2. Household's socio-economic status has influence on the uptake of the improved cook stoves.

1.6 Objectives

1.6.1 Main objectives

To assess knowledge, attitude and socio-economic status in relation to improved cook stoves among selected households in Rombo district.

1.6.2 Specific objectives

1. To measure attitude of Rombo residents towards the use of improved cook stoves.
2. To assess household socio-economic status in Rombo district in relation to the use of improved cook stove.
3. To determine how peoples knowledge on health effect due to indoor air pollution, affect domestic energy choices for cooking.
4. To determine the extent to which Rombo residents utilize the existing financial systems in the district.
5. To determine the relationship between education level and the need to use improved cook stoves among Rombo residents.

1.7 CONCEPTUAL FRAME WORK

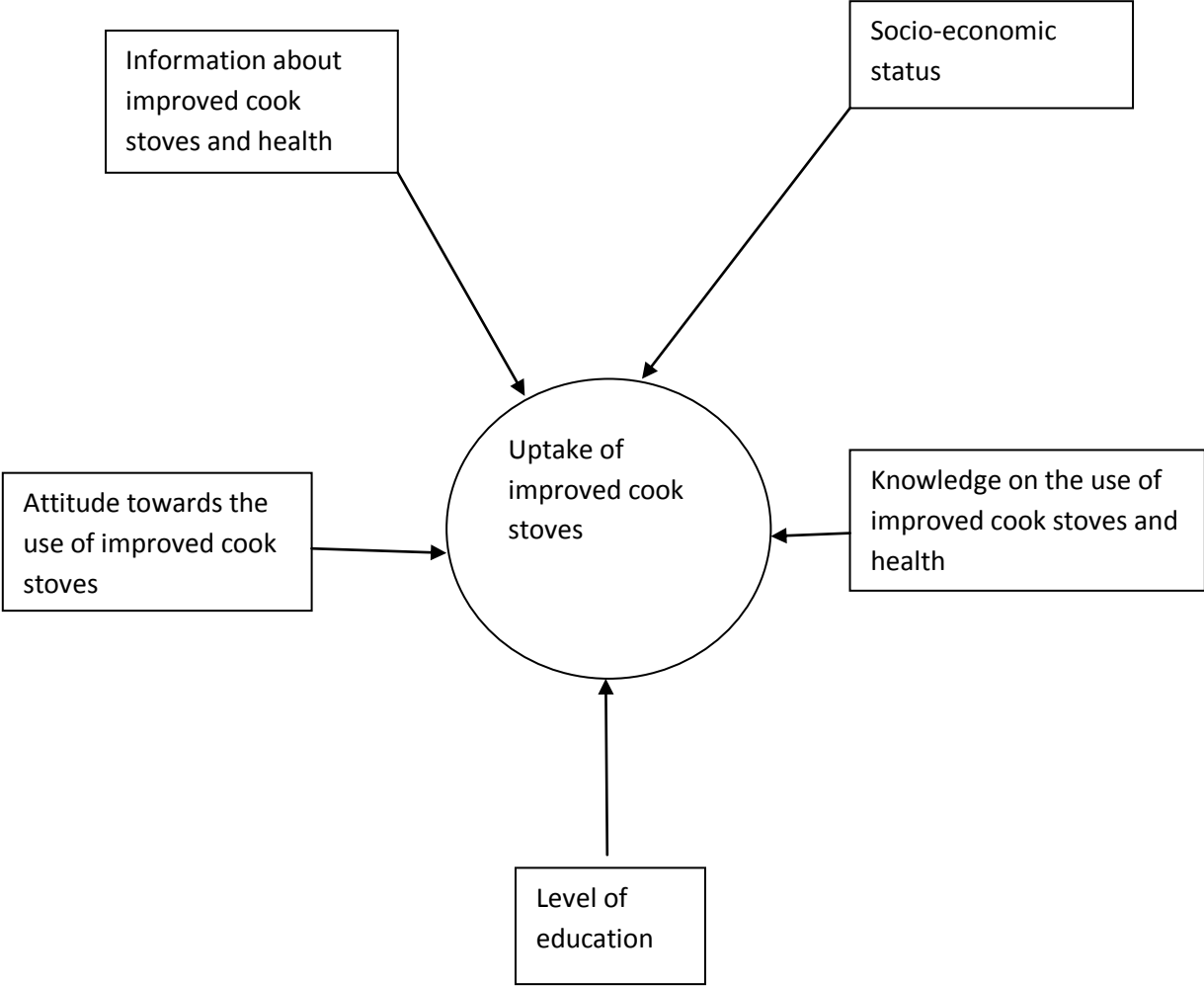


Figure 5: Concepture frame work

CHAPTER TWO

2 LITERATURE REVIEW

Over half the world's population, mostly from developing countries, use solid fuel for domestic purposes and are exposed to very high concentrations of harmful air pollutants with potential health effects such as respiratory problems, cardiovascular problems, infant mortality and ocular problems (Kurmi et al., 2012).

Indoor air pollution is a worldwide health problem causing most of respiratory diseases like ALRI for the children under five years of age, COPD in adults, low birth weight, cardiovascular diseases, lung cancer, still birth and eye infection (Barnes et al., 2009; Kurmi et al., 2012; Pope et al., 2010; Singh & Saleha, 2011).

Indoor polluted air is a dominant exposure for humans as it causes excessive morbidity and mortality mainly for women and children. Thus it plays a major role with regard to public health. Indoor air pollution causes allergies, other hypersensitivity reactions, airway infections, and cancers. The main health problems due to indoor air pollution are in the developing countries with the indoor burning of biomass for cooking and heating (Sundell, 2004).

The probability of getting health problems from indoor exposure, depends on several factors, including rate of exposure, amount of exposure (exposure dose), and type of pollutants to which the person is being exposed.

Moreover, types of stoves, fuel and housing were found to be the confounding factors for indoor air pollution, in relation to the socio-economic status (Kariher, 2009).

It has also been observed that, there is a strong association ($p < 0.0001$) between household socio-economic status and the stove type to be used in that household (Bruce et al., 1998).

The indoor air pollution is mainly attributed by openly burning of the biomass fuels within the household (Edelstein et al., 2008).

Indoor air is more polluted than outdoor air. People, especially women and children are more exposed to the indoor polluted air as compared to men, because they spent most of their time in kitchen where the air they breathe is mostly polluted than any place in the household, hence making them prone to have health problems associated with indoor air pollution (Bruce et al., 1998; Edelstein et al., 2008; Kilabuko et al., 2007; Singh & Saleha, 2011).

In China approximately 420,000 premature deaths occur annually due to indoor air pollution as compared to 300,000 premature deaths due to outdoor air pollution in urban (Zhang & Smith, 2007).

The extent of exposure to the indoor air pollution does not depend only on type of cook stove and fuel used but also found to depend on the type of house, and location of the kitchen in relation to other rooms within the household (Clark et al., 2010; Grieshop et al., 2011; Kilabuko et al., 2007; Moturi, 2010; Padhi & Padhy, 2008).

This was found to be the important confounders which contributes much to the health effect attributed by indoor air pollution of unimproved stoves (local stoves) leading into higher exposure as compared to an improved stoves (Mengersen et al., 2011).

Moreover, higher exposure was noticed to those with houses without cement floor, not well ventilated and locally made in conjunction with the use of wood, cow dung and liquid fuels as compared to those which used electricity for cooking (Bruce et al., 1998).

It has been found that, burning of biomass fuels results in exposure to high levels of indoor air pollution, with injurious health effects.

Possible interventions to reduce the exposure were also found to be; changing of cooking practices by introducing smoke-free stoves (Ruiz-Mercado et al., 2011).

Improved cook stoves have the potential to substantially reduce these exposures. However, few studies have quantitatively evaluated exposure reductions associated with the introduction of improved stoves, likely due to the cost and time-intensive nature of such evaluations (Clark et al., 2010).

Improved cook stoves increases efficiency (optimizes combustion and maximize heat transfer) of biomass resources use in households, institutions and other areas by 50 percent. It reduces indoor air pollution from 6 to 3 tones of CO₂ per household per year. It also reduces drudgery and save time (5 to 2 days a week) for women and children. It can also reduce deforestation and land degradation (100,000 to 50, 000 hacter per year) – TaTEDO report 2011

The commonest indoor pollutants are CO, CO₂, SO₂, NO₂ and other suspended particulates which found to be mostly concentrated in the kitchen as compared to other rooms within the house hold (Clark et al., 2010).

It is conventional wisdom that it is possible to reduce exposure to indoor air pollution, improve health outcomes, and decrease greenhouse gas emissions in the rural areas of developing countries through the adoption of improved cooking stoves (Hanna et al., 2012).

The solution for reducing indoor air pollution was found to be the use of a stove with a chimney, to have good ventilation, getting rid of "dampness" problems, and adequate testing of new building materials would reduce morbidity and mortality (Dominici et al., 2010). The use of improved cooking stoves, can not only reduces indoor air pollution but also they are economic in terms of fuel consumption hence environmental friendly (Hanna et al., 2012; Johnson et al., 2010; Sundell, 2004).

Association between elevated indoor air pollution exposures and burning of biomass fuels in developing countries are well established (Singh & Saleha, 2011). Improved cook stoves have the potential to substantially reduce these exposures (Clark et al., 2010).

There is overall reduction in particulate emissions for rural homes during daily activities upon the use of improved cooking stoves.

More over the ratio of organic carbon (OC) to elemental carbon (EC) within the aerosol fraction decreased between the open fire and improved Pat sari stoves (Johnson et al., 2008)

National Program on the use of improved cooking stoves was introduced by the Government in India. A total of 33 million biomass based improved stoves were supplied in rural areas at a subsidized very low cost. The effectiveness of the new smokeless stoves in reducing the level of pollutant exposure was monitored and found that, there was the mean reduction in particulate matter concentration with improved stoves of 37% and 54% for personal and area sampling, respectively, in the kitchen. The average daily integrated exposure reduced by 40% with the improved stoves. The annual benefit of mortality risk reduction due to improved stoves was estimated to be about 400/household (Patil & Dash, 2006).

The use of improved cook stoves found to have improved fuel efficiency and lower pollutant emissions compared with traditional cooking methods (3 stone cook stove). Furthermore, stoves with smaller-mass components when exposed to the heat of fuel combustion tends to take lesser time to boil, hence they have better fuel efficiency, and lower pollutant emissions (Kariher, 2009).

The challenge is to design stoves with smaller-mass components that also have acceptable durability, affordable cost, and meet user needs (Kariher, 2009).

Improved cooking stove projects in the developing world will not only have the potential to reduce indoor air pollution and improve health but also deforestation, and slows climate change (MacCarty et al., 2005).

Many people fail to associate the health problems they have with the existing indoor air pollution. Therefore, when intervention is paused, they will not participate, hence they won't adopt the proposed intervention, because for them, it is not the big issue. Therefore, these people need to be informed about the health problems they have and how they relate with indoor air pollution (Gordon et al., 2007).

