Socio-Economic and Environmental Impact of Improved Cooking Stove

A Case Study of Motipur VDC of Kapilvastu District

A Thesis Submitted to

Faculty of Humanities and Social Sciences, Department of Sociology/Anthropology
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Letter of Recommendation

It is pleasure to recommend the dissertation entitled **"Socio- Economic and Environmental Impact of Improved Cooking Stove''** is prepared by Mr. Bhesha Raj Acharya, under my guidance and supervision. I have checked this draft and so I recommended it for viva use.

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Approval Letter

This thesis submitted by Mr Bhesh Raj Acharya **"Socio-Economic and Environmental Impact of Improved Coking Stove; A Case Study of Motipur VDC of Kapilvastu District"** has been accepted in partial fulfillment for the requirement of Master's Degree in Arts (Sociology /Anthropology) approved by expert committee.

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RECOMMENDATION BY LANGUAGE EDITOR

This is to certify that I have gone through the draft of dissertation entitled "**Socio-Economic and Environmental Impact of Improved Coking Stove; A Case Study of Motipur VDC of Kapilvastu District"** prepared by Mr. Bhesh Raj Acharya as a language editor and made necessary correction and improvements there in. I have been impressed by her intelligible presentation of facts through the medium of plain and correct English

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Acknowledgement

The present study **"Socio –Economic and Environmental Impact of Improved Cooking Stove: A Case Study of Motipur VDC of Kapilvastu District"** was carried out for the partial fulfillment of Master's Degree in Sociology/Anthropology. A number of persons and institutions have made a contribution to this research. I am extremely grateful to all of them who have immensely helped, guided, supervised to complete the work.

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_____

Bhesh Raj Acharya

March, 2011

Acronyms

AEPC - Alternative Energy Promotion Centre

CRT/N - Centre for Rural Technology/Nepal

CWS - Child Welfare Scheme

CWSN - Child Welfare Scheme Nepal

ESAP - Energy Sector Assistance Program

ICS - Improved Cooking Stove

INGOs - International Nongovernmental Organizations

MB ICS - Mud-brick Improved Cooking Stove

NGOs - Nongovernmental Organizations

RECAST - Research Centre for Applied Science and Technology

REDP - Rural Energy Development Project

VDC - Village Development Committee

HDR - Human Development Report

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CHAPTER: I

INTRODUCTION

1.1 Background of the Study

Nepal has about 25 million people, out of total population 85 percent people live in rural areas (CBS, 2058). The average per capita income of the nation is about US$470, derived mainly from agriculture. The major sources of energy consumed are derived from the biomass resources and imported petroleum products. Overall, traditional biomass is the largest single source of energy, providing about 97 percent of final energy demand and about 95percent of the total population of Nepal dependent on traditional energy sources (AEPC, 2006).

Despite the efforts to develop new and alternative energy sources, still for some time to come, the vast majority of the people will have to depend on bio-mass such as fuel wood for satisfying their basic energy consumption in relation to cooking, heating and lighting. Almost all the energy consumption is based on traditional biomass resources of energy such as fuel wood, agricultural residues and animal dung. As a result of continuing forest degradation, the share of fuel wood energy consumption pattern is in declining trend. Consequently fuel wood is increasingly being replaced by lower grade fuel such as agricultural residues.

Women in rural areas use cooking stoves that requires firewood to prepare meals for their families. These stoves are inefficient; they consume a lot of firewood and they fill the kitchen with smoke. As a result, women spend a lot of time collecting firewood in distant forests. Consequently eye and lung diseases are common among the women and the children, who spend many hours in the smoke filled kitchen. By using improved cook stoves (ICS), rural people not only can save the firewood, reduce the cooking time, and make the kitchen smoke free, thereby protecting from the eye and lung diseases. The ICS directly benefits those women and children, who normally collect the firewood and undertake the cooking.

Improved cooking stoves (ICS) programs started in early 1950s in Nepal. At that time "Hyderabad and Magan stoves" (an Indian model of ICS) were implemented as part of Village Development Services of the “Tribhuvan Village Development Program”. That

program was ended in the early 1960s. After hat a number of organizations such as UNICEF, Peace Corps etc. have integrated ICS dissemination in their other development activities during1970s. In 1980s the National Planning Commission included ICS in a Plan document in attempt to address the pressing fuel wood problem. In 1981 Community Forest Development Project developed prefabricated ceramic ICS. In 1982, prefabricated ceramic Stoves were tested, and after some modification, RECAST developed Ceramics Insert Stoves. During 1985 Small Farmer Development Project of Agriculture Development Bank distributed Ceramic Insert Stoves. Other major organizations and projects which took up further ICS dissemination efforts include United Mission to Nepal, Terai Community Forestry Development Project, Nepal-Australian Forestry Project, Resource Conservation and Utilization Project; CARE/Nepal, RECAST developed a new model of a stove known as "Improved Tamang Stove". They tried to make the stove with cheap readily available local materials. Since early 1990s, new initiatives from various NGOs, INGOs and GOs, for ICS dissemination have been underway. Most of the organizations working on ICS programs concentrate on Midhill and Terai regions, and they are mainly working on Mud Stoves (CWSN, 2009).

With the combined effort of government and other development organization, ceramic prefabricated models of ICS were disseminated in the different parts of the country. However, this model turned out to be not as appropriate as substantial breakage occurred during the prolonged and difficult transportation process. Thus, delivering mixed results and limited success of ICS efforts in Nepal during 1980s.In the early nineties, Research Center for Applied Science and Technology, Nepal (RECAST) re-launched the stove program made out of mud brick which was entirely based upon the Lorena Stove, developed and standardized in Guatemala in early seventies.

The improved stoves are scientific modifications of the traditional stoves. They ensure proper combustion and reduce looses due to convention and tradition and thus utilize the heat value of the fuel efficiently. However, about 25 years of continuous government initiated and donor sponsored stove development program in Nepal could fulfill only about 8.33percent (maximum) achievements regarding the improved cook stoves by the year 2005 (Singh, 2005).

1.2 Statement of the Problem

The rural area of Nepal depends heavily on forest and other biomass resources to meet its domestic energy demand. About 77percent of energy comes from fuel wood, and in the mid-hills 80percent of total energy consumption is based on fuel wood, the sources of which are mainly public forest, community forest and private land.

The demand for biomass energy is rapidly increasing as a result of both population increase and growth of the various types of economic activity in rural communities. This has led to over exploitation of biomass (wood) resources for fuel and other uses clearing the forests for agricultural land causing a serious problem in fuel wood supply and environmental degradation. Growing population and unavailability of alternative energies also leads to loss of the forests in rural areas that is hard to compensate.

In recent years, the Siwalik area has come under tremendous pressure from illegal encroachment. Forest areas have been declining in the Terai of Kapilbastu district over the past three decades. Forest clearing as a result of settling and logging, coupled with the poor socio-economic condition of local communities is the primary cause of forest degradation.
It is very important to quantify such impacts in order to identify the adaptation options and there by minimize potential damage magnitude of deforestation and to analyze health situation of rural women. The main statements of the problem of this study are:

- What is the present status of ICS use in the study area?
- What is the impact of ICS on health situation of rural women in the study area?
- Is ICS helping in reducing respiratory disease after its installation?
- What is the role of ICS in preservation of the community forestry
- How people are adopting ICS?
- How do people perceive about the ICS?

1.3 Objective of the Study

The general objective of the study is to assess the impact of Improved Cooking Stoves on the rural livelihoods of Motipur VDC of Kapilbastu District that includes the fuel wood consumption at the household level and impact on the health of women and children, time

saving (collection of fuel wood and cooking), kitchen management and natural resource conservation.

Specific objectives as follow:

- To assess the status of ICS use in Motipur VDC of Kapilvastu District.
- To examine the socio-economic and environmental impacts of ICS among the ICS users of Motipur VDC of Kapilvastu District.

1.4 Rationale of the Study

The growing scarcity of firewood and other consequences resulting from forest depletion, the search of alternative energy source is seen very crucial. Forests are now being rapidly depleted by indiscriminate and disproportionate felling of trees and illegal encroachment for settlements and agricultural purpose. As forest resources become scarce, the balance between what people need and what they can obtain would shift. As a result, people has to struggle to survive that becomes harder.

Various studies have been carried out on ICS but it is limited only with forestry and environmental sector. Most of the study describes only on how the ICS contribute in deforestation, environment protection and fuel consumption. It is very difficult to gain details knowledge of ICS impact on rural women health status without the study. There are so many factors which are influencing health status of rural women. Any research work and study has not been conducted about the impact of ICS on rural women health status in Motipur VDC of Kapalvastu District so far. The present study attempts to examine the health impact of ICS on rural women of Motipur VDC. This study will reveal the contribution of ICS impact on rural women health status and it will be beneficial for the development workers, research persons, planner and other needy persons.

1.5 Organization of the Study

This research has been organized in seven chapters including introduction to conclusion. Background of the study, statement of the problem, objective of the study is included in first chapter and literature review mentioned in chapter two. In the same way, research methodology mentioned in chapter three and study area and respondents characteristics mentioned in chapter four. Likewise status of ICS used in the study area has been mentioned

in fifth chapter and socio-economic and environmental impact of ICS mentioned in sixth chapter. Summary, conclusion and recommendation mentioned in seventh chapter. References and appendix are submitted at the end of the thesis.

CHAPTER: II

REVIEW OF THE LITERATURE

2.1 Conceptual Overview

2.1.2 Traditional Cooking Stoves

Traditional stove is a common stove that is widely used in rural areas to cook food and animal feed. Three stones stove, tripod, mud stove with one or two holes, etc are the traditional stoves. These stoves are inefficient; they consume a lot of firewood and fill the kitchen with smoke. These stoves are built in open space and fire is distributed widely even outside the stove. Therefore, pot could not absorb the heat so that takes more time to cook food. As a result, fire wood is used more and takes more time to cook. Due to this, women have to spend a lot of time collecting firewood and suffer from lung diseases and eye problems which are common in the rural areas. This also causes deforestation and imbalance in environment (REDP, 2003).

2.1.3 Defects of Traditional Stoves

Traditional Cooking Stoves produces smoke stays in the kitchen due to the absence of vent pipe and harm full to health of the users and their families. The open fire results in risk of accidents with children burn or house hold .By the using of traditional cooking stoves the utensils and clothes become blackened by soot. It needs regular burning (CRT Nepal).and they are less than 10percent efficient (in using the energy store in the wood).

2.2 Improved Cooking Stoves (ICS)

Improved cooking stove is a device that is designed to consume less fuel and save cooking time, convenient in cooking process and create smokeless environment in kitchen or reduce the volume of smoke during the cooking against the traditional stoves. Generally the improved cooking stove is a simple low cost technology that offers multiple benefits to the users including the biomass fuel-wood efficiency. The efficiency of these improved stoves is found to be 25-40 percent (AEPC, 2000).

Improved cook stove (ICS) can be used for the same cooking purposes as it's traditional. It can be used for cooking meals, boiling water and for cooking animal feed. ICS can be used for heating by adding a cast iron/mild steel plate put tight over the pot-holes for the pots or by putting a metal pipe around that space/room to make the hot air pass round the room throughout the chimney. ICS can be used for heating water by attaching back water around the chimney.

2.2.1 Technical Features

ICS is made of 3-part mud/earth, 2 parts straw/husk and 1-part animal's dung. The whole structure is plastered smooth with the same mud mortar. ICS has two fire openings for cooking and other. There is no need to blow the fire. It utilizes the heat, generated by burning fuel wood, more by the deflection of the flames and heated air inside it which travel to the second opening with the help of an in-built baffle located just below the second opening, before the hot air exits out of the chimney, which is made of un-burnt clay bricks that can be made in the village. The iron plates are fitted on the pot holes for pots. The pot holes are round in shape; the pot bottom fits tight on them. It can be made in different sizes and capacities to suit the family size and pot size. It can have one or more openings for pots/pans.

2.2.2 History of ICS Development in Nepal

The development of ICS in Nepal can be divided into three phases. The first phase is the introduction of "*Magan Chula*" which originated in India. At that time, villagers started promoting ICS in some areas of Nepal. The program was aimed at uplifting the people and reducing exposure to smoke. However, the program lacked a scientific aspect of design, promotion and testing.

The second phase started in the early 1970s and focused on improving fuel efficiency, large mud stoves with a number of rings known as "Lorena stove". The main objective during this period was to find a solution to reduce the accompanying deforestation. Dissemination of these stoves was slow because of critical application. In the late 70s, Research Centre for Applied Science and Technology involved in improvement of these stoves and renamed them chulo.

The third phase began in early 1980s and included Research and Development and this included a detailed assessment of cooking performance, standardized production, design methodologies to obtain higher performance and efficiency. The Lorena Stoves, Ceramic Insert Stoves and New Double Wall Stoves – these stoves were designed by RECAST with support from HMF/UNDP/FAO Community Forestry Development Project (CFDP).

Realizing the benefits of ICS promotion and dissemination, the National Planning Commission put target for disseminating 160,000 ICS during the Seventh Five Year Plan (1985-1990) which has been an integral component of development activities of many NGOs and INGOs. Their approaches have changed from top down to target oriented and subsidized approaches and demand driven approach increasing the level of acceptance and sustainability of ICS.

Nepal Government initiated a National ICS program with the Energy Sector Assistance Program (ESAP) of the Danish Government since 1999 with the objectives to establish a sustainable framework and strategy for making available technically adaptable ICS in rural communities based on local capacity building and income generation.

2.2.3 The Present Status of ICS in Nepal

ICS program development and implementation in Nepal started fifty year back. ICS programs in rural Nepal had been of limited success. In the early stage, ICS activities were given relatively low priority as result dissemination did not take place widely.

Later, ICS development took place on the development agenda among NGOs, INGOs, and GOs in Nepal, and there is now consensus about the importance of ICS and the need of a new innovative approach to ICS dissemination. Nepal Government had given the special priority in its ninth five-year plan (1997-2001) and some achievements were made during that period. During that period Government of Denmark and Nepal Government jointly supported a national ICS program under the Energy Sector Assistance Program (ESAP) for the first five year from 1999 to 2004 which was later extended up to 2005. Till date around 1,25,000 numbers of ICS have been disseminated that directly benefits more than 625,000 rural populations in Nepal. Around 2500 local people are trained as promoters or technicians, of them 50 percent are women, are directly employed in installation of ICS which has contributed to increase their income and poverty alleviation (Sapkota, 2005). However, the

figure presented here are only the estimated number of AEPC projects. The numbers must be high since there has been no study to examine the real installation of ICS in Nepal.

