

# **Development through Demand**

Introducing Smokeless Chulahs to the Urban Poor: A Case Study in Ahmedabad, Gujarat

Shaila Parikh<sup>1</sup>  
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**Picture 1: Cooking on a smokeless chulha at the Environmental Sanitation Institute, Ahmedabad**

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Picture 2: Local community members building Behrampura a smokeless chulha

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## **Abstract**

This case study presents an experience in introducing beneficial technology into a poor, urban community through the generation of grassroots demand. The larger objective of the project was to achieve sustainable developmental progress with minimal external financial contribution. The broad, intended audience is those individuals and organizations who are interested in this method of development. Indoor air pollution caused by burning unprocessed biomass is a serious and urgent health concern throughout the developing world. Programs have been launched in the past to address this issue but have had mixed reviews due to lack of sustainability and inattention to user preferences. Over the past eight months, using a variety of techniques from controlled experiments to interactive meetings the families of Behrampura, Ahmedabad have begun to see the benefits of the a new type of cooking stove. This project aimed to stimulate the demand for smokeless cooking stoves; poor urban residents of this area in Ahmedabad, Gujarat are now willing to pay a reasonable amount of money for a technology that can improve their lives. The smokeless chulha is a cooking stove that can save the lives of thousands of women and young girls in urban slums who are subject to the deadly toxins released from burning wood used as cooking fuel.

## 1.0 Summary

This case study presents an experience in introducing beneficial technology into a poor, urban community through generation of grassroots demand. The larger objective of the project was to achieve sustainable developmental progress with minimal external financial contribution. Indoor air pollution is a serious and urgent health concern. Throughout the developing world, the traditional *chulha* cooking stove (an open flame, wood burning stove) is a major cause of this pollution in both urban and rural areas. The toxins and carcinogens released from these stoves cause nearly 500,000 deaths annually in India alone. Work originally began in the area to address livelihood issues of camel cart drivers and their animals through the Animal Help Foundation (AHF), an Ahmedabad based that focuses on the needs of both wild and urban animals. Through the personal relationships built with various families (husbands, wives and children) there emerged the critical issue of cooking fuel. Traditional chulhas used to burn wood for cooking have been a part of Indian cooking for thousands of years. The open-flame cooking platform has a variety of forms and materials but the basic construction is similar: wood is burned under a pot or pan that is placed over an open flame. Due to this open design, the traditional chulha is not only inefficient but also subjects the homemaker (predominantly women and young girls) to carcinogenic fumes. The technology in question – a closed chulha with a pipe to direct poisonous fumes out and away from the living space - is an available product and widely accepted as a better alternative to the open flame chulha. However, for various reasons, this “smokeless chulha” technology, which exists at relatively affordable prices and has several NGOs working to spread awareness, has not taken hold en mass. Though now more prevalent in villages areas, it is still a rare find in urban slums. Over the last eight months, through education and awareness that focused on generating demand for smokeless chulhas as a free market product, the Behrampura community has begun to see the benefits of the smokeless chulha. At the completion of the project, seven smokeless chulhas were built in the community and there were about a dozen additional families interested in building them. Efforts are now underway to use this momentum in order to create a revolution that will motivate the majority of the community to switch to cooking on a chulha that is safer, that costs less per day to operate and that that requires less cooking time.

## 2.0 Findings

### 2.1 Hazards of Indoor Air Pollution

Approximately half the world's population burns unprocessed biomass fuels to meet their daily cooking energy needs. This combustion of wood, dung and crop residue is the major cause of indoor air pollution in developing countries. Combustion of unprocessed biomass fuels in open flame stoves is incomplete and therefore releases smoke particulate matter, carbon monoxide, formaldehyde, polyaromatic hydrocarbons and other toxins.<sup>1</sup> The toxins and carcinogens released from these stoves cause nearly 500,000 deaths annually in India.<sup>2</sup> Indoor pollution from the open flame, traditional chulha cooking stove is linked to respiratory illness, chronic pulmonary disease, pneumoconiosis, lung cancer, Tuberculosis, cataract and adverse pregnancy outcome among many other disease.

Across India a family's economic status generally determines the form of energy used: the wealthy tend to use electric power or clean burning gas while the poorer families use dirty (non-clean burning) fuels. According the Indian National Census, 78% of the country's population uses biomass fuels for cooking.<sup>3</sup> Though chulhas are predominant in villages, they are also common in urban slum areas throughout India.

