

**Reducing indoor air pollution in developing countries: A case study investigating the utilization of improved stoves in rural India.**



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“This project has been submitted in partial fulfilment of the requirements for the award of the Intercalated Degree in International Health. The examiners cannot, however, be held responsible for the views expressed, nor the factual accuracy of the contents”

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## List of abbreviations

ARI	Acute Respiratory Infection
ARTI	Appropriate Rural Technology Institute
FGD	Focus Group Discussion
IAP	Indoor Air Pollution
NGO	Non Governmental Organisation
NPIC	National Program of Improved Chula
WHO	World Health Organisation

## Definitions

Facilitator	A factor which encourages the adoption and utilisation of an improved stove
Constraint	A factor which acts as a barrier to the adoption and utilisation of an improved stove
Dissemination:	The process whereby improved stoves are distributed to communities

## **1.0 Abstract**

### **Aims and objectives**

This study aims to provide an insight into the facilitators and constraints that influence the utilisation of improved stoves in a rural village in Maharashtra, India, and discuss ways in which the utilisation can be improved.

### **Methods**

This qualitative research follows an ethnographic research style. Four weeks of data collection in India involved participant observation, focus group discussions, key informant interviews and semi-structured interviews. Data was fully transcribed and analysed using coding principles and editing analysis.

### **Findings**

The main advantages of the Bhagyalaxmi stove, which facilitate its utilisation, were that it saves households fuel and time. It also produces less smoke. In contrast to previous research the reduction in smoke was not the main advantage. The main constraint to using this stove is the initial cost, which is more than four times the cost of the traditional stove. Women did not feel they needed the luxury of this improved stove at this extra cost and believed that more people would use the stoves if they were cheaper.

### **Conclusion**

Further measures to minimise the constraints and promote the facilitators to improved stove use are needed. Given the global burden of disease attributed to indoor smoke, specific policy measures should be developed to reduce indoor air pollution. Based on these findings, strategies could include re-introducing subsidies, introducing micro credit schemes, awareness campaigns and social marketing, although more research is needed to determine the effectiveness of these measures. Promotional strategies should acknowledge that reducing smoke is not always perceived as the main advantage of improved stoves. Improved stoves should be considered as part of a wider program of alleviating poverty.

## **2.0 Introduction**

Indoor air pollution(IAP), from cooking with solid fuels on open fires or primitive stoves in poorly ventilated houses, is a major cause of morbidity and mortality worldwide. Over 1.6 million deaths and 2.7% of the global burden of disease was directly linked to IAP in 2000[2, 3]. Exposure has been linked to a number of acute respiratory infections (ARIs); the biggest killer of children under 5 years old[4]. Reducing the burden of disease caused by ARIs represents a major public health challenge; IAP is a risk factor that can be reduced by relatively simple and cost effective interventions[5]. These interventions are shown in table 1.

Source of pollution	Living environment	User behaviour
Improved stoves Switching to cleaner fuels (Charcoal, Kerosene, Gas: liquefied petroleum gas, natural gas, biogas) Solar cookers Electricity	Introducing chimneys, flues, hoods Windows and ventilation holes Separate kitchen	Using pot lids Properly maintaining stoves, chimneys and appliances Keeping children away from fires Reducing cooking time Fuel drying

*Table 1. Interventions to reduce exposure to indoor air pollution.[6, 7]*

Improved stoves are the most popular intervention[7]. They reduce exposure to harmful pollutants by improving combustion efficiency and/or introducing chimneys, and, in some cases, reducing cooking times[3]. Studies have shown that children living in houses using improved stoves are 2.6 times less likely to suffer from ARI than those living in homes using traditional stoves[8].

Despite large-scale stove dissemination projects, improved stoves are not used by many of those in greatest need, especially in India[9]. Research mainly focuses on the issues surrounding the distribution of stoves, and relatively little has been published on the users perceptions of stoves after implementation.

This qualitative study explores the facilitators and constraints influencing the utilisation of improved stoves in a rural community in Maharashtra, India, from the perspective of the women with the potential to use the improved stoves. Through a better understanding of these factors, more targeted and appropriate strategies for promoting the use of improved stoves and reducing IAP can be developed.

This report gives a background to improved stoves in India, describes the aims and objectives of the research, the methods used to collect and analyse data and presents and critically discusses the findings in relation to previous research. The findings are used to identify strategies to increase the utilisation of improved stoves and highlight policy measures necessary to reduce the global burden of disease from IAP. The limitations of the research are discussed.

## 2.1 Background: Improved stoves in India.

90% of households in rural India rely on solid fuels, such as coal and bio-mass, for cooking and home heating[10]. The majority of these fuels are burnt in open fires or primitive stoves, resulting in poor combustion efficiency and high levels of IAP that are way above recommended guidelines of the WHO[11], and have serious health effects. It is widely accepted that biomass and coal will continue to be used by these people for the foreseeable future[7].

Early interest in improved stoves focused on the environmental impacts of energy use, leading to a big drive towards increased fuel efficiency. This was the initial focus of the National Program of Improved Chula (NPIC), which distributed subsidised stoves in India from 1983-2001. As the public health benefits of reducing IAP were recognised, the NPIC, and other improved stove programs in other countries, changed their focus to reducing IAP as well as increasing efficiency. Interest in interventions to reduce this health hazard is increasing; interventions to reduce IAP help achieve seven of the millennium development goals[12].

In the majority of field studies measuring the effectiveness of improved stoves, consideration is not given as to whether the stoves will be adequately maintained, or whether people will continue to use the stoves after the study period. This has resulted in the failure of improved stove projects, for example, the NPIC in India did not result in widespread adoption of improved stoves, primarily because of its top down approach, and inadequate consideration of the users needs and preferences[13]. Where the opinions of users are sought, the research methods, questionnaires and household surveys, have often not given the researchers the opportunity to explore the issues raised[14, 15], which is vital if they are to be adequately addressed and the stoves are to reach their potential.

In Maharashtra state in India, an NGO, the Appropriate Rural Technology Institute (ARTI) have been disseminating improved stoves since 1996, initially as part of NPIC, and since the NPIC was abandoned in 2001, they have been operating independently. ARTI are completing an intervention study to evaluate the impact of the improved stoves on IAP[16]. The village in question, Nanegaon, is part of this study. Participants, who fitted their criteria<sup>1</sup>, were able to buy the improved stove at a subsidised rate, in instalments. The social impacts of health of women and children have also been explored by ARTI and results are being analysed by researchers at Liverpool University. This study will provide complimentary data to this project.

Nanegaon is typical of other villages in the high-rainfall area of Western Maharashtra. Village characteristics are shown in Appendix 1. The improved stove that is being adopted is the Bhagyalaxmi. It is an unvented stove (no chimney), with two potholes and a cast iron grate to improve ventilation and combustion efficiency[16]. The traditional stoves in Nanegaon are also two pot stoves. Annotated photographs of the stoves are shown in Appendix 2. The Bhagyalaxmi stove has been shown to significantly reduce IAP in compared to the traditional stove[16].

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<sup>1</sup> based on family size, economic status, number of children and house structure

## **2.2 Research question**

What are the facilitators and constraints influencing the utilization of improved stoves in a rural village in Western Maharashtra?

## **2.3 Aim**

To develop an understanding of the facilitators and constraints influencing the utilization of improved stoves in a rural village in Maharashtra.

## **2.4 Objectives**

- To develop an understanding of the study setting and culture, the existing pattern of stove use, and the impact of traditional or improved stoves on the lives of community members, through key informant interviews, guided walks and participant observation.
- To explore women's perceptions of traditional and improved stoves through focus group discussions and individual interviews.
- To encourage participants to discuss the factors that inhibit some women from using the improved stoves, and for women to generate ideas on how they might be overcome, and make recommendations on how the utilisation of improved stoves could be improved, through focus group discussions.

## **3.0 Methodology**

### **3.1 Study design and research strategy**

This research follows a case study design, allowing a detailed analysis of findings from a single village[1, 17]. The research strategy is qualitative as the study seeks to identify and explore peoples perceptions and behaviours[1]. Because of unfamiliarity with the study setting and culture an ethnographic research style was adopted, to understand the situation from the perspective of the study population, through direct observation, discussion, and reflection[18].

### **3.2 Research methods and data collection**

Four weeks were spent collecting data in India. The main methods used for data collection were participant observation and focus group discussions. Key informant interviews, semi-structured interviews were also used. This allowed methods triangulation, the comparison of findings generated by different methods, to provide more valid results[1, 17]. An overview of the research methods, data collection and analysis is shown in figure 1 and described in more detail below.

### **3.3 Translation**

Since I was not familiar with Marati, the language spoken in Nanegaon, a translator was required for the duration of my time in the village. My initial contact in India, Dr. Karabi Dutta, the co-ordinator of the stove evaluation study being conducted by ARTI, introduced me to a lady from Nanegaon, Jenny<sup>2</sup>, who acted as my translator, and accompanied me throughout observations. Jenny was also interviewed as a key informant, allowing me to integrate her views on the issues being discussed in the analysis, and assess the impact of the translators views on those of the participants[19].

### **3.4 Participant observation**

To answer my research question it was necessary to observe women in their natural context, carrying out activities that related to using the stoves. Interactions and activities observed included starting the fire, cooking, collecting firewood, making cow dung cakes and cleaning the stove. Through participant observation, any differences between real and verbal behaviour (FGD/interviews) became apparent[20]. Observation days were randomly selected. In total 6 days were spent in the village. Cooking on the improved Bhagyalaxmi and the traditional stove was observed.