2.2.4 Government policy on ICS and Subsidy

Government made a policy for promoting development and dissemination of ICS in rural and semi-urban areas. Formal ICS programs began in Nepal in early 1950s. The NPC of Nepal for the first time included firewood problems in the sixth plan (1981-1985), under which solution to the firewood problems were sorted out. The seventh five-year plan (1985-1990) targeted to distribute 160,000 ICS out of which only 49,938 were distributed by the forest sector (WECS, 1994). In 1991 and 1992, the forest division distributed 7,544 stoves. In spite of such ambitious target, the seventh plan did not specify and implementing agency for this work.

The Eighth Five Year Plan (1992-1997) envisaged the distribution of 250,000 ICS out of which 100,000 were planned for the hill regions and the remaining 150,000 in the Terai. Such hypothetical figure obviously becomes unrealistic as long as provisions are not clearly specified for their distribution, extension and effective follow-up. The focus on numbers allows programs to appear successful even when many stoves are ultimately abandoned (WECS, 1994).

The aim of ninth plan was to install 250,000 ICS in the country but the success was 51,100 and training program in 45 districts but success record was in 39 districts only. The tenth plan again emphasized to promote, disseminate and installment 250,000 ICS in rural area (NPC, 2003).

The ICS technology is the cost effective, based on local material and could be installed with simple technical knowledge and training. So Nepal Government has taken policy not to provide subsidy in order to create household ownership in the program there by ensuring sustainability of the program, instead emphasis will be given to the information campaign.

2.3 Review of the Previous Studies

A study was carried out in IUCN Nepal implemented rhododendron conservation Project (known as Tinjure-Milke-Jaljale) in Eastern rural part of Nepal. The sample households covered four VDCs; Basantapur, Sungnam, Solma, Tamaphok. The study site was situated in

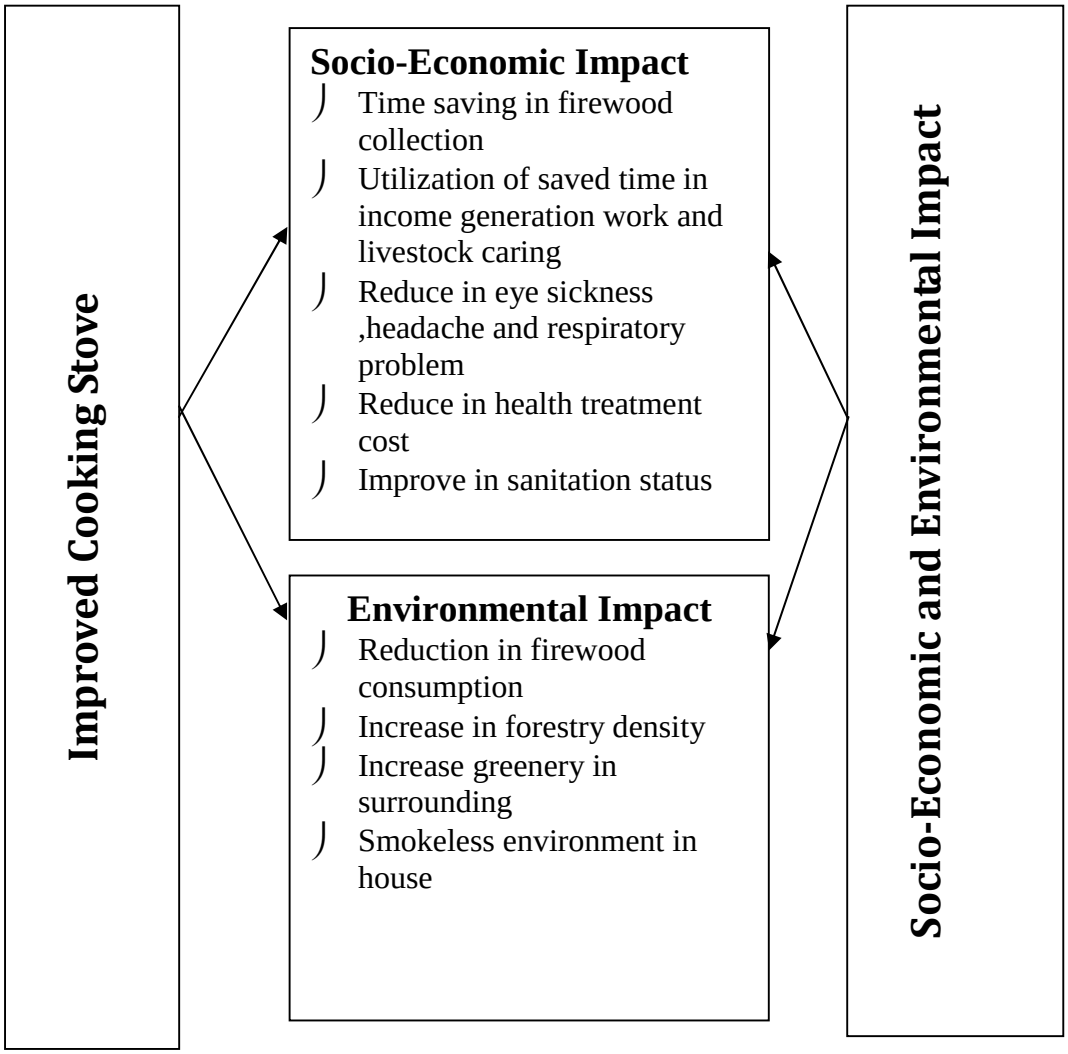
high hills and altitude ranges from 2000 to 2500 meters. In case of Nepalese rural context, the use of ICS has contributed a lot by reducing people's drudgery, improving the health and provides opportunity to school going children for their study. In addition, this technology has also proven as a good option for improving the forestry in the vicinity and has also helped to reduce the C02 gas emission and mitigating climate change. The contribution of ICS in socio-economic sector as well as in environment including climate change is significant and this needs to be taken as a good option for further promotion of poverty environment initiative and making our development efforts sustainable (IUCN, 2008).

In Nepal, women are mainly responsible for cooking activities and collecting firewood. Studies have shown that ICS has efficiency of 15-25percent and fuel wood Saving is 30-35percent thus favoring the drudgery reduction of women as ICS cuts down their cooking time and hardship in collection of scarce fuel wood. Women and their children are generally exposed to indoor air pollution. The indoor air pollution due to the combustion of biomass fuel is the main cause of Acute Respiratory Infection (ARI), Chronic Obstructive Lung Diseases (COLD), eye infection and pneumonia in women and children. Studies have shown that with the use of ICS human exposure to pollutants in the kitchen environment has been reduced an average 69percent of Carbon Monoxide 53percent of Total Suspended Particle (TSP) and 63percent of Hydrogen Carbon Hydrogen Oxygen(HCHO). The majority of the women using ICS have responded that they had asthma and eye burning due to traditional stoves but also that the situation has improved after installation of ICS and they don't suffer from burning eyes and breathing problems
(CRT/N, 2006).

ICS have a potential for a more efficient utilization of wood/biomass resources. Thus, for saving wood and still fulfill people's energy need for cooking purposes, the most important energy need. Moreover, ICS have potential for improving the indoor environment and most rural women suffer from, and for decreasing women and girls workloads. There is thus a rational for an ICS component in energy, community forestry and health programmed that is gender sensitive
(AEPC, 2003).

2.4 Conceptual Framework of the Study

Improved Cooking Stove has several impacts over the users. It has positive impacts on health and sanitation. It further has positive impacts on the Community Forestry because it reduces the quantity of consumption of the firewood. However, this study mainly focuses to study the socio- economic and Environmental impact of Improved Cooking Stoves in various aspects of the study area.



CHAPTER: III

RESEARCH METHODOLOGY

3. Introduction

This chapter describes the tools and technique of present research work. Basically this section has been included site selection, research design, nature and sources of data, data collection technique, household survey, secondary information, direct observation and data processing and analysis procedure.

3.1 Rationale of the Selection of the Study Area

The main reasons behinds for selecting the site are as follows:

- Any study has not been conducted about the impacts of improved cooking stoves of this VDC.
- There is increasing deforestation in the study area and role of ICS can be crucial to prevent the deforestation.
- 50 mud ICS are installed on Motipur VDC in Kapilvastu District, through the joint venture of OXFAM and IRDC.
- Therefore, it has been selected this VDC for the study.

3.2 Research Design

The study has been conducted according to induction research design. Both descriptive and explanatory research method has been used to collect and to analyze the information. Descriptive method includes social, economic, cultural, demographic analysis. Impacts of ICS will be explored.

3.3 Nature and Sources of Data

Both Primary and secondary data were collected for this study. Primary data has been collected by the household survey, group discussion, interview, questionnaire schedule and

observation. Likewise secondary information was collected from relevant books, journals, publications and concern offices.

3.4 Universes and Sampling

There are 3280 households (VDC profile, kartik, 2067) in the Motipur VDC. There are only 50 Household with ICS. All of these 50 households are selected for the study .Women were the main respondents of the study. From each ICS household, an appropriate women member (who often collect firewood and cook food) will be selected.

3.5 Data Collection Technique

Following methods have been used to collect data. However the priority is given to the Validity and reliability of the data.

3.5.1 Interview

To collect the reliable information from household level and impact of ICS, this method has been used. A semi structured interview has been applied in accordance with the status of the respondents after pre-test.

3.5.2Questionair Schedule

Closed ended as well as open ended questions have been developed and used to collect information from the respondents at household level.

3.5.3 Observation

This technique has been used to get special insights on various issues regarding the use of ICS in the village. Specifically, the way ICS is used to be one of the important issues of observation. Similarly, this technique is expected to generate some important qualitative information in the various issues pertaining with the research problem. The activities of the women and their health condition have been observed by participant observation method.

3.5.3 Key Informants Interviews

Information, which is not obtained from the respondents, were collected from the key informants including women community leader, educated person, members of community

forestry, government officials and the experts who were directly or indirectly related with the use of ICS.

3.5.4 Focus Group Discussion

Focus group discussion has been used with women of 12-14 members dividing the total respondents into many groups to collect more information about the present socio-economic status and impact of ICS on health situation of rural women and their relationship with the other caste group and their access to social property and livelihood. To make reliability recorder, camera and latest technology are used.

3.6 Data processing and Analysis

Collected data were presented by using simple statistical and mathematical tools such as percent, graph, and chart etc. To analyze the qualitative information Software Package for Social Science (SPSS) was used.

3.7 Limitation of the Study

The study has limited in the following limitations;

- The study mainly focuses on assessing impact of ICS on fuel consumption, cooking time saving, impact on health and environment.
- Data use in this study has not been verified from any authoritative organization of the government.
- The study was focused only on one VDC of Kapilbastu district 9 Motipur). Therefore, the findings of this study may not be generalized in overall context of all Terai area of Nepal as the study was conducted at a specific site with a limited sample.
- Limited numbers of respondent were participated in this study as sample (Fifty Women Respondents)

CHAPTER: IV

STUDY AREA AND RESPONDENTS CHARACTERISTIC

4.1 The Study Area

Kapilvastu district is located in Lumbini zone of Nepal. It lies in west south of Nepal and 350 km far from the capital city where Lord Buddha was born 26 hundred ago**.** The district, with Taulihawa as its district headquarters, covers an area of 1,738 km² and has a population of 481,976 (2001). As per the population census 2001, its total population is 481976. Male population is 247875 and female population is 234101. Its total area is 1738 sq. km. Total number household is 72932 and average household size is 6.6. This district has 78 VDCs and 5 Parliamentary Constituencies. Motipur VDC is selected for the study. This VDC lies in the northern side with reference to Taulihawa, the district headquarter.

It is known as the ancient kingdom of Shayaka, ancestors of Lord Gautam Buddha. The district situated at the height of 93 to 1491 meters from sea level. Geographically, the district can be divided into plain low lands of Terai. The district is bounded by East: Rupandehi District, West: Dang District and Uttar Pradesh, India, North: Arghakhanchi District and Dang District South. According to 2001 census, the major ethnic groups in this district are as follows, Muslim 19.4 percent, Tharu 12.6percent, Brahmin Hill 8.4percent and Yadav 9.2percent. It is a region with biodiversity, cultural, archaeological and historical monuments that has been proposed to be enlisted in the list of World Cultural Heritage of UNESCO. More than 138 historical sites related to Buddha have already been identified within the boundary to the east of Banganga, west of Kothi, north to Indian border and south to Mahendra highway. The forest of the district stands as a deciduous evergreen forest. The land is irrigated by the rivers like Banganga, Koili, Surai, Chirai, and others. (Map of the survey area sees in annexes)

4.2 Characteristics of the Respondents

Fifty respondents were participated in this study including different sex, age group, economic status, occupation holders etc.

4.2.1 Respondents by Age

Age, a biological factor contributes to social differentiation .it distributes privileges and responsibilities ,rights and duties, in terms of separate statuses(rao,2005) Age structure is cultural demographic data in examining population characteristics. These demographic variables have direct implementation of several issues related socio –economic aspects of a population such as trend of population increase, labor force and female population in the reproductive age. There for any, socio -economic developing planning should consider the age structure of the population. The table 4.1 shows the age stricture of the responds.