#### 2.1.1 Behrampura, Ahmedabad

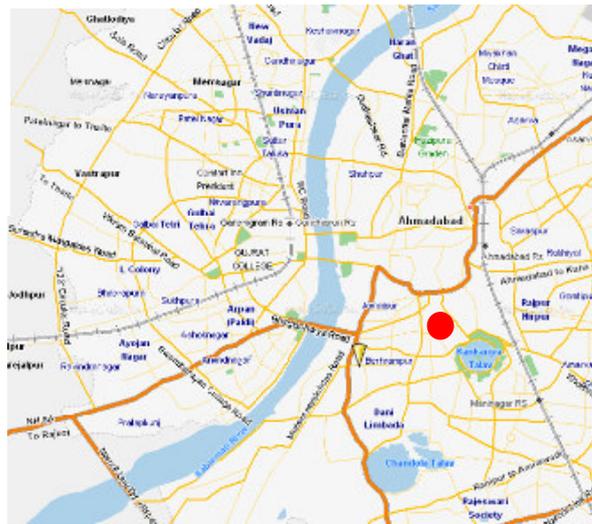


Figure 1: Map of Ahmedabad (*Oonthwaali Chaali*)



**Picture 3: Overhead view of Behrampura area**

Of Ahmedabad's 5 million inhabitants over 55%, or 2.75 million people, are either slum dwellers or squatters with no formal, livable dwelling.<sup>4</sup>

A large portion of the poor and marginalized population in Ahmedabad is Rajasthani migrants who have come south to Gujarat for job and work opportunities. Figures 1 and 2 show the location of the *Sakalchand Mukhi Ni Chaali* near the city's main bus stand, one such community of Marwari migrants. Because of the prevalence of camel cart drivers in the community (numbering between twelve and fifteen) the area of about 5,000 residents is unofficially dubbed the "*Oonthwaali Chaali*" (Camel Neighborhood).<sup>5</sup>

Work originally began in the area to address livelihood issues of camel cart drivers and their animals through the Animal Help Foundation (AHF), an Ahmedabad based that focuses on the needs of both wild and urban animals. Through the relationship built with various families (husbands, wives and children) there emerged the issue of cooking fuel.

### 2.1.2 Cooking Methods in Behrampura

The majority of families living in slum areas cook their meals on wood burning *chulhas* that have been a part of Indian cooking for



**Picture 4: The typical urban chulha is a light portable metal frame**

thousands of years. The open-flame cooking platform has a variety of forms and materials but the basic construction is similar: wood is burned under a pot or pan that is suspended over the open flame. Originating in the villages, chulhas are often made from a mixture of mud, dung and water – materials that are easily accessible in a rural setting. As villagers migrated to the cities, they brought along the chulha and it is still widely used in urban areas with slight modifications. Most commonly found in slum and poor urban



**Picture 5: Metal chulha in use**

areas, pictures 4 and 5 show the urban chulha, which is typically a portable iron frame, purchased for roughly Rs. 50. Some families also make a permanent chulha structure into the floor of the house using tile and cement. The design of the traditional chulha has several critical disadvantages for both the village and the urban environment.

*The chulha uses energy inefficiently.* The open design allows heat and smoke to dissipate from the sides without channeling it to productive use. A significant portion of the heat produced by the burning wood is lost to the open air requiring more fuel. For villagers with easy access to firewood this may have minimal financial consequences, but for those in urban areas cooking on traditional chulhas cooking fuel can become a costly expense. With annual CPI inflation rates as high as 7% over the past 5 years, the price of wood has also increased in recent times. The soaring cost of basic needs is a growing concern.

*The chulha poses serious smoke inhalation health hazards.* The individuals cooking (typically women and young girls) are exposed to carcinogenic flames that cause serious long term health ailments. Also, as chulhas are often placed inside houses, the entire family is also exposed to the fumes.

*The chulha requires extended cooking time.* The traditional chulha can only cook one item at a time requiring the women to cook multiple items separately.

The other common cooking apparatus used in poor urban areas is the single kerosene or primus stove. Kerosene burns relatively cleaner than biomass fuels but too emits some soot and noxious fumes when burned in the liquid form. Liquid kerosene is subsidized by the Government of India and sold in “Fair Price” stores which sell a range of subsidized goods. Because allocations by the central government are done through the states, liters of kerosene available to families vary according to state, rural or urban dwelling and access to clean burning cooking fuels. In Ahmedabad poor urban families are allowed between 8-16 liters per month depending on family size.<sup>6</sup> The current price of subsidized liquid kerosene in the Behrampura area is Rs. 9 per liter (kerosene also sells in an active black market for about Rs. 30 per liter).<sup>7</sup> Biweekly allocations of kerosene are available for pick up on a strict basis between the 1<sup>st</sup> and 15<sup>th</sup> and then the 16<sup>th</sup> and 30<sup>th</sup> of each month. However, the fluctuating demand often catches storeowners off guard and families are caught scrambling to fill their allotment before their biweekly period expires.