No stove program can achieve its goals unless people initially accept the stoves and continue using them on a long-term basis. When a new stove is brought into a household, commonly a stacking of stoves and fuels takes place with each device being used for the cooking practices where it fits best. Therefore, to better understand the adoption process and assess the impacts of introducing a new stove it is necessary to examine the relative advantages of each device in terms of each of the main cooking practices and available fuels (Ruiz-Mercado et al., 2011).

CHAPTER THREE

3 RESEARCH METHODOLOGY

3.1 Study area

Rombo district is one of the six districts in Kilimanjaro Region, Tanzania. It is bordered to the north and east by Kenya, to the west by the Hai District, and to the south by Mwanga District and Moshi rural. Large portion of the district is covered by Kilimanjaro National Park (Kinapa).

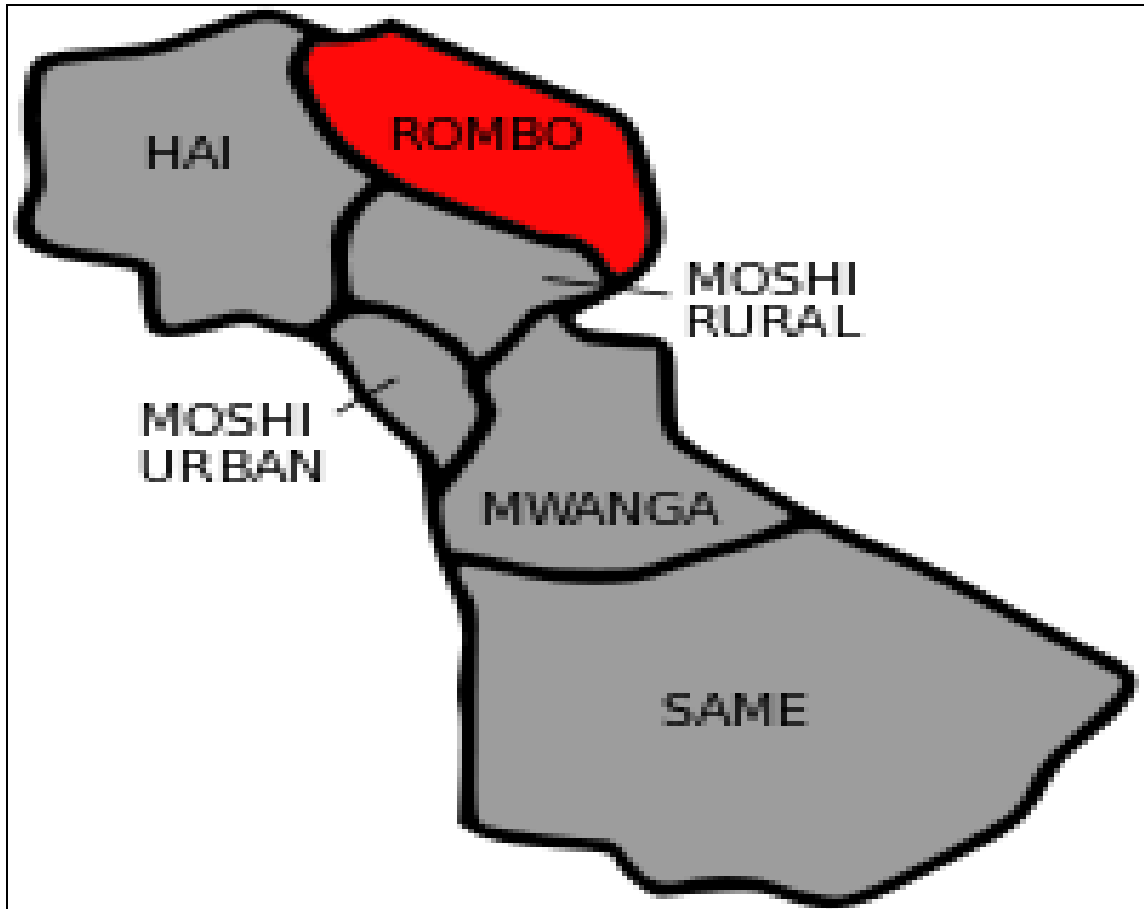


Figure 6: A map of Kilimanjaro region showing Districts

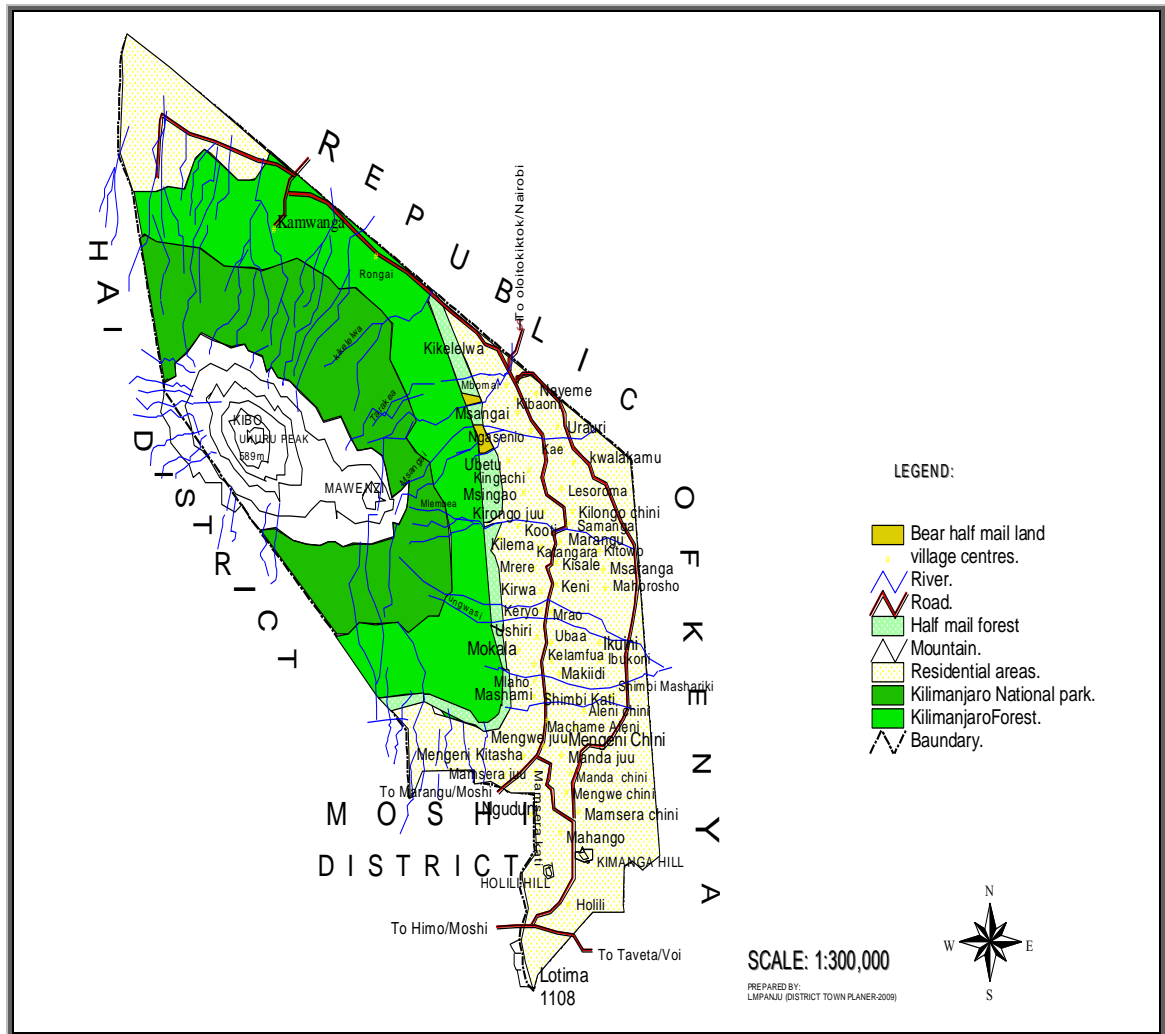


Figure 7: The Rombo district map

According to the 2012 Tanzanian National census, the population of the Rombo District was 260,963, with an average population density of 36 people per square kilometers. The district is divided administratively into 24 wards, namely:-

Aleni, Holili, Katangara Mrere, Kelamfua Mokala, Keni Mengeni, Kirongo Samanga, Kirwa Keni, Kisale Msaranga, Kitirima Kingachi, Mahida, Makiidi, Mamsera, Manda, Marangu Kitowo, Mengwe, Motamburu Kitendeni, Mrao Keryo, Nanjara Reha, Ngoyoni, Olele, Shimbi, Tarakea Motamburu, Ubetu Kahe and Ushiri Ikuini.

The district has an altitude ranging from 1500m to 3400m, with temperatures ranging from 15°C to 30°C. Bimodal rainfall ranges from 400mm–600mm and long rains are experienced from March to May, whereas short rains occur from October to December (Mziray 2002; Mndeme 2006).

Economic activities

Rombo residents involves themselves in small scale farming, where they grow maize, bananas, beans, Irish potatoes and groundnuts, especially at the lowland area (Mengwe). They do also involve in animal keeping, where they practice zero grazing. They do mainly keep pigs, cows, goats, sheep and poultry. They do also participate in small, medium as well as large businesses.

3.1.1 Target population

Household members, from the houses that use locally made cook stoves in Rombo district.

3.1.2 Study population

The study population included household members (male and female) between 18 to 49 years of age from the households which use locally made cook stove (a three stone cook stove). The above group was chosen based on the fact that they are capable of providing reliable information, because they can easily recall and relate the events.

Also it is the group which is productive, both economically and socially. Therefore it will be better to know if they know that they are at risk, by choosing to use a three stone cook stove. Also we need to know their opinion on the use of improved cook stoves as compared to a three stone cook stove. Economic of any country, depends on members of this age group.

3.1.3 *Study design*

A cross-sectional study with qualitative and quantitative components was conducted. A total of 276 household heads, from the households which uses a three stone cook stove, with the age between 19 to 49 years were enrolled into the study. Structured questionnaires were used to correct data for quantitative study while focused group discussion (FGD) guideline was used to lead discussants, so they can discuss basing on tabled themes.

Both qualitative and quantitative studies were needed so as to complement each other. The information missed by qualitative study will be captured through quantitative study. Also the information missed by quantitative study, will similiary be captured through qualitative study.

3.1.4 **Sample size**

A total of 276 households were involved in the survey. 40 participants involved in five focused group discussions (FGDs), each had 8 people. The group was heterogeneous were gender balance was considered. The focused group was divided into age groups of 18 to 29 years, and 30 to 49 years. For quantitative study, a total of 236(95.9) out of 246 participants were interviewed. The number of those participants expected to be interviewed using questionnaire were obtained using the following formula:-

$$N = Z^2 P (100-P) / \epsilon^2$$

Where:- N= Minimum sample size (Household)

Z=1.96 at 95% confidence interval

P= Proportional of household using locally made cook stove in Tanzania which is 80% (TaTEDO report 2012)

ϵ = Marginal error = 5 %

Then N= 246 Household.