Table: 4.1: Respondents by Age

Respondents by age group	No.	Percent
16-25	15	30
25-40	20	40
40-60	10	20
Above 60	5	10
Total	50	100

Source: Field Survey, 2010

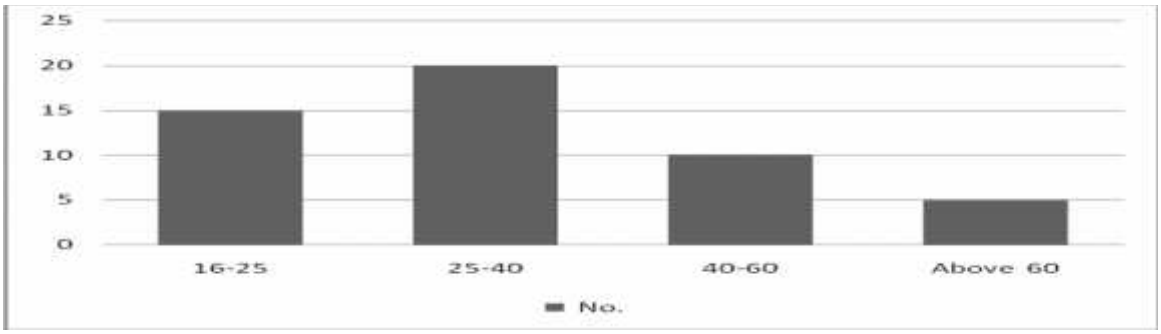


Figure: 4.1: Respondents by Age

Table 4.1 and figure shows various age groups of respondents. Majority of the respondents are from the age group of 25-40. Data shows that those 40percent respondents were from the age group 25-40. In the same way only 10percent of the respondents were from above 60.

4.2.2. Respondents by Education

Knowledge-including information ,attitude and skills- is a fundamental capabilities a person needs to make sense of one self and of the world one lives in .it helps one to re learn ,re-assess, re act, and to change one self and one's world. knowledge is analogously fundamental to the functioning of a society(HDR,1998).one of the important social objectives of education is to equalize opportunity, enabling the backward or underprivileged classes and individuals to use education as a lever for improvement of their

conditions(Rao,2005)in addition; it is an important component of human resource development and plays vital role in transformation of society. The following table shows the educational status of the respondents.

Table 4.2 and figure shows the education status of the respondents. Only 10percent of the respondents were illiterate and other 90percent were literate. In the same way only ten percent were from higher education group. 30percent were from primary level.

Table: 4.2: Respondents by Education

Education Status	No	Percent
Illiterate	5	10
Literate	10	20
Primary	15	30
Secondary	10	20
Higher secondary	5	10
Above	5	10
Total	50	100

Source: Field Survey, 2010

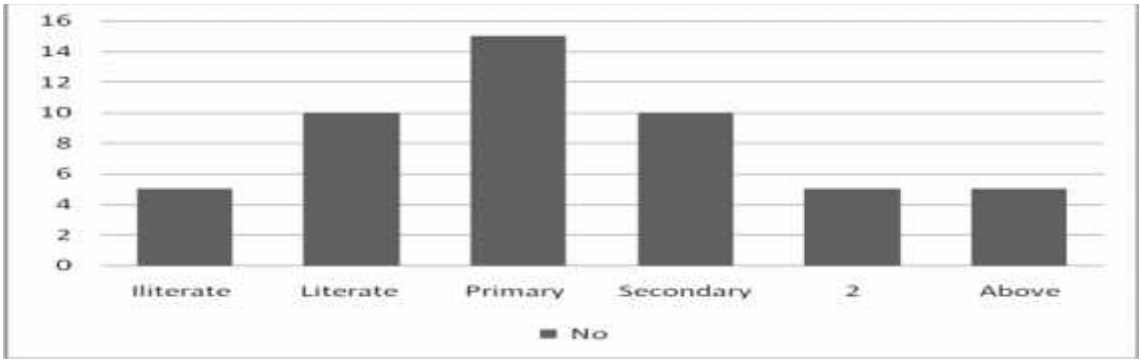


Figure: 4.2. Respondents by Education

4.2.3 Respondents by Caste / Ethnicity

Cast and ethnicity is the identification of a person .this makes one group distinct from other. Most of the social codes are established according to culture of cast/ethnic group. Cast represents any of the social codes are established according to culture of cast/ethnic group. Cast represents any of the hereditary Hindu social classes. The cast is mainly based on the social system under rigid distinction birth, rank, wealth, etc. Ethnic group is a group that is

socially differentiated, has developed its own subculture. And has a shared feeling of people hood; group distinct from other .most of the social codes are established according to culture of cast/ethnic group.

Table: 4.3: Respondents by Cast /Ethnicity

Cast /ethnicity	No	Percent
Hill Bahun	5	10
Tharu	15	30
Yadav	10	20
Muslim	16	32
Other	4	8
Total	50	100

Source: Field Survey, 2010

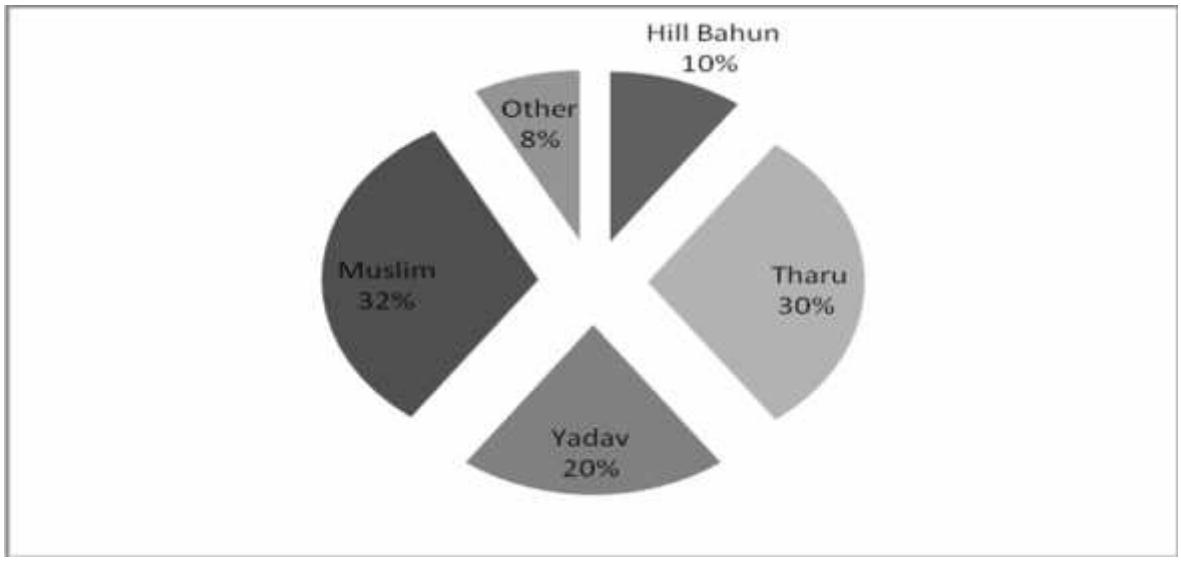


Figure: 4.3: Respondents by Caste /Ethnicity

Table 4.3 and figure shows the composition of the respondents by caste/ ethnicity. According to data 32 percent of the respondents were from Muslim community and 30percent were from Tharu community. In the same way 10percent were from hill Bahun and other 8percent were from other community.

4.2.4. Respondents by Marital Status

Marriage is a legal sanction given by a particular society to the individual man and women to have sexual relation and produce children for the continuation of future generation (Luitel, 2008). The status is presented in the Table 4.4.

Table: 4.4: Respondents by Marital Status

Marital Status	No.	percent
Married	35	70
Unmarried	15	30
Total	50	100

Source: Field Survey, 2010

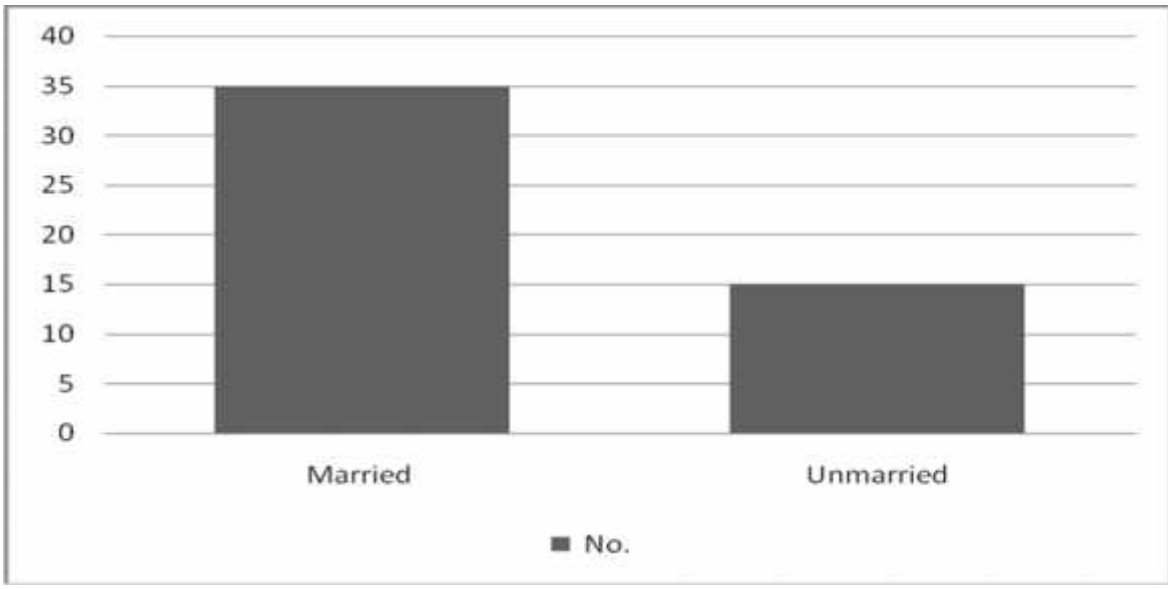


Figure: 4.4: Respondents by Marital Status

Table4.4 and figure shows the composition of respondent by marital status. According to data 70 percent respondents were married and remains 30percent were unmarried.

4.2. 5. Respondents by Religion

Religion is the beliefs in the supernatural force have some influences or control up on world (Haralambos, 2004).Malinowski's (distinctive contribution to the sociology of religion) has argued that religion promotes social solidarity by dealing with situation of emotional stress. Which threaten the stability of society (Haralambos, 2004)."Religion refers to the existence of supernatural beings which have a governing effect on life" (Rao2005).religion regulate the activities of people in own way. It is major component of demography as it has strong effect on people lives of this country. religion is one of important factor/elements of any society-which maintain law and order in society it also guides behavior; thinking and working, which work is do/ not .the following table shows the religious structure of the respondents;

Table: 4.5: Respondents by Religion

Religion	No.	percent
Hindu	20	40
Muslim	20	40
Other	10	20
Total	50	100

Source: Field Survey, 2010

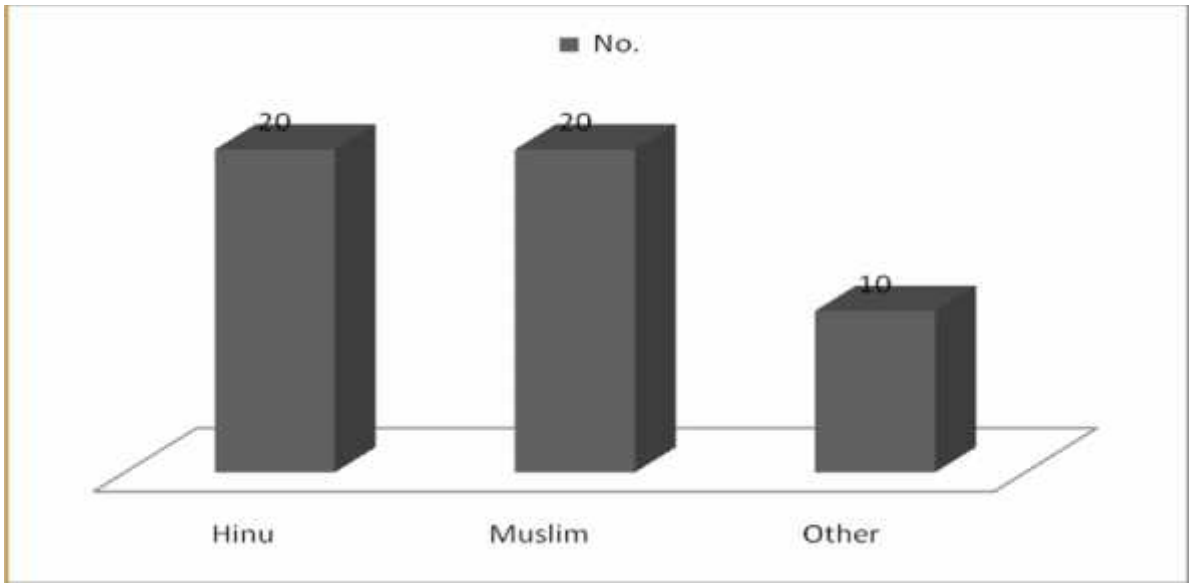


Figure: 4.5: Respondents by Religion

Table 4.5 and figure shows the religious composition of the respondents on the bar graph. Data shows that 40percent respondents were Hindu as well as Muslim and 20 percent were from other indigenous and other religious groups.

4.2.6. Respondents by Household Income

Income is the means for the achievement and functioning of human capacity (Human Developing Report1998) in addition to women employees' income other number of their family also earn money which helps to run their family life smoothly. Total income can be considered as a short term component of household wealth. The total income variable was defining directly from the survey data as the sum of income from all members of the

employees' family. The following table shows the monthly house hold income of the responds.

