

MASSIVE DISSEMINATION OF IMPROVED DOMESTIC CHARCOAL COOK STOVES

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To design improved cook stoves that comply with the requirements of cooking traditional dishes, but also with the ability of local craftsmen to manufacture and widely disseminate them instead of traditional stoves, it is first necessary to know about the habits of the families and craftsmen and which constraints they have to deal with.

The massive dissemination of improved cook stoves has therefore to start with assessing the social settings; as will be outlined in a first section of this article.

In a second step, it will be about conceptualising and experimenting with the prototypes of cook stove (for more detailed information on this step and applied methods and tools, please see the specific articles on this site).

At the end comes the massive dissemination of cook stoves. Some present-day practices will be examined in the second section of this article.

I. INVESTIGATE AND RETRIEVE INFORMATION ON THE FAMILIES

A programme of massive dissemination of improved cook stoves has to collect quantitative information that are statistically representative, and more qualitative information, and it has to take into account feedback from women who use the improved cook stove prototypes. Several types of study and research meet these criteria. The choice of method and approach very much depends on the size of the settlement and not all methods outlined below will be practical to use: especially for small rural places, quicker methods of enquiry, as also presented below, may be most appropriate.

IN-DEPTH ENQUIRY INTO LOCAL COOKING PRACTICES

When launching a massive dissemination of improved cook stoves, the first information required is to understand the needs of the households. This suggests an in-depth enquiry into cooking practices, but with a limited number of families. The objective is two-fold: I) to provide quantitative and qualitative information on the cooking practices, indispensable for designing appropriate improved cook stoves, and II) to provide precise information on the consumption of fuel for different types of standard meals, in order to calculate the total consumption of fuel on a city level.

Specific objectives

The enquiry is mostly about the following four key topics:

- 1) The characteristics of the wooden fuel used : of interest are :
 - The nature of the fuel; firewood, charcoal, wood shavings;

- The type of wooden fuel; pine, eucalyptus, acacia, etc., in order to determine lower calorific value of the fuel, which is necessary to determine the performance of the stove;
 - The quality of the fuel: its humidity, its size, and other information which also impact the calculations of stove performance;
 - The origin of the fuel : information about a city's wood fuel supply chain;
 - The frequency of fuel purchases;
 - The place of purchase: wholesaler, retailer, travelling salesmen;
 - The place of fuel storage and whether it is protected against moisture or rain.
- 2) The management of fuel storage: by daily weighing the stock of fuel, what is added and what remains, on several consecutive days, the fuel consumption of a family can be assessed and thus estimated:
- The daily consumption of fuel per family and per person;
 - The daily (or weekly) costs for fuel, and the price of purchase;
 - Daily additions (purchase, collection, gifts) and depletions (consumption, gifts, loans or resale) by systematically weighing what goes in and out of the stock;
 - The different ways of using fuel in the household: the uses (cooking, hot water, ironing etc.) and the relative quantities used for each.
- 3) The use of fuel for food preparation, meaning observing all steps of food preparation on the stove in order to identify the "kitchen recipe" that will be used in the Controlled Cooking Test (CCT) with improved cook stoves. In addition to the description of the preparation process, the observation also has to allow for precise measuring of the length of time of the preparation and the fuel quantities necessary for cooking the food. These data will serve as a point of reference for the tests of improved cook stove prototypes that will be carried out subsequently. Thus for all the prepared dishes, they will document:
- The weight of fuel used for cooking in grams;
 - The weight of the prepared food (raw and cooked) in grams;
 - The time of lighting the fire, of cooking and of using the stove for preparing the dish in minutes;
 - The nature of the used firelighter;
 - The type of stove used;
 - The number of people (sorted by age categories and gender) that consumed the prepared dish.

Based on these data, it is possible to calculate:

- The daily wooden fuel consumption of a household to feed itself;
 - The number of meals served each day within a family;
 - The frequency and duration of cooking for different typical dishes.
- 4) The material used for cooking, i.e. to find out about the characteristics of the stoves (type, age, state, price at purchase) and the pots (type, size, state of use).

