Chapter 8
A Case Study of the Improved Cooking Stove Programme

By K. Bajracharya[1] and R.N. Gongal[2]

8.1 Introduction

In most households of the mountain areas of Nepal, the most common method of cooking, particularly in rural areas, is on an open fire or traditional stove in which all types of biomass can be burned. In Nepal, most of the cooking and heating needs are provided by a centrally-located hearth in the living area. A sturdy iron tripod that supports a cooking pot is placed above the hearth. Traditional stoves are made from carefully selected clay mixed with chopped straw and sometimes with cow dung. The size and arrangement of the holes for the pots vary according to the needs and wishes of the users. In traditional stoves, the pot rests on three raised supports to allow flue gas to escape from the bottom.

With most of these stoves, whether of the tripod stand or traditional type, the heat under the pot is regulated simply by adding or removing the fuel. Fuel burned in them may include wood, straw, dung, and rice husk. The patterns of cooking with these stoves vary greatly throughout the country. Variations depend upon climate, local customs, family structures, the type of food being cooked, ethnicity, and economic status. Some meals require long periods of boiling and simmering; others depend on quick heating or frying.

The improved cooking stove (ICS) is a simple, low-cost technology that offers multiple benefits to its users, including efficiency savings of between 18 and 42 per cent of the fuelwood consumed by traditional stoves (Shakya 1985, Sulpya 1984). It works on the principle of increasing the concentration of heat directly under the first cooking pot and then channelling the heat to the second burner to cook two pots at once. It conserves heat and reduces heat dissipation with minimum waste. It is reported that about 33 per cent of ICS users in Surkhet District have demonstrated changes in work patterns because the ICS cooked faster and food is kept warmer for a longer period of time (Health Development Project, Surkhet 1992).

There are several improved stove designs in Nepal (Fig. 8.1). The most common stove prior to 1990 was the improved insert type stove. This two-pot stove is made

1. Ms K. Bajracharya worked as a Women's Development Specialist for CRT for the study sponsored by ICIMOD.
2. Mr R.N. Gongal worked as a Financial Analyst for CRT for the study sponsored by ICIMOD.