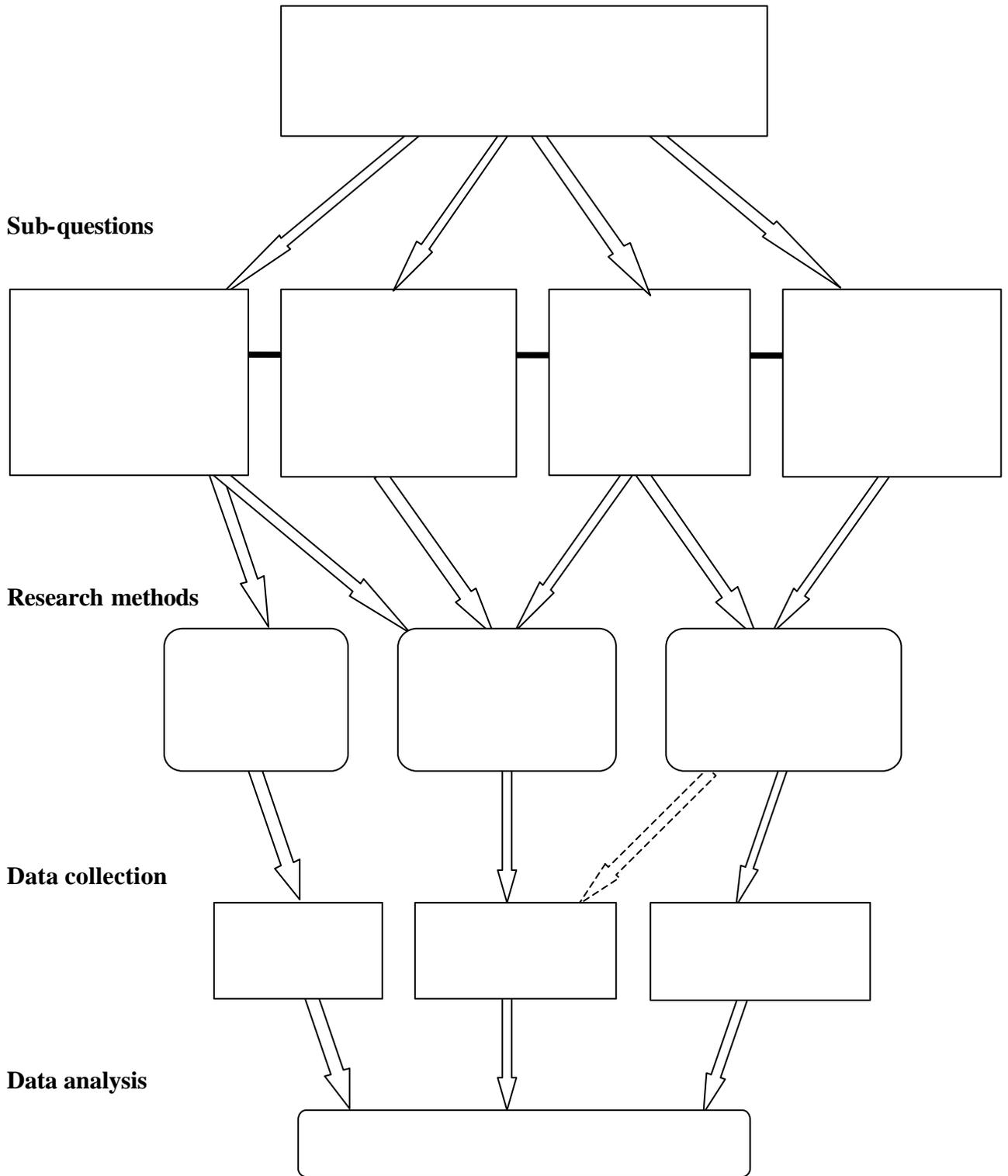
To establish rapport with the participants, I aimed to be unobtrusive, honest, unassuming, and self revealing[20]. As a rapport was developed I became more involved in their activities, for example, helping to cook Bhakari(roti). Such

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<sup>2</sup> Name has been changed for confidentiality

behaviour took the women's minds off the fact that they were being observed and behave in a more typical way[21].

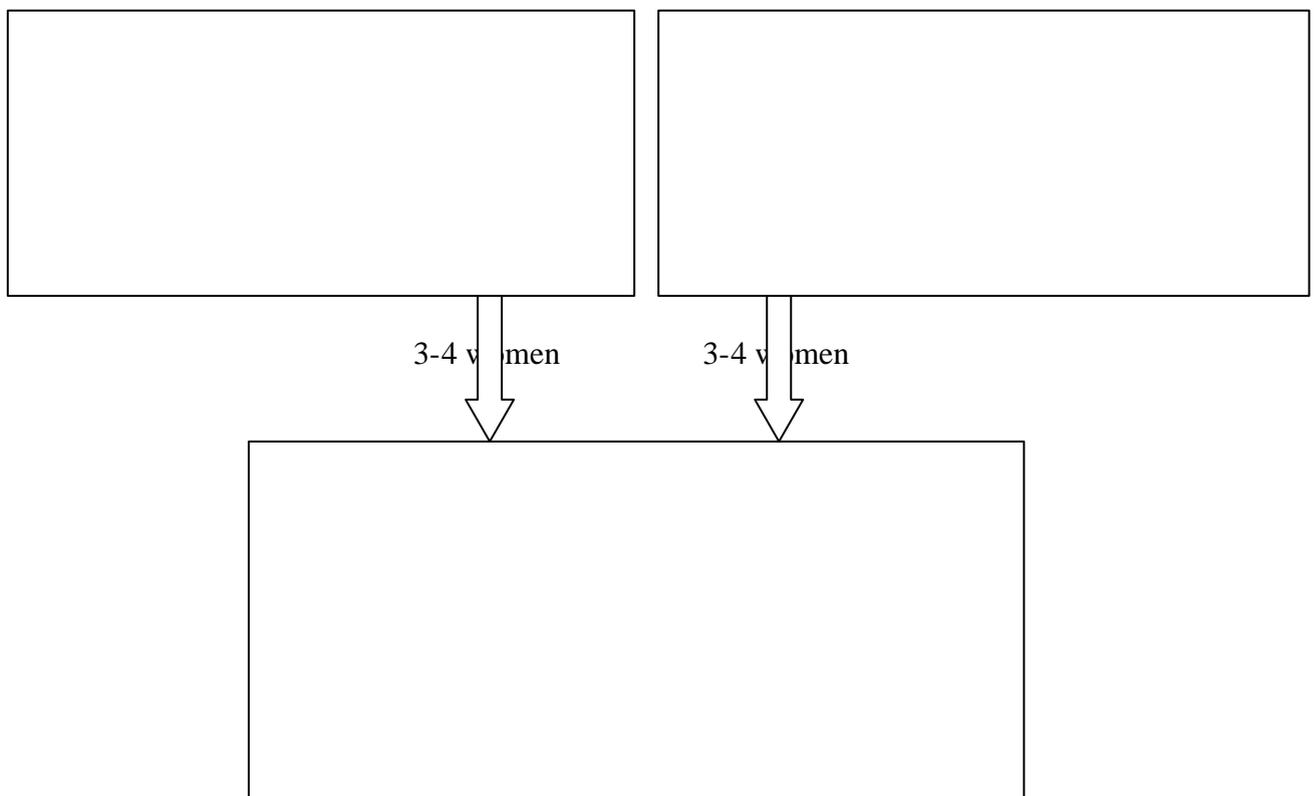
**Research question**



*Figure 1. Overview of research questions, methods, data collection and analysis.*

### 3.5 Focus group discussions (FGD)

Three FGDs were held with women in the village. India is a traditional country where men are dominant, it was felt the women would talk more freely without men present. The first FGD was with women using the improved Bhagyalaxmi stove, the second with women not using the improved stove, and the third with a mixture of women from the first two focus groups. Women were from a similar socio-economic group, avoiding an imbalance of power, facilitating discussion during the focus groups[22]. FGDs were chosen because they allow for group interaction and a greater insight into why certain opinions are held [22]. Each successive FGD sought to corroborate and confirm findings from the previous FDGs, but additional emphasis was placed upon identifying factors which facilitated their utilisation of improved stoves in the first FGD, factors which constrained their adoption or utilisation of improved stoves in the second FGD, and on developing ways of overcoming the constraints in the final FGD. These aims are shown diagrammatically in figure 2.



*Figure 2: FGD structure and criteria for participants*

### **3.6 Key informant interviews**

Key informant interviews were chosen because of their ability to provide me with inside information[18] about the culture and the stove program. Key informants were the co-ordinator of the stove evaluation project, Dr. Karabi Dutta, who has many years experience of working with ARTI in rural communities in Maharashtra, and Jenny, my translator. Key informant interviews took the form of informal communications and semi-structured interviews (Appendix 3). These were key to my understanding of the situation in the village.

### **3.7 Individual interviews**

Individual interviews were held after FGDs to explore and confirm issues raised in the FGD[17]. These were semi-structured and took place in the participant's houses. A cross section of respondents were interviewed, one using the improved Bhagyalaxmi stove, one using the traditional stove and one using both stoves, attempting to search for contrasting opinions and disconfirming cases.

### **3.8 Sampling methods**

Access to the village was gained through the co-ordinator of an improved stove program, who introduced me to my KI1 in the study village.

Snowball sampling was chosen since this provided information rich cases within the time available[23]. Participants were identified and contacted by my key informant in the village, according to the criteria shown in figure 2. Informed verbal consent was gained.

### **3.9 Conducting the focus groups and individual interviews**

Jenny, who was experienced in conducting FGDs, facilitated the FGDs and the interviews. It was not possible for me to facilitate the discussions since I would have had to work through a translator, which would have disrupted the discussion. A note-taker took field notes during the discussion, providing an insight into the nature of the discussion that was not captured on the recording[22] pg147. Meetings were held with the facilitator and the note-taker prior to the FGDs to fully brief them on the focus groups aims and objectives. Characteristics of participants are shown in Table 2.

Focus group questions (Appendix 4) were devised using a questioning route; a series of questions in complete sentences[22]. This eliminated the effect of subtle differences in language that may have altered the way the questions were interpreted by the respondents[22]. Consideration was given to the phrasing of the questions; ensuring questions were open, allowing the response to reflect what was on the participants mind and not the interviewers[22]. The questioning route was combined with an open-ended approach, where other relevant unforeseen topics could be explored if they arose in the discussion[22]. Interviews were semi structured, using a questioning route(Appendix 5).

Characteristic of participants	FGD 1	FGD 2	FGD 3	Interview
<b>Age (years)</b>				
21-40	4	2	2	0
41-60	1	4	2	2
61+	2	1	4	1
<b>No. of family members</b>				
1-3	0	4	3	1
4-6	4	1	3	1
7+	3	2	2	1
<b>Husbands occupation</b>				
Field-farming	4	6	6	2
Salary job	3	0	2	1
Unknown	0	1	0	0
<b>Type of stove used</b>				
Traditional	0	7	4	1
Improved -Bhagyalaxmi	5	0	3	1
Both	2	0	1	1

*Table 2: Characteristics of participants*

Focus group and interview schedules were reviewed by Dr Karabi Dutta, who was familiar with the purpose of the study. Due to time constraints the first focus group was not pilot tested in the field. After the first focus group some changes were made to the questions for subsequent FGDs.

FGDs were held in a room at the house of my key informant, a place where the participants felt comfortable and we would not be disturbed. The facilitator and myself had schedules to follow before, during and after the focus groups, to ensure key events were included (Appendix 5a,b). An additional translator interpreted for me where possible. I was also able to observe and record behaviours and the atmosphere during certain questions. The FGDs were recorded.

Individual interviews were conducted in the participant's home, where the participants were able to demonstrate particular activities relating to the stove as necessary. The limitation of this was that it was not a fully confidential setting and friends or family members sometimes entered and could have influenced their responses. However, they did not appear to be affected by this and I was informed it was a very open community.

### **3.10 Ethical considerations**

Ethical approval for this study was gained from the Nuffield Institute for International Health and Development at the Leeds Institute of Health Sciences (Appendix 6). Informed verbal consent was gained from each participant, according to the information and consent sheet (Appendix 7); many of the women were illiterate and signatures were associated with the government, therefore written consent was not gained, as this may have affected participants willingness to take part. The rights, interests, sensitivities and privacy of the village inhabitants were respected throughout data collection.

All personal information was kept confidential and data was anonymised. The focus groups were recorded, with consent of the participants, and transcribed; the tapes were kept in a secure location and will be destroyed after 3 months.