The methodology

The methodology consists of choosing a sample group of families representative of the population (around 40 families in Antananarivo, from different socioeconomic backgrounds, from different hoods), and to assign them an observer from 7 a.m. until after dinner for 7 consecutive days. The observer will make all the measurements and weighings described above: the additions and depletions of fuel stock, the weight of raw and cooked food, observations on the stove and pots and the steps of preparation for different dishes etc. He/she will use a dynamometer for weighing, a watch, a ruler for measuring etc., and sheets for making notes of all observations.

SOCIOECONOMIC ENQUIRY INTO THE DOMESTIC ENERGY CONSUMPTION OF HOUSEHOLDS

The consumption of domestic energy is generally not well known: the research of the National Statistics Office does not collect the data necessary to design a program of massive dissemination of improved cook stoves. Before a program can tackle the ambitious task of permanently and massively replacing traditional stoves with improved cook stoves, on the scale of a big city, or even several urban centers, a socioeconomic study on domestic energy consumption in the households may turn out indispensable in order to:

- Characterise the households; categories include income, size, environment, budget items, etc.
- Have detailed knowledge of the domestic energy demand;
- Have detailed knowledge of the real energy supply, most notably of the supply with wooden fuel;
- Gather all the data that will allow for the improved cook stoves to be adapted to the needs of the families, as well as to their financial capacities; and
- Gather all the data that will allow for the design of a strategy of fast and massive dissemination of improved cook stoves to replace traditional stoves.

In Antananarivo, for example, such an enquiry was carried out in 1992 by giving questionnaires to 1500 families, a sample chosen to be representative of the population. The enquiry had eight specific objectives:

- 1) To identify penetration rates of various fuels; the principal fuel; types of consumption (cooking, heating of water in the cold season, heating of water in the hot season, ironing, other domestic uses, production of food for sale...); the impact of incomes; the impact of the geographical location of the residence; evaluation of total consumption of the city for each type of fuel;
- 2) To know the specific uses and the conditions of purchase for the main fuels. For each principal fuel, it will be studied: the conditioning of the fuel at purchase (a heap of coal, a bag, a half-bag, a donation, something else); the frequency of purchase (several times a day, once a day, several times per week, twice a month, once a month, other frequency, no purchase); who is the principal buyer (man, woman, child); use for commercial purposes -- sale of food; expenditure for the purchase of fuel;
- 3) To assess the types of stoves and the cooking equipment and characterize them: estimate of the number of each type of stove in use in the city for each type of fuel; evaluation of the number of stoves by types of households (socioprofessional categories, size of the

households); practices of purchase of stoves (who is the purchaser, what are the places of acquisition); the state of the stoves and reasons given for not replacing perforated stoves; the age of each stove in use; the purchase price of each stove; kitchen utensils in use (model, size and number of pots, lids, etc);

- 4) To be well informed on the rate of penetration of improved cook stoves and on how receptive the population is going to be to this new type of equipment; the qualities and the inconveniences the interviewees ascribe to improved cook stoves; the intentions as to their next purchase; the price at which the interviewees would choose an improved cook stove instead of a traditional stove.
- 5) To know the cooking practices of the households: management of the fire and the stove, the cooking tools used and the dishes prepared for each meal of the day, the other uses of the fuel; who prepares the food: the practice of filling the stove (full to the brim, lower than the brim, quantities adjusted according to the dish being prepared); the frequency of simultaneous use of two stoves; whether lids are used on the pots; what is done with remaining embers; the dishes prepared (for example the night before) for breakfast, lunch and dinner.
- 6) To identify the level of knowledge among the population and the households' opinion on marginal fuels, such as pine charcoal, petroleum, gas, or electricity; the knowledge of fuel prices (with verification whether the interviewees are correct in their assumption of prices, especially with regard to alternative fuels they do not use);
- 7) To know media coverage of the principal means of communication: newspapers, radio, television and social groups; membership in an association or a religious group; evaluation of how many families regularly watch television and how often they do so; evaluation of how many families regularly read a newspaper (and of their socioeconomic characteristics), and which newspaper and how often; evaluation of how many families regularly listen to the radio (and of their socioeconomic characteristics), and which stations, how often and what time of the day;
- 8) To understand the decision-making process within the family unit; who decides on what? This is a question of knowing which message to convey and whom to address and sensitize, inform and convince to buy an improved cook stove when the traditional stove is being replaced.