Table: 4.6: Respondents by Household's Yearly Income

Household Income (Rs)	No.	percent
1-5(0000)	15	30
5-10(000)	20	40
10-20(000)	5	10
20-30(000)	5	10
Above 30	5	10
Total	50	100

Source: Field Survey, 2010

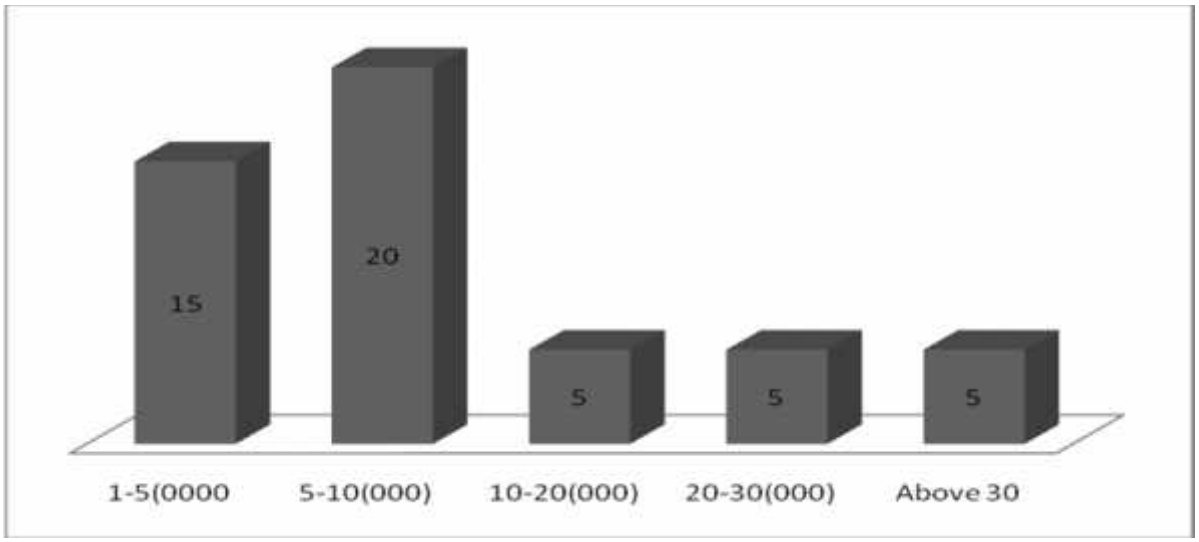


Figure: 4.6: Respondents by Household Yearly Income

Table 4.6 and figure shows the respondent by income status of household. Data shows that most of the respondents were poor because they have low annual income which was shortage to fulfill their daily need .Only 20percent earn more than 20 thousand rupees per year.

4.2.7. Respondents by Household Occupation

Table: 4.7: Respondents by Household Occupation

Occupation	No.	percent
Farming	30	60
Business	10	20
Service	5	10
Other	5	10
Total	50	100

Source: Field Survey, 2010

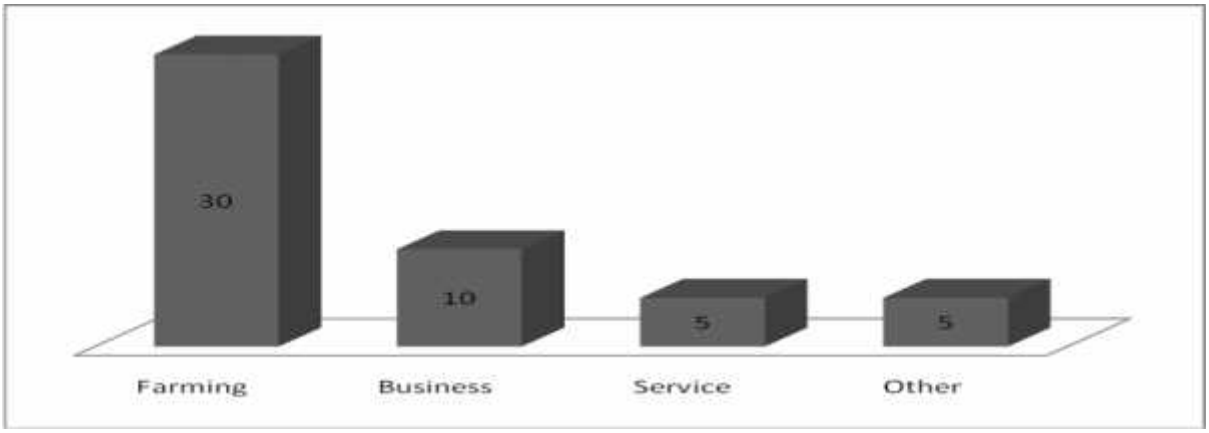


Figure: 4.7: Respondents by Household Occupation

Table 4.7 and figure shows the respondents by the household occupation. Data shows that 60percent of the respondents are from farming 20percent from business as well as from service and remaining 10percent from other sector.

2.3. Conclusion

Sample respondents were taken in this study from various education status, caste / ethnicity religion, marital status etc. Data shows that 40percent of the respondents were from Hindu, 40percent were from Muslim and other 20percent were from other indigenous groups. Similarly, most of the respondents were taken from the poor household because who have less income below than the average Nepali people. Likewise most of the respondents about 70percent were selected from the marriage group because marriage women mainly involved in cooking activities.

CHAPTER: V

STATUS OF ICS USE IN THE STUDY AREA

This section of the chapter includes types of stoves used, age of ICS, inspirer for its installation and use of ICS after installation.

5.1 Types of Stove Used

Two-hole ICS has been found favorite in Motipur VDC, Kapilbastu since all the households have installed it. The main reason behind this is the benefit of cooking two utensils at a time thus saving fuel wood as well as time.

5.2 Age of ICS

Majority of the ICS (40percent) were constructed 1 year back. Twenty two percent was constructed 1-2 years back. About 9 percent were found to be constructed less than one year while 1 percent of ICS was older than 4 years. This shows that use of ICS is accepted by the people in Motipur VDC of Kpilbastu district.

Table: 5.1: Duration of ICS Installation

When the ICS was installed	Respondent No	percent
Less than 1 year	10	20
1 year	20	40
1 to 2 years	8	16
2 to 3 years	6	12
3 to 4 years	4	8
More than 4 years	2	4
Total	**50**	**100**

Source: Field Survey, 2010

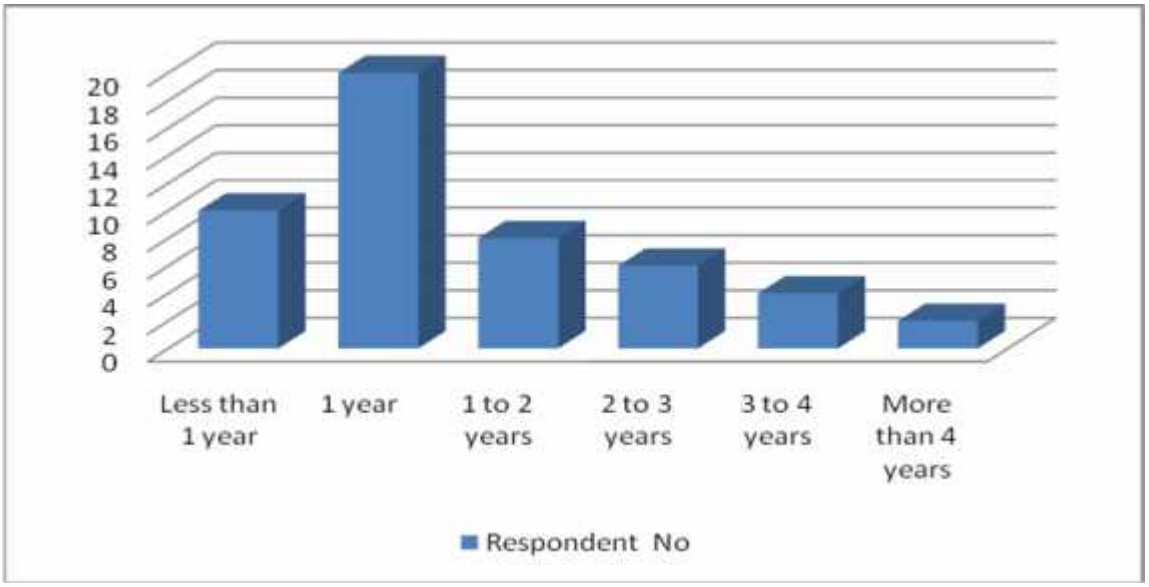


Figure: 5.1: Duration of ICS Installation

Table 5.1 and figure shows the duration of ICs installation of the study area. According to data 20percent of respondents set ICs in their home only before a year. Likewise, 4percent respondents were set it before two years and more.

5.3 .Inspiration for ICS Installation

Organization's workers' role has been found vital in pursuing households to make decision in installing ICS as about 49percent of the share as inspirer goes to them. Inspiration by neighbor (20percent) is also important as non users see and hear the experience of neighboring ICS user about the function, merits and demerits of ICS. Likewise, the role of promoter as inspirers & motivators is also fairly reflected by the promoter's activities (17percent). The role of friends and groups members in inspiring to install ICS was not seen significant. Small number of respondents (4percent) reported that they themselves took initiatives to install the ICS.

Table: 5.2*:* Motivators to install ICS

Motivator to install the ICS	No	Percent
Promoter	30	60
Neighbor	5	10
Friends	4	8
Organization's activists	6	12
Group member	3	6
Others	2	4
Total	**50**	**100**

Source: Field Survey, 2010

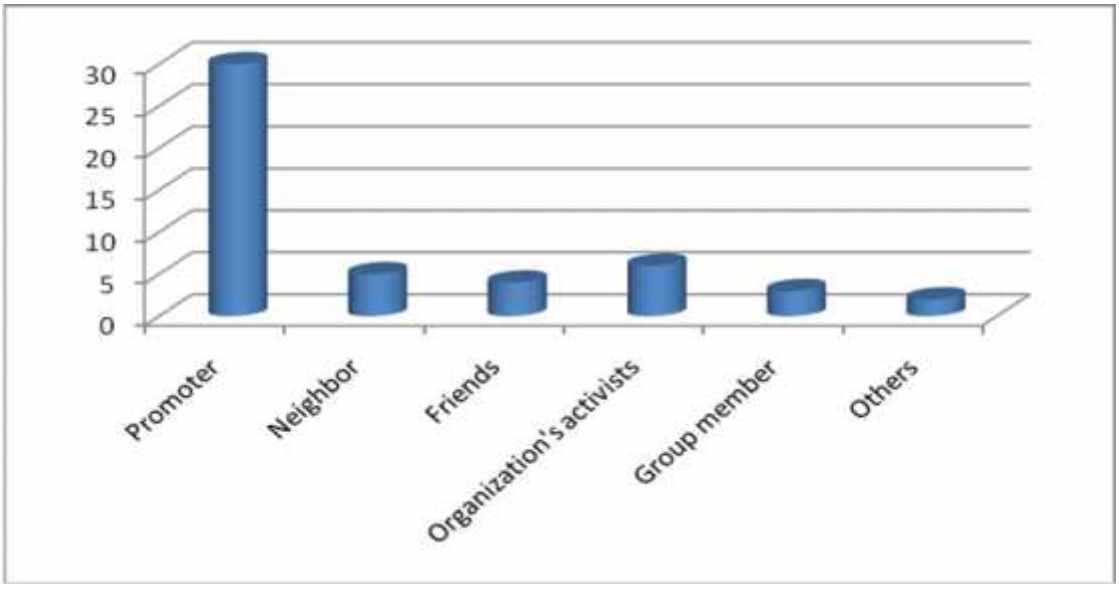


Figure: 5.2: Motivators to Install ICS

Table 5.2 and figure shows the motivators to install ICS. Data shows that more than 60percent ICS were made by the promoters and 40percent were made by the inspiration of other factors such as neighbor, organizational activists, and group members.

5.4 .Use of Installed ICS

Even though ICS was introduced in the era of 70s, it was not able to gain popularity due to several reasons. Mostly reported reasons were technical problems due to which people stopped using ICS in mid way. This study also tried to examine whether people are giving continuation to use ICS. However, the finding of this study is seen fairly positive. It shows that majority of the respondents (82percent) are using ICS after installation. From this, we

can conclude that the perception towards ICS has been changed and people are accepting the improved technology.

Table: 5.3. Use of Installed ICS

Are you continuously using installed ICS at your home?	No	Percent
Yes	41	82
No	9	18
Total	**50**	**100.00**

Source: Field Survey, 2010

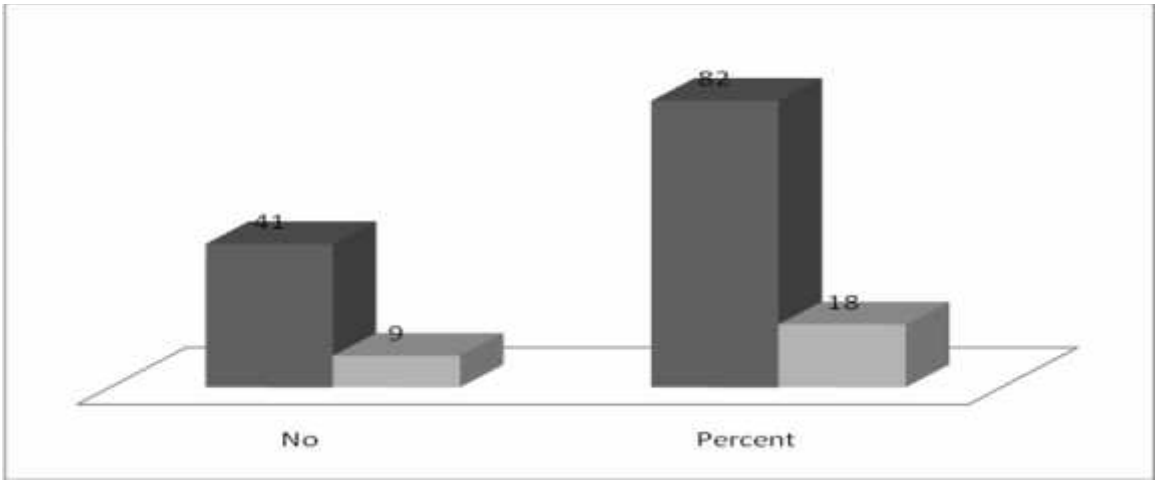


Figure: 5.3 Use of Installed ICS

Table 5.3and figure shows the use of installed ICS. Data shows that 82 percent of the respondents have positive attitude toward ICS. 18percent were not regularly used ICS although they also set ICS at their home and they used bio-gas and gas cylinder. At the same time, about 18 percent respondents reported that they are not using ICS. The reasons they have noted complication in use of ICS like fuel wood combustion is low and takes long time to cook. Other important reasons were lack of experienced technician, chimney placed in wrong place and chulo installed in wrong place, difficult to light fire persistently for the long time and difficult to clean it. Likewise, not having separate kitchen to install ICS was reported for not using ICS.

5.5 Frequency of Maintenance

Operation and maintenance is one of the vital aspects in the successful dissemination of ICS. The frequency of maintenance here means not repairing but frequent maintenance like chimney cleaning. As smearing with cow dung and mud is a daily job, this is not accounted under maintenance category. However ICS needs frequent maintenance than the traditional stoves.