### **3.11 Transcription**

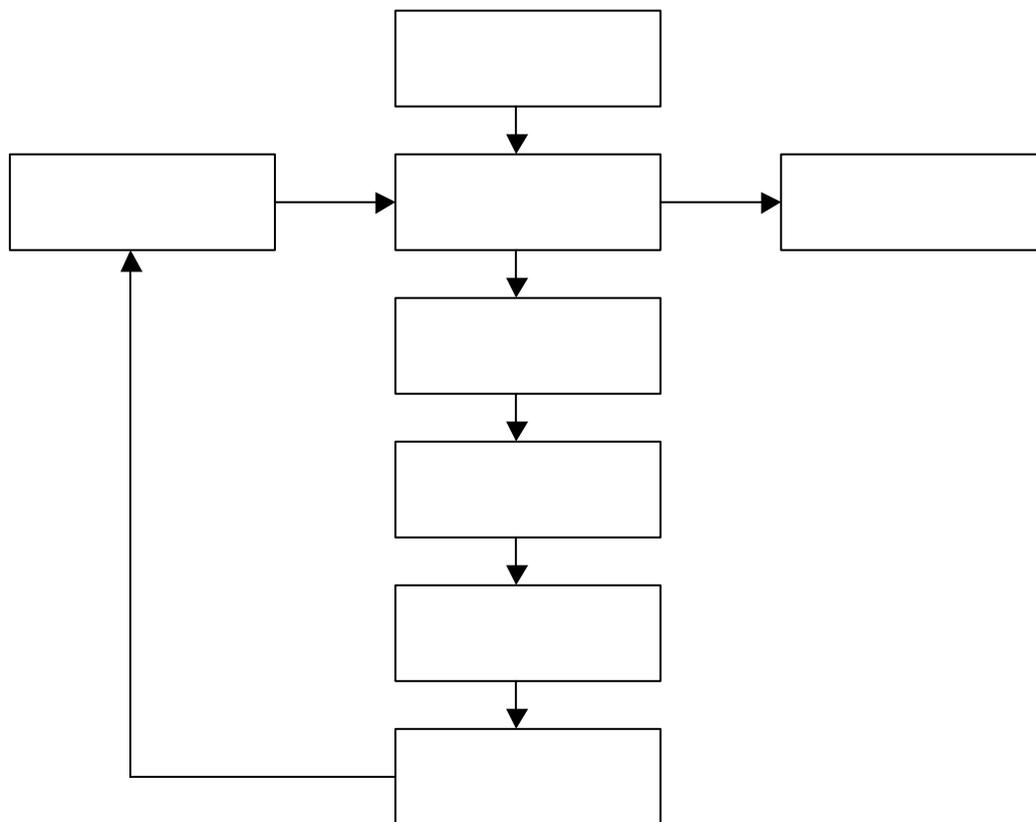
All FGDs and interviews were fully transcribed in Marati, and translated into English by an external translator. This was a limitation since she had not been present at the discussions; however, she was experienced in transcribing and translating, with knowledge of the topic under discussion. The translated transcripts were checked and discussed with both the facilitator and the additional translator who had been present throughout the discussions. Any words or phrases that were ambiguous were reviewed. Preliminary findings from FGD1 and FGD2 were discussed with the participants during FGD3. Ideally the facilitator and translator would have played a more active role in data analysis[19], although since the final analysis was carried out from the UK, coding could not be checked with the facilitator or translator.

### **3.12 Analysis**

Since the goal of the research was exploration and understanding the lived experience of the women, the data was analysed using an editing (data-based) analysis style, as described by Miller and Crabtree[1, 24]. The main stages used in analysis are shown in figure 3.

Meaningful units were selected based on the importance they were given during discussions[22]. For example, very specific responses based on personal experience were given more weight in the analysis than vague comments or 3<sup>rd</sup> person responses.

The meaningful units were coded, or categorised. The codes were sorted and connecting themes were identified and the coded segments were grouped together where appropriate. The coded and sorted meaningful units from the text are shown in Appendix 8. Full copies of the transcripts are available on request. Field notes as well as FGD and interview transcripts were included in the analysis.



*Figure 3 adapted from [1]: Data analysis*

This form of analysis runs the risk of de-contextualising the data leading to a loss of meaning or a wrongly attributed meaning[1]. To prevent this I continually checked the coded segments with the original transcripts, making sure that the patterns still agreed with the context from which they were collected[25]. The themes used in analysis are shown in table 3.

### **3.13 Reflexivity**

My background is as a medical student, having carried out a literature review into the effect of improved cook-stoves on acute respiratory infections in young children. I was very aware of the problems of indoor air pollution on people's health; therefore it was important that I did not let these preconceived ideas influence the research or the analysis. I had to consciously make sure I didn't ask questions and force answers that would fulfil any of my preconceptions.

It was important that I separated myself from any preconceived ideas I had before reading the data. This critical self-examination was equally important throughout the research process, from formulating the research questions to the writing of this report. A structured method of data collection and analysis was followed to reduce the risk of subjectivity in what I chose to see or write up[17].

Main theme	Sub theme	Sub-sub theme	Sub-sub-sub theme
Facilitators	Perceived advantages	Fuel savings	Less work collecting wood
		Time savings	Two potholes opposed to one
			More time to work in field or rest
		Less smoke produced	Health benefits
			Cleaner kitchen
	Lasts longer	Don't have to buy a new stove as often	
	Easy to adopt	Aesthetically similar to traditional stove	
		Burns the same fuel as traditional stove	
Constraints	Disadvantages	Expensive	Cannot afford it
			Cheaper alternative available
			Not available locally
			Men control money
		Grate	Size of hole for wood is reduced
	Cracks in stove		
	Lack of perceived need	Resistance to change	Traditional stove is adequate/better
		Lack of information	Long term benefits not obvious (economic/ health)

*Table 3: Themes used in analysis*

## 4.0 Findings

This study reveals two main groups of factors that facilitate the utilisation of improved stoves in this village, and two main groups of constraints. These are shown in table 4 and presented in more detail below. Quotes that best illustrate the points being made are shown in tables in each section. See Appendix 8 for further evidence.

Facilitators	Constraints
Advantages of Bhagyalaxmi stove: Fuel savings Time savings Less smoke produced Lasts longer <b>Easy to adopt</b> Aesthetically similar to traditional stove Burns the same fuel as traditional stove	<b>Disadvantages of Bhagyalaxmi stove:</b> Too expensive Cheaper alternative available Not available locally Men control money Grate- size of hole for wood is reduced <b>Lack of perceived need</b> Traditional stove is adequate/better Long term benefits not obvious

Table 4: Facilitators and constraints to improved stove use

### 4.1 Facilitators

#### 1) Advantages of improved Bhagyalaxmi stove over traditional stove

When asked about the advantages of the improved stove in compared to the traditional stove, fuel savings were consistently the first answer the women gave. This was followed by time saving. Both of these were constantly referred to throughout all focus group discussions and individual interviews and women gave numerous accounts of personal experiences. Women not only save time from cooking, but also from having to collect less firewood. They said they were able to take rest or work in the field during this saved time.

Women using the improved stoves (FGD1) added that the improved stove produces less smoke, and were able to describe both health benefits and benefits to the cleanliness of their kitchen. These women also recognised the advantage of the increased lifespan of this stove compared to the traditional stove.

Advantage	Supporting quote / Evidence
Fuel-saving	“We use nearly half the bundle” (of wood each time we cook)...”We were using the whole bundle for one time before this stove” (FGD1 pg 3) “We save trouble of gathering and bringing wood” (FGD3 pg4)
Timesaving	“There are two mouths, so cooking is done quickly” (FGD1 pg1) “We can cook on one mouth and we can heat the water on the other mouth simultaneously” (FGD1 pg3) “The other women who use these stoves tell us that they can finish their cooking on time, that is quickly (FGD2 pg2)”
Less smoke	“There is less smoke, because of this reason I like this stove more” (FGD1 pg.6) “There was irritation in the throat, burning in the throat, that has become less. That is the advantage. Eyes used to get red, there was burning in the eyes. We

	are saved from this trouble by this stove.” (FGD3 pg3) “With the mud stove the pot gets darker and it carries dark black carbon. But improved stove it carries less dark carbon” (SSI2 pg1)
Longer life of stove	“We had to change that stove (traditional) after one year, now we do not have that tension” (FGD1 pg4)

*Table 5: Advantages of the improved stove*

2) Bhagyalaxmi stove easy to adopt by women

Other features of the improved stove facilitated easy adoption by the women. These included its aesthetic appearance, which is very similar to the traditional stove, and its design, which enables the same fuels to be burnt.

Features	Supporting quote / Evidence
Aesthetically similar to traditional stove	Photos of traditional(a) and improved Bhagyalaxmi(b) stoves in situ. (note: (b) also has a traditional stove added on to the left side)  (a) (b) “There is only one difference and that is the traditional stove is made from mud and this stove is made from cement.” (FGD1 pg4)
Same fuel	“We use wood in the traditional stove and this stove also, so we do not feel any difference” (FGD1 pg.4) There is very little difference in the way the traditional and improved stoves are lit (Field notes pg.7)

*Table 6: Features facilitating adoption of improved stove*

## 4.2 Constraints

### 1) Disadvantages

The main constraint to purchasing and using the Bhagyalaxmi stove perceived by women in this village is the cost of this stove.

There was also confusion around the actual cost of the Bhagyalazmi stove, since many of those who had bought the stove for the intervention study had only paid the first instalment of Rs100. Women in FGD2, who had not bought the improved stove, told me the price was Rs100, and that this was too much for them. Further discussion with the co-ordinator of the improved stove program confirmed that the actual cost of the stove was Rs180, not including transport costs. This higher price was mentioned to the women in FGD3, and their reaction was to laugh.

A number of different discussions related to the price of the Bhagyalaxmi stove. Women without the stove said they could not afford it, often quoting how much cheaper the traditional stove was. Because it is not available locally they also have to pay transport costs from Pune, 45km away, increasing the cost.

SSI's also provided additional information, such as the influence of men on the decision to buy an improved stove. During the FGD's the women insisted that it was their decision, but when later questioned, it became clear that where money is scarce, they must convince their husbands of its worth before he would pay for it, as it is the men who assume greater positions of power and are in charge of the money.

Disadvantage (Cost)	Supporting quote / Evidence
Cheaper alternative available	"We are poor. We buy this stove (mud) for Rs50/- only, that stove costs us Rs. 100/-. Then we think why should we spend Rs50/- more to get that?" (FGD2 pg2)
Not available locally	"Now if she wants to buy, the transportation is the problem, to bring that cook stove from Pune to here" (FGD3 pg6) (If ARTI would not bring them) "Then we will have to install mud stoves again" (FGD1 pg7)
Men control money	"The man will ask why we need the improved stove" (SSI1) "He will buy if it is cheaper"(SSI1) "The members in our families backed out when they heard the price." (FGD2 pg3).

