A PROJECT OF SAARC ENERGY CENTRE

IMPROVED COOKING STOVES

FINAL REPORT

2013

SAARC ENERGY CENTRE, ISLAMABAD, PAKISTAN

1.0 Executive Summary

There are different models of Improved Cook Stove (ICS) being used in Pakistan. The present study attempted to know which type of ICS people accepted more. Purpose of the study was field trial of the SAARC Improved Cooking Stoves (ICS) to improve its design for the optimum fuel efficiency which would result in less use of biomass and fuel-wood. Specific objectives were to know i) fuel type used for cooking and heating purpose and its effects on livelihood of people and ii) impact assessment of fuel wood fire on environment and health of women and infants.

This report presents the findings from various tests on the improved cooking stove (ICS). The tests were conducted in ten districts of Pakistan having diverse cultural, geographical and climatic variations. Three models of ICS were installed and tested in ten districts (three districts in Punjab, one district in Sind and six in KPK) considering their climate and geographical locations. Efficiency test were carried out by giving the ICSs to forty-nine (49) community households for their feedback. A questionnaire was developed and comments were sought from the beneficiaries. Generally every beneficiary has appreciated the stove in terms of its consumption of less wood, little or no smoke and its efficiency in fast cooking.

Data collection was carried out through conduction of assessment survey. Questionnaire was developed and filled by conducting interviews with individual household, observations and field discussions. Social mobilizers were hired for the conduction of survey and collection of weekly feedback. Survey showed that all the households were using fixed three stone traditional stoves, all of which were without grate and chimney. All the survey households were willing to change the stove type and wanted to improve the existing model for saving the fuel wood and to reduce the health hazards due to indoor air pollution (IAP).

Further, it was observed that by using wood of smaller sizes, the ICS boils 5 litres of water in about 20 minutes, which is less than the three stone fire. The thermal efficiency of ICS is 30-42%. According to the efficiency of ICS regarding fuel consumption and smoke emission rate, the ICS is considered to achieve significant, measurable health or environmental goals. With regard to safety and mobility the stove scored good and satisfactory. The reduced amount of smoke emission and frequent combustion in

minimum time have rated the stove and attracted other community members regarding its installation and adoption.

Advantages of ICS as mentioned by majority of respondents includes reduced emission of smoke in kitchen, less time to cook, saving energy (fuel), easy ignition etc. Study shows that households face many problems related to traditional cooking stove such as: cost of firewood, smoke, time and rain. However, all households were agreed to buy or install ICS continuously. 50% of the households are willing to pay Rs. 2000-3000 for ICS installation.

The Honorable Secretary General visited SAARC Energy Centre Islamabad on 9th April, 2011. H.E. During briefing she appreciated the SEC Study on Improved Cooking Stoves and directed SEC to develop and demonstrate suitable models of Improved Cooking Stoves (ICS) during forthcoming SAARC Summit to be held in Maldives in November, 2011.

The Improved Cooking Stoves (ICS) developed and designed by SEC were completed in 2012. The ICS have been installed for field trials in 2013 in different climatic regions of Pakistan simulating different climatic regions of SAARC member states.

Governing Body recommended that;

- SEC may consider obtaining a patent for the ICS design
- The ICS may carry SAARC logo
- SEC, while keeping in loop the SAARC secretariat, may explore the possibility for securing external funding sources for marketing and technology penetration
- Research and Development may be carried forward for enhanced efficiency of ICS
- GB Members have been requested to explore the possibility of marketing SEC's ICS
- 3D simulations of combustion chamber of ICS by NUST reveals that efficiency of these ICS can be enhanced. SEC will continue development of enhanced Efficient ICS in 2014.

2.0 Introduction

Access to clean and affordable modern energy is critical to fostering lasting social and economic development and to achieving the Millennium Development Goals. Worldwide, almost 3 billion people rely on traditional biomass for cooking and heating, and about 1.5 billion have no access to electricity, with 1 billion more having access only to unreliable electricity networks.

The lack of modern energy services stifles income-generating activities and hampers the provision of basic services such as health care and education. In addition, smoke from polluting and inefficient cooking, lighting, and heating devices kill nearly two million people a year and causes a range of chronic illnesses and other health impacts. These emissions are important drivers of climate change and local environmental degradation.

Rural people in the South Asian region, like other part of the developing world, are overwhelmingly dependent on the biomass fuel as a source of heating for cooking food and other purposes. Biomass fuel that includes wood, crop residues, leaves and animal dung are burnt in traditional stoves called Chullhas in most of the areas. Inefficient burning of these biomass fuel in traditional stoves produce toxic gases and smoke which leave detrimental affect on the health of the women and children due to their exposure to these gases during cooking in the kitchen. Besides, the inefficient burning of the fuel requires larger amount of fuel which means longer time of collection and environmental degradation by rapid deforestation. Rural population has limited access to modern form of commercial energy sources e.g. electricity, piped natural gas, LPG and kerosene etc. With the persistent rise in the size of population coupled with high prices of commercial fuels, the traditional sources of biomass are increasingly being subjected to pressure. Most of the countries in the region have been trying to reduce dependence on the biomass fuels. But the ground reality is that biomass fuel will continue to be used as main source of cooking fuel in this region for years ahead.

Realization of the twine problems of health and environment due to traditional method of using biomass prompted most of the countries this region to introduce Improved Cooking Stoves (ICS) in order to improve the fuel efficiency and reduce the health hazards. Over the last two-three decade's research institutions developed different models of this stoves. However, despite

considerable promotional and dissemination efforts by the Government agencies, NGOs and other donor supported programs, acceptance of ICS replacing traditional cooking stove has not reached to a satisfactory level.

Pakistan is considered to be the high deforested countries. In-fact the country has only 2.2% (1.687 m ha) of forests of which 20.2 per cent (340k ha) is primary forest (FAO). A scientific approbation that is having 25% of the total land under forest cover is must in order to sustain ecological balance. More than 70% of country population lives in rural areas in Pakistan. About 40,000 villages have no access to electricity. Most of them use fuel wood, straw, twigs, leaves, rice husks, jute stick and other agricultural residues as fuels for cooking purpose. The annual consumption of these fuels is about 24.3 million cubic meters and it is about 83% of the total consumption in the country. It is noted that only 4.3 million HHs are connected to natural gas network in country. Even most of the semi-urban and urban population use traditional fuels for cooking purpose.

The use of traditional fuels is also being increased with rapid population growth. As a result, deforestation and consequently a change in the ecosystem are happening that in turn leading to soil erosion and climate change. Therefore, wise use of traditional fuel is necessary to protect vegetation. Improved cook stove, instead of traditional biomass cook stove can ensure efficiency in use of traditional fuels (WEC, 2005). Moreover, improved stove reduces smoke emission and health hazards that ultimately lead to improved livelihood.

Improved stove saves 25-50% fuels compared to traditional ones. In the case of chimney stove, flue gases are also taken out of the kitchen so that the kitchen becomes more comfortable for the cook. Other benefits of improved stove are: save cooking time, less smoke, less blackening of the utensils, saving of fuels, portable stove can be shifted easily during rainy season, etc. South Asian Association for Regional Cooperation (SAARC), Pakistan has developed a number of models of improved stove. Besides, some of the NGOs in Pakistan are actively involved in dissemination of ICS technology among the community members especially in the rural areas. A variety of improved cooking stoves have been designed and developed which include fixed and portable type, metal and clay, single and multiple pot, with chimney and without chimney, with grate and without grate, etc. Appropriate model to replicate countrywide is yet to know.

With so much of the world's population using biomass for their daily household energy needs, it is imperative that biomass be used efficiently and in a sustainable fashion. Justifying an

improved cook-stoves project is easy! Here are some of the ways improved cook-stoves benefit families and communities:*

2.1 Health

- Improved cookers can cut back indoor smoke levels up to 90%
- Improved cook-stoves prevent soot build-up in the lungs and the home.
- Burn risk is reduced when fire is contained safely in an improved cook-stove.
- Carbon monoxide and particulate matter inhalation is minimized, thus reducing respiratory disease associated with polluted indoor air as well as eye infections.
- Serious respiratory diseases such as pneumonia will be reduced if levels of indoor air pollution are minimized.
- Improved cook-stoves are usually constructed at waist level, reducing the risk of falling into an open fire.

2.2 Environmental

- Improved cook-stoves use up to 80% less biomass than traditional cookers (e.g. open fires); Solar Cookers use absolutely none!
- Where biomass is scarce, efficient cooking practices reduce pressure on forests and other sources for biomass.
- Improved cookers emit less greenhouse gases than traditional cookers.
- Efficient cooking means less time gathering biomass fuel, especially if it's found far from the home, and more free time for other activities.
- Surplus biomass can be used in agricultural practices to improve soil fertility, e.g. composting and tilling.
- Improved combustion chambers reduce smoke output significantly and solar cookers emit nothing.
- Reduced human pressure on natural ecosystems helps protect species diversity and abundance.

2.3 Social/Economic/Gender

- Women involved in making household fuel and energy decisions are empowered, thus promoting gender equality.
- Cleaner air in the home benefits the health of new mothers and promotes healthy child development.
- Less exposure to indoor air pollution helps prevent health complications for pregnant women and the developing embryo, including stillbirth and low birth weight.
- Time and energy spent caring for sick family members is reduced while cutting health costs and increasing household income capacity.
- The family can save money by buying less fuel in cases where biomass is purchased.
- Children will have more time to attend classes and other extracurricular activities if they spend less time collecting biomass fuel.
- An improved cookers project could be a potential micro-enterprise opportunity:
    - Manufacturing, assembly, education and training, promotion
    - Train women and they will become entrepreneurs, gaining status in the community, and self-confidence.

*These benefits, while likely, are not guaranteed. Some may not be considered a priority or, for that matter, even perceived by users.

3.0 Technical Description of Improved Cooking Stoves (ICS)

3.1 Designing of ICS

1. Forcing hot gases from the fire to rub against the bottom and sides of the pot is the technique that saves fuel during cooking.

2. Many stoves do not force all of the heat to flow close to the pot and throw away a lot of heat into the air.

3. Heat is not efficiently transferred to the pot if the hot flue gases have too much space between the pot and the sides of the stove.

4. When hot flue gases are forced to flow close to the bottom and sides of the pot in a narrow channel, more heat will be transferred to the pot.

5. The best way to remove smoke from the kitchen is to use a chimney i.e. smoke is pulled through the stove and up the chimney without leaking.

6. If a stove without a chimney is used indoors, then let as much air into the kitchen as possible by placing the stove next to a window.

7. It makes a gap between walls & roof, and creates a wind that pushes smoke out.

3.2 Important Parameters of ICS

1. **Mono-function stoves: ICS** which performs primarily one function like cooking or any single special function.

2. **Multi-function stoves:** An ICS can also be used for purposes other than cooking, e.g. Water heating, room heating etc.

3. **Construction material** – ICS are mainly made of metal, clay, fired-clay or ceramics and bricks or are hybrids.

4. **Portability** –Metal /ceramic ICS are normally portable while clay/brick, clay/stone ICS are high mass and fixed.

5. **Fuel type** – ICS performance depends on the type of fuel used.

6. An ICS may not work when switching to fuel types for which it was not constructed, e.g. ICS designed for fuel wood would not perform at all with rice husks or sawdust.

3.3 Development of SAARC ICS

SEC has designed, developed and manufactured three types of ICS keeping in view the following performance parameters

a) Thermal efficiency

b) Reduction of toxic gasses

c) Particulate matters

d) Multiple uses

e) Ease of use

i. SAARC-I for moderate Plane and Cold areas

ii. SAARC-II for Cold climate and Mountainous areas

iii. SAARC-III for Hot planes and Deserts

3.3.1 SAARC-I:

- Developed for use in cold hilly areas for the purpose of cooking and room heating.
- It is round shaped single pot metallic stove with a chimney and a baffle to control the fuel burning rate.
- Improvement in combustion efficiency to reduce smoke and harmful emissions.
- Improvement in heat transfer efficiency to achieve optimum heat utilization.
- The chimney has a baffle to control the draft of flue gases thereby controlling fuel burning rate.