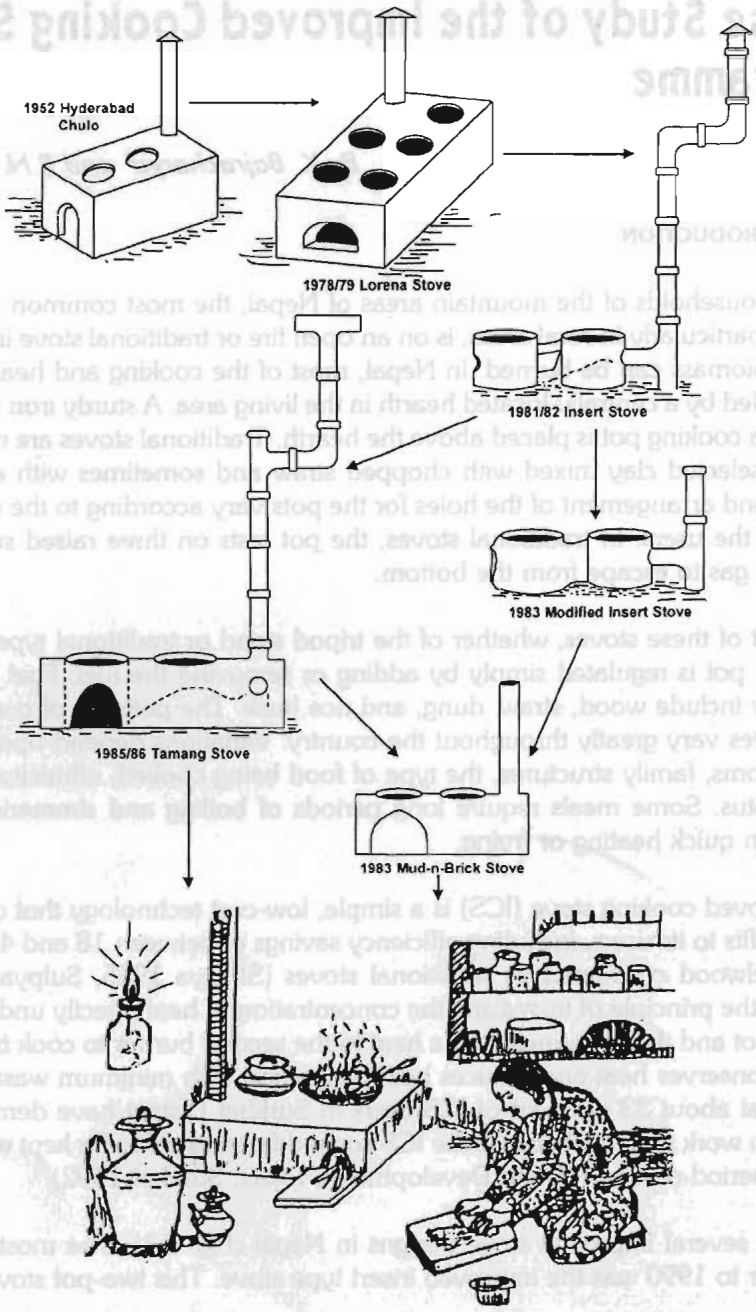

Figure 8.1: ICS Development in Nepal

from three separate ceramic pieces and a clay chimney. It is surrounded by a mud mix. The three pieces are: a firebox, to which the first tunnel is attached, a separate second hole for a pot with a baffle attached, and a rear tunnel attached to the chimney base. There are no doors, dampers, or grates. The cooking pot rests on the mud surround rather than on the ceramic stove. Nowadays, mud-built stoves are becoming popular. They are made of mud mortar consisting of three parts mud/earth, two parts straw/husk and one part animal dung. The whole structure is smoothly plastered with this uniform mixture. Iron plates can be fitted on the pot-holes as stands for vessels. This model has two openings for cooking pots, one behind the other. The pot-holes are round in shape, the bottom of the pot fitting snugly on them. Fuelwood is burned beneath the first opening. The fire and heat travel from the first opening to the second, heating up the pots on them. The smoke produced inside the stove exits through a chimney made of unburnt clay bricks and dung.

The amount of fuel saved depends upon the comparative efficiency of the ICS versus the traditional stove. Potential fuelwood savings with the ICS range from 25.6 to 40 per cent compared to 16 per cent fuel efficiency use of the traditional stove (Sulpya 1991). The efficiency of a stove depends primarily on its burning rate and heat loss from it. The burning rate of a cooking stove is a function of the size and dimensions of the combustion chamber, amount of fuelwood, and availability of oxygen in the combustion chamber. Further, the cooking pot should be placed so that there is no flame coming out along the side of it. All these factors help to increase the efficiency of the ICS, which in turn results in savings in fuelwood compared to the traditional stove (Rijal 1987, Rijal 1993).

Various rural development organizations in Nepal have been promoting this simple and cheap technology for many years. For example, the ICS programme was first implemented by the Department of Agriculture during the early 1950s using Indian models. It was only during the Sixth Plan (1980-85) period, however, that ICS took on momentum as RECAST and the Community Forestry Development Programme (CFDP) collaborated under a UNDP/FAO-funded programme to promote this technology. The only large-scale ICS programme carried out in Nepal has been through CFDP, and it was suspended in 1991 (PEP 1995).

So far, about 90,000 ICS of various types have been promoted and disseminated by the government, NGOs, and private sector agencies. Initially, the ceramic insert type stove was prefabricated and distributed to users free of cost. About 44,000 insert type stoves were distributed, but only 35 per cent are believed to be still in operation since they were not suitable for many rural applications. At present, the ceramic insert type design has been abandoned in favour of stoves built on site using locally-available materials and skills (i.e., mud stoves). It is believed that about 44,000 such mud stoves have been installed, of which more than 90 per cent are still in operation.