Therefore one member from each of the household above was interviewed, making a total of 246 Participants. Only 236(95.9%) responded fully to the interviewed questions as structured in the questionnaire.

3.1.5 Sampling technique

Due to limited funds, time and human resource, eleven wards out of 25 wards which makes Rombo district, were randomly selected. This was done so as atleast to have a representative sample of wards in the district. Thereafter, random sampling of 294 households, a maximum of 27 households from each ward, was done from an average list of 1855 households per ward. One individual (head of the household) from each of selected households was involved in the study. A total of 40 individual (a maximum of 4 individuals from each ward), that's one individual from each household, participated in the FGD and the remaining 236 individuals (a minimum of 21 households from each ward), that's one individual from each household were interviewed using questionnaires.

3.1.6 Inclusion criteria

People from the household which uses locally made stoves (a three stone cook stove) and have the age between 18 to 49 years, able to speak Kiswahili or "Chaggas" language, and has agreed to participate in the study, were recruited.

3.2 Data collection procedures

Before data collection, three research assistants were trained, so as to familiarize them with study methodology and research instruments. All research assistants were females. One of them works with TaTEDO in Advocating the use of improved cook stoves. The research assistants were responsible for filling in the questionnaires and during FGDs, they participated by taking notes.

3.2.1 Pilot test

The research tools were pre tested to 30 households (for questionnaires) and eight people who formed one FGD, in Hai district. Thereafter, questionnaires were revised before commencing main study.

It was absolutely crucial to pilot questionnaires so as to test how long it takes to complete the questionnaire, check if all questions and instructions are clear and try to dispose any items that will not generate usable data. Data was collected by the principle researcher and 3 research assistants

3.2.2 Quantitative study

A questionnaire with both closed and open ended questions was used to collect information. The questionnaires were translated from English into Swahili by the principle researcher.

Later on the filled questionnaires was translated back to English, because the report needs to be written in English. The interviewer read the questions for the participants and filled in the answers. Kiswahili was the language of communication because it is spoken by most of people in our country (National language). Daily cross checking of the filled questionnaires was done by the principle researcher. Incomplete or wrongly filled questionnaires were re-filled. The principle researcher, informed the interviewer to be careful when filling the questionnaire so as to minimize or even eliminate incompleteness of data.

3.2.3 Qualitative study

For qualitative study, information saturation point was reached after conducting, five FGDs. Each group had eight people from different households which use local cook stoves. Discussion groups were formed according to age groups of 18 to 29 years and 30 to 49 years so as discussants could discuss freely. Every discussion lasted for about one to one and half hours.

Notes were taken during discussion after obtaining permission from the participants. The principle researcher moderated the discussion and one assistant researcher was responsible for taking the note as well as being the time keeper.

3.3 *Data management*

Data was managed on daily bases by checking all the filled questionnaires before data entry. The incomplete or wrongly filled questionnaires were isolated, and discarded.

A researcher assistant, whose questionnaires were found to be incomplete or wrongly filled, was given other questionnaires and requested to go back to the field and collect the information, as required. The incomplete questionnaires obtained after re-visiting the households which had incompletely filled questionnaires in the first visit, were regarded as non respons to such respective households.

3.4 *Data entry, analysis and presentation*

3.4.1 Data entry and cleaning

Data from the correctly filled questionnaires was entered into the computer using SPSS statistical package version 15.0. After data entry, they were cleaned. This was done during basic data analysis.

3.4.2 Data analysis

Quantitative data

These were processed using SPSS Version 15.0 computer statistical package. A p- value of <0.05 at 95% confidence interval was taken as significant level. The statistics summary and frequency tables were produced. Cross tabulation was done, from which statistical testing was done to either accept or fail to accept the null hypothesis.

MEASUREMENTS

How knowledge was measured

Level of knowledge on the use of improved cook stoves was measured using sixteen points that were within three questions, as follows:-

- Ability to mention the causes of indoor air pollution, in which smoke, dust, ashes and soot were used. Each statement was given 1 point, hence making a total of 4 points.
- Ability to mention the health problems caused by indoor air pollution. At this circumstance; tuberculosis (TB), cough, eye disease, asthma, cancer, flu and heart diseases were used as the major health problems. Each was given 1 point, making a total of 7 points
- Ability to compare improved cook stoves and a three stone cook stoves in terms of amount of fire wood they use, time taken to cook, and production of smoke,soot and ashes. Each worth 1 point, making a total of 5 points.

Note:-

Total score was 16 points. A respondent who managed to score 50% of the total score or below it (≤ 8 points) was considered to have low knowledge and those who scored more than 8 points were considered to have high knowledge.

Measure of attitude

Those who were ready to change their cooking practise and adopt new safer cooking practise were regarded to have positive attitude towards the use of improved cook stoves.

Education level

Those who have never been to school, failed to complete primary education and those who have completed primary education, together were regarded to be having low level

of education and those who have secondary education and above were considered to have high level of educated.

SES position

Three parameters were used to measure socio economic status (SES), these were level of education, occupation (monthly income), properties the household own. The SES were grouped as very high, high, middle, low and very low based on the following parameters:-

Very high SES position

For the household to have very high SES, the head of the household should have skills (professional skills), own major business, that worth 20 million or more, has modern house (house with tiled floor, plastered walls, gypsum roof and covered with iron sheets/tiles, toilet insides, had water and electricity) equipped with furniture at good state (beds, mattresses, sitting furniture), has high level of education (degree), with a monthly income of more than 700,000 Tsh. Also own television (Tv), radio, and fridge.

High SES Position

For the household to have high SES, the head of the household should have Medium business, minor professional/ technical, with properties that worth between 10 and 20 millions, modern house (house with tiled floor and gypsum ceiling, covered by iron sheets, plastered by cement, inside toilets, better ventilation), better furniture, advanced level education/college education (advanced diploma), Monthly income between 500,000 Tsh. to 700,000Tsh, had TV, radio and refrigerator.

Middle SES Position

For the household to have middle SES, the head of the household should be a skilled craftsmen, clerical, sales workers,accountant, small business, own properties that worth between 5 and 10 millions, had secondary education/diploma certificate , with a monthly income between 200,000 Tsh and 500,000 Tsh. ,owns either Tv, radio, or fridge. Had normal house (covered by iron sheets, windows and door in good order, cement floor, could have water or electricity or both, inside toilet or separate but in good state, beds,

mattresses, sitting furniture of good state, walls plastered by cements, highly ventilated with better surroundings)

Low SES position

For the household to have low SES, the head of the household should be, a machine operator, semi skilled worker, has primary or secondary education, own properties which wealth between 2 and 5 millions, Has normal standard house, made by bricks, roofed with iron sheets, well plastered with cement and it had a cement floor, windows with iron bars and are in good state. Owns furniture, with a monthly income between 150,000 Tsh. and 200,000 Tsh., may own radio, Tv, the house had neither electricity nor water supply.

Very low SES Position

For the household to have very low SES, the head of the household should be Unskilled labourer, menial service worker, have not been in school or had primary education, own properties which worthy less than 2 millions, with a monthly income less than 150,000 Tsh. Has low quality house made up by either timber walls or mad and roofed by iron sheets or grasses, the floor had no cement neither it had plastered walls, poor ventilation, low quality furniture, they may have beds of low quality without mattress or with a mattress which worthy very low, outside toilet poorly constructed, no access to water ,neither electricity. May or may not have a radio.

Note: - Very high SES, high SES and middle SES were grouped as High (good) SES position, while Very low and low were grouped as Low (poor) SES position. (Hollingshead, 1975 & Laula et al., 2012; Bruna et, al 2006, James et al 2010)

3.4.2.1 Qualitative data

The FGDs were conducted in Swahili language. The discussions were recorded in form of short notes. The qualitative information from FGDs was translated from Swahili to English, and then coded. The coded texts were analysed to obtain patterns of response.

The analysis involved thorough reading of the short notes so as to code scripts and formed themes. The coding was done manually and categorised according to the similarities and differences in contents.

3.5 Ethical considerations and Permission

The ethical clearance was obtained from the Muhimbili University of Health and Allied Sciences (MUHAS) Ethical Review Board. Permission to conduct the study was obtained from the District executive director's office (DED's office) after explaining the aim of the study. Permission letter to conduct the study, from DED's office was shown to the WEO's and VEO's.

Before starting data collection, village executive officers (VEO's) or ward executive officers (WEO's) were given a written consent form prepared using MUHAS format, for them to read and decide whether the study should take place in his/her area or not. In case WEO or VEO has agreed the study to be conducted, then he/she was requested to sign the consent form.

Permission to take pictures or take notes during FGD was incorporated in the written modified MUHAS consent form. It was read to the participants during FGD, and VEO or WEO signed on behalf of them after they have agreed to participate. At the household level oral consent was used by both researchers, VEO's / WEO's who also acted as field guides. The participants decide whether to join the study or not. Those who agreed to join were recruited into the study. We explained about the study to the participants. Furthermore we told the participants that confidentiality will be maintained and they are free to either participate or not.

The permission granted by DED and WEO was in written form, and are attached in this report as appendices for justification of abiding to ethical issues. But at household level, verbal consents from the participants were obtained.

CHAPTER FOUR

4 RESULTS

4.1 Quantitative components

4.1.1 Characteristics of respondents

A total of 236 participants each from separate household, responded to the questionnaires, whereby 86(36.4%) were males. Minimum age of respondent was 18 years, while the maximum age was 49 years, with the mean age of 39 years and the response rate was 95.9% (table 1).

The respondents were selected from 11 wards. These included:-Kelamfua Mokala, Kirongo Samanga, Kirwa ken, Makiidi, Mrao Keryo, Nanjara Reha, Olele, Shimbi, Tarakea Motamburu, Ubetu Kahe and Ushiri Ikuini.

Table1: Demographic characteristics of respondents, in quantitative study.

Characteristics	All study subjects	
	(n = 236)	Percent (%)
Sex		
Male	86	36.4
Female	150	63.6
Marital status		
Married	174	73.7
Single	38	16.1
Divorced	2	0.8
Widow	16	6.8
Cohabiting	6	2.5

	Education level		
	Not been in school	3	1.3
	Primary education	157	66.5
	Secondary education	62	26.3
	Tertiary education	14	5.9
	Monthly income (Tsh.)		
	< 60,000	64	27.1
	60,000 to 350,000	115	48.7
	>350,000	57	24.2
	Age group (in years)		
	18 to 28	31	13.1
The	29 to 39	78	33.1
mean	40 to 49	127	53.8

me of the study population is 275,614 Tsh, in which, 115(48.7%) respondents had a monthly income ranging from 60,000 to 350,000 Tsh and 64(27.1%) had the lowest monthly income of less than 60,000 Tsh.