Table: 5.4: Frequency of stove Maintenance

Frequency of Stove Maintenance	No.	Percent
1 time	10	20
1 to 2 times	20	40
2 to 3 times	5	10
More than 3 times	5	10
Not yet repaired	10	20
Total	**50**	**100.00**

Source: Field Survey, 2010

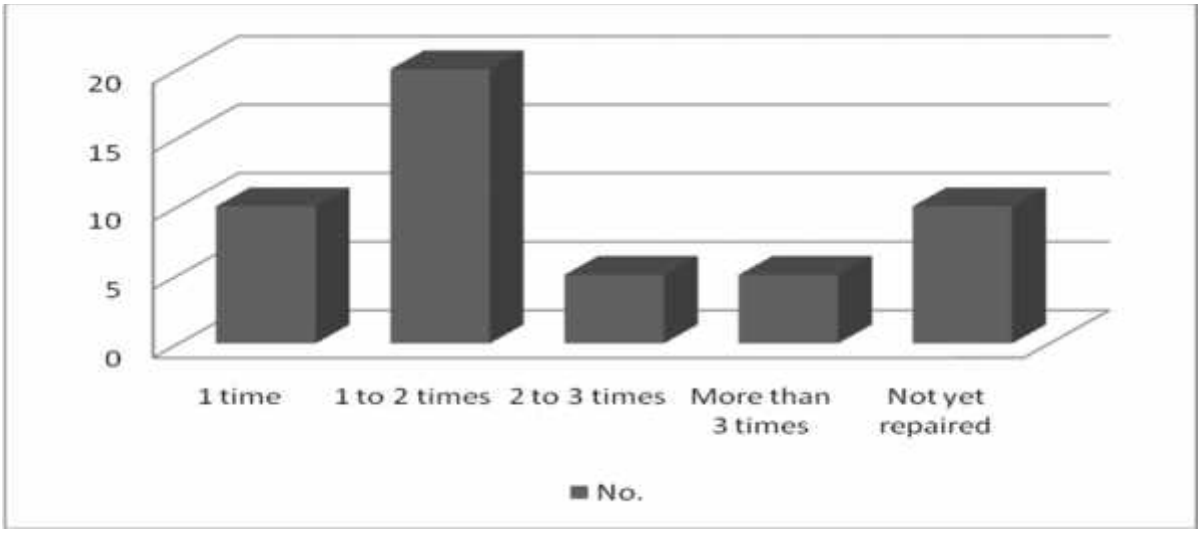


Figure: 5.4: Frequency of Stove Maintenance

Table 5.4 and figure shows frequency of stove maintenance the stove. Data shows that 40percent of the respondents were repaired. 20percent were not repaired yet.

5.6. Continuation of Using ICS.

The study tried to find out whether people are still interested in continuing ICS. About 90 percent respondents showed their willingness to continue using ICS. The major reasons they gave for willingness to continue ICS were less firewood required, less time consumed for cooking; utensils remain clean and easy to use and improved the health situation of rural women.

Table: 5.5. Continuation of Using ICS

Continuation	**No**	**Percent**
Yes	45	90
No	5	10
Total	**50**	**100.00**

Source: Field Survey, 2010

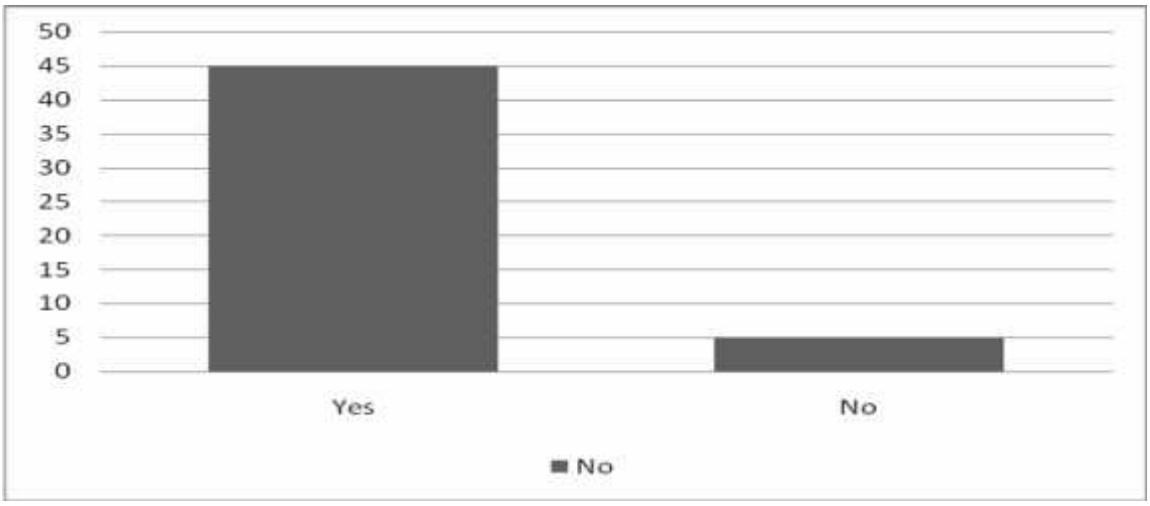


Figure: 5.5: Continuation of Using ICS

Table 5.5 and figure shows that continuation of using ICS. Data shows that 45 respondents (90percent) opinioned that it would be better to continue of using ICS because it is very comfortable to use and more economic, and it produces less amount of smoke. Only 10percent were answered negatively, they said that it is difficult to use because of high fire burning and difficult to clean.

CHAPTER: VI

SOCIOECONOMIC AND ENVIRONMENTAL IMPACTS OF ICS

This section analyses the impact of ICS on the basis of perception of the ICS using households. The impact will be analyzed on firewood consumption, saving in cooking time, impact on health and environment. The analysis will be made by comparing the situation of before and after installation of ICS.

6.1 Impact on Fuel Wood Consumption

This section focuses on the impact made by ICS on reducing fuel wood at the household level. Usually stoves are used for cooking food, heating water and making animal's food.

6.1.2. Fuel Wood Consumption before Intervention of ICS

ICS consumption of the fuel by one third can be shown in the following table.

Table: 6.1 Distribution of Fuel Wood Consumption by Traditional Cooking Stoves

Fuel Consumption before Intervention ICS			**Fuel in kg**
Mean			30
Minimum	Minimum	25	
Maximum	Maximum	35	

Source: Field Survey, 2010

ICS consumption of the fuel wood is less than 66percent percent than traditional Stove. Above mean shows that only 30 kg fuel gives equal energy to hundred in using ICS. Minimum 35 and maximum 25 found by using ICS. It means 25kg fuel gives equal energy to hundred kg by using ICS.

6.1.3. Benefits from the Intervention of ICS

The study revealed that after the ICS installation, the average saving volume of fuel wood is about 14.79 kg per day which is about 444kgs (14.79x30) per month. The lower limit and upper limit of fuel wood saved per day is between 12.76kgs to 16.81kgs. Thus, the annual average saving of fuel wood per household is 5.33 tons (444x12/1000) tons per year.

Table: 6.2: Fuel Wood Saving by a Household Using Improved Cooking Stoves

	Fuel wood Saving (K.gs)
Mean	14.79
95percent Confidence Interval for Mean	
Lower Limit	12.76
Upper Limit	16.81
Standard Deviation	4.45
Minimum	6.00
Maximum	20.00

Source: Field Survey, 2010

The ICS users were found to use the fuel wood from the community forest for preparing food at home, boiling water and preparing animal feeds for their livestock. Before the intervention of ICS, their average consumption of fuel wood is noted as 900kgs per household per month. The total annual fuel wood consumption by the total 90 households before intervention was 972 tons (900kgsx90x12/1000). After the ICS installation, the total annual fuel wood consumption by the 90 households lowered by about 50 percent i.e. 480.6 tons. Thus, from 90 ICS intervention in the Motipur VDC, total of 39.93 (14.79x30x90/1000) tons fuel wood was saved per month. Hence the total annual fuel wood saving per year is about 479 (39.93x12) tons.

6.1.4. Time Consumption for Cooking

It was not easy to identify time utilization by respondents in terms of direct benefits. Normally people do not record time for any work they do in the rural areas. Every activity is seen as routine work that is not recorded in their memory too. However, respondents mentioned that there have been decreasing in cooking time after installation of the ICS. Majority of the respondents reported that cooking time has been reduced. The finding is presented in the Table below.

Table: 6.3: Time Taken by Traditional Stove and ICS

Cooking time	Traditional stove		ICS	
	No.	Percent	No.	Percent
Less than 1 hour	15	30	35	70
1 hour	25	50	10	20
1 to 2 hours	10	20	5	10
Total	50	100	50	100

Source: Field Survey, 2010

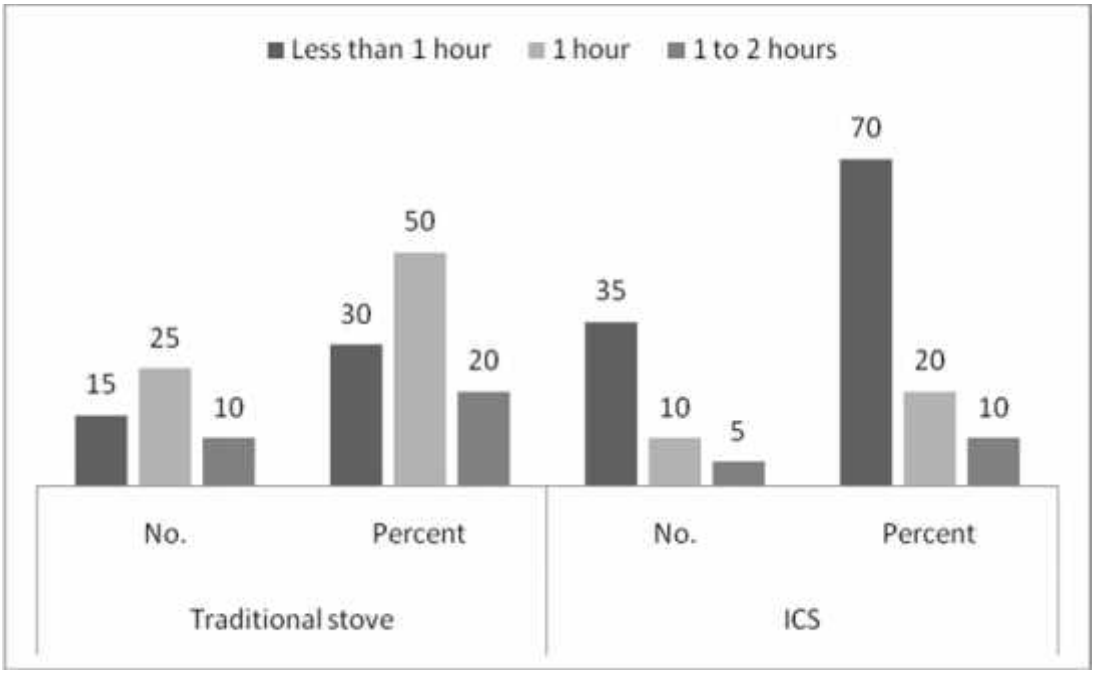


Figure: 6.1Time Taken by Traditional Stove and ICS

6.2. Time Consumption before Intervention of ICS

Time plays the significant role to determine the economic status of each individual. People sometimes give time to do any work unwisely from where they do not able to earn more and sometimes by giving less time they can earn and save time.

Table: 6.4: Descriptive Statistics of Time consumed by Traditional Cooking Stoves to Cook Food

	Time consumption (hour)
Mean	2.04
95percent Confidence Interval for Mean	
Lower Limit	1.73
Upper Limit	2.35
Standard Deviation	0.68
Minimum	-
Maximum	3.00
Range	3.00

Source: Field Survey, 2010

The table 6.2 shows the average time required to cook before installation of ICS. Before using ICS, average time consumption for each household was about 2.04 hours per day. The lower and upper limit of time consumption is 1.73–2.35. Therefore, total hours saved from cooking is 61.2 (2.04 hoursx30 days) hours per month that is 2.55 days per month.

6.2.1. Time Consumption after Intervention of ICS

The study revealed that after the installation of ICS, the cooking time consumption has reduced by more than 50 percent. A significant reduction in cooking time is seen after the intervention. After the use of ICS, cooking time was reported 1.6 hours per day. At the 95percent confidence limit, lower and upper limits for cooking time are 1.24 and 1.96 respectively. Therefore, compared with time consumed by traditional stove, ICS could save time by 0.44 hours per day.

Table: 6.5. Time consumed by Improved Cooking Stoves to Cook Food

	Time consumption (hour)
Mean	1.60
95percent Confidence Interval for Mean	
Lower Limit	1.24
Upper Limit	1.96
Standard Deviation	0.79
Minimum	-
Maximum	2.50
Range	2.50

Source: Field Survey, 2010

However, there were few respondents reporting that there was no reduction but took more time to cook food. The reasons they were explained smoke was not going out properly and fuel wood combustion was low. Therefore, there are still some technical errors resulting negative impact on dissemination of ICS.

6.2.2. Time saved after the Intervention of ICS

The study revealed that after the ICS installation, the average time saved is 0.44 hours per day which is about 13.2 hours (0.44x30) per month. The lower limit and upper limit of time saved per day is .05 -.83 hrs per day at the 95percent confidence level.