Recently, several NGOs and INGOs working in the areas of literacy, health, and sanitation; women's development; energy; and environment, and which include the Nepal-Australia Forestry Project, Save the Children Fund, CARE/Nepal, UMN, UNICEF, FAO, US Peace Corps, GTZ, UNDO, EEC, and IFAD, have made the ICS an integral part of their programme. They have primarily emphasized user motivation and education and are beginning to show success in their efforts to introduce improved stoves on a sustainable basis.

Some of the problems in ICS use are concerned with inflexibility of use for diverse purposes, people's social and religious beliefs, failure of the government to carry out strong promotional programmes, lack of proper education and training for the users, availability of and accessibility to free biomass resources as the main source of rural energy, lack of adequate involvement of women in ICS programmes, and lack of financial and institutional support to local NGOs and research institutions. In spite of these problems, the ICS development and promotion programme has been relatively successful as a new and renewable energy promotion programme in Nepal and has great potential for reducing fuelwood consumption because of the simple and familiar technology (Shrestha 1996).

8.2 Intermediation and Private Sector Participation

The SFDP of ADB/N has also distributed the insert type ICSs at nominal cost, as did the CFDP and Production Credit for Rural Women (PCRW) programme prior to 1990, but these were not adopted in many places due to various technical and sociocultural reasons. Since then, installation of locally built ICS has taken place mainly at environmental project sites supported by UNICEF.

Like ADB/N, the private sector organization, Centre for Rural Technology (CRT), is organizing regular training for ICS technicians. CRT is also coordinating an ICS network that it initiated in 1993 (CRT 1993) within the country by bringing together NGOs, INGOs, donor agencies, research institutions, and interested government departments, with the support of the Asia Regional Cooking Stoves' Programme (ARECOP). Various NGOs and INGOs are playing a leading role in the promotion and dissemination of improved cooking stoves. For example, CARE/Nepal has been integrating the ICS component into its community development programmes, mainly in Bajura, Kabhre, and Lamjung (CARE 1996). Except for expensive models like the cast-iron heater stoves, the cost of actual installation represents a small portion of the overall cost. The major costs of the ICS programme are R&D, promotion, and dissemination and training. So far these activities have been covered by the donors and HMG/N grant assistance. However, there is no integrated programme to promote ICSs, most of the activities carried out recently having been sporadic in nature.

Some R&D activities are being carried out by RECAST to develop large-scale improved cooking stoves, but the R&D programme for ICS is generally poor due to

lack of funding. The Mrigendra Medical Trust (MMT) has been studying the effects of ICS smoke exposure among women. For example, MMT's studies show that ICS reduces smoke exposure to one third of the usual level (Pandey et al. 1990).

8.3 Subsidy Schemes

The stoves installed during the 1980s were mostly distributed free of cost to interested households in rural areas. At present, there is no unified programme for providing subsidies for the installation and use of ICSs. NGOs and government programmes have individual financial assistance or subsidies for ICS installation. For instance, CSD's cast-iron stoves in Jumla, which is the most expensive model so far disseminated, are eligible for a subsidy NRs 2,000. Other clay models, which cost around NRs 200, including labour, are generally given a subsidy for the cost of installation, and this is mostly mobilised by NGOs.

8.4 Issues and Options

A summary of the issues identified from the case study is presented in Table 8.1, and options are discussed below.

Table 8.1: Issues Pertaining to the Improved Cooking Stove Programme

Institutional	Economical	Technology	Social
Sporadic dissemination programme Intermittent dissemination and lack of continual effort Lack of monitoring agency Need for a strong research agency	Construction of ICSs by using local materials/ skills is sustainable	Need for appropriate alternative designs matching the needs of users Cooking with agri-residue Adapting to house structure and climatic factors Space heating requirement	Need for training of local stove technician Social/ritual factors to be considered ICS dissemination to be linked with house/kitchen improvement programme
Source: deLucia and CRT 1997 and field surveys carried out by the study team			

8.4.1 An Intermittent and Diluted Programme

The ICS dissemination programme was a 'one off' type, intermittent and diluted programme. Lack of continuity and long-term vision are among the reasons why the output from these programmes has been poor. For example, after the termination of the environmental project under the PCRW programme, most of the WDS stopped dissemination of ICSs, as in the case of Mangalpur.