The study also showed that, 174(73.7%) of the respondents were married and 38(16.1%) were single. Majority of participants 157(66.5%), had primary education and only 3(1.3%) have never been to school (Table 1).

Table 2: Distribution of respondents by age group and sex

		Sex					
		Male		Female(Total(
		(n)	%	n)	%	n)	%
	18 to 28	12	5	19	8.1	31	13.1
Age group	29 to 39	28	11.9	50	21.2	78	33.1
	40 to 50	46	19.5	81	34.3	127	53.8
Total		86	36.4	150	63.6	236	100

The study showed that most of respondents were females 150(63.6%) and 127(53.8%) of the respondents were within the age group of 40 to 49 years, with the minimum respondent age of 18 years and maximum of 49 years old (Table 2).

Table 3: Relationship between Knowledge on health effect caused by the use of a three stone cook stoves and readiness to purchase and use the improved cook stoves

		Knowledge						P-value
		High		Low		Total		
		(n)	(%)	n	(%)	(n)	(%)	
Ready to purchase and use the improved cook stove	Yes	153	(99.4)	74	(90.2)	227	(96.2)	0.001
	No	1	(0.6)	8	(9.8)	9	(3.8)	
Total		154	(65.3)	82	(34.7)	236	(100)	

Pv = P – Value Fisher’s exact test

Of all respondents 154(65.3%) have high knowledge on the health effect caused by a three stone cook stove and 227(96.2%) were ready to purchase and use the improved cook stoves.

Majority of those who have high knowledge, 153(99.4%) were ready to purchase and use improved cook stoves as compared to 74(90.2%) of those who have low knowledge. This shows that there is strong relation (P= 0.001) between knowledge and uptake of improved cook stove (Table 3).

Table 4: Relation between education of the respondents and the use of improved cook

		Education level						P-value
		Secondary and above		Low to primary		Total		
		(n)	(%)	(n)	(%)	(n)	(%)	
Ready to purchase and use the improved cook stoves	Yes	75	(98.7)	152	(95)	227	(96.2)	0.28
	No	1	(0.4)	8	(5)	9	(3.8)	
Total		76	(32.2)	160	(67.8)	236	(100)	

stove

P – Value, Fisher’s exact test

There was no significant different between those who had secondary level of education or above, and those with primary level of education regarding readiness to purchase and use improved cook stoves (P =0.28).

The study showed that, 98.7% and 95% of those who have education level of secondary school and above and those with primary education and below have almost equal chance to purchase and use the improved cook stoves respectively (Table 4).

Table 5: Relationship between Socio- economic status (SES) and readiness to purchase and use the improved cooks stove

		SES						P-value
		Good		Poor		Total		
		SES		SES		(n)	(%)	
		(n)	(%)	(n)	(%)	(n)	(%)	
Ready to purchase and use the improved cook stoves	Yes	86	(100)	141	(94)	227	(96.2)	0.028
	No	0	(0)	9	(6)	9	(3.8)	
Total		86	(36.4)	150	(63.6)	236	(100)	

P – Value, Fishers exact test

All 86(100%) respondents who had good SES were ready to purchase and use an improved cook stoves as compared to 141(94%) of those who had poor SES. There was statistical significant differences between respondents with Good SES and those with poor SES in readiness to purchase and use the improved cook stoves (P = 0.028). (Table 5)

Table 6: Relationship between Monthly income and Readiness to use an improved cook stoves

		Monthly income in Tsh.				Total		P-value
		Moderate to High (n)	(%)	Low (n)	(%)	(n)	(%)	
Ready to purchase and use the improved cook stove	Yes	57	(100)	170	(95)	227	(96.2)	0.12
	No	0	(0)	9	(5)	9	(3.8)	
Total		57	(24.2)	179	(75.8)	236	(100)	

P – Value, Fisher’s exact test

The household monthly income has no influence on the rediness to purchase and use the improved cook stove. This means that there are no differences in willingness to purchase and use the improved cook stoves between those who have low monthly income and those who have high monthly income (P = 0.12). Having high monthly income, is not a determinant that a person will be willing to purchase and use the improved cook stoves (Table 6).

Table 7:-Relationship between education and attitude towards the use of improved cook stoves

	Education level						P-value
	Secondary and above		Low to primary		Total		
	(n)	(%)	(n)	(%)	(n)	(%)	
Attitude							
Positive	74	(97.4)	150	(93.8)	224	(94.9)	0.35
Negative	2	(3.6)	10	(6.2)	12	(5.1)	
Total	76	(32.2)	160	(67.8)	236	(100)	

P-Value, Fisher's exact test

Majority of participants 224(94.9%) had positive attitude towards the use of improved cook stove. 97.4% of respondents whose education level is secondary or above, have positive attitude towards the use of improved cook stoves . Statistically, there is no significant difference in attitude towards the use of improved cook stoves, with respect to level of education (Table 7).

Table 8:- Relationship between knowledge on the importance of using improved cook stove and attitude towards the use of improved cook stoves

		Knowledge				Total (n) (%)		P-value
		High		Low (n)				
		(n)	(%)	(n)	(%)			
Attitude	Positive	152	(98.7)	72	(87.8)	224	(94.9)	0.001
	Negative	2	(1.3)	10	(12.2)	12	(5.1)	
Total		154	(65.3)	82	(34.7)	236	(100)	

The P value- Fisher's exact test

Among 154(100%) respondents who had high knowledge on the importance of using improved cook stoves, 152(98.7%) have positive attitude towards the use of improved cook stove. This shows that there was strong association ($P = 0.001$), among group with high knowledge and that with low knowledge on the importance of using improved cook stoves and attitude. Those with high knowledge, found to be more willing to purchase and use the improved cook stoves as compared to those who had low knowledge (Table 8)

4.2 *Qualitative Results*

A total of five FGDs which involved 40 discussants with equal number of males and females were conducted. The discussion used Kiswahili (National language) as the language of communication and it based on the following themes:-

Traditional cook stoves and improved cook stoves

Majority of discussants were familiar with a three stone cook stoves as well as an improved cook stoves. Stove pictures were used to clarify the type of stoves which were discussed. They all admitted to have seen the improved cook stoves and two participants admitted to have an improved cook stove at their households.

Comparison between a three stone cook stove and an improved cook stove

Discussants managed to compare the three stone cook stoves and improved cook stoves in terms of reduction of smokes, soot, dust, amount of fire wood they use and time they take to cook.

Majority of discussants said that a three stone cook stoves produces a lot of smokes, soot, and dusts. Moreover the discussants said that a three stone cook stove uses a lot of firewood and takes longer time to cook. For instance one discussant, said *“the three stone cook stove makes the house dirty, the roof of the house will be covered by soot which they referred to as Mlale”* (female 20 – 30 years, Olele). Another discussant added on *“a three stone cook stove though it produces smokes, soot and dust, it is still better than the improved cook stoves, because you can use them to warm yourself and your house, easy to light up and you can mix wet and dry firewood for cooking but you can’t warm yourself using Okoa stove”* (female, 40 – 49 years, Makiidi)

They all agreed that, improved cook stove (“Okoa”) produces less ashes and dust. They further explained that, the smoke from improved cook stoves is being drag out through chimney. For example one discussant argued that, *“Okoa stoves cannot be shifted from one place to another as, three stone cook stoves and uses only well dried firewood.*

We can't manage to have dry firewood, Kinapa (Kilimanjaro national park) doesn't allow us to collect dry firewood from the national park as we used to do" (Male, 29 – 39 years, Ushiri ikuini).

Also another respondent said; *"Okoa stoves (improved stoves) truly preserve the environment, it uses less firewood (one at a time) and the kitchen remains clean"* (female 29 – 39 Ubetu Kaye).

Causes of indoor air pollution and the health problems to be encountered

Majority of participants frequently mentioned smokes, ashes, dust and soot as the major cause of indoor air pollution. Most discussants, mentioned irritation of eyes, eyes becomes red, tearing and cough as the health problems caused by irritating smokes, especially when they use wet firewood. One respondent said *"the use of a three stone cook stoves causes frequent nasal secretion (kamasi kutoka mara kwa mara)"*- (Female 29 – 39 years, Kilongo Samanga). They also said, if cough not treated for long time, it will develop into TB. Another respondent stated, *"Coughing and chest tightness are mostly being caused by cold weather especially to the children and older people but not caused by a three stone cook stove"* (Male 29 – 39 years, Makiidi). He went on saying that a three stone cook stove can cause flu and redness in the eyes.

Reasons for low uptake and unsustainable use of the improved cook stoves

Discussants mentioned the reasons as to why those who have an improved cook stoves they don't use them frequently and those who don't have the improved cook stove they don't want to purchase it despite of knowing the health effect of a three stone cook stove. Discussants pointed out that, people opt not to use improved cook stove because it is expensive to construct. You need to have enough money to pay for materials, labourers and the artisan. One respondent said *"everyone wants development. We want to have a good cook stove, but our poverty hinders us from owning them, we don't have money"* (male 40 – 49 Tarakea Motamburu).

In all of the FGDs, discussants were asked if they were ready to prepare materials for construction if they were to be given an artisan to construct the stove for free. The

findings revealed that all participants agreed that, they will construct the stove. They advised that, this must involve local leaders, for them to make close follow up, and needs to be discussed in the village meeting for the villagers to consent. Also they wanted to know type and amount of materials to be collected, and time to complete collection of materials. They preferred this to paying cash.

One discussant had this to say; “As I said before, *Okoa stoves can't be used for warming yourself during cold weather, neither can it be shifted from one place to the other as it is for a three stone cook stove*”, (a male respondent, Ushiri Ikuini 29 - 39 years).

Another discussant added on “*It is difficult to light up an Okoa stove as compared to a three stone cook stove because you need to have dry firewood, when lighting an Okoa stoves, while in a three stone cook stoves you can use even wet firewood*”, (Female, Shimbi Kati 40 – 49 years).

“*You need to have good kitchen, roofed with iron sheets, with brick walled, for you to install an improved cook stove (Okoa), hence most of us can't afford, because of poverty*” (Male 40 – 49 years, Kilongo Samanga). This argument ended, because one participant who is also an Okoa artisan , assured them by saying that; “*I have built an Okoa stove in a timber walled kitchen, so you can even built in the mud walled kitchen, roofed with grasses* (Male 40 – 49, Shimbi Kati).

It was also reported by the discussants that; community needs to be repeatedly informed about the important of Okoa stoves, because it is a new thing to them in comparison with a three stone cook stove. This was mentioned in almost all FGDs conducted as the reason that will makes people opt to use Okoa.

One discussant opined “*A three stone cook stoves is our culture. We grew seeing our grandparents, and our parents using them. It is difficult to change it abruptly, but as time goes, people will appreciate and start using them*”, (male 40 to 49 years, Olele).

Stapes/Measures proposed to be taken so as to make Rombo residents adopt the use of improved cook stove and reduce indoor air pollution.