Based on one family's estimate a household of five adults and three children requires five liters of kerosene every two weeks. The government subsidy allows them to satisfy their cooking energy needs in about Rs. 90 per month.<sup>8</sup> Compared to wood burning stoves Kerosene offers a cheaper and cleaner alternative. Despite this, the families of Behrampur prefer burning wood to cook their meals not only because it is believed to give food a better flavor, but also because inconsistency of kerosene availability make wood a more attractive option. However, given the soaring costs of wood, the community was receptive to options that were more fuel efficient. Women specifically requested more information on options that would allow them to save money on cooking fuel. It was through their interest that work was begun to introduce the smokeless chulha to Behrampur.

### 3.0 Solutions

Open wood burning stoves cause serious long-term health problems to the women and girls that use them on a daily basis. The objective was to introduce a supplementary option to the community that is both beneficial and likely to be adopted. There are several options available for cooking that minimize or eliminate these ill effects: the gas-cooking stove, the smokeless chulha and the coal-burning cooker.

#### 3.1 Gas Cooking Stove



Picture 6: Gas stove

The gas cooking stove shown in picture 6 is a non-permanent, movable fixture with two burners that is placed on either the floor or counter top. A pipe from the stove allows connection to a 14.2 kg cylinder of LPG (liquid petroleum gas). The gas cooking stove is, from a health and environmental perspective, the best option among commonly used cooking fuels in India (CNG is not used as cooking fuel due to its lack of availability for home use and electricity is currently prohibitively expensive). LPG burns cleanly and does not lead to the degradation of forest lands as does wood fuel. Additionally, the monthly operation cost of cooking with LPG is significantly lower than that of burning wood to operate the chulha. It is estimated cooking for a family of four costs on average about Rs. 300 per month, versus Rs. 600 when using wood burning stoves.<sup>9</sup>

Though ideal, the gas stove is not common in poor and slum areas because of the prohibitive start up costs. The start up kit, which includes the metal stove, one canister of gas and pipe to connect the two apparatus, runs approximately Rs. 3,500. The more convenient package that includes two cylindrical canisters of gas (one which can be used while the other is sent out for refill) is over Rs. 5,000. Additionally, because LPG is also

subsidized by the government and sold through state owned companies, ration cards are needed to secure cylinders – a problem for poor families who do may not have the proper paperwork.

### 3.2 Smokeless Chulha

Another viable option is the smokeless chulha. Somewhat of a misnomer, the smokeless chulha still burns wood like the traditional chulha. However, the closed design of the smokeless chulha uses the heat from the burning wood more efficiently and diverts the carcinogenic fumes out through an overhead cement pipe - away from the individual cooking.

The smokeless chulha still requires burning wood and therefore it is not the ideal choice. There is still some indoor air pollution, it does not stem the degradation of forestlands and it is more expensive on a day-to-day basis the cost of LPG. However, the initial investment required to build the smokeless chulha is roughly Rs. 450, something much more accessible to most poor families than Rs. 5,000 to purchase the necessary equipment for the gas stove. The smokeless chulha is a technology that has been in use and available for many years and is being used throughout various parts of Asia and Africa. This type of chulha, shown in figure 3, is designed with closed walls on all four sides and two top open holes for cooking. A cement pipe affixed to a corner edge is a key feature that diverts the smoke up and away from the individuals cooking.