Table: 6.6: Time Saved to Cook Food by ICS

	Time Saved (hrs.)
Mean	0.44
95percent Confidence Interval for Mean	
Lower Bound	0.05
Upper Bound	0.83
Standard Deviation	0.86
Minimum	(2.50)
Maximum	2.00
Range	4.50

Source: Field Survey, 2010

6.2.3 Benefits seen after the Intervention of ICS

Table: 6.7: Time for Fire Wood Collection after ICS Installation

Time for firewood collection	No	Percent
Less than 1 hour	2	4
1 hour	20	40
1 to 2 hours	10	20
2 to 3 hours	4	8
3 to 4 hours	10	20
More than 4 hours	4	8
Total	**50**	**100.00**

Source: Field Survey, 2010

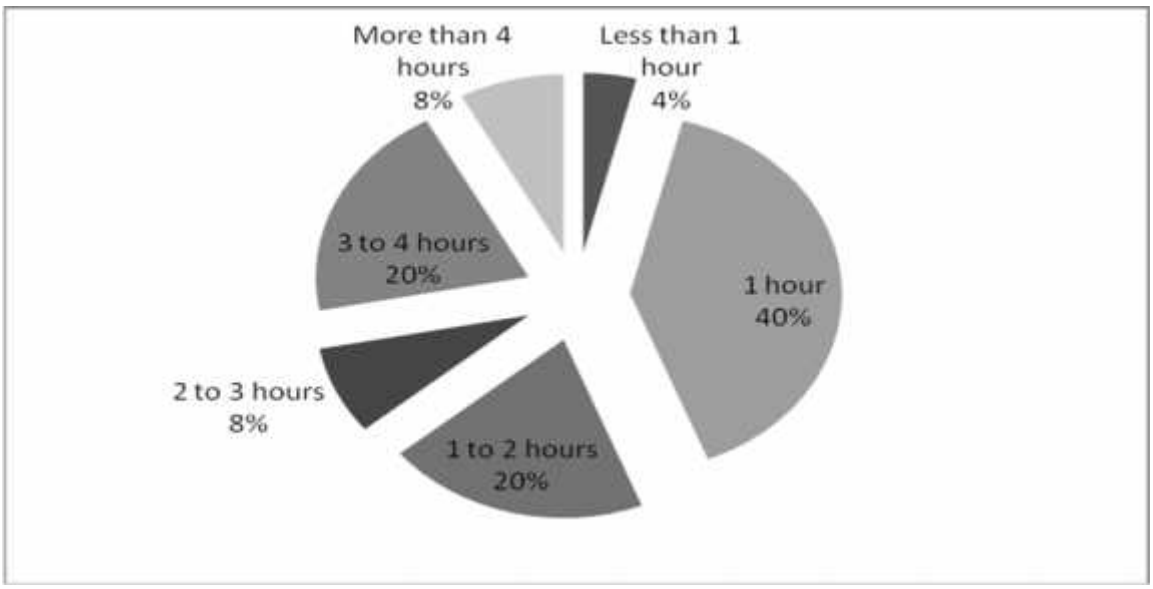


Figure: 6.2: Time for Fire Wood Collection after ICS Installation

The study also revealed that fuel wood collection time was 1 hour as reported by about 20 percent respondents. There were also a significant number of respondents who reported that it

takes more than 4 hours (8percent). Therefore, we could conclude that although fuel wood collection time remains the same, the frequency of fuel wood collection would be reduced by the intervention of ICS since the findings have shown significant amount of fuel wood consumption is reduced.

More than that, during informal discussions women reported that 'Children are now not engaged in getting fuel wood collection from the community forests'. This implies that this is giving direct benefit to children providing free time for education. Likewise, women go to community forests for fuel wood collection, three times a month spending 5-6 hours each time. So 15-18 hours per month and also time saved from cooking. With the introduction of ICS, the requirement for fuel wood has gone down so time for fuel wood collection has been reduced. However, they still require fuel wood for cooking animal feeds which is cooked in open fire outside the kitchen.

6.3. Utilization of Saved Time

Regarding the utilization of the time saved due to reduction in cooking time, majority of the respondents have reported use of the saved time for field works, engaged in income generating activities, caring livestock and cleaning the house. The table below presents the number of responses marked for the activities performed utilizing the time saved from cooking after ICS intervention.

Table: 6.8: Utilization of Time Saved from the Use of ICS

Activities performed utilizing the saved time	No.	percent
Farming	20	40
Income generating work	10	20
Livestock care	5	10
Cleaning	6	12
Water collection	2	4
Helping children learn	2	4
Leisure	3	6
Attending meeting	2	4
Total	50	100

Source: Field Survey, 2010

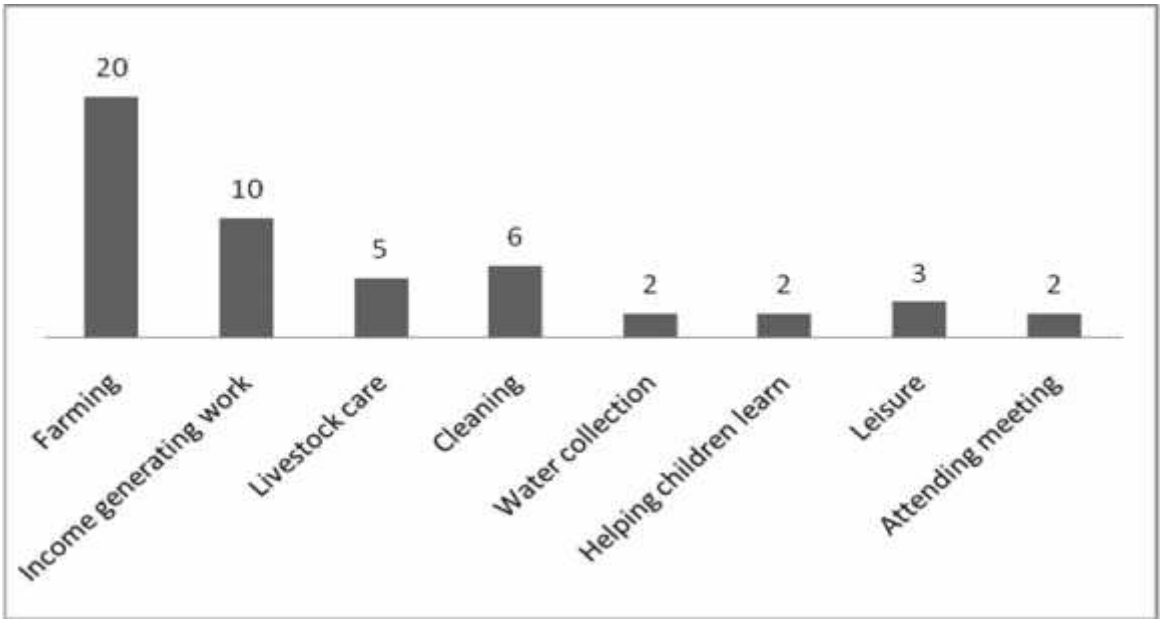


Figure: 6.3: Utilization of Time Saved from the Use of ICS

Table 6.8 and figure 6.3shows utilization of time saves from the use of ICS. Data shows that 40 percent of the respondents use saving time in farming, 20percent use saving time in income generation work, 10 percent in livestock care and 12percent in cleaning.

6.3. Impact on Health and Environment

6.3.1. Health Problems

Indoor air pollution is a significant threat in households using traditional stoves. More than 75percent people have been living in rural areas of Nepal, burn biomass (wood, crop residues, and dung) for cooking and heating. Specifically, indoor air pollution affects women and small children far more than any other sector of society. Women typically spend three to seven hours per day by the fire, exposed to smoke, often with young children nearby.

This survey also revealed that significant proportion of the households were suffering from various health problems before ICS installation because of smoky environment resulting from traditional stoves. It was observed that biomass fuels were the main cooking source. Most commonly cited health problems were eye problems (ranked as no.1problem) and headache (ranked as no 2 problem) Likewise, several other problems like cold flue, respiratory problem, chest pain and cough were also reported frequently.

Table: 6.9: Health Problems before the Installation of ICS

Health Problems	No.	percent
Eye sickness	45	90
Headache	30	60
Respiratory problem	35	70
Cold flu	20	40
Chest pain	15	30
Cough	25	50

Source: Field Survey, 2010

Table6.9 shows health problem before the installation of ICS. More than 90 percent respondents were faced eyes sickness before installation of ICS. Similarly, 60percent faced headache, 70percent inflected by respiratory problem. Likewise, 40percent were faced cold flu and 30percent faced chest pain.

6.3.2. Improvement on Health after Intervention of ICS

Reportedly health problems have been greatly subsided after the ICS installation. Previous studies have also revealed that the significant improvement is seen in smoke-borne diseases such as eye illness, eye burn, respiratory problem, and headache due to installation of biogas and improved cook stoves in the rural areas. Reduction in the above illustrated health complaints were also observed in this study that could be validated to some extent from the data presented below.

Table: 6.10: Health Situation after Intervention of ICS

Exists health problems after ICS installation	No.	Percent
Yes and health condition is same as before	2	4
Yes but not serious as before	20	40
No problems at all	28	56
Total	**50**	**100.00**

Source: Field Survey, 2010

Table 6.10 and figure shows the health situation after intervention of ICS. Data shows that 56percent respondent argued that there were some changed in health situation after intervention of ICS**.**

6.3.3. Cost implication on health before and after intervention of ICS

Of the total household surveyed, about 70percent reported that they used to spend Rs.1000-Rs.3000 annually for treatment. However, after intervention, this has been reduced to less than Rs.1000 as reported by 70percent respondents. The table below gives the glimpse of money spent for treatment before and after intervention of ICS.

Table: 6.11: Annual Estimated Treatment Cost while using Traditional Stoves

Annual Treatment Cost While using Traditional Stove	**Using TCS**		**Using ICS**	
	No.	**Percent**	**No.**	**Percent**
Less than Rs.1000	10	20	35	70.00
Rs.1000 to Rs.3000	35	70	8	16.00
Rs.3000 to Rs.6000	5	10.00	7	14.00
Total	**50**	**100.00**	**50**	**100.00**

Source: Field Survey, 2010

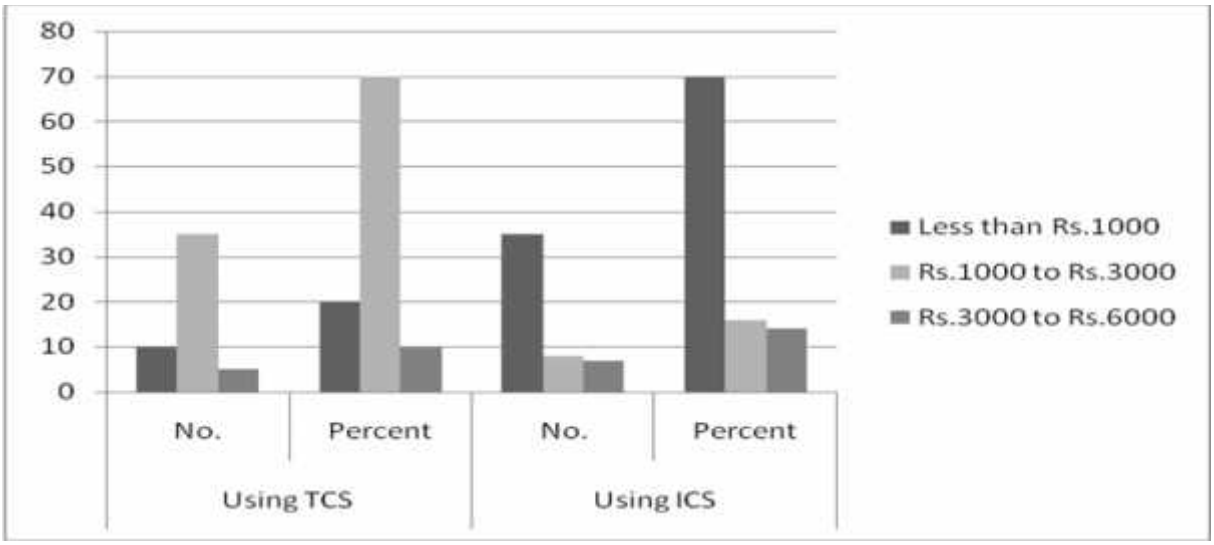


Figure: 6.4: Annual Treatment Cost while using Traditional Stoves

Table 6.11 and figure 6.4shows the annual treatment cost while using traditional stoves. Data shows that 70percent respondents save money in treatment after intervention of ICS.

6.4. Impact on Environment

Impact of ICS on environment was assessed based on the general perception of respondents. Highest number was ranked for reduction in fire wood collection which means pressure in the forest is reduced. However, this is not scientifically proved.

Table: 6.12: Perception of Respondent about Impact of ICS on Environment

Impacts	No.	percent
Firewood collection load is reduced	35	70
Illegal tree falling is reduced	30	60
Decrease in firewood sale	25	50
Others	15	30
Forest is more dense before 5 years ago	15	30

Source: Field Survey, 2010

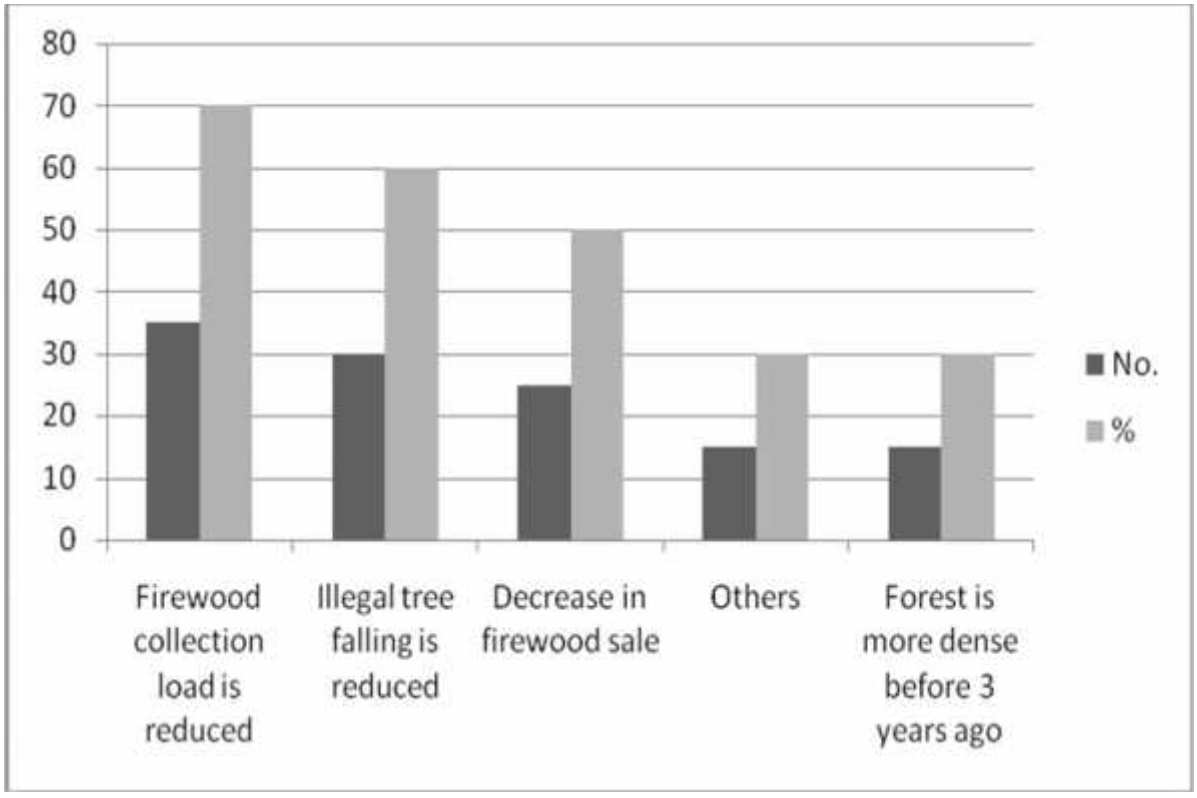


Figure: 6.5: Impact on Environment

Other impacts reported in environment are reduction in illegal tree felling from the forest and decrease in firewood sale. Again, this supports conserving the forest. Respondents also reported that they have seen forest more dense than 5 years before. Again, no such measures are adopted to verify this saying.