Test Results of SAARC-I:

S. No	Features	Results Recorded
1	Temperature in Combustion Chamber	650°-750° C
2	Temperature at the exterior body of the stove	150°-200°C
3	Temperature of the exhaust gases at the exit of chimney out of the room	150°-170° C
4	Burning rate	18.88 gm/min
5	Fire power of the stove	5.8 KW
6	Boiling Time (2.5Kg water, Fuel Wood moisture was 19%)	12 minutes
7	Efficiency	31%.
8	Expected Life	3 years

Fig 3.3.1 SAARC -I

Fig 3.3.1 **SAARC –I in Chitral**

3.3.2 SAARC-II

- Developed for use in cold hilly areas for cooking, water and room heating.
- It is round shaped single pot metallic stove coupled with the duct for placing water tank of 11 litres capacity.
- The duct passes through the center of the water container for safe disposal of smoke.
- The heat of flue gases passing through duct and chimney is utilized for water heating by conduction.
- Heat radiated from body of the stove, duct and the part of the chimney is used for room heating.
- The chimney has a baffle to control the draft of flue gases thereby controlling fuel burning rate.

Test Results of SAARC-II:

S. No	Features	Results Recorded
1	Temperature in Combustion Chamber	650°-750° C
2	Temperature at the exterior body of the stove	150°-200°C
3	Temperature of the exhaust gases at the exit of chimney out of the room	150°-170° C
4	Burning rate	15.84 gm/min
5	Fire power of the stove	4.93 KW
6	Boiling Time (2.5Kg water, Fuel Wood moisture was 19%)	24 minutes
7	Efficiency	43%.
8	Expected Life	3 years

Fig 3.3.2 SAARC -II

Fig 3.3.2 SAARC –II in Thandiani

3.3.3 SAARC-III

- Developed for use in plane areas for cooking.
- It is round shaped single pot metallic stove.
- The stove body is insulated to reduce heat emissions in the surrounding.
- It has a chimney for safe disposal of smoke.
- The chimney has a baffle to control the draft of flue gases at a required rate thereby controlling fuel burning rate.

Test Results of SAARC-III:

S. No	Features	Results Recorded
1	Temperature in Combustion Chamber	650°-750° C
2	Temperature at the exterior body of the stove	70°-120°C
3	Temperature of the exhaust gases at the exit of chimney out of the room	150°-170° C
4	Burning rate	16.29 gm/min
5	Fire power of the stove	5.07 KW
6	Boiling Time (2.5Kg water, Fuel Wood moisture was 19%)	26 minutes
7	Efficiency	33%.
8	Expected Life	3 years

Fig 3.3.3 SAARC -III

Fig 3.3.3 SAARC –III in Hasilpur

3.4 Efficiencies of SAARC Improved Cooking Stoves:

- The ICS were designed and developed by SEC for three different geographical locations as below;
- SAARC-I 31 % efficiency for moderate Plane and cold areas
- SAARC-II 43% efficiency for cold climate and mountainous areas
- SAARC-III 33% efficiency for hot plane area and deserts

The ICS have been put to field trials to assess the followings;

i. Performance of the ICS in the field

ii. Acceptance by the stake holders

4.0 Strategy of Field Trials Study:

Keeping in view the above degraded environmental condition, health and time significance of community especially of women and children, a study on field trials of ICS was conducted in ten districts of Pakistan. The reason behind this selection is to test the ICS efficiency of prescribed models in regions of different climates that ranges from sub-tropical to coastal areas. A detailed baseline survey was conducted in these areas and socio-economic conditions along with cooking practices were evaluated. A cluster of 20 households were selected from each district to carry out the survey and to install five (5) ICS in each district. Selection was carried out as per set criteria and ICS were installed in selected HHS. Feedback was received from respective HHs after ICS installation and suggestions to improve the installed ICS were incorporated to improve the design according to community needs and ease of use at local and national level.

The purpose of the study was a field trial of the SAARC Improved Cooking Stoves (ICS) to improve its design for the optimum fuel efficiency which would result in less use of biomass and fuel-wood. This will achieve two objectives – i) it would decrease deforestation and improve livelihoods of the people and ii) it will improve health condition of the people especially of women and children due to reduced smoke and exposure to indoor air pollution.

4.1 Selection of NGO's for Field Trials

The following two NGO's were selected for the field trials and their contracts are placed at annex I and II respectively.

a) M/s Organization for Integrated and Sustainable Development (OISD)

b) M/s Sahara Welfare Foundation, Malakand

M/s Organization for Integrated and Sustainable Development (OISD) is conducting the field trials of ICS in the following areas for a period of three months.

a) Jand (District Attock)

b) Silanwali, Shahpur (District Sargodha)

c) Hasilpur, (District Bahawalpur)

d) Thatta

M/s Sahara Welfare Foundation, Malakand is conducting the field trials of ICS in the following area for three months.

a) Chitral

b) Upper Dir

c) Mardan

d) Nowshehra

e) Shogran (District Mansehra)

f) Thandiani (District Abbotabad)

4.2 TOR for NGO'S

SAARC Energy Centre formulated the following TOR's for execution of contract for conducting field trials of Improved Cooking Stoves (ICS) designed and manufactured by SEC for different climatic conditions.

TORs are as given as under:

- NGO staff will be trained / briefed by SEC regarding field trials and filling of questionnaire forms.
- The NGO will install and evaluate the energy efficient cooking stoves in the 3 regions of Punjab, Sind and KPK.
- The NGO will hire local field staff for mobilization campaign and for accessing the household.
- Mobilization of local people will be carried out in order to inform them the diversified benefits of fuel efficient Improved Cooking Stoves on environment and health.
- Baseline survey will be conducted after mobilization process to select the households.

- Household will be selected through selection criteria described as under and implementation will be carried out accordingly.
- Households to be trained by NGO for how to use ICS for cooking food.
- Translating the questionnaire into local language by NGO staff.
- A contact person will need to be assigned and his contact number to be shared with the households for help.
- The questionnaire will be filled while delivering stoves and forwarded by NGO on weekly bases.
- Cooking stoves will be installed in the selected household after evaluation.

Criteria for Selection of Households:

- The household should lack easy access to energy (Natural gas and LPG) resources.
- The household should be is using biomass (wood, dung cakes) for cooking purpose.
- The household size should be small having maximum 6 members.
- Household should have low income.
- The households showing keen interest in using ICS for cooking will be given preference.

Monitoring and Evaluation

- The monitoring and evaluation of improved stoves consists of two phases.
- In the first phase, questioners will be distributed among the beneficiaries and questions will be asked from them relating to the biomass use.
- Impact of smoke on health will be analyzed through such questioners.
- Evaluation report will be formulated on the basis of feedback.
- In the second phase, field tests provide feedback on the performance of

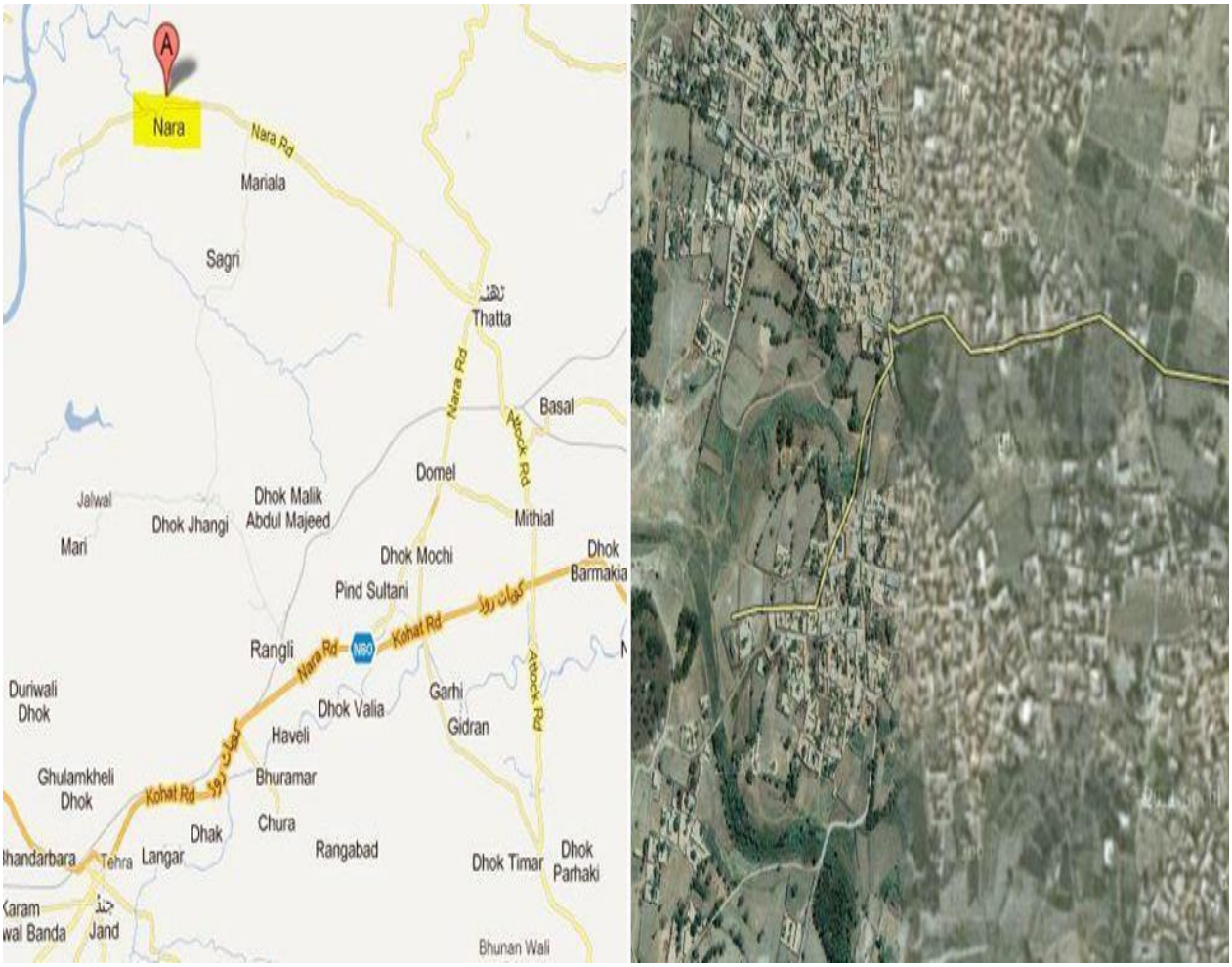
stoves in the hands of actual users in their own kitchens.

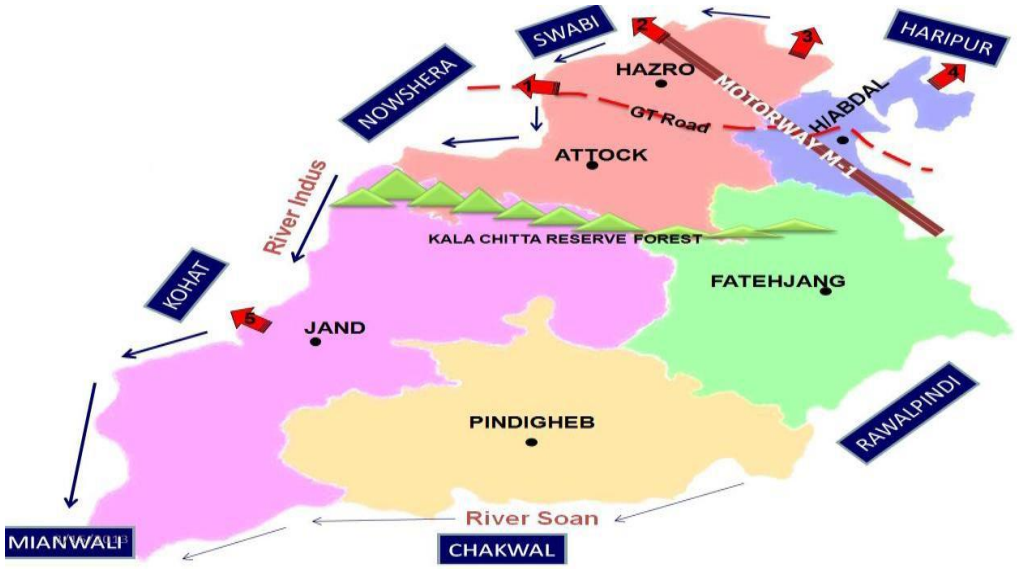
- The stove will be handed over to user for three months as it is beneficial to observe long-term changes in user behavior.
- Feedback will be recorded on weekly basis and transmitted to SEC.
- Pictures should be taken and videos recorded of the events when installing stove in the household, training them and during awareness campaign among the neighbors.