Discussants said, Okoa is very expensive, it worthy up to 150,000 Tsh. Therefore, most of villagers won't afford. Let the government helps us to get them at affordable price. Many people want to use them, but we are poor. In average, in all FGDs conducted a price range between 30,000 to 50,000 Tsh., was proposed to be affordable price for most of people. *"People must pay at least a little amount of money for them to have Okoa stoves, this will make them use the stove because they will be feeling pain for the money they have paid rather than giving them for free"* (Female 29 - 39 years, Shimbi kati).

One discussant argued that there is no need of providing free stoves; let people buy them at an affordable cost, if you want people to use them. He said; *"if they contribute little amount of money to buy the improved stoves, they will use them because they will have guilty conscious of losing money they have contributed. They will feel pain, using the stove will releave their pain"* (Man 40 – 49 years, Kilanfua Mokara).

Another discussant had this to say; *"Not everyone knows about Okoa, therefore community needs to be trained not only about the important of these stoves but also how to use them"*. She went on saying that; *"education usually ends at district level, there is a need of providing education up to the lower level (to the civilian) through village meetings, in schools and other gathering"* (female discussant 40 - 49 years, Ubetu kaye). Building kitchen away from the main house and not sleeping in the kitchen were also proposed to be one of the ways to reduce indoor air pollution though one participant said that, *"sleeping in the kitchen is not a problem when those who cook have finished cooking and there is no irritating smoke"* (Male 40 – 49, Kelanfua mokala). He argued that, after cooking the place remains warm hence it makes them fill comfortable being there, especially during winter period.



Figure 7: Members of one of the focus group, posed for the picture together with the principle researcher (Squatted) after the discussion.

CHAPTER FIVE

5 DISCUSSION

The study assessed the attitude of Rombo residents towards the use of improved cook stoves, in relation to the knowledge they have, not only on the health problems caused by indoor air pollution following the use of a three stone cook stove, but also the advantage of improved cook stoves versus a three stone cook stoves.

5.1 Quantitative findings

224(94.9%) respondents know that, a three stone cook stoves causes indoor air pollution. They also managed to mention frequently, smokes 187(76%), dusts 64(26%), ashes 9(3.7%) and soot 7(2.8%) as the major causes of indoor air pollution. Moreover; they went far mentioning the health effects caused by indoor air pollution. They also frequently mentioned coughing 134(54.5%), eye diseases 113(45.9%), tuberculosis 78(31.7%), asthma 34(13.8%) and skin problems, like burn 4(1.6%), as the likely health problems that could be caused by indoor air pollution, due to the use of a three stones cook stove. This shows both awareness and knowledge people have, about the pros and cons of proper choices on cook stoves at the household level. This is similar to the study done by Xin and his fellows who showed that 92.5% of participants knew about the indoor air pollution and understood the common indoor pollutants (Li et al., 2011).

Being aware is one of the preliminary measures that will guarantee the adoption of the new innovation, which is health friendly, but this must be taken in conjunction with other parameters, that hinders adoption of improved cook stoves.

Most of respondents 228(96.6%) admitted to use a three stone cook stoves frequently and 13(5.5%) admitted to use other cooking stoves, including saw dust cook stoves (“Jiko la Bulla”), paraffin stoves and charcoal cooking stoves, in addition to a three stone cook stove.

Moreover, 3(1.3%) households were found to have a three stone cook stove, charcoal stoves, paraffin stoves and saw dust stove, in addition to these they also own an improved cook stove (Okoa), but yet they don't use them frequently, due to shortage of well dried firewood, which are mostly preferred to be used. In one household a biogas was seen, and they were using it.



Figure 8: Picture showing a stove using biogas and decomposition tank



Figure 10: Picture showing Okoa stove as seen in one of the households during the study.

A total of 224(94.9%) respondents showed positive attitude towards the use of improved cook stoves (table 7 and 8), this resides with the study done by Wang and Mullahy in China in 2006 that showed 96% of respondents were willing to pay for improving their indoor air quality.

The findings showed that 154(65.3%) has high Knowledge on the health problems caused by indoor air pollution, following the use of traditional cook stoves (table 3).

This shows that, there is a need of imparting the knowledge to the people about the health effects caused by indoor air pollution and the proposed solution, to overcome the problem. Knowledge must come first before any intervention so as to insure compliance and sustainability of the proposed intervention. There is a need of doing community sensitization. Different ways of communication must be taken into the board. Use of traditional dances, radios, bill boards and even leaf lets. These need to go hand in hand with information on how to use and where to get the proposed cook stoves.

The study showed that, people who have knowledge about the use of improved cook stoves and health effect caused by the indoor air pollution following the use of traditional cook stoves are three times more likely to change their risk behavior and adopt the new type of cook stove which is environmental friendly and hence improve their well being.

Poverty, lack of education and awareness are the major factors affecting the choice of cooking fuel, type of cook stoves, place of cooking and respiratory health (Owusu Boadi & Kuitunen, 2006). Similar findings has been found in this study, in which out of 227 (100%) respondents who were ready to use improved cook stoves, 142(62.6%) were educated (those who has primary education and above)- see table 1.

The Study showed that if people had enough knowledge on the important of using improved cook stoves, their difference in SES will have less effect on the uptake and sustainable use of improved cook stoves (table 3 and 5). Though if SES stands alone, it will have great impact on the uptake and sustainable use of the improved cook stoves ($P = 0.028$).

But in the presence of adequate knowledge about the health benefits, that will be obtained following the use of the improved cook stoves, even those with low SES will weigh the prone and cons, for them to opt to use it or not.

The study showed that, out of 227(100%) respondents who are ready to purchase the improved cook stoves, 77(33.9%) comes from the group of people considered to be poor (who had low and very low SES) – see table 5. From the health belief model, “People will change their risk behavior and adapt to the new protective behavior if they feel themselves to be at risk, and they perceive that, they will face severe health consequences if they don’t take action and change their risk behavior”. The decision to change their risk behavior can happen irrespective of their SES. Study done by Owusu and others in Ghana, showed that, household socioeconomic status and educational attainment of respondents had a significant impact on respiratory health through their particular influence on the choice of cooking fuel. Households that use wood and charcoal have a high incidence of respiratory health symptoms. The poor are more affected by respiratory health problems due to their heavy dependence on solid fuels as compared with their wealthy counterparts. Households that cook in multiple purpose rooms are more affected by respiratory health problems than those that cook out doors (Owusu Boadi & Kuitunen, 2006). This reside with what has been seen in Rombo, where some people sleep in the kitchen, (figure 11 below).This habit makes them more prone to the health problem caused by indoor air pollution.



Figure 11: Picture showing a three stone cook stove in the sleeping room

From the study, educated and uneducated people are equally likely to adopt and use the improved cook stoves. Education is not an indicator towards improved cook stove adoption. Majority of those with low to primary education and those with secondary education and above were 95% and 98.7% respectively, willing to purchase and use the improved cook stoves. Statistically there were no differences in willingness to purchase and use the improved cook stoves by regarding level of education ($P = 0.28$)- see table 4.

Most of participants 119(48.4%), use national microfinance bank (NMB) for financial services. Some participants 85(34.6%) store their cash in saving and credit cooperative society (SACCOS) especially those who are economically poor. Other 14(5.7%) use Vikoba and few found to use both Vikoba, NMB and SACCOS. NMB is a reliable financial institution and it has more members than other financial institutions.

Therefore it is better to use NMB if there will be a need for the Rombo residents to refund a given percent of cash after they have been given the subsidized improved cook stoves.

There is a need also to consider SACCOS, because that is where most of the poor people (which are the group of interest) can be reached easily when planning to improve their well being. But thorough understanding of the refunding mechanism needs to be taken into account.

5.2 *Qualitative findings*

Most of participants knew about indoor air pollution caused by the use of a three stone cook stove and they managed to list, at least one cause of indoor air pollution. All of them mentioned smoke as the main indoor pollutants, and some respondents, mentioned, dust, soot and ashes as the major particulates of indoor air pollution. All members spotted the use of a three stone cook stove as the major source of smokes and soot indoor. Similar findings were reported in the study done by Clark and his fellows in Honduran, 2010 were smoke, soot, dust and ashes were the commonest cause of indoor air pollution.

Members admitted to have seen an improved cook stove. They also know a three stone cook stoves, because they all have it in their household.

They managed to compare improved cook stoves and a three stone cook stoves in terms of smoke production, time taken to cook and fuel consumption. This signifies that, they do have enough knowledge about safe cooking practice. They also went on explaining that wet fire wood, produces a lot of choking smokes as compared to the dry one.

Eyes problems, coughing, and chest tightness were the major health problems mentioned by most of them. This implies that, they have somehow managed to link the indoor air pollution with the health problems they have experienced. But few of them disagreed, that coughing and chest tightness as to have been caused by the use of a three stone cook stove, rather they regard them to be caused by other causes like cold weather as well as the old age. People are somewhat aware with the indoor air pollution, its cause and the health effect cause by the use of a three stone cook stove. The findings look similar to what has been found by Kilabuko et al., 2007 where association between respiratory diseases and exposure to domestic biomass fuel smoke was revealed.

Though people are aware, community health education and keeping on raising community awareness on the important of using improved cook stoves for their well being is still needed.

Majority of participants proposed the use of improved cook stoves and separation of the kitchen from the sleeping house as the solutions in reducing indoor air pollution at the house hold level. Although they faced difficulties to link most of the health problems they have with the indoor air pollution due to the use of traditional cook stoves, this might have been contributed by the long time it takes for the health effect to be seen. This finding implies that, though people have knowledge on health effect due to indoor air pollution, and they have positive attitude towards the use of improved cook stoves, but they still need to be frequently mobilized on the importance of using improved cook stoves, empowered economically, so as to enable them to have both, sustainable uptake and use of the improved cook stoves.

Similar findings were seen in the study done by Owusu and Kuitunen where by 92.6% of participants, were ready to use improved cook stoves.

For sustainable uptake and use of improved cook stoves, community awareness is mandatory. This can be by providing health education, as well as distribution of subsidized cook stoves especially to those with poor SES. This coincides with the study done by Edelstein et al 2008 who showed that an increase in awareness of the health-effects of indoor biomass cooking smoke may be the first step in implementing a program to reduce exposure to the indoor air pollutants.

Discussant argued that there was no need of providing free stoves. They said let people buy them at an affordable cost, if you want people to use them. This implies that, for the people to use the stove they must have a sense of owner ship. Similar results were reported in the study done by Pushpa, 2011 where free improved cook stoves were provided but the uptake and sustainable use remained to be the big challenge. The study concluded that, free provision of improved cook stove, makes them to lose sense of owner ship, hence they won't bother to use them accordingly, because they perceived not to be a priority to them.

5.3 Study strength and limitations

5.3.1 Strength

Combination of both qualitative and quantitative studies allows complementation of one study by the other in case of weaknesses of each approach. This helps the researcher to have deep understanding of the research problem. Also validation of findings can be done by comparing the results obtained in each of the research methods.