ENQUIRY INTO THE COMMERCIAL USES OF WOOD ENERGY

This enquiry concerns the commercial users of wood energy, in particular the cookshops, the street restaurants, the bakeries and the hotels. The objective is:

- To measure the importance of the wood energy sector in selected cities, and to evaluate in particular the importance of the consumption of firewood and charcoal beyond private households;
- To understand the ways wooden fuel is used in order to define most appropriate approaches to promote the use of improved cook stoves;
- To analyse how wood energy can be saved in ways adjusted to the specific needs of these non-domestic users in the selected cities.

Both the used fuel and the cooking practices are of interest:

- The fuel : the principal type of fuel ; the uses of this principal fuel (cooking, water heating); the consumption; the expenses in relation to the fuel; the means of supply;
- Cooking practices: for each type of fuel, the stoves used (model, age, price of purchase or manufacture, condition); the tools used for different dishes (model and size of the pots); the number of dishes prepared each day; the kinds of dishes sold for breakfast, lunch and dinner.

ENQUIRY INTO THE CRAFTSMEN AND PRODUCERS OF TRADITIONAL (AND IMPROVED) COOK STOVES

This study has the following objectives:

- To localise and count the different workshops within one community. We distinguish between the craftsmen who work with sheet metal (the principal sheet metal craftsmen) and the craftsmen who work with earth and clay (the potters and producers of tiles and bricks). We shall also endeavour to identify the opinion leaders among the craftsmen, who will be the ones able to motivate their community to produce improved cook stoves;
- To describe the equipment in the workshops and to take inventory of the production techniques the craftsmen have mastered. This means understanding the organisation of labour and the manufacturing process of a traditional stove, evaluating the manpower of a workshop and the distribution of locations, further evaluating the limits of their skills and knowledge, and identifying a possible need for professional training to start production of improved cook stoves;
- To describe the commercialisation chain of the products and their respective importance and difficulties; to evaluate their potential for development with regard to the dissemination of improved cook stoves.
- To identify the difficulties encountered by the craftsmen, in particular those likely to have an impact on the production and dissemination of improved cook stoves: supply with raw materials and recovering their costs, financial problems etc.
- Finally, to evaluate the total capacity for production of stoves in one particular locality.

After the craftsmen have been localised, the study is taken in the form of interviews, based on a questionnaire given to the person in charge of each workshop.

ENQUIRY INTO COOKING ENERGY CONSUMPTION IN SMALLER-SIZE LOCALITIES

In small rural places, a reduced study will be sufficient to see if the improved cook stoves developed for the families of the capital and other big cities are able to meet the needs of the rural families, and, if not, it will supply the information necessary to adapt the improved cook stoves according to the local conditions. The enquiry is carried out over several days through the distribution of a questionnaire, split into three parts:

- The fuel used: the range of fuels used; the principal fuel; the use of the principal fuel (cooking, water heating, ironing, producing food for sale etc.); the primary budget for fuel; the means of supply;

- Cooking practices: for each type of fuel, the stoves used (model, age, price and place of purchase, condition); the tools used for different dishes (model and size of the pots); the number of people living in the house (grouped by age); the dishes prepared the day before for breakfast, for lunch and for dinner.
- The family and the house: the mother's activities; the father's activities; the equipment in the house (electricity, running water, radio, television, refrigerator).