5.0 Field Trials Areas

Testing of improved cooking stove (ICS) was carried out in ten districts of Pakistan. Three districts from Punjab six from KPK and one from Sind were selected to conduct the study. The detailed profile of selected villages is stated as below.

5.1 Nara Village of Jand Tehsil District Attock





5.1.1 Introduction of NARA

Nara is a village and union council of Attock District in the Punjab Province of Pakistan. It is part of Jand Tehsil. Nara is a village, located in the south western part of Attock district. It is 117 kilometers away from the federal capital, Islamabad. It is situated at the border between the Punjab and Khyber Pakhtun-khwa province of Pakistan. The Indus River separates the two provinces. Indus River is approximately five kilometres away from the village. Administratively, the village is a union-council of five other surrounding villages: Pari, Dandi Jiswal, Kundrala, Jalwal and Mari. Population of the village is around 35,000-40,000 inhabitants. Ethnically, the inhabitants of the village can be divided into three groups: local Indians (Jats, Bhatti Rajputs, and Janjua Rajputs), Arabs (Awans, Khattar Awans, and Fatimid Syeds), and Afghans (Khattak and some Bangash Pathan families). According to the Punjab Districts' Gazetteers, Awans (also known as Alvi Syeds) got hold of the area after driving Janjua Rajputs out of the Salt Range. Khattars are the mixed race of Awans and Jats. The differences among these groups are almost non-existent because of inter-marriages and Islamic concept of equality. People of the village are very brave, hard-working, and industrious.

Climate of region is hot summers and cold winters. Geographically, the area is hilly, consists of plateaus and dissected plains. It's mainly a rain-fed area. The land of the village is very fertile. It is a prominent and renowned village of Attock District. Environment of the village is clean. As long as flora and fauna of the village is concerned, various species of birds are

commonly seen in the village. Jujube Fruit trees are very common in the village. The literacy rate among the village inhabitants is around 70 per cent. There are more than 15 government schools in the village. A higher secondary school (Govt. Higher Secondary School, Nara) up to intermediate level is also imparting education to the boys of the village. Healthcare facilities include rural hospital and 3-5 private clinic including health care professionals and quacks.

Livelihood of people depends upon agriculture and livestock. Small scale conventional fruit farming is common among village people. The arable land of the village is the main source of growing vegetables and crops at local level. Besides crop production, livestock rearing also contribute to the generation of household income and provides employment opportunities. Main crops of village include wheat, peanuts, corn, maize, millet, grams and pulses. Economy of the village is mainly agro-based. Mong Phalli (Peanuts) is considered to be the cash crop by farmers. Nara is gifted with large amount of natural resource from fertile land to forests and agricultural products. Human resource is also a big asset of area. However the increasing human population is posing serious threats on the natural resources of village. People relay totally on forest wood for cooking and heating.

5.1.1 Stove Distribution and installation in Nara, Tehsil Jand

Fig 5.1.1-1 in Nara, Attock

Fig 5.1.1-2 in Nara, Attock

Fig 5.1.1-3 in Nara, Attock

5.2 Shahpur Saddar District Sargodha

5.2.1 Introduction of Shahpur Saddar

Shahpur Saddar is a city and capital of Shahpur Tehsil, district Sargodha Punjab province, Pakistan. It lies on the Jhelum River. Shahpur Sadar is surrounded by 1) Bakhar Baar State, 2 Aaqil Shah, 3 Jalpana, 4 Shahzad Pur, 5 Shahpur City, 6 Kotla Syedaan. Population of Shahpur Saddar is 274,000 (1998) being mainly Muslim and Punjabi speaking. The people of the area are

very humble and are hard workers. Land of area is very fertile because of which majority are involved with the occupation of agriculture. Shahpur mainly comprises of flat, fertile plains. Climate of village is extreme heat and cold with maximum temperature of 50 °C (122 °F) in the summer while the minimum temperature recorded is as low as freezing point in the winter. Being the agricultural town, the vast fields have provided the opportunities of farming and livestock rearing to local inhabitants. Some of the main crops include citrus, wheat, rice, and sugar cane, which are exported to the other cities as well as internationally. The main livestock for the village include goats, sheep, buffaloes and cattle.

Forest, green lands, fields and vegetation of rain fed area is considered to be the natural resource of Shahpur. Linear plantation is absent in area however trees grown in the area includes Kikar and Shisham. Energy poverty is prevalent among the local residents of area. Majority of rural households lack clean cooking fuel and electricity for lighting and cooking. Local residents thus relay on natural resource for heating and cooking purpose. 60% of residents meet their needs through using biomass, including wood from forests. Natural resources of the area are depleting rapidly and are in threat also.

5.2.2 Stove Distribution Ceremony in Shahpur Saddar

The stove distribution ceremony was held in Shahpur village of Sargodha district. Community members were informed and gathered at one place and stoves were distributed among deserving HHS. People readily participated in mobilization campaign and expressed their willingness to take it for experiment.

Fig 5.2.3-1 in Shahpur, Sargodha

Fig 5.2.3-2 in Shahpur, Sargodha

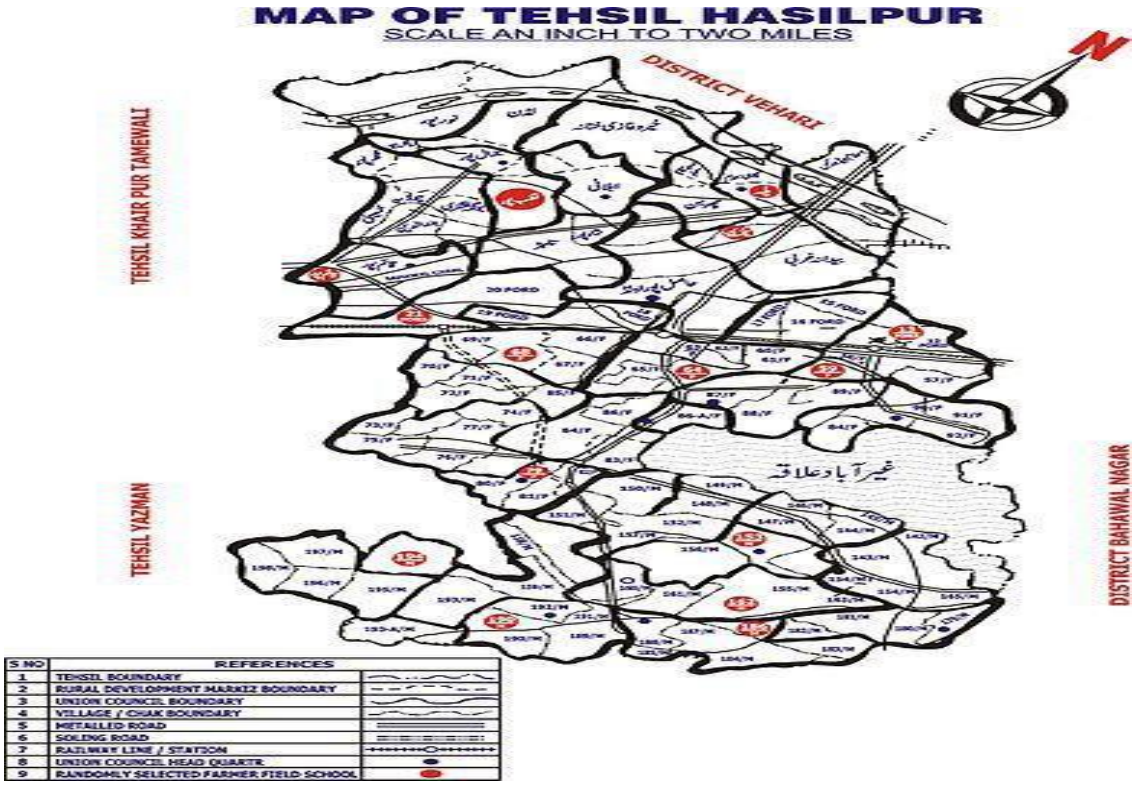
Fig 5.2.3-3 in Shahpur, Sargodha

Fig 5.2.3-4 in Shahpur, Sargodha

Fig 5.2.3-5 in Shahpur, Sargodha

Fig 5.2.3-6 in Shahpur, Sargodha

5.3 Hafizabad Village of Hasilpur Tehsil District Bahawalpur



5.3.1 Introduction of Hafizabad Basti of Tehsil Hasilpur

Hafizabad Basti is one of the marginalized and rural village of Hasilpur Tehsil, District Bahawalpur. The village is home of rural inhabitants. Kacha house made of mud and bricks exist here. Land of the village comprises of humid fertile soil. Occupation of major is agriculture. Cotton and mangoes are famous products of this area.

Climatic condition is harsh ranging from extreme hot to cold in summer and winter season. Literacy rate is 37.9 percent in stated area. The literacy rate of male is higher as compared to females. One Govt. hospital is present at tehsil level that provides the health facilities to urban and rural population. Apart from that 19 private clinics are also working at tehsil level for the provision of health facilities.

Livelihood of people entirely depends upon agriculture and livestock. Cotton is main crop of the area. Inhabitants of area are also associated with the camel rearing. Traditional craft are also considered to be the source of income in this area. Major crops and fruits of the area are: cotton, wheat, sugarcane, dates, mangoes and citrus. At present, there are textile spinning mills, sugar mills, flour mills, cotton ginning/processing factories and oil expelling units in the district. There exists wide scope for cotton based industries i.e. textile spinning, weaving, processing/printing. The most popular traditional craft is making of delicate and decorated earthenware. These earthen-wares display the skill of the artisans who are concentrated in the Tehsil of Ahmedpur East. Decorated lampshades and flower-vases are also made from camel skin in some other parts of the district. Hand embroidery work on shirts is yet another specialty of the area. Other crafts include basket making, cotton and woolen durries, patch work, etc

5.3.2 Distribution and installation of SAARC ICS in Hafizabad Basti Tehsil Hasilpur District Bahawalpur

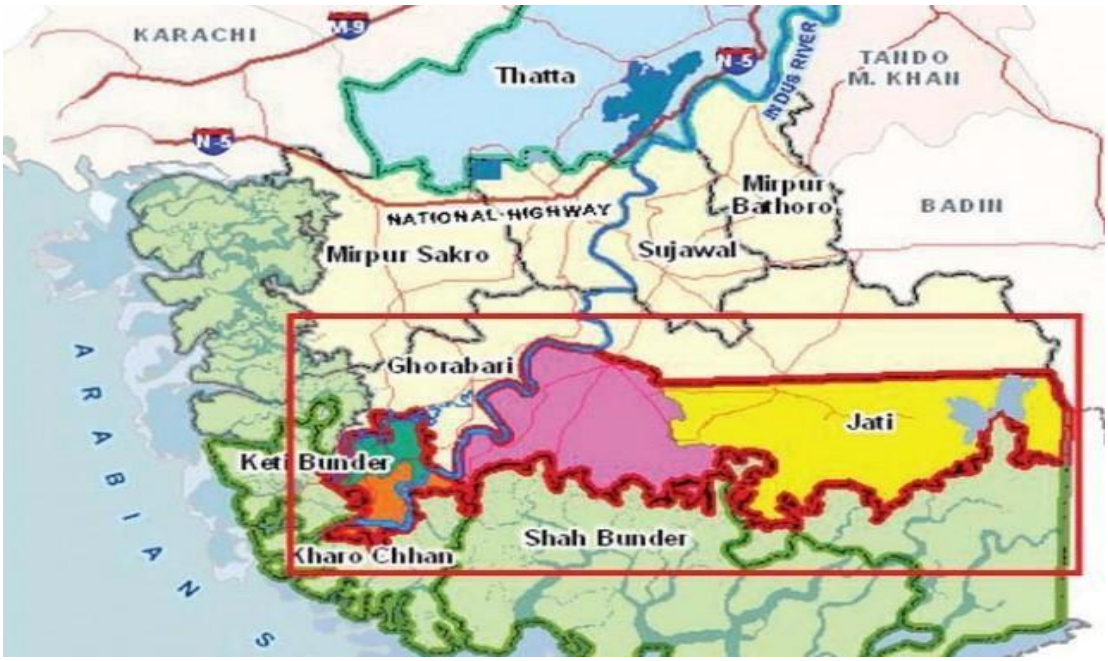
Fig 5.3.2-1 in Hasilpur, Bahawalpur

Fig 5.3.2-2 in Hasilpur, Bahawalpur

Fig 5.3.2-3 in Hasilpur, Bahawalpur

Fig 5.3.2-4 in Hasilpur, Bahawalpur

5.4 Nawab Khan Village, District Thatta



5.4.1 Introduction to Nawab Khan Rind Villages of Taluka Shah Bunder

Village Nawab Khan Rind is one of the oldest villages of Taluka Shah Bunder, District Thatta, Sindh. The taluka is among the oldest Taluka of Sindh. It shared its boundaries with Taluka Jati in East and North, in west by Taluka Kharochan and Taluka Ghorabari beside Arabian Sea in South. It is situated on an area of 1503 Sq. Miles, 734,879 acres of land and 2505 sq. Kms.