6.4.1. Other Improvements Seen on Environment

Majority of the respondents reported that the surroundings are seen more greenery than before (project intervention). Even though, ICS is a small component of energy promotion program in Kapilbastu district Motipur V.D.C. area, the finding shows that it has contributed significantly in forest conservation. Likewise, people feel that pollution has been reduced such has indoor air pollution due to smoke coming out from traditional stoves.

Table: 6.13: Other environmental Benefits of ICS

Other Environmental Improvements After ICS Use	No.	Percent
No Idea	5	10
Clean environment	1	2
Clean house	2	4
Forest conservation	10	20
Good health	1	2
Green surrounding	20	40
No improvements	1	2
No pollution	9	18
River control	1	2
Total	**50**	**100.00**

Source: Field Survey, 2010

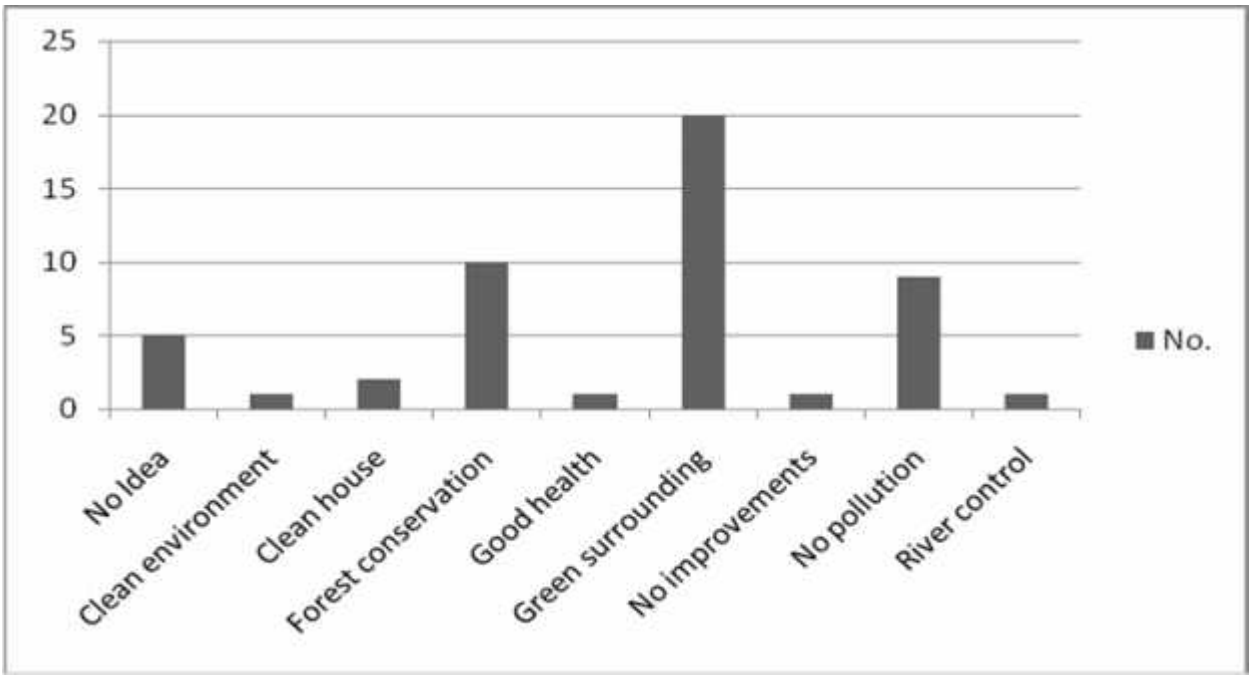


Figure: 6.6: Other Environmental Benefits of ICS

Table6.13 and figure 6.6 shows the other environmental benefit of ICS. Data shows that 40percent of the respondents argued that it helps to maintain greenery of the surrounding. In the same way 20percent opinioned that it helps to conserving the forest.

6.4.2. Impacts on Sanitation and Reduction in Women's Drudgeries

Table: 6.14: Other Impacts Seen After ICS Installation

Impacts	No.	Percent
No Idea	4	8
Clean house, effective	3	6
Clean surrounding	23	46
Easy to clean utensils	10	20
Good health	5	10
Good result	1	4
Less respiratory diseases	2	4
Less smoke	2	4
Total	**50**	**100.00**

Source: Field Survey, 2010

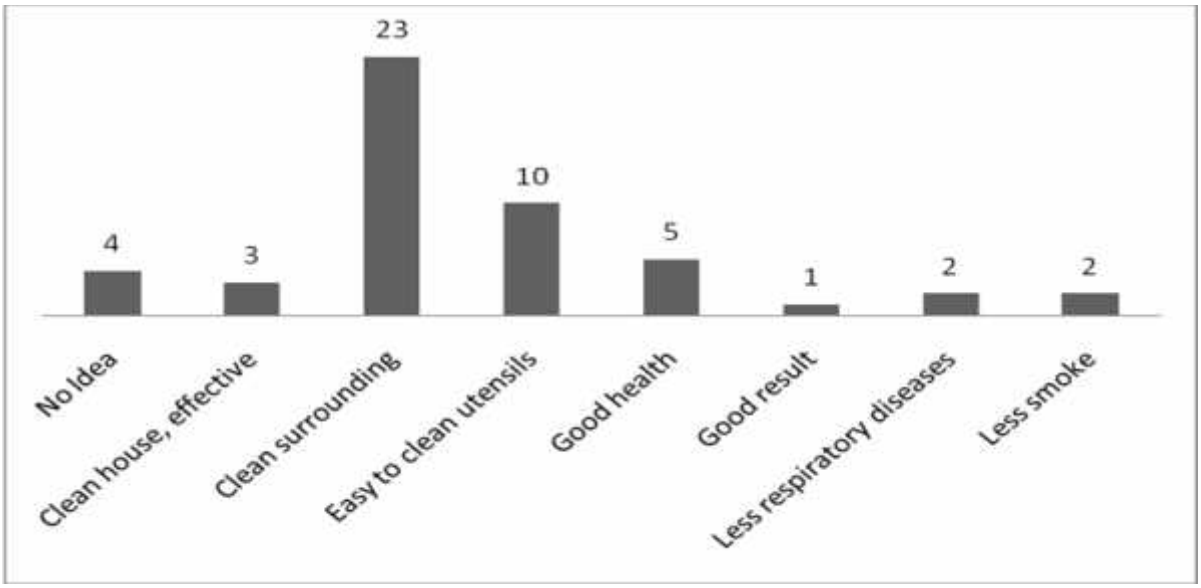


Figure: 6.7 Other Impacts Seen After ICS Instillation

Table 6.14 and6.7 figure shows other impacts seen after ICS installation. Majority of the respondents reported that the utensil remain clean due to ICS. Earlier, women used to cook on open fire so the utensils turned black due to smoke and all the houses too turned black which took lots of time and energy. But women are relief from this problem resulting good sanitation and reduction in their work drudgeries. The table below also shows the impacts seen in different areas.

Besides, above illustrated impacts, ICS installation also had other socio-economic impacts, which are particularly helpful in decreasing drudgery of women members.

The reduction in drudgery had been through decrease in cooking time, smokeless environment, clean house, etc. During informal discussions, women also reported that they have time to participate in the group meetings.

6.4.3. Other Benefits

The question was explored to get respondents view whether they have seen any addition opportunity after the intervention of ICS. For ICS program, ICS promoters have been trained by the project. There are over ten ICS promoters in Motipur VDC (Source: ICS Field Office). As reported by member of Women Apex Body, the promoters are making income by making ICS in the villages.

6.5 Conclusion

ICS is popular among Motipur V.D.C. of Kapilbastu district. More than ninety percent respondents opinioned to continue the ICS and only few respondents were against it. ICS descries the consumption of fuel by one third. Like that it saves cooking time and reduces pollution. Main effect of ICS falls on health situation of the rural women. More than 70 percent users argued that after using ICS it improved the situation of health**.**

CHAPTER: VII

SUMMARY, CONCLUSION AND RECOMMENDATION

7.1 Summary

This research has been conducted on Motipur V.D.C of Kapilbastu district of Lumbini zone. The limited number of respondents (50 women) was taken as the sample including different caste /ethnicity, education status, religion, income status etc. It has been taken respondents only from two wards of the V.D.C ward No. 4 and 5.Total number of household of these two wards were 3280 among them 50 household were taken as sample of this study. Major summary is presented in the following points;

- Most of the respondents were selected from poor economic background. 40percent of them earn less than ten thousand rupees per year.
- Almost 90percent respondents were literate and only 10 percent were illiterate.
- 32 percent of the respondents were from Muslim group, 30 percent from Tharu, 20percentfrom Yadab, and 10percent from hill Bahun and 8 percent from other community.
- Likewise 40percent respondents were from Hindu, as well as from Muslim and only 20 percent from other religious groups.
- ICS is popular on ethnic community as well as poor people. They take it as scientific invention and feel pride of using it.
- Larger percentage (40%) have been using the ICS for less than 1 year
- More than 60 percent of ICS were made by the promoters other 40 percentage were neighbor, organizational activities and group member.
- ICS consumes 66 percent firewood compared to traditional stoves.
- Almost 90percent of the respondents are in the favor of continuing this project because of it's a lot of benefits.

- Only10percent of the respondents are reporting negatively; it took more time to cook food. the reason they were explained smoke was not going out properly and fuel wood consumption was low

- Likewise, 56 percent of the respondent argued that there was some positive change in health situation after intervention of ICS.

- Majority of the respondents reported that cooking time has been reduced.

- Almost 40 percent of the respondents argued that it help to maintain greenery of the surrounding.

- 40 percent of the respondents use saving time in farming and 20percent use saving time in income generation work.

- More than70 percent of the respondents argued that after using ICS it improved the situation of health.

- By the installation of ICS nearly one third of fire wood consumption decreases.

- 70percent of the respondents reported that medical expenses were reduced subsequently after using ICS.

7.2 Conclusion

ICS installed in the VDCs are mostly 2 to 3 years old. This shows that the benefits from the ICS are visible so the villagers accept it. Majority of the respondents are using ICS. Staffs of development organizations working in the area were seen as active player in motivating people to install ICS. Although promoters are trained even in information dissemination, their role was not reported significantly. Improved Cooking Stove project served large number of beneficiaries in the Motipur VDC of Kapilvastu district.

There are many socio –economic benefits of ICS. The ICS has many advantages over the traditional stoves. Similarly time saving, easy to clean utensils, prevalence of fire accidents were reported rarely. After the installation of ICS majority of the households have relieved from eye problem and headache. All of those who complained about chest pain and

respiratory problems got their got their condition improved after ICS installation. Many reported that medical expenses were reduced subsequently after using ICS.

The ICS save one third of firewood, the most important characteristic of ICS is that it is efficient in energy use and thereby in eco-friendly technology. Its shows that ICS can play eminent role to save the energy and environment .it also saves time spent on collecting firewood. The findings of the study show that ICS is fairly effective in reducing forest pressure. The finding shows that each household saves significant amount of firewood.

This time was used in the field, engaged in income generating activities caring livestock and cleaning house. After ICS installation, time is saved from two activities i.e. from fire wood collection and from cooking activities. Similarly, respondents also were involved in Income Generating Activities. ICS empowered the rural women and their life situation by allowing them to involve in organizational activities.

7.3 Recommendations

- A wider level promotion for ICS installation, specifically in its technical aspects is required as people are still hesitant to install ICS because of technical issues;
- Baseline to measure impact of ICS is missing. Therefore, there is need to conduct baseline survey to assess impact at the end of the project. Non users survey should be conducted to help compare in the future;
- Although government has given some space for ICS promotion in its 10^{th} five year plan, implementation in the field is negligible. ICS program is seen as the program of development agencies only. Thus, this should be integrated with VDC level program. This also helps to sustain the program in the long run;
- Government office and NGO implemented ICS activity to reduce pressure in the forest targeting the poor and disadvantage segment of the area. The study should be conducted to assess whether these groups have access to this service.
- More awareness programs and encouragement installing ICS in the community is required.
- Training to build ICS should be provided to the local people, so that they can make ICS themselves and help to build for other local people also.

REFERENCE

AEPC, (2003) Government Policy and Strategies of Improved Cook Stove for Dissemination in Nepal

AEPC, (2004) *"Final Report on Impact Study on Improved Cooking Stoves Program Effectiveness"*, Dhobighat, Lalitpur

CBS (2002) Nepal living standard survey 1996, Kathmandu Nepal.

CBS (Central Bureau of Statist biogas), 2004. *Statistical Pocket Book-Nepal*. HMG/Nepal Kathmandu.

CRT Nepal, (2000) *"Status of Improved Cooking Stove Technology in Nepal,* Tripureshwor, Kathmandu.

CRT, Nepal, (2005) *"Improved Cook Stove (ICS) Development: A Case from Nepal"* Tripureshor, Kathmandu.

CRT/N (2oo6) Improved Cooking Stove (ICS) Development: A Case from Nepal

CRT/N,(2005).*National Energy Situation Survey Report*: Nepal-focus on renewable energy and poverty reduction. Report submitted by Centre for Rural Technology Nepal to International Network for Sustainable Energy in 2005.

CWSN (2009). Project completion report Improved Cooking Stoves

DDC/REDP, (2003) "Sudhariyeko Chulo Eak Parichaya: Biseshta ra Awastha", Charikot, Dolakha.