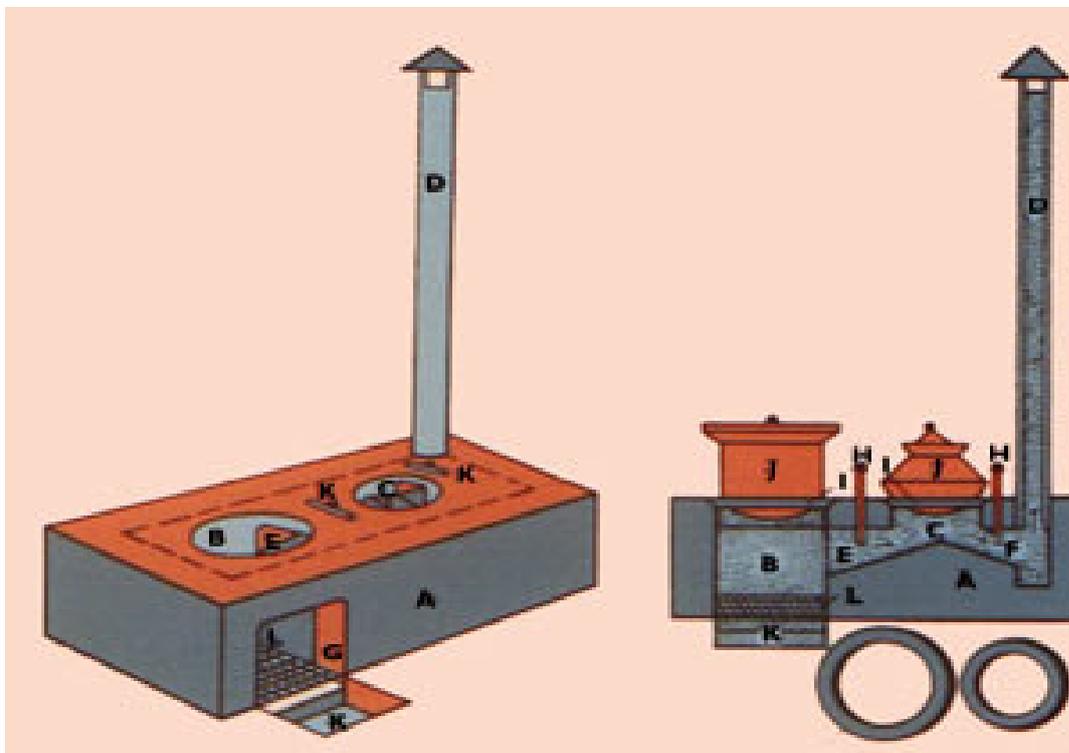


Figure 2: Specifications of smokeless chulha

Within smokeless chulhas there are several minor variations though the basic design remains similar. The Environmental Sanitation Institute, Ahmedabad builds a basic smokeless chulha as per the below specifications.

### **3.2.1 Features of the Smokeless Chulha<sup>10</sup>**

Foundational clay slab measuring 75 cm x 40 cm x 22 cm  
First oven (hole for cooking) measuring 20 cm in diameter and 20 cm in depth  
Second oven measuring 17.5 cm in diameter and 10 cm in depth  
Smoke outlet pipe 7.5 cm in diameter and 2 meters in length  
Flame passage tunnel 13 cm x 6 cm (height) connecting first oven to second oven  
Smoke passage tunnel from second oven to pipe 7.5 cm x 5 cm  
Hole for placement of firewood to be burned 18 cm x 18 cm  
Damper for controlling flames between ovens  
Steel rings for placing different sized pots and pans on ovens  
Utensils on oven  
Ash pit 22 cm x 15 cm x 7.5  
Steel grating for ventilation

### **Benefits of the Smokeless Chulha<sup>11</sup>**

- Diversion of smoke away from cooking area. Multiple health benefits including prevention of injuries to eyes, minimal inhalation of carcinogenic fumes.
- Reduced probability of catching fire as exposure to intense heat is minimized
- Time saved due to cooking with two stoves
- Reduction in consumption of firewood because lost heat is minimized by the closed design
- Made with local materials and skills

### **Sarai Cooker**

The third option is a using a cooker fueled by coal. This Sarai Cooker is marketed through SEWA (Self-Employed Women's Association) and their Project Urja initiative launched in 2006. The cooker is a closed steel container with multiple levels - somewhat similar to an Indian tiffin - with the bottom layer containing space for hot coals. Raw rice, vegetables and *daal* placed in the cooker are cooked and ready for eating in several hours. This method is both cheap and effective, costing less than Rs. 2 per meal for cooking fuel and requiring no attention for the food to cook. However, it does not allow for cooking of *rotla* the staple bread that is eaten with every meal. Therefore, most families use this in conjunction with their traditional chulha.

### **3.3 Solution Chosen for Implementation**

Given the three options in this case study, the smokeless chulha was chosen for implementation.

Gas stoves are the ideal option: they are cheaper to run on a daily basis and better for the environment and women's health. However, the start up costs are prohibitive for the majority of the target population and often require long term financing solutions. Additionally, there is fear in using gas cylinders – many believe it's high flammability makes it dangerous and likely to cause serious injury and damage. Also it is common belief that food cooked on a chulha tastes better than that cooked on a gas stove or in a coal cooker. Both economic and social factors make the mass adoption of gas cook stoves a difficult shorter-term problem.