Population of the village is about 1,000 individuals consists of 60 households approximately. Most people are dependent on agriculture and live stock, main source of income is labor that work in agriculture field. Basic facilities are not available at village level. The village remains ignored for the provision of health, education and safe drinking water facilities, therefore there is no dispensary or primary school established near the village. The area remained affected as result of three consecutive floods. The village is located very near to the border of Taluka Jati (Worst affected Taluka of District Thatta during floods 2010).

At the time of flood it was hit and faced massive loss but was ignored during assistance.

Environmental condition is very worst. People of area are very poor and living below poverty line. Source of income is very limited as there exist no income generation opportunities. Gas and electricity is not available thus energy requirements of people largely depend upon local biomass and fuel wood.

5.4.2 Distribution Ceremony in Village Nawab Khan Rind

Fig 5.4.2-1 in Nawab Khan Rind, Thatta

Fig 5.4.2-2 in Nawab Khan Rind, Thatta

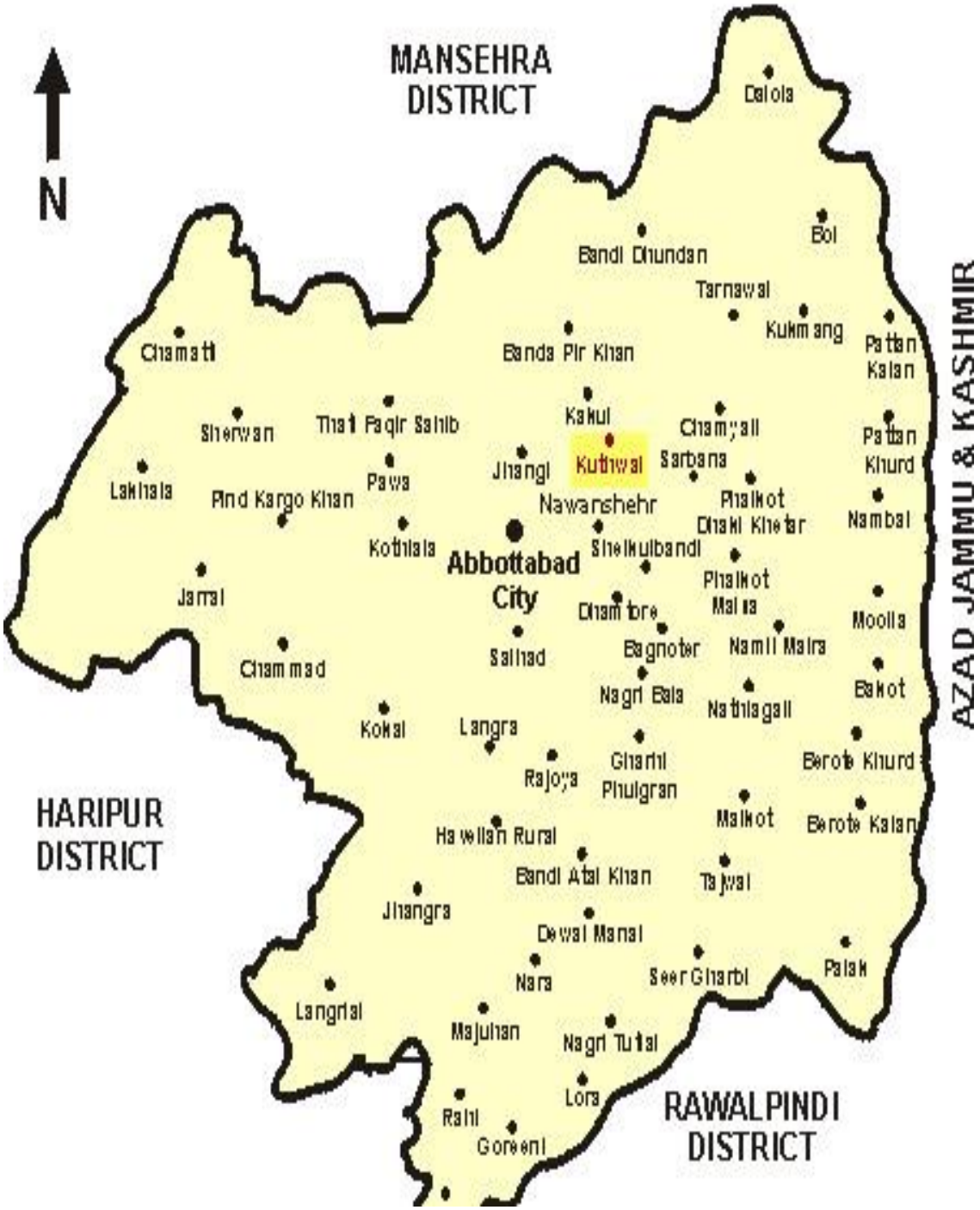
Fig 5.4.2-3 in Nawab Khan Rind, Thatta

Fig 5.4.2-4 in Nawab Khan Rind, Thatta

Fig 5.4.2-5 in Nawab Khan Rind, Thatta

Fig 5.4.2-6 in Nawab Khan Rind, Thatta

5.5 DISTRICT ABBOTTABAD



5.5.1 Introduction:

Village Khutwal is a mountain resort town or hill station in Abbottabad , Khyber Pakhtunkhwa, Pakistan. It is a part of the Galyat range, where several hill-stations are situated, closely connected to each other, and with their names mostly ending in Tandyani is known for its scenic beauty, hiking tracks and pleasant weather, which is much cooler than the rest of the Galyat due to it being at a greater altitude. It is situated 34 kilometers at one hour's drive away from both Murree and Abbottabad, lying midway between these two places. The drive time from Islamabad is usually about two hours, unless there is a lot of traffic.

The weather of Khutwal remains cool, pleasant and foggy in summers. During the months of June to August, rain is expected almost every day. Cold winds start to chill the weather in Autumn. Winters are very cold and chilly. In December and January, heavy snowfall occurs and weather remains cold in spring. Here most comfortable weather is the summer season from 1 May to 31 August.

Abbottabad is famous for its extreme cold temperature, heavy rainfall and heavy snowfall. Before sixty's the business was closed in winter due to heavy snowfall and cold weather in the city of Abbottabad but the situation is changed now as we observed.

The summer's season starts a little late and is comparatively less severe. The temperature begins to show higher record from May and it lasts till June. Winter season is severe and heavy snowfall takes place. The months of December, January and February are extremely cold.

Wiqas Hussain Shah SAARC-I

Fig 5.5.1-1 in Kuthwal, Abbottabad

Abdul Jalil SAARC-I

Fig 5..5.1-2 in Kuthwal, Abbottabad

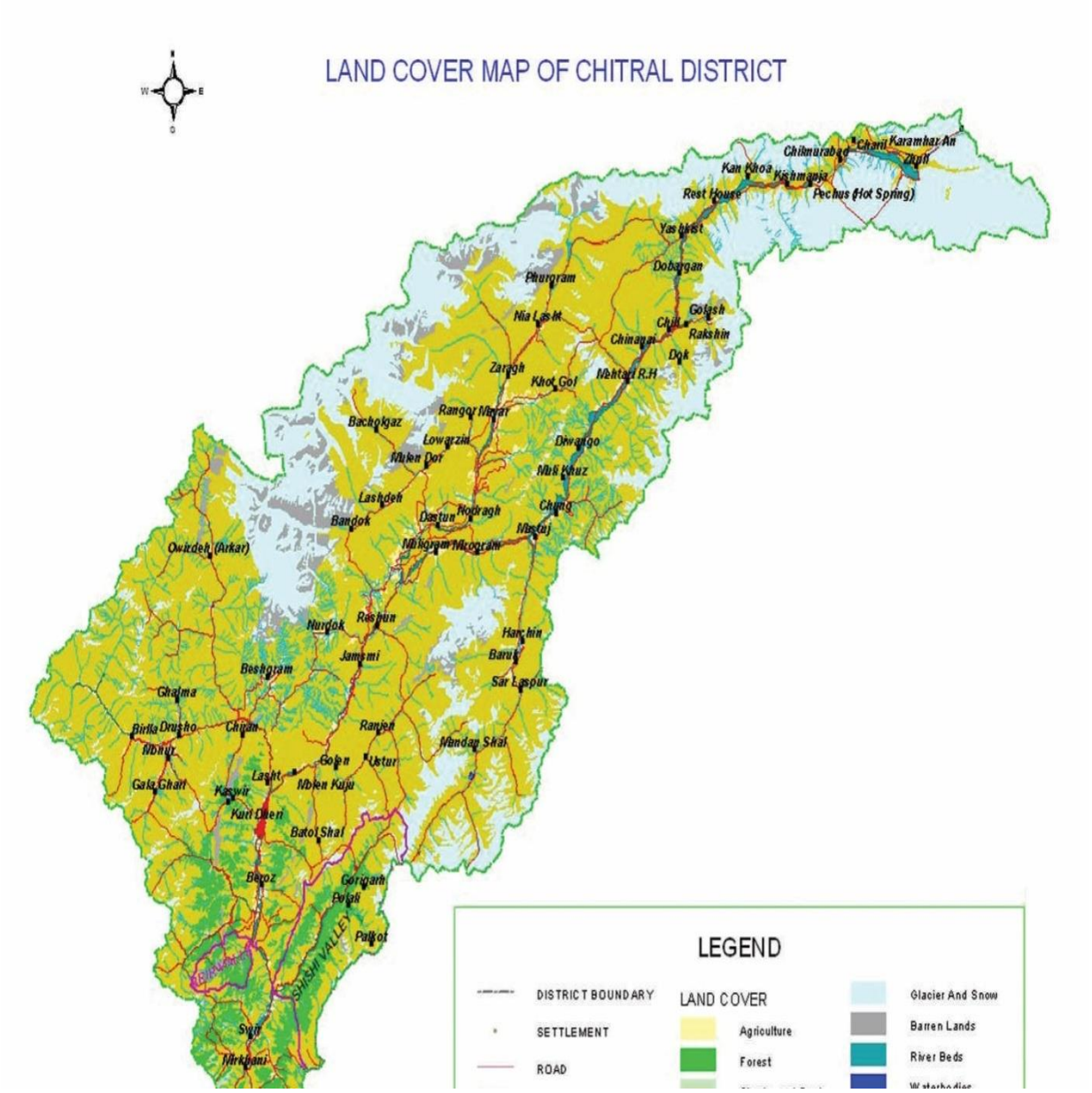
Abdur Rashid SAARC-II

Fig 5.5.1-3 in Kuthwal, Abbottabad

Farooq Ahmad SAARC-I

Fig 5.5.1-4 in Kuthwal, Abbottabad

5.6 District Chitral



5.6.1 Introduction:

Chitral is the largest and the northern most district in the Khyber Pakhtunkhwa of Pakistan. The word *'Chitral'* means "field" in the native language (Khowar). The terrain of Chitral is quite

mountainous and includes part of the Pamir Mountain. On the west it borders with Afghanistan and with the Wakhan Corridor (a narrow strip separating Pakistan and Tajikistan) in the north, Northern Areas in the east and districts of Upper Dir and Swat in the South. Previously Chitral was a princely state and was merged with Pakistan in 1969.