*Table 7: Disadvantages of the improved stove that are related to cost*

Other disadvantages of the Bhagyalaxmi stove that were discussed included the presence of the grate, which decreases the hole size where the fire is burnt. Women using and not using the improved stove viewed this feature negatively. Women using the stoves were disappointed that cracks appeared in the front section of the stove as soon as they used it. I was informed that these cracks are normal because of the heat generated and close after the fire goes out.

Despite being well adapted to fulfil the main cooking necessities in the village, many women still used the traditional stove for activities such as boiling water. They said that tasks such as boiling water were quicker on the traditional stove. Practices

depended on the size of their family and the time available; they used the traditional stove if they were in a hurry.

Disadvantage	Supporting quote / Evidence
Grate	<p>“The thing is like this, we did not have grate in our traditional stove, so we found it very awkward.” (FGD1 pg7)</p> <p>“There is a grate below, because of the grate we also feel it blocks our work. The hole there becomes very narrow, that prevents us to put more fuel wood.” (FGD2 pg2)</p>
Cracks	<p>“I tell you madam, these stoves are very good from all sides. But every stove has cracked in the middle of the mouth”. (FGD1 pg4)</p>

*Table 8: Disadvantages of the improved stove*

## 2) Lack of perceived need

The overwhelming consensus among women who were not using the improved stoves was that they didn't need the improved Bhagyalaxmi stove.

Some of the issues raised were that they were satisfied with their traditional stoves which were adequate or even better than the improved stoves for some tasks, that they are not used to looking at the long term benefits of things, and a lack of information about the improved stove and the long term health risks of IAP.

Lack of perceived need	Supporting quote / Evidence
Resistance to intervention	<p>R: If these people want us to become forward, what difference does it make to us? We buy our present stove for Rs40/- only (FGD2 pg4)</p>
Satisfaction with traditional stove	<p>“New things are for those who want luxury items” (FGD2 pg2)</p> <p>“Now we feel our present stove is good enough for us.” (FGD2 pg2)</p> <p>“Our present ‘laxmi’ stove (traditional) looks sweet to me” (FGD2 pg2)</p>
Lack information	<p>“We did not have information about these stoves” (FGD 3 pg6)</p> <p>“They say...if I don't use the stove, and the other person is using the stoves, it's not like she's falling sick the next day or maybe two months time, it's a long term process, that's something in the future, they really don't bother about the future.” (KI interview1 pg6)</p> <p>Long-term health risks of IAP were not known.</p>

*Table 9: Lack of perceived need for the improved stove*

### 4.3 Improvements

In general these women were very satisfied with the Bhagyalaxmi stove. However, a significant proportion were not using it, either because they were not willing, or not able, to buy it. Their main recommendation to improve its utilisation was simply to reduce the cost. One woman suggested adding pot raisers to make local pancakes, but the other women did not agree that these were needed.

Recommendation	Supporting quote / Evidence
Reduce cost	“If you reduce the price many people can use these stoves” (FGD3 pg11)

*Table 10: Recommendations to improve utilisation of the improved stove*

### 5.0 Discussion

The reduction in smoke, which I perceived to be the most important benefit, was not the main advantage quoted by these women, and was not mentioned at all by the women in the second FGD, which consisted only of women not using the improved stoves. Women using the improved stove did give specific examples of the benefits of less smoke, but only after being probed on the issue. This suggests that reducing smoke is not perceived as a main advantage of the Bhagyalaxmi stove by these women.

This finding contrasts to a study in Nepal, where 92% of households using the improved stove reported less smoke as the main advantage of the improved stove[26]. This may reflect a greater capacity of the New Nepali cook-stove, which had a flue, to remove smoke. These perceptions could also reflect the knowledge of health risks, a community based child health project informed the Nepali study population that less smoke could reduce ARI mortality[26]. A study in India also reported that users of the improved stoves ranked the removal of smoke from the household as a higher priority than energy saving[27].

From a health perspective, either the women do not know about the health risks of IAP, or they don't perceive them to be important. Having spent time cooking with these women and observing their activities in the village I believe that they do not perceive smoke to be a problem that is going to be solved while still cooking with wood. They have been exposed to smoke whilst cooking all of their lives, and come across so many discomforts in their daily life that a bit of smoke is something they can deal with. Villagers have developed other methods of reducing smoke, such as using dry wood or only burning certain types of wood that burn with less smoke. This evidence suggests that there is a need to raise awareness of the health risks of IAP, which were not known about in Nanegaon.

The predominant advantages of the Bhagyalaxmi stove, according to these women, was the fuel saving and time saving. This supports previous research which has also shown these to be perceived as significant advantages of improved stoves[28-31]. This is not surprising since fuel saving has been the focus of many stove dissemination programs, and the extra heat going to the second pothole is designed to

save time. It is encouraging that the users feel these benefits. Both women using and not using the improved stoves were aware of these advantages, suggesting these issues had been discussed in the village, increasing the internal validity of these findings.

The increased lifespan of the Bhagyalaxmi stove, is because it is made from cement rather than mud. This was discussed by the women who were using this stove, but not by the women using the traditional stove. Since the stoves were only introduced to Nanegaon two years ago, the increased life has yet to have a significant impact on these women. However, this has meant the Bhagyalaxmi stove has not been made locally, because of lack of expertise, which has significant drawbacks[32] and implications for the long term sustainability of this intervention.

Corroborating previous research[29, 33], the most significant constraint to the adoption and subsequent utilisation of the Bhagyalaxmi stove that the women perceived was the cost. A study in Lucknow[34] reported that the people could afford the improved stove, but they would have to be very certain of the benefits to justify such an expense. Findings suggest that the situation is the same for a number of households in Nanegaon. Equivalent to roughly three times their daily wages<sup>3</sup>, an improved stove is a significant investment, however, it is not impossible. Indeed, comments about the cost of the Bhagyalaxmi stove often compared it to their traditional stove, which is much cheaper, and did not merely say it was too expensive. If there was no alternative, I believe a significant proportion of the households could afford this stove. However, there is an alternative. Therefore to justify the additional cost, the improved stove must be perceived as worthwhile investment.

A significant proportion of the women in Nanegaon did not perceive the Bhagyalaxmi stove to be a worthwhile investment and showed resistance to this intervention, and felt that outsiders were forcing them to change. They were aware of the benefits discussed above, but still didn't feel they needed the improved stove; traditional stoves have been around for thousands of years and have evolved to meet the local needs in a way that is affordable to the users[35]. This reinforces the need to acknowledge and incorporate these women's knowledge into the design of improved stoves. Community participation can achieve this, and projects using these methods are showing signs of success[11, 34].

The only practical disadvantage that the women perceived was the presence of the grate. Participants had difficulty adjusting to the grate, and disliked having to chop wood into smaller pieces to accommodate the grate. Some women had removed the grate completely, thus compromising its efficiency and role as an improved stove. This re-enforces the need for participatory activities, which ensure women understand the role of the different features of the improved stove.

It also became clear during the course of the study that successful adoption and utilisation of an improved stove is not merely about convincing the women of the benefits of the improved stove, but also about convincing the men. Studies in Kenya[28] and Mexico[29] have also acknowledged this barrier, and women in Kenya suggested promoting the advantages of interventions to reduce IAP to men in terms of

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<sup>3</sup> According to estimates given by key-informant

comfort, that they can “drink beer in the cool of their kitchen”[28], as a means to addressing the finance issue. However this was a sensitive issue and not discussed widely by the women in Nanegaon, these comments are based on observation and one individual interview. Had more time been available it would have benefited this research to have interviewed or held FGD with men from the village to determine their perceptions of the improved stoves.

### **5.1 Policy Implications**

From a health perspective, it is important that households, who are currently cooking on open fires or traditional stoves, adopt improved stoves that can reduce IAP and its associated health risks. Given the international importance placed on reducing IAP, international organisations such as the WHO or the World Bank should provide means of achieving these goals and promoting the use of improved stoves to those in greatest need. This study has shown that changing a culture of cooking on traditional stoves or fires is challenging. It needs a combination of targeted strategies and collaboration between international and local organisations.

The women’s recommendation to improve the utilisation of the Bhagyalaxmi stove was simply to reduce the cost. Reducing the cost would increase the number of people who could afford, or justify, this expense.

Subsidies are one method of reducing the cost. Reports suggest that subsidies lead to low value being placed on the stoves, indeed subsidies have not been successful in India in the past[13]. However, ARTI subsidised the Bhagyalaxmi stoves in this village, and they are being used by the women who own them, suggesting that with the right support subsidised stoves can be implemented successfully. It may be the lack of support, rather than the presence of the subsidy, that leads to the failure of the subsidy approach. This is an area that should be explored more thoroughly.

Internationally, the most successful intervention programs target subsidies towards the commercialisation of the stoves[27]. Commercialisation of improved stoves can potentially introduce competition and lower the price of the stoves in a sustainable way[7]. An alternative method of finance is the provision of micro-credit to households to support the purchase of an improved stove and is receiving growing attention[36]. Whichever scheme is developed, it must be carefully assessed and designed to meet the needs of those in greatest need and enable diffusion of the improved stoves to the poorest households.

However, other discussions and observations do not indicate that by simply reducing their cost, utilisation will be increased. In addition, the advantages of the improved stove need to be realised by the potential users. Awareness campaigns should be used to highlight these benefits of the improved stoves. This study suggests that in this village is more effective to focus these campaigns on the fuel and time saving abilities of the improved stoves, rather than the health benefits, which are given a lower priority in these women’s minds. Campaigns should be preceded by surveys of user needs and perceptions. Social marketing uses marketing techniques to motivate consumer behaviour to achieve socially desirable ends such as improvements in health[7]; the promotion of improved stoves as to address this public health problem

is likely to benefit from social marketing. Marketing and awareness campaigns should target men as well as women.

Finally, the women must feel that they are choosing to adopt the improved stoves. Community participation in every stage of design and dissemination of improved stoves will help to achieve this.

Although current policy acknowledges the importance of reducing IAP, specific strategies are not suggested as to how to achieve this. Based on the constraints identified in this case study, policy measures which could be adopted by international organisations, governments and local NGOs, should include the following strategies:

Constraint	Strategies
Cost	Subsidies Commercialisation of improved stove Micro-credit schemes
Not available locally	Train local artisans to make improved stove
Lack of perceived need Resistance to change Lack of information	Awareness campaigns Social marketing Community participation
Men control the money	Include men in awareness campaigns

*Table 11: Recommended strategies to improve utilisation of improved stoves*

There is a close relationship between poverty and dependence on poor quality fuels. Improved stove projects should be part of a wider development strategy to alleviate poverty and reduce IAP. Other interventions, such as behaviour change, or switching to cleaner fuels, should not be discounted, and integrated approaches to tackling IAP should be developed.

## **5.2 Limitations of the study**

This study focused on facilitators and constraints from the perspective of women from the village. As indicated in previous research, the processes involved in the design and dissemination of improved stoves will also have a significant influence on the uptake and utilisation of the improved stoves, and on the attitudes and perspectives of these women. A detailed examination of the processes involved in the design and dissemination of the Bhagyalaxmi stove was not incorporated into the analysis of this study. I realise this will have implications for the policy recommendations and is a limitation of this report.