Though less ideal than gas, the smokeless chulha is a far superior option than the traditional chulha. Additionally, because it is more closely related to the traditional chulha it allows for a more gradual step towards development. Often drastic changes are resisted by communities habituated to functioning in a specific manner. Also, it can be made mostly with materials that are easily and locally available.

Smokeless chulhas are widely accepted as a viable intermediate step between the traditional chulha and gas cooking stoves. In fact, the Indian government has recognized indoor air pollution from wood burning chulhas as a source of concern and in 1986 launched the Government of India's Nation Program on Improved Chulahs (NPIC) – though the program has had mixed reviews due to lack of sustainability and the inattention to user preferences.<sup>12</sup>

## **4.0 Implementation**

The idea of introducing smokeless chulhas came from the community members themselves. Originally, work was initiated in the area in an attempt to address issues of urban camels and the families that depend on them. Through this relationship grew relationships with other members of the community unrelated to camels and their carts. Several of these women expressed specific concern about the rising cost of wood and how it had impacted their household finances. They were excited at the prospect of a different kind of chulha that would save them money and time.

From the beginning, the project aimed to introduce the smokeless chulha in a sustainable manner without subsidies or other financial incentives. The majority of the families within Behrampura area are poor but have the economic means to purchase the smokeless chulha which totals under Rs. 500. However, for various reasons such as lack of education, motivation and urgency the community has not been moved to adopt the product. The below detailed process is the initiative to convince the Behrampura community at large that this product is worth their hard earned money.

### **4.1 Gaining Community Buy-In**

The Chulha Project began by taking advantage of preexisting community relationships and leveraging organizations such as the Environmental Sanitation Institute and SEWA who had already acquired a specialty in this area. However, in order to introduce smokeless chulhas into Behrampura in a widespread and sustainable manner, the first step was to gain product specific buy in from the women of the community – the main end users of the product.

The Environmental Sanitation Institute (ESI), spawned from the Safai Vidyalaya, is an organization that has worked to train, construct, and supervise environmental sanitation campaigns throughout India since 1985. In their attempt to improve the national sanitation they have also done work to promote smokeless chulhas in villages throughout Gujarat and India.

Given their expertise in the field and their experience in working with smokeless chulhas, ESI was enlisted to help educate the women about the benefits of smokeless chulhas. A representative from ESI came in mid-March to Behrampura and gave an introduction on smokeless chulhas to the women in the community. The informational talk was held in the evening just before the women began cooking for dinner and drew about 15 women from the area. The interactive talk lasted 30 minutes and included pictures and discussions about the smokeless chulha.

Based on the momentum of this discussion the following week 10 women and 5 children took an expedition to the ESI center, about 15 km from their homes, in order to see and use this new chulha for the first time. At ESI the women participated in an experiment which allowed them to experience the benefits of the smokeless chulha first hand. Dividing

themselves into two groups, the women cooked a meal of vegetables and *rotlaa* (Indian bread): half the women using the new smokeless chulha and the other half on their traditional chulha. They started at the same time, with the same ingredients and made the same items.



Picture 7: [left] Test group 1 cooking on the traditional chulha; [right] Test group 2 cooking on the smokeless chulha

Pictured above, Test Group 1 cooked on the traditional open flame chulha where wood is burned under the pot. The traditional chulha allowed a large part of the heat and smoke created by burning wood to escape into the environment and consequently exposed the women to these elements. Test Group 2 cooked their *rotlaa* and potato and eggplant vegetable mix on the smokeless chulha which was closed on all four sides. In the smokeless chulha wood burned under the left stove hole where the flames heated the rotla. The smoke and heat stayed trapped inside and then moved to the right stove heating the pot of vegetables and then up and out through the cement pipe on the right.

According to the women, the results were clear: cooking on the smokeless chulha took half the time, used 30% less wood and allowed the women to breathe easier. The women were also excited by other benefits such as cleaner pots and pans; women spend considerable time scrubbing the black, baked-on soot from their kitchen utensils. Given the evidence, the women were then free to decide if they felt the new chulha was worth the Rs. 450 investment for their own home.

#### Building the First Working Example

The next step was building the first working chulha in the Sakalchand Mukhi Chali. Hastimal Sagara, a well-respected and educated member of the community agreed to build the first chulha in his home. He was eager to have a smokeless chulha at his house as his mother is almost completely blind from years of exposure to smoke, heat and light from cooking on the traditional chulha. There were several advantages to building the first chulha at his home. Firstly, the prominent location of the home exposed the chulha to maximum foot traffic and the chulha's position as a permanent structure outside the home at the corner of an open porch allowed full visibility to passers by. Secondly, Hastimalbhai's position of respect as an educated member of the community offered an idea platform for the first smokeless chulha in the area.