5.6.2 Livelihood potentials / vulnerabilities

- The valleys are bestowed with rich natural resources including precious forest species of Deodar used for construction purposes, Pine nut and also Oak forests supplied to the rest of Chitral as firewood.
- People are socially open to development and there is no problem associated with access to women for development interventions.
- The area is prone to disasters such as flash floods and heavy soil erosion. In upper parts of the valley, heavy snow and occasional avalanches also occur.
- Extreme poverty prevails due to limited diversity of livelihood resources
- High dependency on natural resources
- Remoteness and limited access by service providers (e.g. education, health, agriculture)
- Limited access to market

5.6.3 Village Shishi Kohtar:

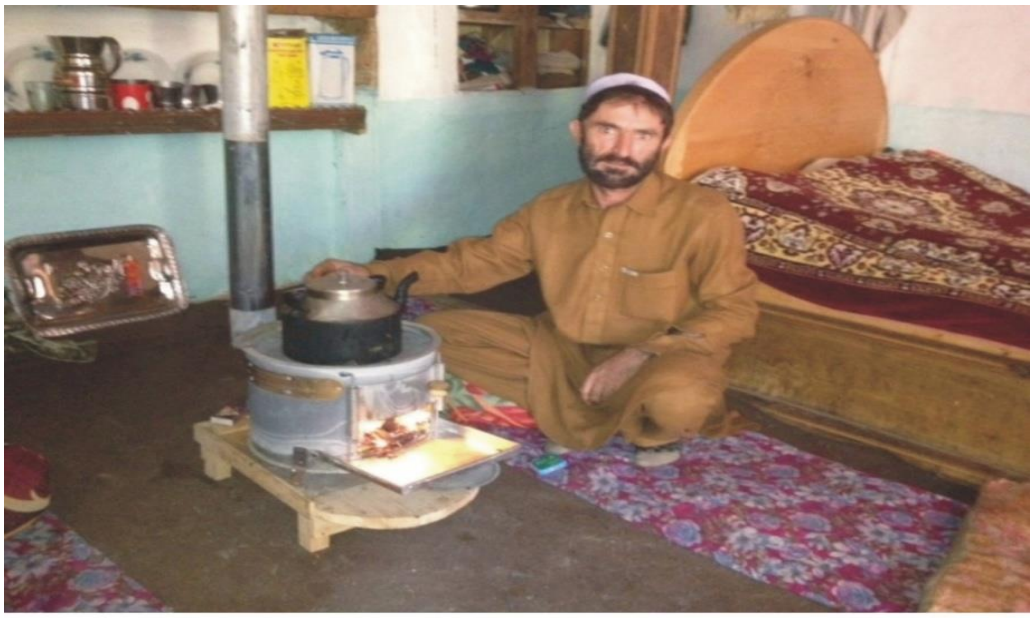
Village Shishi Kohtar is the largest valley of Tehsil Drosh (Chitral). Most of the area is double cropped i.e. maize and wheat are consecutively grown except in Madaklasht, which is the last village of the valley. The main sources of income are wood cutting (both fire wood and timber), pine nut and walnut collection, livestock rearing, daily-wage labour and subsistence farming. Three types of people live in the valley as per the households' typology established by the LP. These are: The poor (gharib); subsistence (guzara) and the prosperous (qawteen). This categorization has been done through a process of livelihoods assessment conducted with the communities. It is based on the socio economic status of the area.

Based on the potential, vulnerabilities of the valleys and the typology data, the programme has implemented the following development interventions:

- Establishment of fruit orchards, off-season vegetables, improved varieties of vegetables and cereals.
- Kitchen gardening
- Livestock management and breed improvement (small and large ruminants)
- Distribution of goats and poultry under a revolving mechanism among the poor
- Improved varieties of fodder and feed
- Introduction of fuel efficient stoves for reduced fuel-wood consumption and smoke inhalation by the women
- Reducing disaster risk through measures like protection walls, check dams, plantations and soil conservation activities
- Preparedness for disasters among communities is also a high priority area in the villages.
- Community based small infrastructures such as drinking water, irrigation channels and pony tracks.
- Income generation through sustainable collection of Pine nuts and Walnuts using improved technologies and tools.
- Improved skills in sustainable collection and processing of medicinal and aromatic plants.
- Local products such as embroidery and woolen work, etc.

Gul Faraz SAARC-I

Fig 5.6.3-1 in Shihshi Kotar, Chitral



Waheed Ullah SAARC-I

Fig 5.6.3-2 in Shihshi Kotar, Chitral

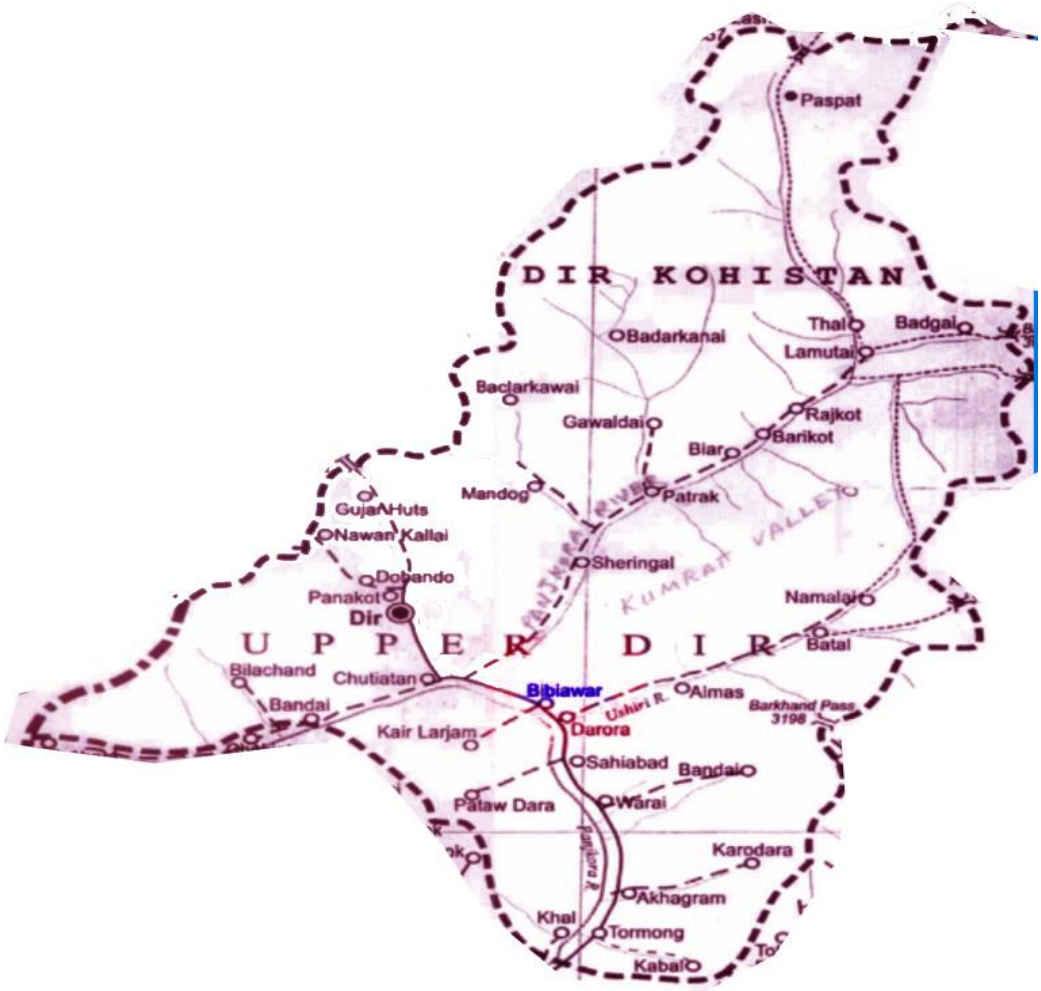
Adena Muhammad SAARC-I

Fig 5.6.3-3 in Shihshi Kotar, Chitral

Sher Wali SAARC-II

Fig 5.6.3-4 in Shihshi Kotar, Chitral

5.7 District Upper Dir



5.7.1 Introduction:

The Valley of Dir, which is full of enthralling beauty, chanting scenes and exhilarating climate is famous worldwide. This area is rich in snow-capped mountains, pine and fir forests, pleasant climate, crystal clear rivulets, melodious waterfalls and cataracts and lush green scenes.

Upper Dir district is 3,699 square kilometers in area and formed part of the former Malakand Division, lying along the Afghanistan border between Chitral, Bajaur Agency and Lower Dir. Almost the entire district lies in the valley of the Panjkora River which raises high in the Hindu Kush at Lat. 35.45 and joins the Swat River near Chakdara in Malakand District, at Lat. 34.40. Upper Dir is rugged and mountainous with peaks rising to 16,000 feet (4,900 m) in the north-east and to 10,000 ft (3,000 m), along the watersheds with Swat to the east, Bajour Agency to

south west, and Chital to North, Lower Dir to south and Afghanistan to the west.

It is connected with the Kohistan District via the Badawi Pass.

5.7.2 Village Bibyawar

Village Bibyawar is a town in Upper Dir District of Khyber-Pakhtunkhwa. It is located north of Malakand on the north bank of the Dir River, in a commanding position near the entrance to Swat District and at the entrance to Lower Dir. It is about 230 km from Peshawar and 240 km away from Saidu Sharif, It's the gateway to Upper Dir District.

Bibyawar has been an important center for the last 3500 years and is littered with remains of the Gandhara grave culture, Buddhist sites, and Hindu Shahi forts. The ancient route from Afghanistan via Nawa Pass and Katgala Pass crosses the Dir River at Bibyawar.

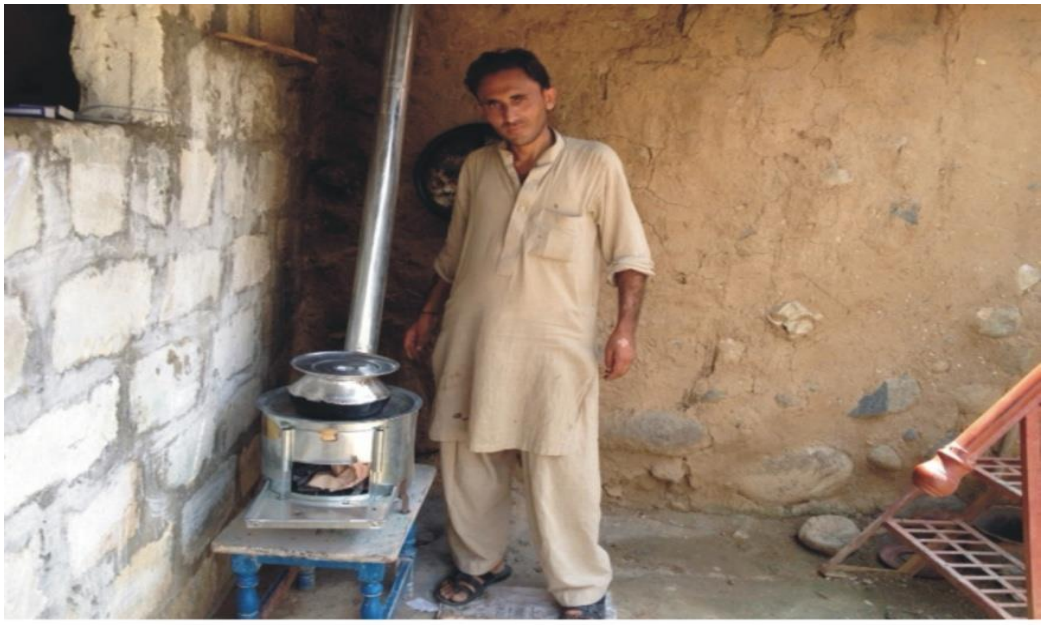
The district Dir upper is upper part of the old Dir district. At the time of independence Dir was a state ruled by Nawab Shah Jehan Khan. It was merged with Pakistan in 1969 and was declared as a district in 1970. In 1996, it was bifurcated into Upper and Lower Dir districts. Upper Dir district consists of DIR and Wari sub divisions with district headquarter at Dir.