II. MASSIVE DISSEMINATION OF IMPROVED COOK STOVES

To have an impact on deforestation caused by the extraction of wooden fuels, the spread of improved cook stoves has to be massive. It also has to be fast: if not, the reductions in wood cutting caused by the spread of improved cook stoves will be quickly compensated for by population growth in any given area. If the market does not develop quickly enough, there is also a big risk that the craftsmen manufacturing the improved cook stoves instead of traditional stoves will stop producing them.

It is not an option to subsidize the improved cook stoves, as no government will accept subsidizing their production indefinitely, and when the subsidies are cut, the families and craftsmen will simply return to traditional stoves. A program of massive and dynamic dissemination of improved cook stoves has to be built on:

- Supporting the craftsmen in their innovative effort to produce improved cook stoves and replace their production of traditional stoves;
- Promoting improved cook stoves among the families.

1. SUPPORT MEASURES FOR CRAFTSMEN

The craftsmen are the first link in the chain of disseminating improved cook stoves: if they do not decide to produce improved cook stoves instead of traditional stoves, the project will be in grave difficulty. This is why, in the absence of subsidies, the project should take measures to make the innovative decision easier, and to even share a few of the risks.

a) Initial training of craftsmen for the manufacture of economical stoves

In general, the improved cook stoves reflect the know-how of the craftsmen as observed during the enquiry into the craftsmen sector. The technical training of the craftsmen is thus rather technically simple and is generally made up of:

- A presentation on improved cook stoves, with an explanation for why they make fuel use more economical;

- A presentation on the production process of improved cook stoves;
- A demonstration of the manufacture of different models selected for dissemination, carried out by two trainers (preferably chosen among the leaders of opinion who were identified in the study of the craft sector). During this demonstration, each craftsman manufactures a copy of each of the improved cook stoves, which he can keep as a model for his workshop;
- Equipment of each trained craftsman with a set of gauges of tracing or moulding for each improved cook stove;
- Distribution of a Guide of Manufacture, a picture-heavy reminder of the contents of the training that also allows them to share the information with the other craftsmen in their workshop;
- An order of five stoves of each model that will be distributed. The manufacture of these stoves according to the standards explained during the training allows the workshop to obtain a certificate of “craftsman approved by the project”.

b) Additional training of craftsmen producers of economical stoves

After six months of activity, the project can offer the workshops that have been trained in the production of improved cook stoves some additional trainings on how to organise a team of craftsmen producers, how to manage their finances etc. These additional training sessions will be an opportunity to revisit the principles of improved cook stoves, recall the norms that are to be respected in the manufacture... This is also an opportunity to train the craftsmen of a workshop who did not have the chance to attend the training the first time.

c) Micro credit from macro finance institutions

A major obstacle for the development of an improved cook stoves production is often the absence of floating capital of these workshops. The cost of raw materials is high and it is hard to buy in quantities that would reduce unit costs. Furthermore, the meagre profit margin of producing improved cook stoves does not allow for the building up of stocks, which would be a burden on savings. One support action could be to put the craftsmen in touch with local microfinance institutions to initiate micro loans, which will be the starting point of an adapted floating capital.

d) The anonymous repurchase of unsold improved cook stoves

The craftsmen decide on their own to manufacture and commercialize improved cook stoves. This is often a great risk, as they depend on a good sale of their stoves to live and to purchase the raw materials for the next batch of stoves. This is why a project may choose to anonymously repurchase the improved cook stoves that have remained unsold at the end of the big weekly market, in order to encourage the craftsman to continue to pursue this type of production. The so established stock of improved cook stoves could be commercialized at big events or used as promotional gifts on public holidays, for example.

e) Maintain a permanent dialog with the craftsmen

Life of a craftsman is difficult. Various events can suddenly disrupt their capacity to produce, make them doubt... It is important to establish a permanent dialog with them, to be able to react quickly and to prove an active partnership. This means establishing a relationship of trust between the craftsmen and the project: valuing the craftsmen by including them in the design process of the first improved cook stove prototypes, in the training sessions (for example, the trained craftsmen become in their turn educators of the project paid for their service...), and by helping them to better commercialise the improved cook stoves they produce.