### *Generalisability*

The facilitators and constraints discussed will differ between regions and culture depending on the type and use of improved stove, limiting the generalisability of this research. However, there will be similarities, and as such the findings of this research can be extrapolated to similar populations in other areas. The research methods and

findings may help others to investigate sufficiently similar situations and in this way the research may become transferable.

### *Sampling*

During the sampling of participants for FGDs and interviews, I was not made aware of the refusal rate, although I was informed some women were very busy and could not come. In addition, my key informant may have selected a certain sub-group of women to participate, which would have implications for the representativeness of my findings. However, having spent time in the village I am confident that the participants in the focus groups were representative of the population.

### *Time*

The study was particularly limited by time, both during the field-work and during the analysis of the data. Had more time been available, more focus group discussions could have been held throughout Maharashtra to gain a more representative perspective of the facilitators and constraints that influence the utilisation of improved cookstoves in Maharashtra. In addition many of these advantages described, such as smoke removal, cannot be easily quantified, and without spending more time developing a deeper understanding of the way these women live, it is difficult to assess the importance that they attach to the various benefits they have described.

### *The Hawthorne effect*

There was a risk that the study population may have behaved in an atypical way because they knew they were being observed[17]. Efforts were made to establish rapport with the women to minimise this effect.

### *Language and translation*

Not being able to speak the local language was a significant barrier. I was forced to rely on my translator throughout all discussions and interviews. Participant observation enabled me to collect data, without the need for any language or the possible problems associated with translation. However, despite being able to observe participants behaviour during FGDs it was difficult to link behaviour with questions during analysis. In addition to the inevitable problems with translation, such as the limitations in reproducing direct quotations [19], I experienced some additional problems with translation (discussed below), which may have implications on the reliability of my data.

Although my translator/facilitator appeared to understand when I spoke to her, and I had been reassured that she was capable of translating the focus group or interview questions herself prior to the discussions, when I received the translated transcripts back it seemed, despite our extensive discussions, she had not fully understood my instructions. I had devised the questioning route to minimise differences in the ways the questions could be interpreted; however, the questions asked by my translator/facilitator did not reflect the consideration I had put into the wording of the questions. In addition, she deviated from the question route, skipping some questions if they were similar to previous questions; my motivation for including them was the

different phrasing used might encourage discussion on a different aspect of the answer[22]. These subtle differences in language were not apparent to my facilitator and perhaps reflect the limitations of translation.

These issues reflect a communication problem between my translator and myself. This may have been due to simple misunderstanding, exacerbated by the power differential between the community translator and myself, as discussed by Temple and Young[19], or it could be attributed to cultural differences, as we placed different emphasis on the relative importance of different aspects of the research.

Nevertheless, although the FGDs were not run entirely as I had planned, after reflection and discussion of these issues with the coordinator of ARTI and my translator, I realise that her modifications were made with the best intentions and may have strengthened the research in some ways. She asserted that had she asked the questions as I had planned, the women would not have answered. Coming from the same village as the women she had the advantage of being familiar with them, their culture, and way of thinking; she had also conducted FGDs with them before. Although some modifications were detrimental to the research, with some inappropriate use of leading questions, since the context of the answer was considered in analysis, the validity of the results will not have been affected. I am confident that an accurate picture of the women's perceptions has been given. This experience has highlighted the need to balance carefully worded interview schedules with the more culturally sensitive knowledge of the translator.

In light of these experiences, if I were to conduct the research again I would ensure that I checked the facilitator's understanding prior to the FGD, by asking questions about what we had discussed. In addition I would ensure the FGD questions were translated into Marati, then back translated into English so I could ensure the wording was correct and discuss any differences prior to the FGD. In a situation like this using a topic guide for FGD questions[22], instead of the questioning route, may be more appropriate, giving the facilitator the freedom to ask the questions in the way she feels is most culturally appropriate. I would give consult more with the local translator during the construction of interview schedules and ensure the facilitator was fully trained in running FGDs and not rely solely on recommendations of previous researchers. I would run a pilot FGD so any problems could be rectified before formal data collection begins.

## **6.0 Conclusion**

This study has explored the facilitators and constraints influencing the utilisation of improved stoves in Nanegaon village in Western Maharashtra. The main advantages of the Bhagyaxmi stove, which facilitate its utilisation, were that it saves households fuel and time. It also produces less smoke. In contrast to previous research the reduction in smoke was not the main advantage. The main constraint to using this stove is the initial cost, which is more than four times the cost of the traditional stove. Women did not feel they needed the luxury of this improved stove at this extra cost, and believed that more people would use the stoves if they were cheaper. Improved stoves are being used in the village although at present an improved stove has not been purchased since the initial dissemination, indicating that the constraints outweigh the facilitators.

This study suggests the need for further measures to minimise the constraints and promote the facilitators. Given the global burden of disease attributed to indoor smoke, specific policy measures should be developed to reduce IAP. Such strategies could include re-introducing subsidies, introducing micro credit schemes, awareness campaigns and social marketing, although more research is needed to determine the effectiveness of these measures in a range of settings. Promotional strategies should acknowledge that reducing smoke is not always perceived by users as the main advantage of improved stoves. The influence of men on the uptake of improved stoves could be an important determinant of success, more detailed analysis of their involvement would enable targeted strategies. It is clear from this research that more account needs to be taken of people's needs and perceptions, to ensure successful implementation and utilisation of improved stoves and a reduction in the adverse health effects associated with IAP. To have a lasting effect improved stoves should be considered as part of a wider program of alleviating poverty.

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## Appendix 1

Village characteristics	
Distance from Pune	45km
Population	500
No. of households	70
No. of households using	
- Improved Bhagyalaxmi stove	20
- Traditional mud stove	60
- Gas	2
Range of household size	Jan-15
Monsoon season	Jun-Aug
Average temperature	25°C
Temperature range	1°C - 37°C
Literacy Rate	Unknown
Average annual income	Rs25-30000/-
Average cost of food for 1 week	Rs300/-

*Table 1: Contextual background information*

Appendix 2

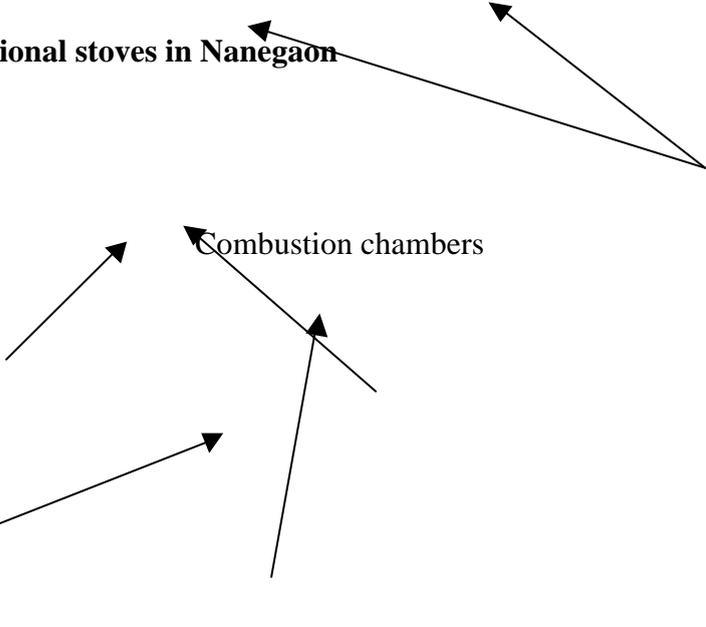
**Improved Bhagyalaxmi stove**

Grate

Combustion chamber

**Traditional stoves in Nanegaon**

2 pot holes  
Pot raisers



## Appendix 3

### **Key informant interview – Karabi Dutta**

Introduction and background given

1. Can you tell me about ARTI's improved stove program
  - How long have you been disseminating stoves?
  - What type of improved stoves do you disseminate?
  - How do you promote the stoves in rural areas?
  - What is the main aim of ARTI?  
Health/development/money/combo
2. How is ARTI affiliated to the government scheme of distributing improved stoves?
  - Do you advertise the metallic stoves to people living below the poverty line? How does this affect the dissemination of the other smokeless stoves?
3. How much do the improved stoves cost?
4. How do you view the uptake of improved stoves in Nanegaon?
5. How does Nanegaon compare to other villages in Maharashtra?
  - Is Nanegaon typical of villages in Maharashtra?
  - What about villages that opt for chimney stoves?
6. In your opinion what are the main factors that influence the utilization of improved stoves in Maharashtra, and in particular in Nanegaon?

### **Key Informant interview – Jenny**

Introduction and background given

1. Can you tell me about the improved stoves in this village
  - When were they first introduced?
  - What do you think of them?
  - Do many people in this village use them?
  - How easy is it for people in the village to buy an improved stove?
2. In your opinion, are the improved stoves good for people in this village?
  - Why good/bad?
  - What is good/bad about them?
3. What do you think makes people buy and use the improved stoves?
  - Have money/use less firewood/ supportive family/understand benefits?
4. What do you think prevents or stops people from buying and using the improved stoves?
  - Cost of stoves? Don't like to change? Traditional chula is ok?
5. Do you have any suggestions of ways to improve utilization of improved stoves in this village?
  - Change to chula? More subsidy? Easier access?
6. Summary. Is this correct? The aim of this research is to explore the factors that help people to use the improved stoves, or stop people from buying and using the improved stoves. Is there anything else you can think of that might be important?

## Appendix 4

### Focus group 1 – with women using the improved stoves

#### Introduction

Thank you all for coming, this is Zoe from the UK, she is a student at university doing a project about smoke in people's homes. She is interested in the effects of cooking smoke on people's health and wants to hear your thoughts and opinions on the improved stoves that you have bought. This will help her understand the situation in this village. She is not selling stoves, this is just a research project. She hopes her report will help improvements be made to stove projects so there is less smoke in people's homes. She is just as interested to know if you think the improved stoves are worse, the same or better than the traditional stoves. There are no right or wrong answers. Anything you say is confidential, and when I write the report I will not use any names. If it is ok with you we will record the discussion so we can remember what is said. Only one person should talk at a time. It should take around 1 hour, but you can leave at any time you want.

#### Questions:

1. Can you each tell us your name and how long you have had an 'improved stove'.
2. Can you describe how the improved stove is different from the traditional stove?
3. What does this mean for you?

#### Key questions:

4. What made you buy the improved stove?
5. What do you like about the improved stove?  
*(probe if needed: is there any difference in smoke production? Is this good?)*
6. What do you not like about the improved stove?  
*(probe if needed: does it need cleaning? Produce enough heat?)*
7. How do you find the improved stove to cook with?  
*(probe: can you cook all foods on the improved stove? does it effect the way you cook the food/ the taste of the food that is cooked/ cooking for special occasions, time spent cooking)*
8. Can you think of any reasons why you use the improved stove and others do not?
9. What has made it easier for you to use the improved stove?
10. What has made it difficult for you to use the improved stove?
  - How do you overcome these difficulties?
11. Does anybody sometimes use the improved stove and sometimes use a different stove?
  - If yes, what other stove do you use and when do you use each one?
12. Does anybody else cook in your house?
  - If yes, how do they find the improved stoves?
13. What do the rest of your families think of the improved stove?