5.3.2 Limitations

Not all non verbal and verbal communication could be captured, also Interpretation of some data, could have been influenced by researchers subjectivity. Moreover it is time consuming in terms of data collection (a researcher needs to be there all the time) and also during data processing.

Because of the small sample, the results cannot be used to generalize to the entire population of Rombo residents, though we opted to have a representative sample. Difficulties in getting sensitive information needed in estimating socio-economic position, like Property owned by the house hold or permission to look for furnitures in the house.

Conclusion and recommendation

Knowledge on the health effects caused by the use of three stone cook stove and household socio-economic position, had effect on the willingness to purchase and use the improved cook stove. Therefore when planning for any intervention in promoting the use of improved cook stoves, emphasis must be put in, provision of knowledge, about the new innovation and improve the household socioeconomic status, by either providing loans to those who had poor SES, through existing financial institution, so that they increase both uptake and sustainable use of the improved cook stoves. In the case of Rombo residents, subsidization of improved cook stoves by paying the artisans who will build the stove can be done to those community members who have collected the building materials.

There is a need of knowing if the culture of a particular society were intervention is planned to take place interferes with the planned intervention and find the way out to address such problem. Moreover, to address this issue of prolonged use of a three stone cook stoves and its health effect, both centre and local government must fully participate, for the betterment of not only the health of civilians, but also country's economy, because a healthy person will have time to produce and contribute to the country's economy. We need to have national campaign on this, and address the issue seriously because it is a silent killer.

Government should formulate and implement realistic and effective wood fuels conservation policies and strategies. There is a need to enhance technological back-up, strategies, and resources for training and developing market networks (producers, dealers and distributors).

We do also need to strengthen improved coo stove quality control through effective monitoring and market mechanism. These in turn need to go hand in hand with urgent formulation and implementation of large scale improved cook stove promotion with sustainable biomass production and substitutes (biogas) strategies, here scale and urgency is of essence!!- to conserve forests, reduce health problems, by so doing we will savewomen and children. Furthermore when implementing the intervention, the

innovation diffusion theory should be taken into account. The theory keeps on insisting that, not all people will adopt at once, there are late adopters, who frequently needs to be given information, for them to adopt the new innovation.

Therefore repeated information on the use of improved cook stove will help late adopters, to adopt the new cooking practice, which is safe to their health as well as environment.

Generally, the study pave the way on how to go about, during cook stove intervention programs, so as to have sustainable uptake and use of the improved cook stoves.

Area for further research

There is a need to do randomized control trial study, to establish use and effect of improved cook stoves. Analyze the type of pollutants produced by fire wood collected from different types of plants which residents use them as the source of fire wood, and what are their health effects that can be caused by those pollutants.

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APPENDICES

APPENDIX 1- INFORMED CONSENTS

ENGLISH VERSION

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES



DIRECTORATE OF RESEARCH AND PUBLICATIONS, MUHAS

INFORMED CONSENT FORM

ID-NO.

Greetings,

My name is **Mr. Dennis Ngaromba** a student from School of Public Health and Social Sciences at Muhimbili University of Health and Allied Sciences in Dar es Salaam.

Purpose of the Study

Dear respondent I would like to inform you that this is a research study titled “**Knowledge, attitude and Socio-economic assessment for improved cook stoves, Rombo District, Kilimanjaro Region**”. I would like to give you information about your participation in the study.

This study is aiming to explore your Knowledge, attitude and Socio-economic position, on the use of improved cook stoves. We do want to know if you perceive to be at health risk when using a three stone cook stove, and what measures will you take to prevent yourself from such risk. The obtained information will be used during intervention project which will involve distribution of improved cook stoves at a highly subsidized cost, using the existing financial systems.

May you please express your ideals freely in honest and trustful manner for betterment of the results. This will lead into better recommendations on how to implement the intervention in order to ensure increased uptake of the improved cook stoves and its sustainability.

Confidentiality

During the study we will be taking the reported information by either taping or taking the short note. In some instances pictures of the respondents will be taken and been used during report writing. All information obtained will be kept confidential on the best of our knowledge and pictures taken will be used for research clarification and not otherwise. No name will be written on the questionnaire or in any report/documents that might let someone identifies you. Your name will not be linked with the research information in any way. The investigators will take care of the data and information collected. However, the final results after the analysis will be shared with other stakeholders and I will submit the manuscript for publication in scientific journals.

Right and withdrawal alternatives

Your participation is voluntary. You may withdraw from the study at any time during interview even if you have consented to participate. There is no penalty for refusing to participate on the study. You will not experience any loss if you refuse to participate in this study. You may also decide your picture not to be taken.

Benefits

The information you provide will help to the stake holders to think proper way that could be used so as to assist Rombo residents to change their cooking stoves and adopt the use of improved cook stoves. This will prevent you from health effect of indoor air pollution, caused by the use of traditional cook stoves (a three stone cook stoves).

If any damage will occur

It is not expected that there will be any damage for your participation as the respondent to this study.

Risks

There is no harm for participating in the study. However, you are free to stop participation at any time during this discussion in case you feel uncomfortable.

Who to Contact

If you ever have questions about this study, you should contact the **Principal Investigator**, Mr. Ngaromba Dennis (+255 714 88 42 52) of Muhimbili University of Health and Allied Sciences, P. O. Box 65001, Dar es Salaam.

If you ever have questions about your rights as a participant, you may call **Prof. M. Moshi, Chairman (Research and Publications Committee, MUHAS. P.O.Box 65001, Dar es Salaam – Tanzania, Tel +2552150302-6); Dr. Simon Mamuya (+255655721377) and Idda Mosha (+255 717 050 748)**, from Muhimbili University of Health and Allied Sciences , P.O. BOX 65001 Dar es Salaam, who are the supervisors of this study.

Signature:

Do you agree?

Participant agrees

Participant does NOT agree

.....

I have read the contents in this form. My questions have been answered. I agree to participate in this study.

Signature of participant

Signature of Research Assistant

Date of signed consent

DECLARATION

The above document describing the benefits, risks, and procedures for the research titled "**Knowledge, attitude and Socio-economic assessment for improved cook stoves,Rombo District, Kilimanjaro region**" has been read and explained to me and I have agreed to participate. I certify that the nature and purpose, the potential benefits and possible risks associated with participating in this study have been explained to me.

Signature or Right Thumb stamp of the respondent Date

Signature of Research Assistant.....DATE.....

**FOMU YA RIDHAA YA KUSHIRIKI KATIKA UTAFITI
CHUO KIKUU CHA SAYANSI ZA AFYA MUHIMBILI**



KURUGENZI YA TAFITI NA UCHAPISHAJI

FOMU YA RIDHAA

Namba ya utambulisho

Ridhaa ya kushiriki kwenye utafiti

Salamu!

Ninaitwa Bw. Dennis Ngaromba mwanafunzi wa shahada ya pili katika chuo cha sayansi ya tibam-Muhimbili. Nashughulika kwenye utafiti huu wenye lengo la kutathmini ufahamu uelewa, na hali ya kiuchumi kwa wananchi wa wilaya ya Rombo kuhusu madhala ya kiafya yatokanayo na matumizi ya majiko ya kiasili (jiko la mafiga matatu), na umuhimu wa kutumia majiko bora ili kupunguza uchafuzi wa hewa ndani ya nyumba, pamoja na kupunguza matatizo ya kiafya yatokanayo na matumizi ya majiko ya asili.

Madhumuni ya Utafiti

Utafiti huu unafanyika ili kutimiza sehemu ya matakwa ya shahada ya uzamili ya sera ya afya na usimamizi ya Chuo Kikuu cha Afya na Sayansi ya Tiba Muhimbili. Utafiti unalenga kuchunguza uelewa wa wana Rombo kuhusu madhara ya kiafya yanayotokana na kuvuta hewa chafu ndani ya nyumba zetu kutokana na matumizi ya majiko ya asili. Pia utafiti utaangalia utayari wa watu wa Rombo katika kutumia majiko bora na ni njia zipi zitumike ili kuhakikisha nyumba nyingi zinakuwa na matumizi endelevu ya majiko

bora, ili kulinda afya ya wana familia. Wakati mwingine utaombwa kupiga picha zitakazo tumika katika kuboresha taarifa, na si vinginevyo.

Hivyo unaombwa kushiriki katika utafiti huu kutokana na upeo na ufahamu ulionao ili tuweze kupata taarifa sahihi zitakazotumika katika mradi wa usambazaji wa majiko bora.

Tafadhali kuwa mkweli na muwazi kwa vile matokeo ya utafiti huu yanaweza yakatoa maamuzi na mapendekezo ya baadaye.

Nini kinahitajika ili kushiriki

Ukikubali kushiriki katika utafiti huu, utasailiwa ili kuweza kujibu maswali toka kwenye dodoso lililoandaliwa kwa ajili ya utafiti huu.

Usiri

Taarifa zote zitakazokusanywa kupitia utafiti huu hazitahusisha majina. Namba za utambulisho zitatumika. Kutakuwa na usiri na hakuna mtu yeyote asiyehusika atakayepata taarifa zilizokusanywa. Isitoshe, picha zote zitakazopigwa, ikiwa ni pamoja na picha za washiriki, watakao shiriki katika majadiriano, zitatumiwa kuboresha taarifa ya utafiti na si vinginevyo.

Hatari

Hakuna madhara utakayopata kwa kushiriki kwenye utafiti huu.

Haki ya kujitoa au vinginevyo

Ushiriki katika utafiti huu ni wa hiari. Unaweza kuacha kushiriki katika utafiti huu muda wowote hata kama ulikwishatoa idhini yako. Kukataa kushiriki au kujitoa kutoka kwenye utafiti hakutahusisha adhabu yoyote.

Faida

Kama utakubali kushiriki kwenye utafiti huu taarifa utakazotoa zitatuwezesha kutupa mwanga zaidi juu ya mtazamo wa wana Rombo katika suala zima la matumizi ya majiko bora, ukilinganisha na kipato chenu, pamoja na uelewa wenu juu ya athari za kiafya zitokanazo na matumizi ya majiko ya asili. Pia tutapata mwanga juu ya utayari wa watu wa Rombo katika kutumia majiko bora. Matokeo ya utafiti huu yanaweza kutoa taarifa ambazo zinaweza kusaidi katika kuboresha njia mbali mbali zitakazotumika katika kutekeleza mradi wa kusambaza majiko bora.

Endapo utapata madhara

Hutegemewi kupata madhara yoyote kutokana na ushiriki wako katika utafiti huu.

Nani wa kuwasiliana naye

Kama una maswali kuhusiana na utafiti huu, wasiliana na Mtafiti mkuu, **Bw. Dennis Ngaromba (Tell. +255 714 884 252)** wa Chuo Kikuu cha Afya na Sayansi ya Tiba Muhimbili, S. L. P. 65001, Dar es Salaam.