SAARC -I

Fig 5.7.2-1 in Bibyawar, Upper Dir

Daughter of Sumia SAARC -I

Fig 5.7.2-2 in Bibyawar, Upper Dir



SAARC -I

Fig 5.7.2-3 in Bibyawar, Upper Dir

SAARC -I

Fig 5.7.2-4 in Bibyawar, Upper Dir

5.8 District Mansehra

5.8.1 Introduction:

Mansehra (former Pakhli Sarkar) has a very old history in the Sub-Continent. Its geographical boundaries have constantly been changed in the times of various Rajas, Maharajahs and Kings

in the past. Alexander the Great after conquering the northern India established his rule over a large part of it. Different historians are of the opinion that in the year 327 B.C.

5.8.2 Project Site:

Papraing is a village situated on a green plateau in the Shogran Valley, northern Pakistan at a height of 2,362 meters above sea level. The village was affected by the earthquake of 2005 when some building were damaged. It is only 10 km from Kiwai village Papraing 24 km from Balakot. The road from Islamabad to Kiwai is metalled and measures 212 km. From Papraing, you can ride a jeep or horse or hike to several picturesque places like Siri, Paye and Makra Peak. Hotels and motels are easily available at affordable costs. The local people are friendly and helpful.

The climate of the village is warm in summer and cold in winter. The northern part where there are high mountains is cold in summer due to snow clad mountains and is very cold in winter. The total annual rainfall of the district according to 1972 census report is 72 inches.

Papraing (2400 meters) is a lush green beautiful but small plateau. The main attraction (for me) is the vast, sprawling green (in summer) lawn of the KPK Forest Department's rest house. From there the view all around on a clear day is breathtakingly beautiful. Other than that there are a few decent and one luxury hotel and that's about it. For me a few hours stop in Papraing is always refreshing. If I stay longer than that, it becomes boring. But if you absolutely have to spend more time in Papraing.

Mansehra is located at 34° 14' and 35° 11' north latitudes and 72° 49' and 74° 08' east longitude. It is bounded in the north by Batagram and Kohistan districts, in the east by Muzafarabad district of Azad Jamu and Kashmir, in the south by Abbottabad and Haripur districts and in the west by Swat district.

Daughter of Asmat Ullah SAARC-I

Fig 5.8.2-1 in Papraing, Mansehra

Khani Zaman SAARC -II

Fig 5.8.2-2 in Papraing, Mansehra

5.9 DISTRICT MARDAN

5.9.1 Introduction:

In the beginning, the name Mardan was given to a small area after the name of Pir Mardan Shah, a prominent religious figure. Gradually, a large surrounding area came to be known as Mardan.

The district lies from 34º, 05’ to 34º, 32’ north latitudes, and 71º, 48’ to 72º, 25’ east longitudes. It is bounded on the north by Buner District and Malakand protected area, on the east by Swabi and Buner districts, on the south by Nowshera district and on the west by Charsadda district and Malakand protected area. The total area of the district is 1632 square kilometers.

The summer season is extremely hot. A steep rise of temperature from May to June, even July, august and September regarded quite high temperatures. During May and June dust stroms of frequent at night. The temperatures reach to its maximum in the month of June.

5.9.2 Project Site:

Village Kandoo Baba (Lund Khwar) has historically been an important town in, during the Gandharan era it had been a visiting sanctuary for Buddhist Monks from their nearby strongholds at Takht Bhai. Many archaeological sites have thus been discovered. Even before the Buddhist times it was a major cattle and herd breeding area.

Village Kandoo Baba is located some 18 km from Takht Bhai, 10km from Sher Garh and about 30 km from Mardan on the National Highway between Swat and Peshawar District. The town is surrounded by two main streams and a smaller brook from 3 directions which flow throughout the year thus lending Lund Khwar its name as well as a safety against possible invaders, a strategic point and basis for its foundation. The town is connected with Sher Garh through a main road which reaches the town through a bridge on the stream.

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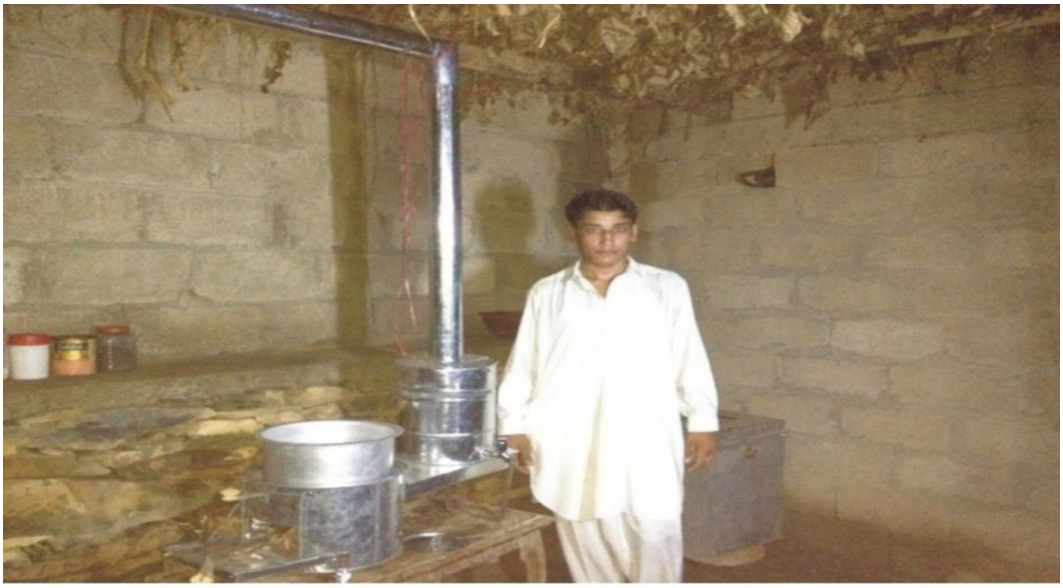
Siraj Gul SAARC -II

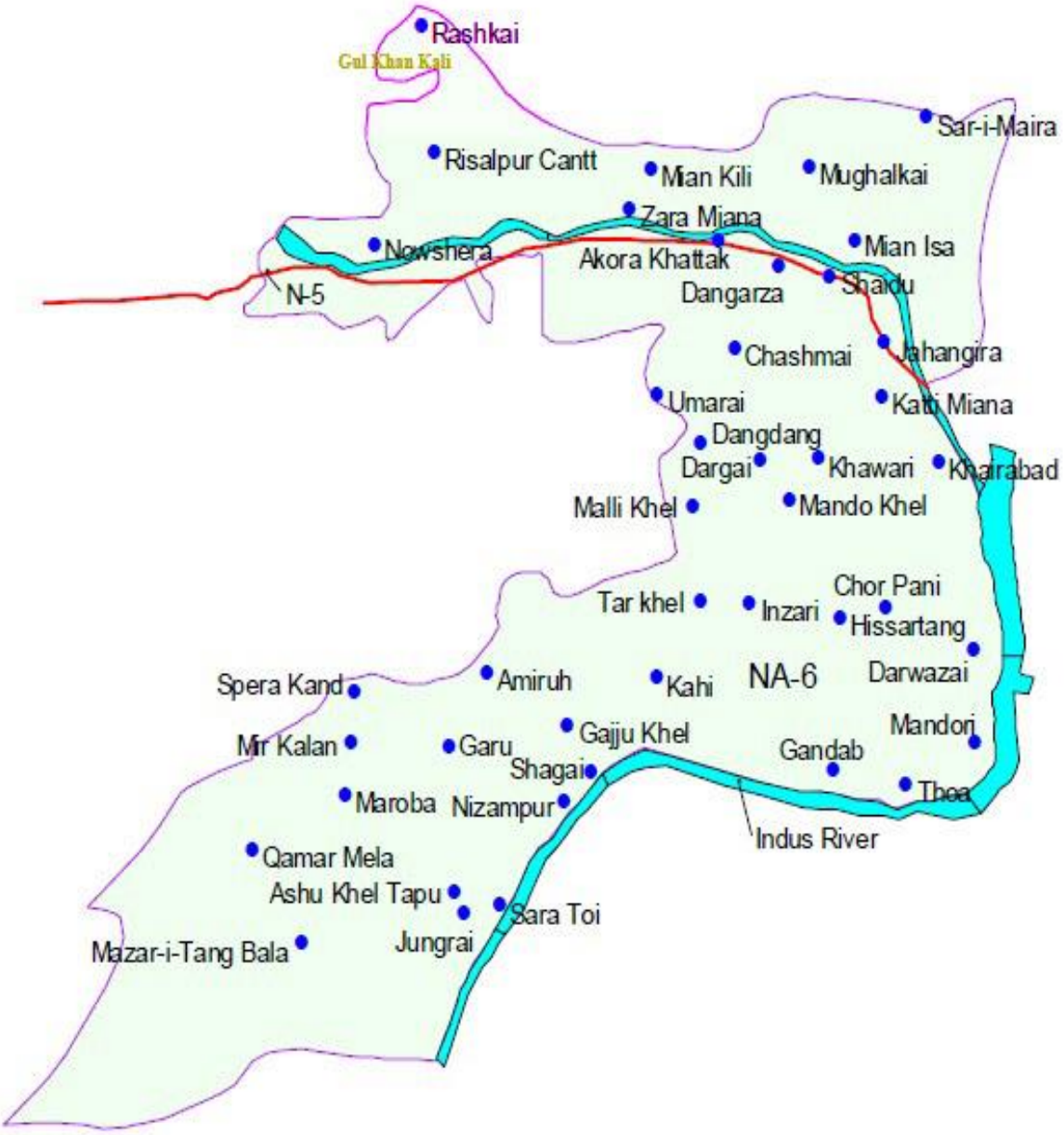
Fig 5.9.2-1 in Kandoo Baba, Mardan



Son of Gulshan bibi SAARC -II

Fig 5.9.2-2 in Kandoo Baba, Mardan

5.10 District Nowshera



5.10.1 Introduction:

The district of Nowshera is considered to be the most historical place and have a great significance due to its strategic positioning in the province of Khyber Pakhtunkhwa as it is situated to the west of Peshawar, to the east of Swabi and Northwest Charsadda and Mardan. Thus, Nowshera is the centrally located region of the province. The name of the district is

locally known as “Naw” “khaar”. The total area of the district is 1,748 km². The population density is 608 persons per square kilometre. Total agricultural area is 52,540 hectors. The main source of income of the region is agriculture. Until 1988 Nowsehra was a tehsil (sub division) of Peshawar; in 1988 it became a district.

5.10.3 Project Site:

Village Gul Khan Kali the Sagris seem to have been altogether independent of the family of Malik Gul Khan, who established themselves at Gul Khan Kalli and were the acknowledged chiefs of all the other Khattaks, from the Kabul River, to the neighbourhood of Kohat. Malik Gul Khan Successors appear to have held their eldership under the confirmation of the Delhi Emperors, and usually met a violent death at the hands of their relatives. The celebrated Khushal Khan was their most noted chieftain. His great grandson Sadullah Khan, being on bad terms with his father Afzal Khan (the historian), established himself on the site of the present town of Teri which has ever since been the head-quarters of the western Khattaks. Sadullah himself afterwards succeeded to the chief ship of the whole tribe, but from this time forward the western Khattaks were separately governed by a chief of their own residing at Teri.

Gul Khan Kali is a small town located along the Nowshera-Mardan road, in Khyber-Pakhtunkhwa.

Imran Khan SAARC -II

Fig 5.10.3-1 in Gul Khan Kali, Nowshehra

Adam Khan SAARC -II

Fig 5.10.3-2 in Gul Khan Kali, Nowshehra

6.0 Training and Awareness Campaign

Awareness and orientation workshops were held in each of the targeted locations arranged by Social Mobilizers. About 10 members from Community were selected for the dissemination of information and on-site presentation. Stove functions were clearly disseminated and benefits of using improved cooking stove were shared briefly. Male members were informed regarding health hazards caused by exposure of indoor Air pollution (IAP) to women and children and direct and indirect cost they spend on treatment of diseases. It was clearly stated that the environment, health and energy efficiency technologies are linked with each other and that the,

- Environment is degrading at faster rate and current forest cover is unable to cope with the needs of present generation.
- Deforestation causes accumulation of gases in air
- Fuel wood collection process is tedious and time consuming, women and girls are unable to get education and don't have the time to earn from other means
- Spending major time in field affects their health
- Exposure of women and children to IAP causes various eye and lung infection
- The food taste doesn't change with the adoption of improved cooking stove and Improved cooking stoves are designed according to the demands of rural community Members.