### Ending questions

14. Of everything that we have discussed, what do you think is the main reason that has made you keep using the improved stove?

Now Jyoti will give a summary of the main questions and main ideas that have been discussed.

15. Is this a good summary of what you said?
16. The aim of this project is to explore the factors that affect the use of improved stoves in this village, is there anything else that you think makes a difference to whether or not you use the improved stoves that we have not talked about? Is there anything we have missed?

That's the end of today's group.

In around 2 weeks I would like to have another focus group with some of you to talk about some of the things that make it difficult for people to use the improved stoves, and to think about how to make them better and easier to use. We will also talk about what you would like to see done to help with the problem of indoor smoke from cooking. There will be some women who are not using the improved stoves there too. If you can come, could you think about some of the things we have talked about today, and if there are any other things you would like to see done in this village. Thank you very much for your time.

### Focus group 2 – with women not using the improved stoves

#### Introduction

Thank you all for coming, this is Zoe from the UK, she is a student at university doing a project about smoke in people's homes. She is interested in the effects of cooking smoke on people's health and wants to hear your thoughts and opinions on cooking stoves. This will help her understand the situation in this village. She is not selling stoves, this is just a research project. She hopes her report will help improvements be made to stove projects so there is less smoke in people's homes. She is just as interested to know good and bad things about the different stoves that you use. There are no right or wrong answers. Anything you say is confidential, and when I write the report I will not use any names. If it is ok with you we will record the discussion so we can remember what is said. Only one person should talk at a time. It should take around 1 hour, but you can leave at any time you want.

#### Questions:

17. Can you each tell us your name and what type of stove you use.
18. Can you describe the stoves you are using at the moment?  
*(probe if needed: what they look like, how many pots, fuel)*
19. What is good about the stoves you are using at the moment?
20. What is bad about the stoves you are using at the moment?

#### Key questions:

21. What do you think about the improved stoves?  
*(probe: has anyone had any experience with the improved stoves? Has anyone used them and stopped using them? If yes, ask what made them stop)*
22. What do you think is good about the improved stoves?  
*(probe: difference in smoke production? Is this good? Do they think indoor smoke is a problem?)*
23. What do you think is bad about the improved stoves?  
*(probe: does it need cleaning? Produce enough heat?)*

24. What do you think you would change if you bought an improved stove?

*(probe: can you cook all foods on the improved stove? Do you think it would effect the way you cook the food/ the taste of the food that is cooked/ cooking for special occasions, time spent cooking/ smoke in the kitchen)*

25. What stopped you from buying an improved stove?

26. Would you like a new stove?

If yes - What makes you want an improved stove?

- What makes it difficult for you to buy or use the improved stove?

- What would make it easier for you to buy or use the improved stove?

27. Does anybody else cook in your house?

- If yes, how do they find the improved stoves?

28. What do the rest of your families think of the improved stoves?

Ending questions

29. Of everything that we have discussed, what do you think is the main reason that has stopped you from buying or using the improved stove?

Now Jyoti will give a summary of the main questions and main ideas that have been discussed.

30. Is this a good summary of what you said?

31. The aim of this project is to explore the factors that affect the use of improved stoves in this village, is there anything else that you think makes a difference to whether or not you use the improved stoves that we have not talked about? Is there anything we have missed?

That's the end of today's group. In around 2 weeks I would like to have another focus group with some of you to talk about some of the things that make it difficult for people to use the improved stoves, and to think about how to make them better and easier to use. We will also talk about what you would like to see done to help with the problem of indoor smoke from cooking. There will be some women who are using the improved stoves there too. If you can come, could you think about some of the things we have talked about today, and if there are any other things you would like to see happen in this village. Thank you very much for your time.

### Focus group 3 - with 3 women from the 1<sup>st</sup> focus group and 3 women from the 2<sup>nd</sup> focus group

Thank you all for coming back. To remind you, this is Zoe from England. She is a student at university doing a project about smoke in people's homes. She is interested in the effects of cooking smoke on people's health and would like to hear your thoughts and opinions on the improved stoves, and what makes it easy or hard for you to use the stoves. She is not selling stoves, this is just a research project.

She hopes her report will help improvements be made to stove projects so there is less smoke in people's homes. There are no right or wrong answers. Bad things are just as important as good things. Anything you say is confidential, and when I write the report I will not use any names. If it is ok with you we will record the discussion so we can remember what is said. Only one person should talk at a time. You can leave at any time you want.

In the first focus groups we discussed what you thought of the improved stoves. The main points you raised were that.....

1. Is this correct? Is there anything you want to add to this?

As a group I would like you to decide which thing made you want to buy and use the improved stoves the most (good things about the improved stoves).

2. Can you explain why \_\_\_\_\_ is the most important? Do you all agree? ...etc.
3. You said the improved stoves produce less smoke.
  - What does this mean for you?
  - Why is smoke a problem?
  - Why is reducing smoke good?
4. You said the improved stoves use less wood
  - Why is this good?

I would now like you to think about what stopped you using, or stopped you from buying an improved stove (problems with the improved stoves). Which is the most important?

5. Can you explain why? Do you all agree? ...etc
6. You said the improved stoves were expensive
  - How much does an improved stove cost in relation to how much your family earns?
  - Did you or would you have to sacrifice (go without) something to buy an improved stove?
7. Someone said they sometimes boil water on the traditional stove instead of the improved stove.
  - Why do you use the traditional stove for this?
  - Do lots of people do this?
8. Now I would like you to think about the problems with the improved stoves. Can you think of ways of reducing these problems?
  - How about those of you who are using the improved stoves, how have you overcome these problems?
9. How can we make it easier for you to buy and use the improved stoves?

10. Do you think this would make more people use the improved stoves?

11. What would you like to see done to help with the problem of indoor smoke in this village?

12. Summary. Is this correct? The aim of this research is to explore the factors that help people to use the improved stoves, or stop people from buying and using the improved stoves. I also wanted you to come up with some ideas on how we can make it easier for you to use the improved stoves. Is there anything else you can think of that might be important? Thank you very much for your time.

## Appendix 5

### Semi structured interview with women

This is Zoe from England. She is a student at university doing a project about smoke in people's homes. She is interested in the effects of cooking smoke on people's health and would like to hear your thoughts and opinions on the improved stoves, and what makes it easy or hard for you to use the stoves. She is not selling stoves, this is just a research project.

She hopes her report will help improvements be made to stove projects so there is less smoke in people's homes. There are no right or wrong answers. Bad things are just as important as good things. Anything you say is confidential, and when I write the report I will not use any names. If it is ok with you we will record the discussion so we can remember what is said.

1. Can you tell me about your day in relation to using the stove?
  - What do you use your stove for?
  - When do you use your stove?
  - What fuel do you use in your stove?
  - Where do you get this fuel from? Does this take long? Is it hard work? Who helps you with this?
2. How is the improved stove different from the traditional stove?
3. What type of stove do you use?

If using the improved stove

4. Why do you use the improved stove?
  - What do you like about it?
  - Was it easy to buy?
  - Will you buy another one if this one breaks? Why?
5. What do you not like about the improved stove?
  - Time? Size of wood?
6. Do you sometimes use the traditional stove as well? When? Why?

If not using the improved stove

- 4a. What do you think of the improved stove? Good/bad
  - If good: Why have you not bought an improved stove?
7. Summary. Is this correct? The aim of this research is to explore the factors that help people to use the improved stoves, or stop people from buying and using the improved stoves. Is there anything else you can think of that might be important?

## Appendix 6a

### Check list for Jyoti for focus groups

Before focus group:

? Invite 7 or 8 women to participate each focus group according to the given criteria

Focus group 1: women (age 16+) using the improved stove

Focus group 2: women (age 16+) not using the improved stove

Focus group 3: women from focus groups 1 and 2.

? Make sure all the women understand the purpose of the focus group – tell them information from the information sheet and get consent

? Make sure the note-taker is coming and understands what she has to do:

- *Draw a diagram of the seating arrangement*
- *Complete a participant information form with observed background information on each participant*
- *Write notes, including the key points of the discussion, notable quotes and important observations (silent agreement, obvious body language, indications of group mood, irony or contradictory statements when the meaning is opposite of what is said).*

? Make sure you understand all the questions, if you do not understand them, tell me and I can explain or get someone else to translate.

During the focus group:

? Make sure all the women talk

? Make sure the women talk one at a time

? If the women all agree, ask if anyone thinks something different

? Make sure you leave time for women to add comments, don't move on too fast

? If the women say something that is not clear, ask for more information

- ask them to explain
- ask for a example of what they mean
- ask them to say more, or describe what they mean

? Be neutral, don't agree or disagree with the women.

## Appendix 6b

Checklist for me

#### Before focus group

- ? Test the recorder (turn it on, talk and walk around the room, play back)
- ? Ensure the moderator is clear about her role and responsibilities
- ? Ensure the note-taker is clear about her role and responsibilities

#### During focus group

- ? Ensure all the women are talking
- ? Draw a diagram of the seating arrangement
- ? Complete a participant information form with observed background information on each participant, watch their body language

#### Immediately after focus group

- ? Spot check the recording to ensure proper operation
- ? Feedback from moderator
- ? Write my impressions of the focus group

## Appendix 7

Nuffield Centre for International Health & Development  
Leeds Institute of Health Sciences



**UNIVERSITY OF LEEDS**

**TO WHOM IT MAY CONCERN**

12/04/2007

Dear Sir/Madam,

**Re: Zoe Catherine Anderson**

This letter is official confirmation that Zoe Catherine Anderson is registered as a full-time student on the twelve month Intercalated BSc in International Health first class honours degree programme at the Nuffield Centre for International Health and Development, University of Leeds during the academic year 2006/2007.

I had the opportunity to observe Zoe closely during the term time as the Programme Director of this degree. Zoe always took extra initiative to accomplish the given tasks and assignments on time, and participated actively in group works and presentations. I can confirm that Zoe also demonstrated good analytical skills and logical approach to problem solving while writing the Project A (Literature Review).

Zoe Catherine Anderson will be completing the fieldwork for a small study entitled "Reducing indoor air pollution: what factors affect the use of improved cook-stoves in a rural community in Maharashtra, India?" during April to June 2007. The supervisor for this project is Dr. Kamran Siddiqi. As part of the preparation for the research project, Zoe has interrogated the ethical implications of this research through completing an ethical approval process here at the University of Leeds, and approval has been granted.

If you require any further information concerning Zoe Catherine Anderson, please don't hesitate to contact me.

A handwritten signature in black ink, appearing to be 'Dr. Abu Naser Zafar Ullah'.

Dr. Abu Naser Zafar Ullah  
Programme Director  
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## Appendix 8

### Information

I am a 4<sup>th</sup> year student from the University of Leeds in the UK, doing a small research project as part of the course.