Kama una swali kuhusu stahili zako kama mshiriki unaweza kumpigia simu **Mwenyekiti wa baraza la Utafiti na machapisho Prof. M. Moshi S.L.P. 65001, Dar-es Salaam. (Simu: 2150302-6)** au wasimamizi wa utafiti huu **Dr. Simon Mamuya (+255 655 721 377) na Bi Idda Mosha,+255 717 050 748** wa Chuo Kikuu cha Afya na Sayansi ya Tiba Muhimbili, S.L.P 65001, Dar es Salaam.

Sahihi:

Je umekubali?

Mshiriki amekubali Mshiriki hajakubali

Mimi nimesoma maelezo ya fomu hii.

Maswali yangu yamejibiwa. Nakubali kushiriki katika utafiti huu.

Sahihi ya mshiriki.....

Sahihi ya mtafiti msaidizi.....

Tarehe ya kutia sahihi ya idhini ya kushiriki.....

Kukiri

Taarifa iliyopo hapo juu inaonyesha faida, hatari na taratibu za utafiti wenye kichwa cha habari kinachosema “**Kuchunguza, uelewa, utayali na hali ya kipato cha kaya zilizopo wilaya ya Rombo katika matumizi ya majiko bora**”. Nimeelekezwa vyema na mtafiti, na nimekubali kushiriki.

Sahihi/Dole gumba la mshiriki..... Tarehe.....

Sahihi ya Mtafiti

msaidizi.....Tarehe.....

APPENDIX 2

QUESTIONNAIRES-ENGLISH VERSION

Serial number

Date of interview.....

Section A: Socio-Demographic information

1. Sex

- a) Male
- b) Female

2. Age

3. Marital status (circle the chosen option)

- a) Single
- b) Married
- c) Divorced
- d) Co-habiting
- e) Widowed

4. What is your education level? (Circle the chosen option)

- a) Not been in school
- b) Primary
- c) Secondary
- d) Tertiary (college/university)

Section B: Questions to measure attitude & knowledge on the health effect of indoor air pollution and choice of stoves to be used

5. Have you ever heard about indoor air pollution?
 - a) Yes
 - b) No (go Qn 7,8,12..)

6. If yes, what do you think are the possible causes of indoor air pollution?
 - a) Smokes
 - b) Dust
 - c) Others (specify).....

7. Do you know that the use of locally made cook stove causes indoor air pollution
 - a) Yes
 - b) No (go Qn 12)

8. Do you know that, the indoor air pollution caused by locally made cook stoves has health problems to the people who breathe it?
 - a) Yes
 - b) No (go Qn 10)

9. What health effect can be caused by the indoor polluted air due to the use of traditional cook stove (don't read the options to the respondent)
 - a) Tuberculosis
 - b) Irritation of eyes
 - c) Asthma

- d) Coughing
- e) Others (specify).....

10. If you are well informed about the health effect caused by using traditional cook stoves will you opt to adopt smoke free stoves (improved cook stoves)?

- a) Yes
- b) No

11. If no, why?

- a)
- b)
- c)
- d)

12. Do you agree that, improved cook stove is better than a three stone cook stove?

- a) Yes
- b) No (go Qn 14)

13. If yes, how? (don't read the options to the respondent)

- a) It has less smoke production compared to traditional stoves
- b) It uses less fire wood
- c) It reduces cooking time
- d) Others (specify).....

14. If no, why? (don't read the options to the respondent)

- a) Very expensive
- b) Difficult to use them
- c) Others (specify).....

15. If the improved cook stoves could be available, at a reasonable price which is slightly higher than that of a three stone cook stove, will you purchase it?

- a) Yes
- b) No (go Qn 18)

16. In case you are given a chance to propose on how much to be contributed so as to have an improved cook stove. How much will you contribute?

.....

17. In case trained on how to make improved cook stoves using your local available material will you proceed using them by making your own improved cook stoves using the material found at your place?

- (a) Yes
- (b) No

Section C: Socio economic status

The information below is going to be used in ranking of SES basing on occupational and education level /skills (Hollingshead.A.B,1975 & Laula et al.,2012)

Social strata	Range of computed score	State of SES
Major business and professional, degree / advance diploma Modern house, properties \geq 20 million Tsh. income $>$ 700,000 Tsh/month	66-55	Very high
Medium business, minor professional, technical , modern house,properties worth 10 to 20 millions , diploma / advanced diploma. Income 500,000 – 700,000 Tsh /month	54-40	High
Skilled craftsmen, clerical, sales workers, Diploma/secondary. Wealth worth 5 to 10 million, Normal house. Income 200,000 to 500,000 Tsh./month	39-30	Middle
Machine operator, semi skilled workers, secondary education / primary, wealth worth 2 to 5 million. low quality house. Income 150,000 Tsh. to 200,000 Tsh/ month	29-20	Low
Unskilled laborers, menial service workers, wealth worth $<$ 2 million, poor quality house, primary education & below. Income $<$ 150,000 Tsh./month	19-8	Very low

18. What are your main economic activities?

- a) Agriculture
- b) Business
- c) Livestock keeping
- d) Mining
- e) Employed
- f) Others (specify).....

19. What is the approximate amount of money you earn per month?

.....

20. What properties do you own? Circle all that apply

- a) Car/cars
- b) Motor cycle/Motor cycles
- c) Bicycle/bicycles
- d) Modern house/houses
- e) Local house/Houses
- f) Livestock's (cows, goats, sheeps, Camels, Donkeys)
- g) Land (how much acres)
- h) Others (Specify).....

Section D: Available financial institution and mechanisms

21. What financial institutions are available in your place? (let him/her mention)

a)

b)

c)

d)

22. Which ones out of the financial institution mentioned are you a member?

a)

b)

c)

23. If someone wants to provide you with improved cook stoves through your financial institution so you can slowly pay back only 60% of the cost without interest for 2 years, will you be able to adopt it?

a) Yes

b) No

QUESTIONNAIRE SWAHILI VERSION (DODOSO)

Dodoso kuhusu uelewa, utayari na hali ya uchumi kwa wakazi wa wilaya ya Rombo, katika matumizi ya majiko bora /majiko sanifu

Namba Tarehe/...../.....Aliyejaza.....

Kijiji.....Kata.....

Muda wa kuanza..... Muda wa kumaliza.....

SEHEMU A: TAARIFA BINAFSI

1. Jinsi (a)Ya kiume (b)Ya kike

2. Umri.....

3. Hali ya ndoa (zungushia jibu atakalotaja)

(a) Sijaoa/Sijaolewa (b) Nimeoa/Nimeolewa (c) Nimeachika (d) Nina mpenzi (e) Mjane/Mgane

4. Kiwango cha elimu yako? (zungushia jibu atakalotaja)

(a) Sijasoma (b) Msingi (c) Sekondari (d) Elimu ya juu (chuo/chuo kikuu)

SEHEMU B :

Uelewa kuhusu madhara ya kiafya yatokanayo na uchafuzi wa hewa ndani ya nyumba unaotokana na matumizi ya majiko ya asili (mafiga matatu) na utayari katika uchaguzi wa majiko bora ya kupikia

5. Je umewahi kusikia kuhusu uchafuzi wa hali ya hewa ndani ya nyumba?

(a) Ndiyo (b) Hapana (Nenda swali 7,8,12..)

6. Kama ndiyo, unafikiri nini kinasababisha uchafuzi huo?
- (a) Moshi kutoka jikoni (b) Vumbi (c) Mengineyo
(Taja).....
7. Je unakubali kuwa, matumizi ya majiko ya asili, yanasababisha uchafuzi wa hewa ndani ya nyumba?
- a) Ndiyo (b)Hapana (Nenda swali la 12)
8. Je unafahamu kuwa uchafuzi wa hali ya hewa ndani ya nyumba, unaosababishwa na matumizi ya majiko ya asili, unaathari za kiafya kwa wanao vuta hewa hiyo?
- a) Ndiyo (b) Hapana (Nenda swali la 10)
9. Je ni madhala gani ya kiafya yanaweza sababishwa kwa kuvuta hewa chafu, iliyotokana na matumizi ya majiko ya asili (usi msomee majibu)
- (a) Kifua kikuu (b) Ugonjwa wa macho (c) Pumu (d) Kukohoa (e) Mengineyo.....
10. Endapo utataarifiwa ipasavyo kuhusu madhara ya kiafya yatokanayo na matumizi ya jiko la asili, je utakuwa tayari kutumia jiko ambalo ni salama kwa afya yako (jiko bora)?
- a) Ndiyo (b)Hapana
11. Kama, hapana, kwanini?
- a)(b).....
12. Je unakubaliana na usemi huu, majiko mbadala ni bora kuliko majiko ya asili?
- a) Ndiyo (b) Hapana (Nenda swali la 14)
13. Kama, ndiyo, kwa nini? (usimsomee)

(a) Yanazalisha moshi kidogo ukilinganisha na majiko ya asili (b) Yanatumia kuni kidogo

(b) Yanapunguza muda wa kupika (d) Sababu nyinginezo
(Taja).....

14. Kama hapana, kwanini? (Usimsomee)

(a) Ghalama yake ni kubwa (b) Ni vigumu kuyatumia (c) nyinginezo
(Taja).....

15. Kama jiko mbadala linapatikana kwa bei rahisi, licha ya kuwa ni gharama kidogo ukilinganisha na jiko la asili, je uko tayari kununua?

(a) Ndiyo (b) Hapana (Nenda swali la 18)

16. Endapo unapewa nafasi, upendekeze bei ya jiko mbadala, je ungependekeza shilingi ngapi kulingana na kipato chako?
.....

17. Endapo utaelekezwa jinsi ya kutengeneza majiko mbadala kwa kutumia malighafi zilizoko katika eneo lako, je utaendelea kutengeneza na kuyatumia ipasavyo?

(a) Ndiyo (b) Hapana

SEHEMU C: HALI YA KIUCHUMI

Taarifa ifuatayo itatumika katika kupangilia madaraja ya kiuchumi kwa kuzingatia ujuzi/kiwango cha elimu, Kipato, Mali, na shughuli afanyazo muhusika. (Hollingshead, 1975 & Laula et al., 2012), pia hali ya nyumba.