Community members from every union council showed great interest and readily participated In awareness and training workshops, All the participants shred the information with other Community members or members of their family due to which each person showed their Willingness to buy the stove at nominal charges

6.1 ICS Awareness and orientation Campaign in Nara Village, District Attock

Fig 6.1-1 in Nara, Attock

Fig 6.1-2 in Nara, Attock

6.2 ICS Awareness and Training Campaign in Shahpur Saddar District Sargodha

Fig 6.2-1 in Shahpur,Sargodha

Fig 6.2-2 in Shahpur,Sargodha

6.3 ICS Awareness and Training Campaign in Hasilpur, District Bahawalpur

Fig 6.3-1 in Hasilpur, Bahawalpur

Fig 6.3-2 in Hasilpur, Bahawalpur

6.4 ICS Awareness and Training Campaign in Village Nawab Khan Rind Taluka Shah Bunder District Thatta

Fig 6.4-1 in Nawab Khan Rind, Thatta

Fig 6.4-2 in Nawab Khan Rind, Thatta

7.0 Field Trials

7.1 Methodology

Improved cooking stoves were installed in 49 households (Annex-III) of ten selected districts. Households were selected according to selection criteria as devised by SAARC Energy Centre. Socioeconomic survey was carried out prior to the selection of Households (HHs). A cluster of 20 respondents were selected and data was gathered from them. Data was collected using structured questionnaire (Annex-I) from 104 households. Besides, informal discussion and observation were also made for data collection.

Households were selected based on their experiences and availability of existence. Married women involved directly in cooking were selected as respondents. The project is committed to seek consent of respondents before conducting interview. Based on their willingness to provide information, interviews were conducted. Several teams each consisting of two social mobilizers conducted the survey.

Households having no access to energy, having low income, having minimum 4 to 6 members, depending entirely upon biomass and fuel wood, living there permanently and women or child headed households were preferred for distribution and installation of SAARC Improved Cooking Stoves (ICS). The households willing to participate and provide feedback were given special emphasis.

Five households from each village were selected and provided with ICS. Method to deal with ICS was described to beneficiaries and method regarding feedback collection was briefed. The feedback was collected as per described schedule and suggestions of community members and recipients were incorporated. The list of areas for the implementation and evaluation of efficient cooking stove are as under.

7.2 SAARC Countries Simulating Regions

S No	District	Climatic Conditions	Resembling with SAARC Regions
1.	Chitral	Max Temp:28°C,Min Temp: 0°C	Mizar-e Sharif,North Afganistan &
2.	Upper Dir	Max Temp: 28°C, Min Temp: 0°C	Saygham, North Afganistan
3.	Mardan	Max Temp:40°C, Min Temp: 6°C	Jalalkot, East Afghanistan
4.	Nowshera	Max Temp:41°C, Min Temp:6°C	Jalalkot, Afghanistan & Nepal Himalaya
5.	Mansehra	Max Temp:32°C,Min Temp: 2°C	Nepal, Himalaya range & Shimla, India
6.	Thandiani	Max Temp:26°C,Min Temp:0°C	Nepal, Himalaya range & Shimla, India
7.	Attock	Max Temp:46°C,Min Temp:12°C	Ghazni, Central Afghanistan
8.	Sargodha	Max Temp:47°C,Min Temp:14°C	Pathankot, Himachal Pardesh, India
9.	Bahawalpur	Max Temp:50°C,Min Temp: 12°C	Bikanir, Bhivani, Rajasthan, India
10.	Thatta	Max Temp:42°C.Min Temp:17°C	Bhuj, Calcutta India & Dhaka, Bangladesh,

7.3 ICS Placement Areas:

S No	District	Climate	Stoves	Quantity
1.	Chitral	Cold	SAARC-I & II	4+1 = 5
2.	Upper Dir	Cold	SAARC-I & II	4+1 = 5
3.	Mardan	Warm	SAARC-II	2
4.	Nowshera	Warm	SAARC-II	2
5.	Mansehra	cold	SAARC-I & II	1+1 = 2
6.	Thandiani	Cold	SAARC-I & II	3+1 = 4
7.	Attock	Warm	SAARC-II & III	2+3 = 5
8.	Sargodha	Warm	SAARC-II & III	2+3 = 5
9.	Bahawalpur	Desert	SAARC-II & III	2+3 = 5
10.	Thatta	Coastal	SAARC-II & III	2+3 = 5

8.0 Results of Field Trials:

Average family size was 7.5 (Min 2, Max 13) in most of the households. Members above sixty years were also found in few (20%) households. Female members (mostly wives of household heads) involved in cooking spent 3 hours on average (Minimum 1.5 hours, Maximum 4.5 hours) a day for cooking. Involvement of daughter and grandmother in cooking was found in some of the households while children and infants were also found in kitchen during cooking hours. All of the households used to cook thrice (Morning-Afternoon/Evening) a day. 30% of respondents reside in kacha house.

All the users were using three stone traditional stoves. The beneficiaries are of the view that the stove is energy efficient and clean as it emits less smoke. The reduced consumption of fuel, controllable flame and reduced time required in ignition has made it unique as compared to three-stone stove. Moreover it is easy to use as compared to traditional one and saves approximately 25% to 50% of fuel-wood when used and they save from Rs.500 to Rs.800 per month on fuel consumption. Some other advantages (no change in food taste, no or minimum black spot in the cooking pot especially at the lower portion) were also reported. Few respondents expressed the views as wood efficient stove as compared to cow dung and agriculture residual. The beneficiaries are happy in having portable, durable stove that remain safe even in rain and can shift easily to inside the room. Beneficiaries appreciated that the stove is very easy to use as compared to traditional one.

8.1 Remarks of Beneficiaries:

- Wood consumption is reduced from 25% to 50%.
- Smoke is reduced and sometime there is no smoke at all.
- It is convenient to burn the fire.
- Food taste is improved
- Food is cooked quick and fast.
- Fire is controlled in the stove with the result bread is not burnt. Earlier it was burnt as informed by some of the beneficiaries.
- Due to reduced smoke now they do not have eyes irritation.
- If it is lying in the rain, it does not harm because it is covered from all sides.

- Labor in collecting fuel wood is reduced.
- It is good for rainy season as it is moveable.
- Its maintenance is lot easier than traditional stove, also chances of getting damaged are lot less as its totally made of metal.
- It does not black the utensils so much as it was done with three-stone stove.
- More efficient with wood and agriculture residual than cow dung.
- At the time of storm or wind blowing, the stove works smoothly whereas the previous three- stone stove requires to cove r it.
- It is neat and clean.
- Female expressed happiness that they use less fuel now. They collect wood once in two weeks time. Earlier they were collecting the wood every week.
- Performance of the stove is good and effective. It is beneficially for health as well as economically.
- Beneficiaries reported that the cough and eye irritation in their families reduced after using this stove.

8.2 Suggestions by Beneficiaries for improvement of the stove

Some of the beneficiaries have suggested some improvement to be made to make it friendlier:

- Front tray should be adjustable so that ash can be removed easily.
- It should have handle on both sides so that it can be carried away easily. It should have grate on the top so that a small pot/utensil can be used or placed
- If size of input space can be increased, it would help to use more wood or Agriculture residual at a time which will maximize heat if needed.
- Stove strands should be 3 to 4 inch height from the land.

8.3 Feedback:

The feedback reports are very satisfactory and they indicate as below:

- Saving in Fuel

- Reduction in smoke
- Saving in cooking time
- Easy in lightening the stove
- Health benefits

8.4 Fuel Savings in ICS:

- 25-50% of Fuel savings
- Monthly saving of Rs. 500-1000/-
- At many places people collect wood so fuel saving results in less no of hours spent in fuel collection.

8.5 Smoke Reduction:

- Efficient combustion of wood resulting in less smoke.
- Provision of chimney keeps the smoke out of the room/kitchen

Smoke reduction greatly helps in reduction of lung and eye diseases

8.6 Cost Analysis:

- The manufacturing cost of ICS is as given below:
- SAARC-I Rs. 3000/-
- SAARC-II Rs. 4500/-
- SAARC-III Rs. 4000/-
- The cost will reduce once ICS are manufactured in large quantities.

9.0 Future Plans:

ICS are being given to relevant organization of the Member states on the recommendations of the GB Members along with Engineering and Manufacturing drawings to create marketing opportunities.

9.1 Barriers in Marketing of ICS

- Lack of awareness about health
- Lifelong habits using conventional stoves
- Variation of efficiency from the lab to the field
- Lack of expertise for design/manufacture of ICS
- Withdrawal of subsidy
- Inappropriate choice of ICS for the local people
- Inefficient fuel consumption in some ICS
- Some users did not like fixed type of ICS
- Comparatively higher cost of ICS

Feed Back Summary

Nara, District Attock:

S No	Questions	Arshad Khan SAARC III	Sher Khan SAARC III	Lal Khan SAARC II	Hafiz Abdul Manan SAARC II	Ghulam Muhammad SAARC III
1	State the ease of use of existing Stove and Improved Cooking stove?	Easy	Easy	Easy	Easy	Easy
2	How much Time is saved by using Improved Cooking Stove?	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes
3	How much Fuel is saved by using Improved Cooking Stove?	Rs.400 per month	Rs.500 per month	Rs.500 per month	Rs.700 per month	Rs.700 per month
4	Is there any reduction in smoke?	No Smoke	No Smoke	No Smoke	No Smoke	No Smoke
5	Did you notice any change in the food taste by cooking on Improved Cooking Stove?	Yes	Yes	Yes	Yes	Yes
6	Did you notice any reduction in cough/eye irritation incidences?	Yes	Yes	Yes	No	Yes
7	Are you satisfied with Improved Cooking Stove?	Yes	Yes	Yes	Yes	Yes
8	Will you agree to buy Improved Cooking Stove, If yes then at what cost?	Rs 2000	Rs 2000	Rs 2000	Rs 2000	Rs 2000

Feed Back Summary

Basti Hafizabad, District Bahawalpur:

S No	Questions	Muhammad Baksh SAARC III	Ameena Sarwar SAARC II	Jannat Bibi SAARC III	Masoora Khan SAARC III	Muhammad Ramzan SAARC III
1	State the ease of use of existing Stove and Improved Cooking stove?	Easy	Easy	Easy	Very Easy	Easy
2	How much Time is saved by using Improved Cooking Stove?	Less than 15 minutes	Less than 30 minutes	15 minutes	Less than 15 minutes	Less than 15 minutes
3	How much Fuel is saved by using Improved Cooking Stove?	Rs. 900 per month	Rs. 800 per month	Rs. 900 per month	Rs. 1200 per month	Rs. 750 per month
4	Is there any reduction in smoke?	No smoke	No smoke	No smoke	No smoke	No smoke
5	Did you notice any change in the food taste by cooking on Improved Cooking Stove?	Don't know	Yes	Don't know	Don't know	Yes
6	Did you notice any reduction in cough/eye irritation incidences?	No	No	No	Yes	No
7	Are you satisfied with Improved Cooking Stove?	Yes	Yes	Yes	Yes	Yes
8	Will you agree to buy Improved Cooking Stove, If yes then at what cost?	Rs 2000	Rs 2000	Rs 2000	Rs 2000	Rs 2000

Feed Back Summary

Shahpur, District Sargodha:

S No	Questions	Tasawur Sultan SAARC III	Muhammad Ramzan SAARC III	Shahnaz Akhter SAARC III	Muhammad Abdullah SAARC III
1	State the ease of use of existing Stove and Improved Cooking stove?	Very Easy	Very Easy	Very Easy	Very Easy
2	How much Time is saved by using Improved Cooking Stove?	15 minutes	15 minutes	15 minutes	15 minutes
3	How much Fuel is saved by using Improved Cooking Stove?	Rs 750 per month	Rs 500 per month	Rs 750 per month	Rs 600 per month
4	Is there any reduction in smoke?	No smoke	No smoke	No smoke	No smoke
5	Did you notice any change in the food taste by cooking on Improved Cooking Stove?	Yes	Yes	Yes	Yes
6	Did you notice any reduction in cough/eye irritation incidences?	Yes	Yes	Yes	Yes
7	Are you satisfied with Improved Cooking Stove?	Yes	Yes	Yes	Yes
8	Will you agree to buy Improved Cooking Stove, If yes then at what cost?	Rs 2000	Rs 2000	Rs 2000	Rs 2000