The main aim of this project is for me to learn a little bit about the things that you like or don't like about the new cook-stoves, and how these things affect your use of these stoves.

My intention is not to judge you on whether or not you use a stove, but to try and understand a bit about how these stoves have affected your life and how you cook.

By agreeing to take part in this project you will be asked to fill in a very short questionnaire and take part in a group discussion about these things with me, my translator, and about seven other women on

.....(insert time and venue)

The discussion will last for as long as you want it to, it might last about 1 or 2 hours. You will be free to leave at any time. You do not have to say anything if you don't want to.

The discussion will be tape-recorded. These recordings are to help me make sure I can accurately remember what you say. They will only be listened to by the translator and transcribers, no one else will hear them. Your names will not be made known to anyone outside the group.

I ask you not to repeat anything anyone says in the discussion outside of this group.

I will arrange a meeting with your group at the end of the study period, to give you an idea of the things I will write up. I will not have all the results by then, but I will have an idea of the main points I want to say. This will give you a chance to say if I am drawing the right conclusions from our discussions, and if I have understood what you meant.

The results of this study will be given to the co-ordinator of the stove project and other people interested in the improved stoves. They will be used to inform future projects, so that the stoves can be made to fit in better with your lifestyles, and you can enjoy less smoke in your homes. Nothing you say will disadvantage you in any way.

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### Consent

*I have understood the aims of this research project, and what I have to do. I understand that I can withdraw from the study at any time.*

## Appendix 9

### Advantages of improved stove over traditional stove

#### Fuel

R: This stove needs less fuelwood, cooking is done nicely (FGD1 pg1)

R: It needs less fuelwood, (FGD1 pg1)

R: I think fuelwood is required less, and it is easy to cook on this stove. (FGD1 pg2)

R: We need less fuelwood and that is the exact reason behind it

R: Our mud stove (traditional) requires too much fuelwood, but this stove requires less wood, that is why we like this stove. (FGD1 pg2)

R: We use nearly half the bundle...If we bring this much firewood from outside, we can cook two times on that much wood...We were using the whole bundle for one time before this stove(FGD1 pg3)

R: Yes, we can cook on half the bundle of wood(FGD1 pg3)

R: And we need this much smaller sticks (here she must be showing the quantity by hands) (FGD1 pg3)

R: Cow dung cakes are not at all required for this stove(FGD1 pg5)

R: They need less fuelwood, so they tell, (FGD2 pg2)

R: The women who are using these stove say that they need less fuelwood. (FGD2 pg3)

R: Less fuelwood is needed, less cowdung cakes are needed...Because of this advantage, we like the stove (FGD2 pg3)

R: Our mud stove needs too much wood (FGD2 pg3)

R: This needs less fuelwood (FGD3 pg3)

R: We need to bring less fuelwood. We have to make small pieces of wood to use in this stove. We used to need more wood before, now we use less wood(FGD3 pg4)

R: We cannot use large wood, we have to use thin small wood for this stove(FGD3 pg4)

R: What is the advantage to you in this? We save trouble of gathering and bringing wood (FGD3 pg4)

R: There is plenty of wood available here, but we do not have manpower to bring the wood. R: Are the young girls of today are ready to bring wood? (FGD3 pg4)

R: Men go to cut when the wood is of large size

R: Women bring small wood

R: Men make small pieces of big logs, then women make bundles and bring the bundles on their heads

R: They put the bundle on their head and come with the help of walking stick, in their hand(FGD3 pg5)

R: We feel it will be better if we use these stoves permanently. Now we do not have anybody in our households who can go to forest and bring the fuelwood. (FGD3 pg10)

R: I bring wood with my friends. It is hard work. It takes 2.5 hours. In monsoon I don't collect wood. (SSI1)

**R: I collect firewood with 4-5 friends in the morning, 6-8am. It is hard work.**

R: To produce cow dung cakes we collect cow dung and create a round shape and allow it to dry in the sun. It is easy to create cow dung cake.I use cow dung cakes in monsoon season (4 months). Because wood gets wetter in monsoon so to create fire we use wood, cow dung cakes, together. (SSI2)

## Time

R: There are two mouths, so cooking is done quickly. Fire goes to both mouths neatly (FGD1 pg1)

R: If the stove gets heated properly then I can finish my cooking in half an hour. And it needs less fuelwood. (FGD1 pg1)

R: and if the stove gets properly heated, then cooking can be done quickly (FGD1 pg1)

R: Cooking can be finished in one hour to half an hour. I need one hour to finish cooking for 15 persons. (FGD1 pg1)

R: Cooking can be done quickly on this stove. (FGD1 pg2)

R: If we get up at 5 o'clock in the morning, we can finish all our work at about 9 o'clock, including cooking etc (FGD1 pg2)

R: Everything can be done on this stove on both the sides. I mean if I put water for bath on this mouth, I can cook rice on the other mouth at the same time. After that I put curry to cook here and start making Bhakarlis (rotis). That means I can finish every cooking in 1 hour. (FGD1 pg2)

R: The stove gets heated quickly, there is no smoke, cooking can be done quickly, water also gets hot quickly. So we do not need much time, we can finish everything in very short time (FGD1 pg2)

R: we can cook on one mouth and we can heat the water on the other mouth simultaneously (FGD1 pg3)

R: There is no trouble, and cooking is done quickly (FGD1 pg5)

R: We can cook quickly on this stove (FGD1 pg5)

R: But there is always some work or other in our place. women are working, doing this thing or that thing, always work. (FGD1 pg5)

R: Cooking is done quickly on that stove (FGD2 pg1)

R: There are 2 mouths in that stove, this is a new thing. Because of this, cooking can be done fast. On one mouth you can cook rice, at the same time you can cook curry on the other mouth (FGD2 pg2)

R: The other women who use these stoves tell us that they can finish their cooking on time, that is quickly. (FGD2 pg2)

R: Yes, we need more time to cook on our old mud stoves. (FGD2 pg2)

R: This stove is like our stove with second mouth. We can cook quickly on that stove, in 15 minutes (FGD2 pg3)

R: Yes, we can cook on both the sides simultaneously. Because of this, cooking can be done fast. Water gets heated and on the other mouth cooking can be done. (FGD3 pg3)

R: Whatever you put on the stove, it cooks quickly (FGD3 pg5)

R: I have never used improved stove but I heard from others it cooks food very fast, no smoke or less smoke, but in mud stove it takes more time to cook and it spread lots of smoke (SSI1)

R: If I save time, I will work in the field in this time. (SSI1)

## Smoke

R: There is less smoke, smoke is not much. (FGD1 pg2)

R: The smoke is less now (FGD1 pg3)

R: Yes there is some smoke when we start the fire, but when wood starts burning, the smoke vanishes completely....There is smoke until fire starts naturally...Though the floor is smooth, it becomes a little bit black above the stove naturally. It is wood fire....A little bit black is there, it is not gas to remain completely clean. Just a bit black is there (above the stove) (FGD1 pg3)

<p>R: There is less smoke, because of this reason I like this stove more(FGD1 pg5)</p> <p>R: There was sharp stinging to eyes in front of the traditional stove</p> <p>R: There is less smoke and cooking is done quickly(FGD1 pg5)</p> <p>R: There is advantage to our eyes. There is no trouble to our eyes, that is the advantage.</p> <p>R: There is less smoke to our eyes, whatever other troubles we were getting from smoke before, they are reduced now.</p> <p>I: What were the troubles</p> <p>R: There was irritation in the throat, burning in the throat, that has become less. That is the advantage. Eyes used to get red, there was burning in the eyes. We are saved from this trouble by this stove. (FGD3 pg3)</p> <p>I: Is there any problem created by less smoke?</p> <p>R: No, no, not at all (FGD3 pg3)</p> <p>R: But then smoke and everything about smoke and it causes some diseases, causes a bit of discomfort, they come across so many discomforts in their daily life that a bit of smoke is not a big problem. (FGD3 pg9)</p> <p>R: When the fire starts, smoke vanishes automatically</p> <p>R: Whatever we tried, if we make fire outside, the smoke gets produced there also</p> <p>R: If we cannot bare all that smoke, then what should we do?</p> <p>R: Is that a gas or what?</p> <p>R: When wood starts burning, smoke vanishes (FGD3 pg11)</p> <p>I: You do not use dung-cakes because they produce smoke</p> <p>R: Yes</p> <p>R: We must put dry wood. The wood burns nicely when it is dry</p> <p>R: Yes, teak wood produces very much smoke – I do not use that</p> <p>R: Pots also become black from that wood</p> <p>R: I think waste from agriculture is very good (FGD3 pg11)</p> <p>R: I have never used improved stove but I heard from others it cooks food very fast, no smoke or less smoke, but in mud stove it takes more time to cook and it spread lots of smoke (SSI1)</p> <p>R: I like improved stove, no problem of smoking, cooking, it causes less smoke, there is difference between traditional and improved stove. The smoke of mud stove it goes straight away upward but the smoke of improved stove it remains down and less smoke while cooking. With the mud stove the pot gets darker and it carries dark black carbon. But improved stove it carries less dark carbon. (SSI2)</p> <p><u>Smoke recognised as a problem – already have strategies to reduce smoke</u></p> <p>R: if the wood is wet and if the fire does not start quickly, then only we use dung-cakes along with the wood, we use dung-cake immediately after the fire have started. Otherwise the stove gets choked and smoke is produced. Then we cannot reast the Bhakris and we cannot cook curry on the other mouth also (FGD3 pg4)</p> <p>R: Dung-cakes produce more smoke. When the wood gets fired properly then cooking can be done nicely on both the mouths. Cow dung cakes make the stove choked. (FGD3 pg5)</p> <p><i>Stoves are positioned in particular places in their houses to direct smoke out of the room (Field notes, pg6)</i></p> <p>Large eaves spaces facilitating removal of smoke (Field notes, pg6)</p>
<p><u>Durability</u></p> <p>R: There is only one difference and that is the traditional stove is made from mud and this stove is made from cement. (FGD1 pg4)</p> <p>R: We had to change that stove after one year, now we do not have that</p>

tension...There is no tension or changing the stove after one year...Now we are using this stove from 2 years (FGD1 pg4)

R: We are still using these stoves. Traditional stove used to brake after, comparing to that this stove does not brake at all. So we do not have to daub the stove. We had to daub the old stove after every two days. But this stove remains good up to 15 days. We can daub the stove after 15 days. It does not brake and looks good. (FGD1 pg6)

R: I clean the stove by using mud and spreading around stove. I clean the stove after 4 days. I feel good after cleaning. I like both stoves. I think this one is nice (SSI1)

R: All family members like this stove because it lasts 2 years.(SSI2)

R: if you make a concrete one the lifespan increases to 5 years, so in this case if a person actually invests money in buying an improved cook-stove (KII-K pg1)

#### Easy to adopt

#### Aesthetic appearance

R: There is only one difference and that is the traditional stove is made from mud and this stove is made from cement. (FGD1 pg4)

R: We think that stove is somewhat different (FGD2 pg1)

#### Fuel

R: There is no difference in taste (FGD1 pg4)

R: There is basically no difference in that stove and this stove

R: We use wood in the traditional stove and this stove also. So we do not feel any difference. (FGD1 pg4)

R: There are not at all any effects, I mean I do not feel any difference between both the stoves. (FGD1 pg4)

R: We are used to cook on the wood stove, so what trouble we have? (FGD1 pg5)

#### Disadvantages of improved stove compared to traditional stove

#### Cost

R: I also like to have it. But our conditions are like this...(laughs)

R: Yes, you are right! Our condition is like this...but we also wish to have these new stoves (FGD2 pg2)

R: We are poor. We buy this stove (mud) for Rs50/- only, that stove costs us Rs. 100/- . Then we think why should we spend Rs50/- more to get that? (FGD2 pg2)

R: Sometimes we get our stove for Rs30/- only. When people heard the price is Rs100/- they backed out. If the price was Rs50/-, then we would have taken easily. (FGD2 pg3)

R: The members in our families backed out when they heard the price. If the stoves are available free of charge, then everybody would have lifted them as quickly as possible (all of them laugh) (FGD2 pg3)

I: How can we give them free of charge?