The following week, with the help of a private contractor associated with ESI, the neighborhood had its first cement smokeless chulha built as shown in pictures 8 & 9 on the previous page. The community came together to help build the chulha: women mixed sand, water and cement to create the mixture for the chulha, children ran out to fetch bricks when the supply ran out and one of the local mason workers in the area also came by to help. The building of the chulha attracted quite a crowd on that Sunday afternoon and generated significant buzz.

**Picture 8: Chulha building in process**

**Picture 9: The chulha attracts a crowd**





**Picture 11: Chulha pipe below the house roof**

The finished chulha is currently in working order at Hastimalbhai's house. However there are two minor issues with this chulha that need to be rectified. Firstly, the pipe that was installed in the chulha was cut too short as shown in picture 11. Therefore, instead of the pipe diverting the smoke up through the metal roof and over the house, the pipe deposits the smoke just under the metal roof. Some of the smoke then dissipates into the house and rooms. Work is in process to extend the pipe to come out through the metal roof. Secondly, the heat from the open flame which causes expansion of the pots and pans has cracked the chulha around the larger of the two stove holes. Placing the pots and pans on top of a small metal

**Picture 10: Crack in chulha**

sheet with a hold cut out for the chulha flame will alleviate this expanding pressure. The pressure from the pans will be diverted to the metal and will not cause further cracking on the chulha.

## 4.2 Problems in Gaining Critical Mass

The first sample in the community was built with the hope that it would act as a catalyst to generate demand for smokeless chulhas. The chulha did build significant awareness within the community and word spread quickly around the area. However, the experimental outing and the first chulha fell short of providing the momentum needed for critical mass. Many families expressed sincere interest in building the smokeless chulha but were unable to commit to actually building one. A large number of families also expressed future interest in having a smokeless chulha built but were again not willing to take immediate steps. Below are the main hurdles faced in obtaining critical mass in the community – in the order of qualitatively estimated importance.

*Uncertainty in building a permanent structure.* The metal chulhas currently used are portable and light weight. Women expressed concern that smokeless chulhas are permanent structures. Multiple families have expressed an interest in building a smokeless chulha but only after they make some planned upgrades to their home within the next 6 months or 1 year. Despite the health and cost benefits, they are unwilling to invest in the permanent structure.

*Lack of urgency.* Many women acknowledge that the smokeless chulha is a superior product to their chulha but do not see an urgent need to build one.

*Cost.* Some families have expressed interest but claim that they are unable to afford the cost of the chulha which exceeds Rs. 400.

*Space limitations.* Homes in the area are often small with one or two rooms housing 5 to 15 family members. The smokeless chulha, because of its larger size does not always fit into the space available in many households.

*Safety.* Several families cited concern at having a bottle of flammable gas around children. Though rare, there have been cases of punctures in the bottle and leakages which have caused injury and even death by sudden fires.

*Intention to eventually upgrade to gas.* There are families within the neighborhood who intend to upgrade to gas eventually. Even though obtaining a gas stove may be several years down the line, they are unwilling to spend money on the smokeless chulha at the present time.

Material	Quantity	Approx Cost Per Unit (Rs.)	Approx Total Cost (Rs.)	Purchased From
Iron Grill	1	30	30	SEWA
Bricks	20	2 per brick	40	Local store
Cement	15 kg	5 per kg	75	Local store
Sand	8 pans	10 per pan	80	Local store
Small pebbles	2 pans	10 per pan	20	Local store
Cement pipe and cap	1	80-110	80-110	Select material stores
Labor		100 per chulha	100	SEWA member
Total Cost			Rs. 425 - 455	

### Building Smokeless Chulhas II & III

SEWA Bank launched a new initiative in 2006 called Project Urja which works on several energy related income generating initiatives for their members. Among their projects is one which encourages the use of smokeless chulhas. This group is responsible for marketing the chulhas and getting them built by the bank's own



Picture 12: Transporting 10 foot cement pipes

members (who have been trained on how to construct them).

Upon learning that SEWA is involved in making smokeless chulhas, their help was enlisted in conducting a meeting to jump start the weaning interest within Behrampura.

A 30minute informational session was held in Behrampura by an employee of SEWA. She explained the benefits of the chulha, showed pictures and distributed flyers explaining the chulha details. The early afternoon meeting was attended by approximately 20 women. At the end of the meeting, though several women expressed interest in the chulha no one was willing to make a commitment. Assuming that cost may have been a limiting factor, an incentive of Rs. 100 towards the labor cost was offered and two women stepped forward to have the chulha built the following week. Ultimately, however, the money was not the most critical factor and both women backed out of their commitment. No chulhas were built the following week. One woman backed out because her family planned to upgrade their house from a temporary to permanent structure after the upcoming rainy season. The other family decided that they would eventually like to upgrade to gas. It seemed that the momentum once again had died.