8.4.2 Technical Follow-Up and Back-Up

Lack of monitoring and follow-up is an important reason for the low adoption rate; for example, something as simple as a chimney being blocked by soot has led to

discontinued use of ICSs in many cases. Again, users need the ICS to be improved as time goes on, so continuous technical back-up and follow-up on ICS dissemination are required.

8.4.3 Matching the Local Requirements

The needs of ICSs and the environment in which they are used are diverse. The same ICS cannot be disseminated to the *Terai* and the high hills. The type of fuel used, cooking habits, the types of food cooked, house design, and other specific requirements of the user/area need to be considered during dissemination. For example, the fear of fire hazard from the chimney was one of the main reasons for the low adoption, rate in Bayarban.

8.4.4 Use of Local Materials and Building Up Capabilities

After learning from the CFDP ceramic stove distribution programme, the ICSs were disseminated with better vision, approaches, and technology. The use of local materials and training of ICS technicians at the local level are positive aspects of the new programmes.

8.4.5 Fixed ICS Design

From the case studies, it was found that the fixed design of ICSs is one reason for its low adoption rate. The fixed-design ICSs failed to meet the requirements of users in many cases: i.e., animal feed preparation, space heating, use of agricultural residue as fuel, and *raksi* preparation. Not fulfilling requirements not only results in the rejection of ICSs but also creates a negative effect on the new technology. Serious R&D efforts are required, and technicians/motivators should be equipped with a wide the range of ICS designs to match the needs of the user.

8.4.6 Fuel Consumption

Reducing fuel consumption is one of the foremost objectives of the ICS dissemination programme, but whether this has taken place or not has not properly been assessed. Sometimes it is found that fuel consumption increases after the dissemination of ICSs (as in the case of Urthu – a twofold increase in fuel consumption over the traditional stove).

8.4.7 Research and Development

The identified R&D needs from the case studies are: a) low-cost ICSs for space heating with smoke removal; b) ICSs free from fire hazard; c) development of versatile ICSs capable of operating off different fuels (including crop residue); d) effective chimney construction; e) ICSs for big families, and one allowing *raksi* preparation,

animal feed preparation, etc; e) reduction of cooking time; and f) need to incorporate sociocultural factors.

8.4.8 Technology Transfer to the Villagers

The selection of ICS technician plays a vital role in the ICS dissemination programme. A technician should be otherwise unemployed, of local origin, innovative, with good motivational skills, and preferably a woman (Box 8.1). At least two technicians should be trained in a similar environment on the construction and operation and maintenance of ICSs. The importance of each component of ICS should be thoroughly relevant to the user, and the user should be involved in choosing the location of the ICS installation.

8.4.9 Level of Subsidy

Except for the ICS disseminated in Jumla, the only cost an ICS entails is for the installation, since local materials are used. The user's participation during installation should be encouraged. The main cost incurred during the dissemination of ICSs is that of training ICS technicians and promoting the product, and this requires a subsidy. There should also be efforts to develop appropriate models/designs of ICS for commercial distribution.

8.4.10 Gender Issues

Women's refusal to accept and use the 'improved' stoves has been blamed by energy planners for the failure of ICS programmes. However, the blame could be more correctly placed on stove project planners who did not assess social and economic factors and user behaviour. For example, adequate consideration was not given to the religious and cultural customs of users while designing the stoves. Also, the active participation of women has not been mobilised for the stove programme. In many instances, men were consulted and selected for stove training to the neglect of women, and this resulted in the failure of the improved stove programme prior to 1990. However, with the dissemination of improved mud stoves, the time spent by women on collecting firewood, cooking, and cleaning pots/pans has been reduced (See Tab. 8.2). The money and time spent gathering fuelwood can be saved. There is also the positive impact on the general health of women derived from not being exposed to smoke. Further, installation by trained women promoters creates employment and generates income (CRT 1996).