R: Price should be at least half of the present price. We really like them to have. (FGD2 pg3)

R: It is only because we are poor, we do not have extra money to spend. (FGD2 pg3)

R: What is there which is difficult in the stove? Only the price of the stove is difficult to pay.

R: It is very costly, paying money is the main difficult question, what else? (FGD2 pg3)

R: Only difficulty is about paying money, otherwise there is nothing difficult in using it. (FGD2 pg3)

R: We do not have money to buy that stove, so we backed out and still are backing out. (FGD2 pg4)

R: There is not so much income in the villages. Generally people are poor here.

R: We work as daily wagers. We work for whole day. What can we do in that income? (FGD2 pg4)

R: I would like to buy but could not buy (FGD2 pg4)

R: Because of the high price only I could not buy this stove (FGD2 pg4)

R: I did not pay it because I did not have enough money to pay (FGD3 pg6) that something they do not want to talk about. This is not the question of the problem of money. It's a mindset that they will say that they need a bigger mouth. They said that they did not buy it because there's a small hole, the hole is actually connected to the other pot hole, so because of the grate the hole becomes small. (FGD3 pg6)

R: Not for this. The main problem is that it is expensive. They cannot afford it. Can you compare 50Rs and 300Rs. There is no comparison. That is very difficult for them to understand that 300Rs are going to continue for 5 years. They cannot understand that. They did not have that much of money to spare for the stove, nor can they make their family members understand that. (FGD3 pg7)

R: if they buy it, then they have to go without some essential things. (FGD3 pg8)

R: But the main question is here we have given stress on the basis of monthly income. Here we actually should not consider monthly income, because all of them are basically from agricultural families, so they make yearly income. And when they say 300Rs is high they are not thinking on the basis of the income. The basic comparison is of traditional stove. If the traditional stove also costs the 300Rs probably they wouldn't have found it very costly. And now they would have to go without any essential goods. Taking of 300Rs from their earning is not a big deal. But if something is available at cheaper rate why should they buy it:? That is the problem. (FGD3 pg9)

R: I had less money. Money is the reason

I: is this the exact reason? We did not demand money at first/

R: You did not tell the price, we lifted them without paying money. We paid afterwards (FGD3 pg9)

R: But the improved stoves price is much higher than the traditional stove. SO only a few people bought these stoves. Because of the difficulty in paying the price of improved stove, other people were not able to buy these stoves. (KII-J)

#### Family

R: The members in our families backed out when they heard the price. If the stoves are available free of charge, then everybody would have lifted them as quickly as possible (all of them laugh) (FGD2 pg3)

**I: You bought the improved stove, who made the decision of buying this stove, yourselves or your husbands?**

R: It was our own decision

“The man will ask why we need the improved stove” (SSI1)

“He will buy if it is cheaper”(SSI1),

#### Availability

R: I feel these stoves should be bought here again (FGD1pg1)

R: We got these stoves from ARTI

R: I think if these stoves are available again we will take(FGD1 pg4)

R: Then we will buy this stove again, if these stoves are available here to us (FGD1 pg5)

R: We will purchase them from you (ARTI) only...If we would not bring them, then?...Then we will have to install mud stoves again ...What could we do otherwise? (FGD1 pg5)

R: she wanted to test it what other people do with it, but by the time she got the news it is a good stove, it is too late. Now if she wants to buy, the transportation is the problem, to bring that cook stove to bring from Poona to here. It is quite expensive now, the stove costs Rs 80/- she has to pay 100Rs. But if there are 10 or 15 people who are going to buy the stove, then it becomes cheaper for them, for 80Rs (FGD3 pg7)

R: Its not hard. They just have to give rupees. I want a stove, I have the money, so they will continue to give them (FGD3 pg7)

R: this is a very traditional country, and people in the village, since their main source of income is an annual income, when they spend money they think a lot, it's for them 6 months in for thinking about buying a product is not a big deal, whereas in the city or suburban areas, when we want to buy something we maybe think about it for maybe 7 days and then buy it. Here they think of many pros and cons so when the stoves have come as you know first they wanted some people to use it, to see if it's good and then buy it, this was when we came to Nanegaon, as this was one of our intervention villages where we were conducting the IAQ study, so we did not have a 6 month period for them to think of whether they wanted to buy the improved stoves, (KII-K pg5)

R: through CDs and literature and lectures and then something like focus group discussions where a lot of people came together, kind of a self help group, the women they come together and we explain them the advantages of the stoves (KII-K pg5)

#### Negatively perceived design features

##### Grate

R: We removed the grate

R: We also had removed the grate

R: There was trouble by that grate

R: We have more family members, so we removed that grate. Those who have more than 4 persons in the family, they have removed the grate. (FGD1 pg6)

R: At first there was grate, but we had to spend too much time for daily cooking, cooking cannot be done quickly.

I: You have 15 members in your family?

R: Yes, because of that I removed the grate. Now cooking can be finished quickly(FGD1 pg6)

R: The thing is like this, we did not have grate in our traditional stove, so we found it very awkward. Now there is a grate in this stove. (FGD1 pg6)

R: You can put the grate still. I have aquired the skill of using this stove perfectly. On the contrary I find it very difficult to use the traditional stove now(FGD1 pg6)

R: All women are not the same, aren't they?

R: All women are not the same, it depends on how you use the stove (FGD1 pg6)

R: There is a grate below, because of the grate we also feel it blocks our work. The hole there becomes very narrow, that prevents us to put more fuel wood. So it should be big enough. (FGD2 pg2)

R: It used to get filled immediately. So ash used to go under it and it used to get choked. So I remove the grate to make more deeper space(FGD3 pg10)

### Cracked

R: I tell you madam, these stoves are very good from all sides. But every stove has cracked in the middle of the mouth. (FGD1 pg4)

R: What we do, we fill the cement in the crack which has appeared there, so it does not crack often(FGD1 pg5)

R: Now there is a crack in the middle part of this stove. Because of the strong heat, the stove cracked in the middle (FGD1 pg1)

### Lack of perceived need / resistance to change

#### Don't need improved stove

R: I feel that my old stove is good for me (FGD2 pg1)

R: No, we like it. That stove looks wonderful, I like it and I wish to have it. (FGD2 pg1)

R: I like to have a new type of stove (FGD2 pg2)

R: But do you think it is as good as our mud stove? New things are for those who want luxury items. (FGD2 pg2)

R: Our present 'laxmi' stove looks sweet to me(FGD2 pg2)

R: Now we feel our present stove is good enough for us. Our financial condition is like this, it does not allow us to spend more. (FGD2 pg2)

R: Who doesn't like to have new things? Everybody likes to have them, but our financial condition is like this, what can we do?

R: Everybody likes to have them. If we can afford then only we can buy them

R: If these people want us to become forward, what difference does it make to us? We buy our present stove for Rs40/- only (FGD2 pg4)

R: But what was bad in our stoves before? (FGD3 pg3)

R: We did not have information about these stoves (FGD3 pg6)

R: there are only 2 persons so I did not use it (FGD3 pg6)

I: You are not using this stove, what is the reason behind that?

R: Because there are few persons (FGD3 pg6)

R: Older generation is not very happy to use new things. (FGD3 pg6)

R: I think both stoves are same. No need to change to improved stoves. We are poor people. (SSI1)

#### Continued use of traditional stoves

**R:** We generally use one stove, but we have one stove outside the house. When we are in a hurry, then we use this stove for heating water, only for water heating. (FGD1 pg5)

R: Yes we are in a hurry in the morning, so we use both the stoves. We heat water on the traditional stove, sometimes we cook rice, put curry to the boil (FGD1 pg5)

R: We do not use anything else after installing this stove

R: You have less family members

R: It is sufficient for our family members.

R: What else am I telling? There is difference between cooking for 4 to 10 persons and for only 2 persons. When you have your old father staying with you, you were feeling the difference

R: Yes, I use both the stoves. We are only 2 persons in the family, so sometimes I cook on this stove, sometimes on that stove (FGD3 pg1)

R: If you have many members in the family and you also have guests and visitors sometimes more often, then you have to use that stove also (FGD3 pg10)

R: I do not feel any difference. I use the old traditional stove once in a while, or when I am in a hurry to finish my work (SS13)

### Long term benefits difficult to perceive

#### Economic

R: That is very difficult for them to understand that 300Rs are going to continue for 5 years. They cannot understand that. They did not have that much of money to spare for the stove, nor can they make their family members understand that. (FGD3 pg7)

#### Health

R: There is less smoke produced in these stoves. They need less fuel wood. Because of that the health of the family is made safe. (KII-J)

R: in the eastern part of Maharashtra they are not going to waste money to buy a stove, which is supposed to reduce smoke, because the smoke is supposed to be harmful for their health but they, you know is something like smoking, you cannot immediately find any difference from a smoker and a non smoker, it's a long term process, which is a very slow process they (improved stoves) are not something which is going to cause a lot of impact so the people still prefer their traditional way (KII-K pg6)

R: It is a problem, you know it causes them temporary discomfort, in the sense that eyes water, there is irritation in their throat, but we talk about it causes diseases, they say it's not something that causes like if I don't use the stove, and the other person is using the stoves, it's not like she's falling sick the next day or maybe 2 months time, it's a long term process, that's something in the future, they really don't bother about the future. (KII-K pg6)

### Improve utilisation

I: Do you want any changes?

R: No, I want it like this only (FGD3 pg8)

R: We think the price should be reduced a little bit (FGD3 pg10)

R: If you reduce the price many people can use these stoves. (FGD3 pg11)

R: There should be pot raisers on the upper side of the pot holes (FGD3 pg8) We have 3 pot raisers in our (old) stove, so smoke comes from all the three sides on us, while cooking.

I: Why do you want them?

R: For making pancakes (Ghawan resembles to pancake, they are made of rice flour)

I: Can't you make them on the other pot hole?

R: No, they require heat and a big flat pot of iron so they can be made on the primary hole only

R: So she wants to put pot raisers, but they make it only once or twice a year. (FGD pg9)