2. PROMOTIONAL ACTIVITIES AMONG THE FAMILIES

Most families that have heard of "improved cook stoves" associate them with the idea of saving fuel. However, they often do not have a correct idea of the price (they may think the improved cook stoves are too expensive for them), they are not sure if the economic advantages are true, and are waiting to see whether their neighbours will be satisfied before taking the risk of acquiring an improved cook stove. A program of improved cook stove dissemination therefore has to provide this information, as well as confidence and a dynamic to boost the improved cook stoves. This can be achieved by a series of actions, detailed below.

1. Improving the image of improved cook stoves

The improved cook stoves made of sheet metal do not look very different from traditional stoves: they are made from parts of recovered raw material, have a similar form and shape and are not particularly attractive. To overcome this obstacle and make the improved stoves easy recognizable, the program can act on three levels:

- **The finish of the improved cook stoves:** in Madagascar, the UPED has paid particular attention to the finish of its improved cook stoves. The Dago, for example, with a rounded edge at the upper part of the stove, which also has the advantage of making this part of the combustion chamber, where the full pot rests during the entire simmering stage, more stable. The edges of the primary openings for air intake are also rounded, reducing the emissions dust from the inside of the stove. The bottom of the Dago is curved, which gives it a better base. These details increase the time of manufacture slightly but do not require additional raw materials and give the Dago a very personal image, which is socially gratifying.
- **The presentation:** in Madagascar, the UPED always suggested to the craftsmen to paint the outside part of the stove, in order to improve their presentation and to raise recognition value at a stall. A poll on the market has allowed to identify the most appreciated colours. Since this paint is not meant to be long-lasting, the craftsmen can get it at the recovery market at a very low price.
- **Give the improved cook stoves a name:** whereas the traditional stoves do not have specific names, each Malagasy improved cook stove has been given a name, chosen from the results of an opinion poll held on the market: "Dago" (which means "Homeland" in Malagasy), "Mateza" (which means "durable" in Malagasy), "Mitsitsy be" (which means "very economical"). The promotional campaigns will make it possible to personalise these improved cook stoves.

2. Support in advertisement

The improved cook stove program has to produce advertising material for promoting improved cook stoves, in particular:

- Leaflets, stickers, and posters at the disposal of the craftsmen producing improved cook stoves;
- Signs that identify the sales points of improved cook stoves with the logo of the program, so the trained craftsmen are easy to identify;

- Radio and television advertisements, if possible with the participation of popular artists;
- Fabrics, t-shirts, streamers... with images, names and slogans relating to improved cook stoves.

3. Periodic organisation of campaigns that stimulate and sensitive to the use of improved cook stoves throughout the entire duration of the program

To promote the dissemination of improved cook stoves on the market, the improved cook stove program has to coordinate a campaign of stimulating and sensitizing the public, including:

- The organisation of popular events, with for example podiums and public concerts under the patronage of local celebrities ;
- Television broadcasts with the participation of well-known entertainers and artists;
- Radio broadcast, transmitting public concerts, regular talk shows, weekly messages at prime time;
- Distribution of t-shirts with the logo of the programme and a picture of the improved cook stove;
- Involvement of stakeholders from the civil society: NGOs, Lion's Club, Rotary, professional associations etc.
- Active involvement in public events, such as fairs, National Holiday, International Women's Day: Organise a cooking contest on improved cook stoves, or demonstrations to compare the preparation of food on a traditional stove and on an improved stove and show the actual economic advantages, with an improved cook stoves as the prize of the competition;
- Open shows and animations to sensitize entire hoods, supported by local associations.