Ezzati, M. and Kammen, D.M.2002. The health impact of exposure to indoor air Pollution from solid fuels in developing countries: knowledge gap and data needs. *Environment Health Perspectives*, 2002,110 (11):1057-1068.

IUCN, (2008) Improved Cooking Stove (ICS) and Its Impact on Firewood Consumptions and Reducing Carbon Dioxide Emission: A Case Study from TMJ Area, Nepal

Ministry of Population and Environment, Nepal Government Nepal Reviewed through http://www.mope.gov.np/environment/sir.php

Nepal Government/NPC 2002, *Tenth Five Year Plan*, Babar Mahal, Kathmandu.

REDP (2000). In Impact study of REDP Program, Kathmandu, Nepal.

Rao,(CN Shankar,2005)'sociology; principal of sociology with an introduction tosocial though; new dehli,Schande &company Ltd.

Haralambos, Michael 2004, sociology thems and perspectives, New dehli vikas publishing House pvt Ltd

Sapkota, B.1984. *A Study on performance of Insert Stove with Different Types of FuEL. Proceeding of Workshop Seminar on Improved Cooking Stoves in Nepal*. September 5- 7, 1984, Gorkha.

Sapkota, S.K., (2000), *The Present Status of ICS in Nepal*, www.aepcnepal.org/sp/ics.php

Singh R.B., 2005, "The Status of Traditional Biomass Fuel Resources in Nepal and the Fate of Redential Energy Consumption through the Domestic Cooking DDevices", *Journal of the Institute of Engineering*, Vol.5, No 1, Pulchowk, Kathmandu, Nepal.

WECS, (1994/95), *"Perspective Energy Plan: Socio-Economic (Gender) Issues in Energy Development"*, Kathmandu, Nepal

ICIMOD website: www.mtnforum.org/apmn/ics1.htm (Dec 2001), e-conference Paper.

AEPC website: www.aepcnepal.org/sp/ics.php

CRT Nepal website: www.crtnepal.org

APPENDIX-A

Tribhuvan University

Prithvi Narayan Campus

Department of Sociology and Anthropology, Pokhara

Title of Research:

Socioeconomic and Environmental Impact of ICS

Questionnaire Schedule for Respondent

1. General Information of the Respondents

<table>
<tr><td colspan="3">a) Name: b) Caste/ethnicity

c) Sex: Female..... Male d) Age… e) Religion…</td></tr>
<tr><td colspan="3">f) VDC….. g) Ward No. … h) Name of group (if member).....</td></tr>
<tr><td>i) Marital status
☐ Unmarried
☐ Married
☐ Widow/widower

Other (specify if any)</td><td>j) Main Profession of the family
☐ Agriculture
☐ Business
☐ Wages/ labor
☐ Student
☐ Job holder
Other (specify if any)</td><td>k) Education
☐ Illiterate
☐Literate
☐Primary level
☐Lower secondary level
☐Secondary level
☐Higher education</td></tr>
<tr><td colspan="2">l) Family type

☐Nuclear ☐Joint</td><td>m) Members eating in the same kitchen

Total No..... Female..... Male.....</td></tr>
</table>

2. Economic condition

a) For how many months can farming feed you?	b) What do you do if it insufficient for	c) What is your family's other profession besides farming?

□ Less than 3 months □ 3-6 months □ 6-9 months □ 9-12 months □ 12 months and surplus to sell □ No land	consumption from farming? □ Wage laborer □Share-crops farming □ Business □ Service □Foreign employment □None Other (specify if any)	□None □Rs. 6000-9000 □Less than Rs. 1000 □Rs. 9000-12000 □Rs.1000-3000 □Rs. 12000-15000 □Rs.3000-6000 □Above Rs.1500

3. Information on ICS installation

a) When did you install ICS at your home? □ Less than 1 year □ 1 year □ 2 years □ 3 years □ 4 years □ more than 4 years	b) Which type of stove have you installed? □ One hole □Two holes □ Three holes
c) Who motivated you to install ICS? □ Promoter □Neighbor □ Friends □ Group members □ Other (Specify if any).....	d) Are you using the stove? □ Once □Twice If no, why? …… …… …… ……

If you are using the stove please respond to the following questions:

a) For what purpose do you use ICS? □ Cooking □Boiling water □ Make animal food □ Make liquor □ Heating room □ Other (Specify if any).....	b) How often have you done maintenance after installing ICS? □ Once □Twice □ Thrice □ More than 3 times □ Not at all	c) What type of problems are you facing in using ICS? (you can check more than one question) □ Problem of smoke outlet □ Direction of chimney against wind direction □ Does not burn wood properly □ Consumes more firewood □ Cooks food slower than tradition stoves □ None of the above □ Other (Specify if any).....

d) What other types of stoves are you using beside ICS? □ Bio gas □LPG □ Kerosene stove □ 3 stones □ Tripod □ Traditional mud stoves	e) Are there any houses who have constructed ICS but not using them? □ Yes □No If yes, what might be the reason? .....

4. Effectiveness of ICS

a) How much fuel wood was used in Traditional Stove in a day? …….. kg	b) How much fuel wood is required now in a day? …….. kg
c) What types of bio fuel do you use at your home? □ Fire wood □Cow dung cake □ Hay/straw	d) Where do you collect firewood from? □ Community forest □Government forest □ Private forest □ From own farmland

□ Twigs and agricultural residue □ Other (Specify if any).....	□ Buy □ Other (Specify if any).....
e) Who goes to collect fuel wood in your family □ Self □ Father-in-law □Husband □ Wife □ Mother-in-law □ Son □ Daughter □ Daughter-in-law □ All the family members □ Buy □ None of the above Other (Specify if any).....	f) How much time do you spend to collect fuel wood? ……. Min./hour
g) How much time did you require to prepare food in Traditional stoves? …… min./hour	h) How long it takes to prepare food in Improved cooking stoves? …… min./hour
i) How long did you used to spend to collect a bhari of fuel wood while using traditional stove? □ Less than 1 hour □ 1 hour □ 2 hours □ 3 hours □ 4 hours □ more than 4 hours	j) How long does it take now to collect a bhari of fuel wood after ICS installation? □ Less than 1 hour □ 1 hour □ 2 hours □ 3 hours □ 4 hours □ more than 4 hours

5. Impacts of ICS on Health

a) What kind of health problems did you use to face while using traditional stove?	b) Do you still have those problems? □ Yes, same as before.

□ Respiratory □ Cough and cold □ Chest pain □ Asthma □ Eye problem □ Headache Other (Specify if any).....	□ Yes, but not serious as before □ No
c) How much money do you used to spend on health check-up while using traditional stove in a year? □ less than thousand □ 1000-3000 □ 3000-6000 □ 6000-9000 □ 9000 and above □ No idea	d) How much money is spent now on health check-up after using traditional stove in a year? □ less than thousand □ 1000-3000 □ 3000-6000 □ 6000-9000 □ 9000 and above □ No idea

6. Impacts of ICS on Environment

a) What impacts are seen in forest conservation after the use of ICS (you can check more than one responses) □ Reduce in fire wood collection □ Illegal tree felling has been minimized □ Minimized fire wood sale □ Compared to 5 years back, forest looks dense Other (Specify if any).....	b) What other improvements are seen in environment conservation after using ICS? …… …… ……
c) What impacts are seen in sanitation after use of ICS? ……	

…… ……

7. Other Benefits from use of ICS

a) Have you been able to save your cooking and cleaning time after use of ICS? □ Yes □□ No If yes, how much time? ..... min/hour	b) What do you do to utilize your time? …… …… ……
c) How many people in your area are engaged in promoting/constructing ICS? …… people	d) How much does it cost to construct an ICS? Rs.……to Rs…

8. Other Information regarding use of ICS

a) Do you want to continue using ICS? □ Yes □□ No Why? ..... …… …… ……..	b) What do you think has to be done to make ICS program more effective? Please give your suggestions. …… …… …… ……

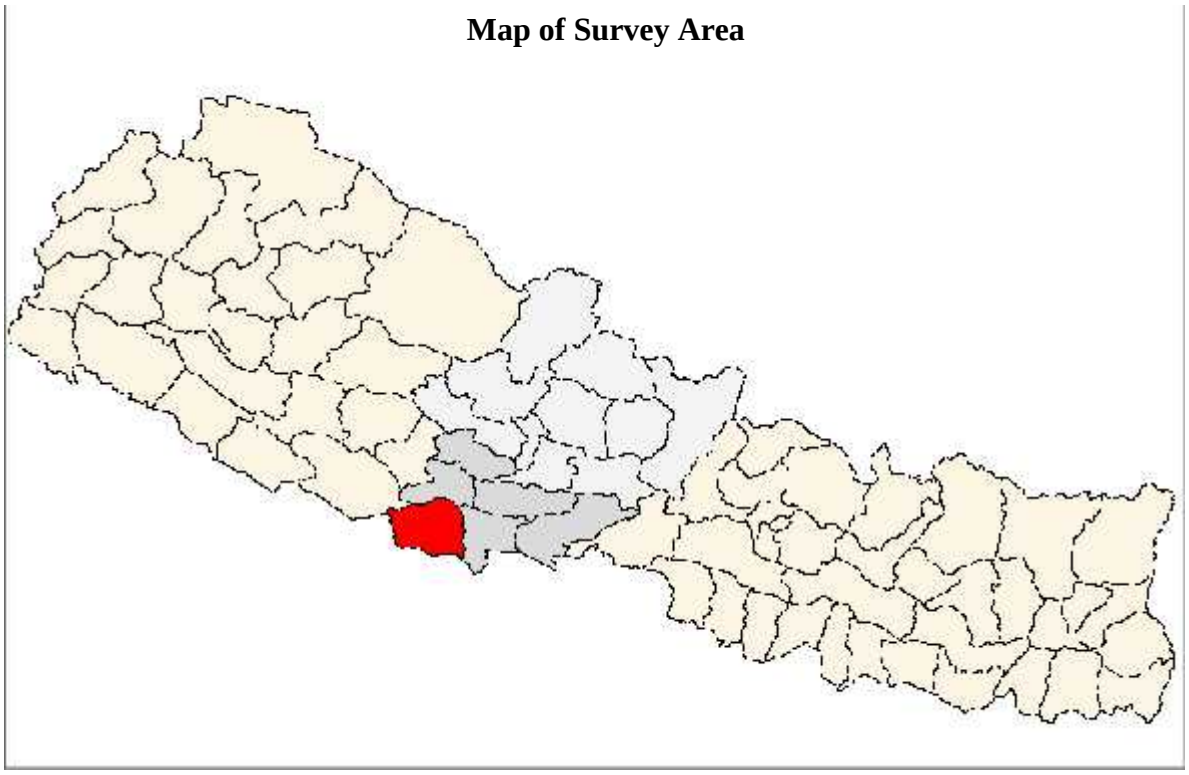
Notes: Please give your opinion if you have any regarding ICS which are not covered in the questions above.

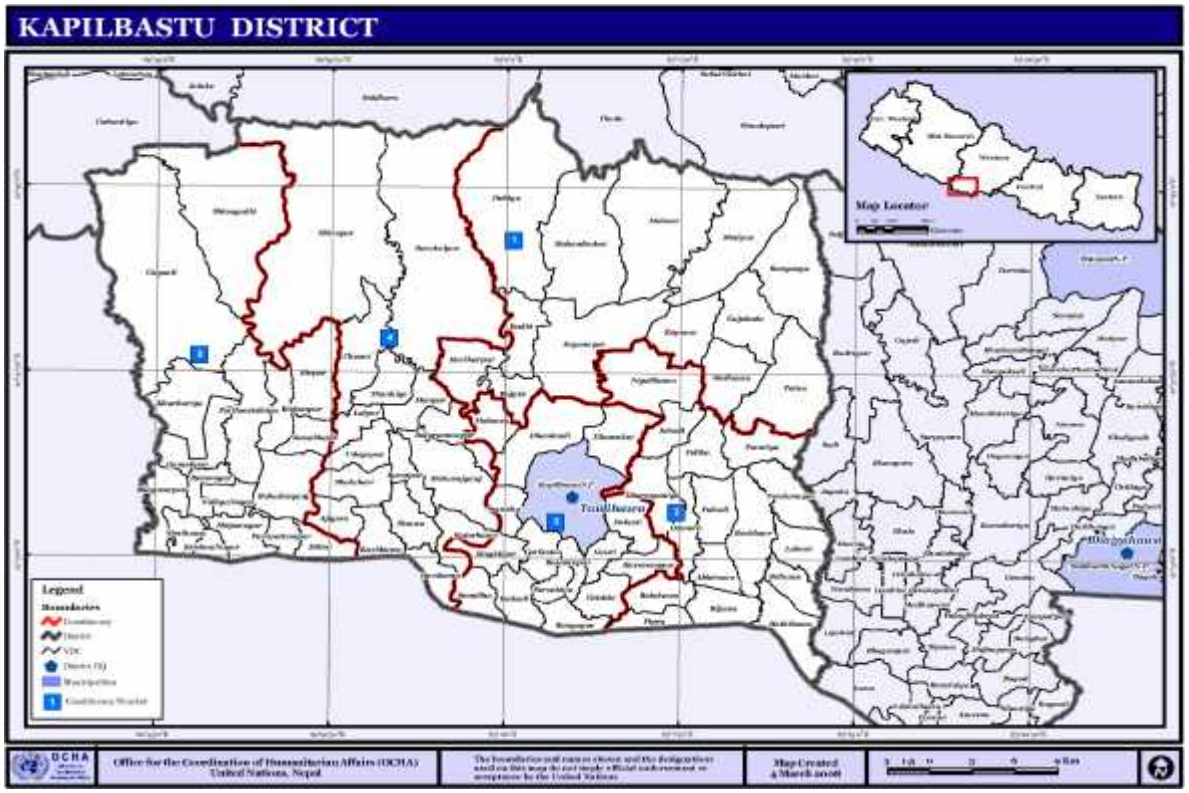
…….. …….. …… ……..

Thank You

APPENDIX- B

Map of Survey Area





LIST OF PHOTOS

Photo of improve cooking stoves

Photo of traditional chulo

Photo of field study

Researcher collecting information