A possible improvement in the health conditions of women through ICS dissemination has not yet been recognised. Instead forest conservation was and still is the major concern of many ICS programmes. In many instances, an incorrect design and faulty positioning of the chimney have created a reverse flow of air from chimney to stove, thereby making the kitchen smoky instead of smokeless.

Box 8.1: Case Story of an ICS Promoter and User

Mrs. Ganesh Kumari Bhandari lives in Bungkot Village of Gorkha District. There are three members in her family, including herself. They own a small teashop. She did not get a chance to study and hence has remained illiterate. Her husband, a teacher, died 15 years ago. After his death she could not live with her husband's family. She moved to her present location on her own and purchased two *ropani*(s) of land and established the teashop with great difficulty. She realised the need to earn money to ensure a better future for her children. She was attracted to income-generating activities, but due to lack of money, she could not invest in big business. Two years ago, the Production Credit for Rural Women (PCRW) project was run by the Women's Development Division (WDD) in her village, and she installed a latrine with its assistance was provided with an ICS for NRs 20. After installation of the ICS she noticed improvement in the kitchen environment, although she was not fully comfortable while cooking. Later she realised that the stove was improperly fixed to the iron tripod. She went to the PCRW office and told them about the problem, but her problem was not attended to, so she decided to take training on ICS. The WDD and CRT (Gorkha Branch Office) suggested that she participate in ICS training so that she could herself construct ICSs and generate income. She took a training course organized by the CRT on the installation and use of ICSs. After training she exploited her new skills as an additional income-generating activity. She started by experimenting with her own ICS, reconstructing it. Then she began to install ICSs in neighbours' houses. She usually asked the household women to prepare the soil, and during her first visit she made the chimney block and bricks for the cooking stove body and let them dry. The next day she would assemble the cooking stove. How many cooking stoves she can install in a day depends on her initial preparation and the help from the women of the household. If everything goes smoothly, she can build four to five cooking stoves a day. So far she has installed 73 ICSs in her village. She gets NRs 120 per ICS installation. The demand for ICSs is increasing rapidly, and she has even extended her service to another village. Now she earns enough money and is able to save some for her children's future. She is happy to have an ICS and to promote it as well. Her economic condition is improving due to her success in promoting ICS and earning from this.

Source: Field survey conducted by the study team.

Table 8.2: Women's Daily Allocation of Time before and after ICS Installation

Time	Before	Time	After	Remarks
4:00	Get up, make fire, cook animal food and, clean	4:00	Get up, make fire, cook animal food and clean	
5:00	Fetch water, prepare tea and *khaja*, (snack) boil milk, and make ghee (butter)	5:00	Fetch water, prepare tea and *khaja*, boil milk, and make ghee (butter)	
6:30	Feed children, send children to school, feed men, and eat themselves	6:30	Feed children, send children to school, feed men, and eat themselves	
7:00-8:00	Cook rice, serve grass, and other food to animals, cook food	7:00-7:30	Cook rice, serve grass to animals, serve other food to animals, cook food	
9:00-11:00	Serve food (lunch), eat (lunch), clean utensils, fetch water, clean cow dung in the cowshed	8:00-10:00	Serve food (lunch), eat (lunch), clean utensils, fetch water, clean cowdung in the cowshed	
		10:00-11:00	Rest	
12:00-12:45	Do household work (washing clothes, weaving), prepare *khaja*	12:00-12:45	Do household work (washing clothes, weaving), prepare *khaja*	
12:45-18:30	Collect fuelwood, work in field (according to season) weeding, levelling, etc.	12:45-18:30	Collect fuelwood, work in field (according to season) weeding, levelling, etc.	Collect fuelwood once a week
19:00-21:00	Cook dinner, feed children, feed adults, and eat	19:00-21:30	Cook dinner, feed children, feed adults, eat, clean utensils, prepare the essential things for next day	
21:00-23:00	Clean utensils, prepare essential things for the next day and sleep	21:30-23:00	Sometimes chat with family members and sleep	

Source: Field study (Bunkot Gorkha), source persons: Mrs Ganesh Kumari Bhadari, Ms Srijana Bhandari, and Mrs Purna Kumari Khanal.

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