Mgawanyo ndani ya jamii	Alama	Hali ya uchumi
Biashara kubwa, ujuzi wa kupindukia, Elimu ya juu (chuo kikuu), Mali za thamani zaidi ya Tsh.milioni 20, Nafasi za juu za uongozi katika ajira, Nyumba ya kisasa yenye samani zenye ubora wa hali ya juu. Kipato > 700,000 Tsh./ mwezi	66-55	Ya Juu sana
Mfanya biashara wa kati, Mwenye ujuzi maalumu, Fundi sanifu, elimu ya kati (vyuo vingine), muajiliwa wa kawaida, mmiliki wa nyumba ya kawaida na samani bora, piki piki, Mmiliki wa mali za thamani ya kati Tsh.million 10 hadi million 20. Kipato 500,000 – 700,000 Tsh./ mwezi	54-40	Ya Juu
Mtumishi mwenye ujuzi, Muadishi, Mtunza fedha, Mtunza kumbukumbu, Msimamia mauzo, elimu ya sekondari/chuo, mmiliki wa mali zenye thamani kati ya Tsh.mill.5 na 10, nyumba ya ubora wa kati na samani zenye ubora. Kipato 200,000 – 500,000 Tsh./ mwez	39-30	Ya kati
Muendesha mitambo, Mtumishi mwenye ujuzi wa kati, elimu ya msingi, mmiliki wa mali zenye thamani chini ya Tsh. Mill 2, Nyumba ya kawaida na samani zenye ubora kiasi, kipato 150,000 – 200000 Tsh/ mwezi	29-20	Ya chini
Mtumishi asiye na ujuzi wowote, elimu ya msingi/hana elimu, kipato chini ya Tsh.1700 kwa siku, mmiliki wa maliisiyozidi milioni 1, Nyumba duni yenye samani duni. Kipato < 150,000 Tsh. /mwezi	19-8	Ya chini sana

18. Je unajihusisha na shughuli gani?

(a) Kilimo (b) Biashara (c) Ufugaji (d) Nimeajiliwa (e) Shughuli nyinginezo
(Taja).....

19. Pato lako ni kiasi gani kwa mwezi?.....

20. Je unamiliki vitu gani?

(a) Chombo cha moto (taja)

(b) Baiskeli

(c) Nyumba ya kisasa/kawaida (d) Ardhi

(d) Mifugo (Taja idadi na aina ya mifugo)

(e) Vinginevyo (Taja).....

SEHEMU D: TAASISI ZA FEDHA ZILIZOPO

21. Ni taasisi zipi za kifedha zinapatikana ndani ya wilaya yenu? (taja).....

22. Wewe ni mwanachama wa taasisi ipi/zipi kati ya ulizozitaja? (taja)

23. Endapo anatokea mtu au taasisi na kukupatia jiko mbadala, ambalo utatakiwa kulipia asilimaia 60 ya ghalama yote kidogo kidogo kwa muda wa miaka 2 kupitia taasis yako ya fedha, je utakuwa tayari kupokea jiko hilo.

a) Ndiyo (b) Hapana

GUIDES FOR FOCUSED GROUP DISCUSSION

FOCUSED GROUP DISCUSSION GUIDELINE -ENGLISH VERSION

Introduction

- Greetings
- WELCOMING NOTE

Thanks for agreeing to be part of the focus group. We appreciate your willingness to participate.

- Self introduction, introduction of research assistant (Time keeper) and then other participants.

PURPOSE OF FOCUS GROUPS

We need to have focused group discussion so as to find how much do you know about the health effect of indoor air pollution in relation to the type of cook stove used within the house hold. Furthermore we need to know your attitude towards the use of so called improved cook stoves in relation to the house hold socioeconomic status. We do kindly need your inputs and we want you to share your honest and open thoughts with us, so we can have clear reliable information that will be used during intervention project in order to increase both uptake and sustainability on using improved cook stoves. Your information will help us to know how to implement intervention project on the use of improved cook stoves.

GROUND RULES

1. WE WANT YOU TO DO THE TALKING.

We would like everyone to participate and I may call on you if I haven't heard from you in a while.

2. THERE IS NO RIGHT OR WRONG ANSWER.

Every person's experiences and opinions are important. Speak up whether you agree or disagree. We want to hear a wide range of opinions.

3. WHAT IS SAID IN THIS ROOM STAYS HERE

We want folks to feel comfortable sharing when sensitive issues come up. What is said in this room will be reported in general terms, with no person or even village identifiers – we want you to be comfortable sharing sensitive issues, and we assure you that you, the speaker, will remain anonymous”

4. WE WILL BE TAKING SHORT NOTE AND THE GROUP PICTURE

We want to capture everything you have to say. We don't identify anyone by name in our report. You will remain anonymous. The note taken will be transcribed for purposes of reporting the results / opinions, and no individual will be traced through them. No individual's voice will be attached to his / her name. Also pictures taken will be used for justification and clarification of the study and not otherwise. In case you don't want your picture to be taken, be free to inform us. It is your right.

We need to agree to switch off our phones for a while or put them in Vibration mode.

Introduction of the Topic

In all of the questions in this part of introduction, I will first give them chance to explain if they know something about it. In case they fail I will explain with examples, show them some pictures, and ask them if they have ever come across such scenario or they still experience it/ use it. Each question will last for 15 minutes; each participant will have at least 2 minutes to contribute in every question.

- What are the traditional cook stoves?
- What are they said to be improved cook stoves?
- What is indoor air pollution?

Guiding questions

1. Compare traditional cook stoves and improved cook stove in causing indoor air pollution?
2. What are the health effects of the indoor air pollution to the house hold members?
3. What do you think causes indoor air pollution?
4. What could be done at the household level to reduce indoor air pollution?
5. What is your opinion on the statement that, the traditional stove (a three stone stove) you're using have effect on your health?
6. For those who agreed that the traditional cook stoves have an effect to their health, why you haven't changed them and adopt the so called safe cook stove?
7. What is your opinion on the use of improved cook stoves?
8. What do you think should be done so as the household should have sustainability uptake and use of improved cook stove?

Conclusion:

- Summary of what we have agreed during the discussion of all questions as will be presented by the note taker (assistant researcher)

THANK YOU VERY MUCH

MUONGOZO WA MAJADILIANO ELEKEZI KUHUSU MATUMIZI YA MAJIKO MBADALA

Utangulizi

- Salam
- Kuwakaribisha

Natoa shukran zangu za dhiti kwa kukubali kwenu na kuja kushiriki katika majadiliano haya.

- Utambulisho binafsi, kumtambulisha mtafiti msaidizi (Mtunza muda) na Utambulisho wa washiriki wengineo.

LENGO LA MAJADILIANO

Tunahitaji kufanya majadiliano haya ili tuweze kujua, ni kwa kiasi gani mna uelewa kuhusu matatizo ya kiafya yatokanayo ya uchafuzi wa hali ya hewa, ndani ya nyumba zetu, kutokana na aina ya majiko tunayotumia. Zaidi ya yote, tunahitaji pia kuelewa mtazamo wenu kuhusu matumizi ya majiko bora, ukilinganisha na kipato cha familia. Tafadhali, tunahitaji sana mchango wako, hivyo tunapenda utushirikishe mawazo yako halisi, bila kificho ili tuweze kupata taarifa sahihi na za kuaminika ambazo zitatumika wakati wa mradi wa kusambaza majiko bora, ili kuongeza uhitaji na matumizi endelevu ya majiko bora kwa watu wa Rombo.

Taarifa zenu zitatusaidia kujua, mbinu mbali mbali zitakazo hitajika ili kufanikisha utekelezaji wa mradi huo.

KANUNI ZA MAJADILIANO

1. TUNAHITAJI MJADILIANE

Tungependa kila mmoja wenu ashiriki kikamilifu katika majadiliano. Naweza kukutaja ili uchangie mawazo yako, endapo utakuwa umekaa kimya kwa muda mrefu.

2. HAKUNA JIBU SAHIHI WALA LISILO SAHIHI.

Uzoefu wa kila mtu na maoni yake ni vitu vya muhimu sana kwetu. Ongea, hata kama unakubaliana au hukubaliani. Tunahitaji kusikia mawazo/maoni yenu kwa upana zaidi.

3. TUTAKAYO ONGEA KATIKA CHUMBA HIKI YATABAKI HAPA HAPA

Tunahitaji waongeeji wawe huru kushiriki katika kutoa maoni endapo kutajitokeza suala nyeti. Tutakachokiongea humu ndani, kitaripotiwa kwa ujumla wake, hakuna mtu atakaye husishwa nacho, wala kijiji. Tunahitaji muwe huru kujadili mambo nyeti, kwani hakuna atakaye tajwa.

4. TUTAKUWA TUNA CHUKUA TAARIFA FUPI YA MAJADILIANO KWA MAANDISHI NA PICHA YA PAMOJA YA KIKUNDI.

Tunahitaji kuwa na taarifa ya kila kilicho ongelewa. Hatuta mtaja mtu kwa jina kwenye taarifa yetu. Taarifa ya mazungumzo, ita fafanuliwa kwaajili ya kutaarifu matokeo au maoni yenu. Hakuna atakaye fuatiliwa kupitia taarifa hiyo, wala sauti kuhusishwa na jina la mtu ye yote. Isitoshe, baadhi ya picha zitakazo chukuliwa zitatumika kwenye ripoti, ili kuonyesha u halisia na kuifanya yenye kueleweka na kuaminika zaidi na si vinginevyo.

Nadhani ni vyema tukikubaliana kuzima simu zetu kwa kipindi chote cha majadiliano au tuziweke katika hali ya mtetemo.

Utangulizi wa mada

Kila mara, washiriki watapewa nafasi kueleza endapo wanafahamu chochote kuhusu maswali yafuatayo. Endapo watahindwa, nitawaelezea huku nikitumia mifano, kuonyesha picha, na baadaye kuwauliza kama wamewahi kumbana na mazingira hayo.

Kila swali litatumia dakika 15 na kila mshiriki atakuwa na dakika 2 za kuchangia mawazo yake kwa kila swali.

- Majiko ya asili ni yapi?
- Majiko mbadala ni yapi?
- Nina maana ya uchafuzi wa hewa ndani ya nyumba?

Maswali ya muongozo

1. Linganisha majiko ya asili (jiko la mafiga matatu) na majiko bora katika kusababisha uchafuzi wa hali ya hewa ndani ya nyumba mnazoishi.
2. Ni madhara gani ya kiafya ambayo wanafamilia wanaweza pata kutokana na uchafuzi wa hali ya hewa ndani ya nyumba?
3. Unafikiri nini kinasababisha uchafuzi wa hali ya hewa ndani ya nyumba zenu?
4. Nini kifanyike katika ngazi ya familia ili kupunguza uchafuzi wa hali ya hewa ndani ya nyumba zao?
5. Nini maoni yako kuhusu kauli hii “ majiko ya asili mnayotumia yana athari kubwa katika afya zenu”
6. Kwa wale wote waliokubaliana na usemi kuwa, majiko ya asili yana madhara kiafya, je kwa nini watu hawataki kubadirika na kuanza kutumia majiko bora na salama?

7. Je nini maoni yenu katika matumizi ya majiko bora?
8. Nini kifanyike ili kaya iweze kumiliki jiko/ majiko bora na kuwa na matumizi endelevu ya majiko hayo?

Hitimisho:

- Maelezo mafupi ya tulichokubaliana wakati wa majadiliano kwa kila swali. Yatasomwa na aliyekuwa akiandika taarifa ya majadiliano haya kwa ufupi (mtafiti msaidizi)

ASANTENI SANA