Feed Back Summary

Nawab Khan Rind, District Thatta:

S No	Questions	Muhammad Arif	Ali Akber	Ameer Bux Rind	Allah Bachyeo	Nazar Muhammad
1	State the ease of use of existing Stove and Improved Cooking stove?	Very Easy	Easy	Easy	Easy	Easy
2	How much Time is saved by using Improved Cooking Stove?	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes
3	How much Fuel is saved by using Improved Cooking Stove?	Rs 700 per month	Rs 900 per month	Rs 1000 per month	Rs 1000 per month	Rs 600 per month
4	Is there any reduction in smoke?	No smoke	No smoke	No smoke	No smoke	No smoke
5	Did you notice any change in the food taste by cooking on Improved Cooking Stove?	Yes	No	Yes	Yes	Yes
6	Did you notice any reduction in cough/eye irritation incidences?	No	No	No	Yes	No
7	Are you satisfied with Improved Cooking Stove?	yes	yes	yes	yes	yes
8	Will you agree to buy Improved Cooking Stove, If yes then at what cost?	Rs 3000	Rs 2000	Rs 2000	Rs 2000	Rs 2000

Feed Back Summary

Shashi Kotar, District Chitral:

S No	Question	Sher Wali Khan SAARC II	Adena Muhammad SAARC I	Waheed Ullah Khan SAARC I	Gul Faraz SAARC I	Hadayat Ullah Khan SAARC I
1	State the ease of use of existing Stove and Improved Cooking stove?	Very easy	Very easy	Easy	Easy	Very Easy
2	How much Time is saved by using Improved Cooking Stove?	15 minutes	15 minutes	Less than 15 minutes	Less than 15 minutes	15 minutes
3	How much Fuel is saved by using Improved Cooking Stove?	Rs 1200 per month	Rs 750 per month	Rs 600 per month	Rs 800 per month	Rs 700 per month
4	Is there any reduction in smoke?	No smoke	Reduced smoke	No smoke	No smoke	Reduced smoke
5	Did you notice any change in the food taste by cooking on Improved Cooking Stove?	Yes	Yes	Yes	Yes	Yes
6	Did you notice any reduction in cough/eye irritation incidences?	No	Yes	No	No	No
7	Are you satisfied with Improved Cooking Stove?	yes	Yes	Yes	Yes	Yes
8	Will you agree to buy Improved Cooking Stove, If yes then at what cost?	Rs 2000	Rs 2000	Rs 2000	Rs 2000	Rs 2000

Feed Back Summary

Bibyawar, District Upper Dir:

S No	Questions	Mudassar SAARC II	Samshal Khada SAARC I	Raza Khan SAARC I	Sardar Ali SAARC I	Sumaiya SAARC I
1	State the ease of use of existing Stove and Improved Cooking stove?	Easy	Easy	Easy	Easy	Easy
2	How much Time is saved by using Improved Cooking Stove?	15 minutes	Less than 15 minutes	15 minutes	Less than 15 minutes	15 minutes
3	How much Fuel is saved by using Improved Cooking Stove?	Rs 1200 per month	Rs 1000 per month	Rs 500 per month	Rs 500 per month	Rs 800 per month
4	Is there any reduction in smoke?	No smoke	No smoke	No smoke	No smoke	No smoke
5	Did you notice any change in the food taste by cooking on Improved Cooking Stove?	Yes	Yes	Yes	Yes	Yes
6	Did you notice any reduction in cough/eye irritation incidences?	No	No	Yes	No	Yes
7	Are you satisfied with Improved Cooking Stove?	Yes	Yes	Yes	Yes	Yes
8	Will you agree to buy Improved Cooking Stove, If yes then at what cost?	Rs 4000	Rs 2000	Rs 3000	Rs 2000	Rs 4000

Feed Back Summary

Kandoo Baba, District Mardan:

S No	Question	Gulsahan Bibi SAARC II	Siraj Gul SAARC II
1	State the ease of use of existing Stove and Improved Cooking stove?	Easy	Easy
2	How much Time is saved by using Improved Cooking Stove?	Less than 15 minutes	30 minutes
3	How much Fuel is saved by using Improved Cooking Stove?	Rs 1000 per month	Rs 950 per month
4	Is there any reduction in smoke?	Yes	Yes
5	Did you notice any change in the food taste by cooking on Improved Cooking Stove?	No	Yes
6	Did you notice any reduction in cough/eye irritation incidences?	No	No
7	Are you satisfied with Improved Cooking Stove?	yes	yes
8	Will you agree to buy Improved Cooking Stove, If yes then at what cost?	Rs 2000	Rs 3000

Feed Back Summary

Gul Khan Kali, District Nowshera:

S No	Question	Adam Khan SAARC II	Imran Khan SAARC II
1	State the ease of use of existing Stove and Improved Cooking stove?	Easy	Easy
2	How much Time is saved by using Improved Cooking Stove?	30 minutes	30 minutes
3	How much Fuel is saved by using Improved Cooking Stove?	Rs 1200 per month	Rs 1100 per month
4	Is there any reduction in smoke?	No smoke	No smoke
5	Did you notice any change in the food taste by cooking on Improved Cooking Stove?	Yes	Yes
6	Did you notice any reduction in cough/eye irritation incidences?	No	No
7	Are you satisfied with Improved Cooking Stove?	Yes	Yes
8	Will you agree to buy Improved Cooking Stove, If yes then at what cost?	Rs 4000	Rs 4000

Feed Back Summary

Thandiani, District Abbotabad:

S No	Questions	Farooq Ahmed SAARC I	Waqas Hussain Shah SAARC I	Abdul Jaleel SAARC I	Abdur Rashid SAARC II
1	State the ease of use of existing Stove and Improved Cooking stove?	Easy	Easy	Easy	Easy
2	How much Time is saved by using Improved Cooking Stove?	Less than 15 minutes	15 minutes	Less than 15 minutes	30 minutes
3	How much Fuel is saved by using Improved Cooking Stove?	Rs 400 per month	Rs 600 per month	Rs 750 per month	Rs 900 per month
4	Is there any reduction in smoke?	No smoke	No smoke	No smoke	No smoke
5	Did you notice any change in the food taste by cooking on Improved Cooking Stove?	Yes	Yes	Yes	Yes
6	Did you notice any reduction in cough/eye irritation incidences?	Yes	Yes	No	Yes
7	Are you satisfied with Improved Cooking Stove?	Yes	Yes	Yes	Yes
8	Will you agree to buy Improved Cooking Stove, If yes then at what cost?	Rs 2000	Rs 2000	Rs 2000	Rs 2000

QUESTIONNAIRE FOR SELECTION OF HOUSEHOLDS

To be filled in by NGO

Household ID: _____

	Village	
	District	
	Date of Interview	
	Name of the Surveyor/Data Collector	
	Mobile Ph:	
	Signature of the Data collector	

		Response
1.	**Name of the Household Head**	
	Gender	
	Age	
	Address	
	Phone No	

2. How many members are in this household?
(Only include members who permanently live here and exclude family members who stay somewhere else most of the time)

a	Adult Male	
b	Adult Female	
c	Male below 18 Years	
d	Female below 18 years	
e	Children below 5 years	

3. Please tell us how many members of this household have any income?

Ans : ----------

4. What is the highest level of education that any household member has got?

a	Illiterate	
b	Can read and write	
c	Primary school (up to class 5)	
d	10^{th} Pass	
e	Intermediate	
f	Graduation (BA)	

5. What are the major income sources for this household?

a	Agriculture	
b	Daily Wage	
c	Shop-keeping/ Small business	
d	Agriculture Labour on fields of others	
e	Private Salaried Job	
f	Govt. Salaried Job	
g	Keeping of Animals	
h	Remittance from other family members	
i	Others	

6. How many acres of land do you cultivate?

a	Acres	
b	Leased	
c	Self	

7. Medical expenditures in last year (include doctors fees, travel cost to see/visit doctor/hospitals, medicines etc)?

ANS: ---------- in Rupees

8. Please let us know what are diseases on which treatment you spent money last year?

a	Fever	
b	Respiratory Disease	
c	Lung Disease / TB	
d	Eye Disease	
e	Heart Problem	
f	Cancer	
g	Blood Pressure	
h	Skin	

9. Does your household have electricity connection?

a	Yes	
b	No	

10. Do you have vehicle?

a	Cycle	
b	Motorcycle	
c	Cart	

11. Do you stay in your own house or rented house?

a	Own House	
b	Rented House	

12. Please tell us what type of house you live in ?

a	Open Hut	
b	Mud House with thatched roof	
c	Pakka House with thatched roof	
d	Pakka House with concrete roof	
e	Other	

13. Please tell us about where you cook your daily food in different seasons?

		Rainy Season	**Winter**	**Summer**
a	In separate kitchen inside the house			
b	In other closed room inside house			
c	In courtyard/open space inside house			
d	Open space outside the house			

14. How much time do you spend on cooking every day? Please tell us the time spent every time you cook in a day?

a	Morning	
b	Afternoon	
c	Evening	

15. Please let us know which cook stoves you have in your house?

a	Open fire/ Three stone fire	
b	Traditional potter Cookstove one burner	
c	Traditional potter Cookstove two burner	
d	Portable Traditional cookstove	
e	Other	

16. Please tell us about the different fuels that are used for cooking?

		Name of the Fuel (cow dung, firewood, agriculture Residue-coal	Monthly consumption	Purchase price	Collected quantity	Time spent in collection in hours per visit	How often do you collect in a month	Collection by male/ female
a	Primary fuel							
b	Secondary Fuel							
c	Tertiary Fuel							

17. Please let us know what are your major concerns/problems/comments about your cooking experience?

a	I do not have any problem	
b	The cooking process takes a lot of time.	
c	The cookstoves give a lot of smoke.	
d	I have to spend a lot of time on fuel collection.	
e	I have to travel long distances to collect fuel.	
f	The cookstove consumes a lot of fuel.	
g	The cookstove does not allow me to cook all kind of foods that I want.	
h	The cookstove takes a lot of time in lighting.	
i	It is difficult to control the fire in my existing cookstove.	
j	It is difficult to cook on the cookstove in some seasons.	
k	Other	

18. How do you feel about the safety of cooking facilities in your household?

a	Very Safe	
b	Ok- But would like to improve	
c	Rather Dangerous	
d	Very Dangerous	
e	Don't Know	

19. Who cooks the food?

a	Mother	
b	Sister	
c	Wife	
d	Daughter	
e	Any other Please Define: ----------	

WEEKLY FEEDBACK FORM

To be filled in by NGO

Household ID: _____

	Village	
	District	
	Date of Interview	
	Name of the Surveyor/Data Collector	
	Mobile Ph:	
	Signature of the Data collector	

		Response
1.	**Name of the Household Head**	
	Gender	
	Age	
	Address	
	Phone No	

2. Which features from below do you find in Improved Cook stove?

a	Less Smoke	
b	Less consumption of fuel	
c	Ability to control fire	
d	Easy to light	
e	Ability to accommodate multiple type of fuel	
f	Ability to accommodate multiple type of vessels	
g	more durable	
h	portable	
i	aesthetically appealing	
j	Faster cooking	
k	Others	

3. State the ease of use of existing stove and Improved Cooking Stove?

a	Easy	
b	Very easy	
c	Difficult	
d	Others	

4. How much time is saved by using Improved Cooking Stove?

a	Less than15 min	
b	15 min	
c	Half hour	
d	Others	

5. How much fuel is saved by using Improved Cooking Stove?

a	Less than 25%	
b	Less than 50%	
c	More than 50%	
d	Others	

6. Did you notice change in the food taste by cooking on Improved Cooking Stove?

a	Yes	
b	No	
c	Don’t know	

Did you notice any reduction in cough / eye irritation incidences.

a	Yes	
b	No	
c	Don’t know	

6. Are you satisfied with Improved Cooking Stove?

a	Yes	
b	No	
c	Don’t know	

6. Will you agree to buy Improved Cooking Stove, if yes then at which cost?

a	Rs. 2000	
b	Rs. 3000	
c	Rs. 4000	