**Picture 13: Smokeless chulha #2**

During this time, there had been several other leads: Kokaben who had a new house and was considering the chulha to prevent the blackening of her walls and pregnant Varshaben who wanted a chulha to protect her and her baby from the fumes. Several weeks after the meeting, both families expressed a strong and repeated interest in building chulhas (they were informed of the Rs. 100 incentive but neither family was ready to build at that time). Soon thereafter, these two families committed themselves to building a smokeless chulha in their home and a mason worker, trained by SEWA's Project URJA, agreed to arrive on Saturday afternoon to build the two chulhas.

The cement pipe is the most critical aspect of the smokeless chulha but it is also becoming increasingly difficult to find them in and around Ahmedabad City. Pipes of cement are quickly being replaced by ones made of plastic and metal - neither of which can be used for smokeless chulha: the plastic will melt and the metal will be hot to the touch, which can cause injury.

The women working with Project Urja offered to help in procuring two cement pipes for the Behrampura chulhas and at the 11<sup>th</sup> hour they were unable to come through on their promise. Though it took several unexpected hours, because of her obvious financial incentive (she is only paid if the chulhas are made) the mason worker was adamant to in procuring two pipes for the two chulhas. Picture 12 shows her in the rickshaw with the pipes on her way back to Behrampura. Each chulha took about 4 hours and work was completed by 8:30 pm that night. One of the two finished chulhas is shown in picture 13.

### 4.3 Follow-up Meetings

Building smokeless chulha numbers two and three again created a significant buzz within the community and many more families appear to be both eager and committed to having one built. However, to infuse more enthusiasm into the community several follow-up meetings were held to give more details about the chulha including its benefits and the price.

The meetings are an attempt to address one of the main hurdles to building the smokeless chulha: a lack of urgency among the community members. The meeting focuses on three major aspects of the chulha:

- Health benefits
- Economic benefits
- Time saving benefits

The meetings attempt to present the concepts in an interactive, dynamic and engaging manner to the women of the community. Using colorful charts, such as those in picture 15, actual money to show rupees saved and physical props such as wood, blackened pots and pans and bidi cigarettes the women are able to visualize the changes and benefits of the smokeless chulha. Additionally, when possible, the follow-up meetings include a panel of several women from the three families who already use the smokeless chulha.



**Picture 15: Health and economic charts used in follow-up meetings**

Approximately 20 women and 10 children attended the first major follow-up meeting and 10 adults and 8 children attended the second major meeting.

Building Chulhas IV - VII

As expected the meetings created enough interest and buzz to generate several more orders for smokeless chulhas. In the last weeks of the project, four additional chulhas were built within the community. The reasons for building the chulhas varied from recognition of its benefits to social pressures by community members but each family was motivated and excited about the product.

By August 2007, seven smokeless cooking stoves had been build in the area and there were pending orders for about a dozen more.

### 5.0 Sustainability

Market-based development solutions require minimal outside forces in order to be sustained. A system set up in which the poor are able to help themselves is preferable to one in which costs are subsidized. In fact, in some cases, “help” from the outside often

ignores the market, risks upsetting existing incentive structures and superimposes external perceptions, moral values and guilt complexes onto those for whom the aid is intended.

Items given for free typically retain less value in the eyes of the owner than items purchased. In fact, community members themselves have acknowledged this fact. In Rajasthan villages, the government gives smokeless chulhas for free to families and many of these smokeless chulhas remain unused and ill maintained. The families of Behrampura are all Rajasthani migrants and they have relatives with smokeless chulhas in their respective villages. However, they claim that the chulhas are not valued or cared for properly. Often times, not for profit entities give away valuable items without creating the necessary demand for the item. In market based solutions, demand creation and therefore education and awareness are critical aspects of the project.

The smokeless chulha is good technology and it's affordable for most people in the Behrampura area. In theory, once the market has matured, no one from the outside is needed to propagate the spread of smokeless chulhas if enough demand and awareness are initially generated. For this reason, from the beginning, the intention has been to introduce smokeless chulhas in a manner that will be sustainable in the long term. The families of Behrampura are willing to pay money for a product that is beneficial to them. Already three have been built with about 5 potential chulhas and there are no subsidies offered nor are there any direct linkages with an NGO.

The key factor is generating awareness and subsequently demand in the community for the product. Over the last 6 months awareness and demand were slow in coming but have picked up considerable velocity. The Sakalchand Mukhi Chaali has an estimated population of 5,000. Given the strong ties of the community and the close proximity in which they live, it is estimated that anywhere from 20 to 40 smokeless chulhas in the area would be sufficient to generate widespread, sustainable demand. At the end of the project in August 2007, seven chulhas had been built in the area. Increasing this number of chulhas will be critical to the longterm success of the project.

One issue that threatens to be a rather large problem is the shortage of cement pipes. Most PVC pipes are currently made from plastic – cement pipes are a rare find. Plastic pipes can not be used because they will melt. Metal pipes are also impractical because they will be hot to the touch and therefore are dangerous.

## **5.1 Chulha's as a Micro Social Enterprise**

For the first several chulhas the labor was contracted externally – first from a mason worker with ESI and subsequently with SEWA. They proved reliable and efficient but only come when specifically called. Throughout the experience it was noted that the most effective method of encouraging the adoption of the product was through personal relationships and constant reminders – neither of which can be provided by outside parties.

However, training several of the women within the Behrampura community to build the cooking stoves will change the dynamics of the program entirely. The external “development” project becomes the source of livelihood of a single, or several women. If the women have a financial incentive to propagate the spread of the cement smokeless chulha (they are paid Rs. 100 per chulha they build) they will use their relationships and local methodologies to further the spread of the smokeless chulha. Since these women live in the same community they will have a stronger, more effective impact.

Initially the work of building the chulha was being done by Amarben (a dedicated, hard working woman who was part of SEWA Bank's initiative to generate income for women) who lived outside of the community. In the process of building the smokeless chulhas, Daryaben (a local community woman) was enlisted for her enthusiasm and intelligence. In the end Daryaben was set up with the tools she needed to (1) start her own business making these chulhas and (2) generate demand for the product she was selling. Though the project ended at this very critical stage of sustainability, the seeds had already been planted over the previous 8 months.

## **6.0 Conclusion**

### **6.1 Summary of Findings**

Generation of sustainable demand for a new product requires a repeated, consistent message and creative marketing.

This is not a new idea for for-profit companies; marketers of consumer products and advertising agencies have known for years that catchy slogans and unusual selling techniques are likely to get their product adopted by the main stream population. However, the same ideas can work for products that can save lives among the urban poor. Marketing in a small area through personal, individual marketing as was done in this case is obviously unsustainable in the long run. Though mediums such as radio and television permeate all classes of society now, effective marketing is often hindered by the budget constraints of the non-profit organizations advocating the products. In this light, social entrepreneurship may be one way to attack this issue.

It is possible to make positive developmental progress without or with minimal external subsidies.

This project was a case study to experiment whether developmental progress could be made in a community with minimal subsidies and outside funds. Granted, this may not be possible in all communities or situations but in this situation with the urban poor smokeless chulhas have begun to gain acceptance at market prices.

Monetary contribution is a requirement to instill a sense of ownership. Ownership generally correlates to the attachment of value thereby increasing usage and maintenance. The members of the Sakalchand Mukhi Chaali in general are poor but able to afford the basic necessities of life. Accustomed to promises of subsidies from political parties looking for votes, the members of the community have been habituated to looking for and asking for subsidies. However, admitted by members of the community, services and commodities offered for free or at subsidized rates are valued less such as the municipality education, kerosene and water. In contrast, families closely monitor consumption and maintain close watch on education for which they pay (private schools or tuition classes), wood and electricity.

The smokeless chulha costs roughly Rs. 450 and is completely unsubsidized. Though money is tight in many families, they scrape together the funds because they believe in the product. Consequently, they properly use and maintain the smokeless chulha over the years.

Requiring monetary compensation also has the added benefit of empowering the community members. By putting the ability to improve their health and decrease their expenses back in their hands, it reduces their feelings of helplessness and their tendency to be victims and beggars. What they have done, what benefits they have provided for their families they have done on their own - with their own money and without subsidies from outside sources. They are capable of changing their own lives for the better.

Community pressure is a double edged sword that both prevents positive developmental progress and catapults slow change into widely accepted modes of operation.

Upon first being introduced, the community shunned smokeless chulhas largely because they were not used to the product and because no one else in the community used it. The pressures of the tight knit community's habits and traditions prevented individuals from stepping outside of established boundaries. However, once adopted by more progressive, liberal minded and respected members of the community, the same societal pressure has opened up and is pushing members to adopt the new technology.

## 7.0 References

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