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Master thesis:

Kitchens, Women and Perception

From the inside, looking out

A study of kitchens in a rural area of Cochabamba, Bolivia

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ABSTRACT

Kitchens play a role in the daily life of the family. Kitchens in rural areas of developing countries have some specific characteristics in common; lack of comfort, difficult access to water, poor structures, lack of efficient ventilation, and a lot of smoke. The studies about kitchens have been analyzing diverse aspects, like the stove, the functions, and the climate. Little, if nothing was studied in relationship to the users. The objective of the present research is to make a study of kitchens in rural communities of Chimore Bolivia. The research assumes that the women spend more time in the kitchens, and in consequence are the most exposed group to the kitchen conditions, and that the management and characteristics of the kitchen have effects on the health. It looks to know which group is the most involved in the kitchen conditions, to what degree is the health affected by these conditions, what is the degree to the women's awareness about the effects in health. Moreover try to see if there is any reaction to remedied these effects, incase they are negative. Related studies about kitchens and human health effects, as well as a survey that was carried out in Chimore are used in the analysis. The effects on health from smoke exposure vary from coughs, and headaches to asthma and even lung cancer. The women perceive the effects, however, they are not aware of the complications in a long term. Adapting to the smoke in the kitchen, accepting it as part of their responsibility in the family, there is almost no intention to change. The dissemination of information about health effects, and the integration of more efficient stoves to cook, are suggested as possibilities to improve the kitchen conditions.

KITCHENS, WOMEN AND PERCEPTION
From the inside, looking out
A study of kitchens in a rural area of Cochabamba, Bolivia

INTRODUCTION

The characteristics of the kitchens in rural areas of developing countries have a diversity of types and styles. Lack of comfort, lack of hygienic conditions in the management of meals, difficult access to water, lack of ventilation, and smoke are common.

High levels of indoor kitchen pollution are produced by the combustion of biomass used as fuel. The biomass is collected from the forest and the surroundings of the house. Half of the world's population uses this kind of fuel for cooking and heating; in some places it represents the only source of energy for the dwellings. According to the World Health Organization (1997), each year 1.9 million deaths are caused by indoor pollution in rural contexts of developing countries. Indoor air pollution from biomass combustion has been recognized as an environmental health risk affecting hundreds of millions of people.(WHO,1991)

The women responsible for the provision of food, the collection of fuel, and the preparation of meals for the family, are more likely than men to be exposed to unhealthy house conditions. Also, inadequate provision of water, domestic hygiene and food preparation may increase women's labor, and take their toll on vitality and resistance to disease. (WHO, 1997)

Previous studies related with kitchens have been analyzing different aspects (Nyström, 1994; Ellegård, 1997; WHO,1991) Technical issues of the kitchen environment, the effects of indoor pollution and health, climate and kitchen design were considered. However, there is too little if nothing wrote about people in the kitchens. The opinion of the users of the kitchen, mainly women, should be considered in order to understand the subject. In this context the present research has the main objective to make a study of kitchens in a rural area of Bolivia, where the woman perception of the kitchen conditions, such as indoor air pollution and hygiene is analyzed.

The research considers two major assumptions. First, the women are the most exposed group to the kitchen's condition. Second, the management and characteristics of the kitchen have effects on the health of the family. Having these considerations, the research look to know which group is the most involved in the kitchen conditions; to what degree is the health affected by the kitchen conditions? What is the degree

of the women's awareness of the kitchen effects in health?. Finally, is there any reaction to remedied these effects, in case they are negative?

The specific objectives of the study are:

1. Look for the management and characteristics of the kitchens in the communities.
2. Consider the effects of the kitchen conditions, especially indoor pollution on the family's health.
3. Look to the woman's perception about the kitchen conditions.
4. Look for the reaction to possible negative health's effects caused by the kitchen conditions.

In order to achieve the objectives, the research is presented in six chapters. Chapter I is a brief explanation of the methods and tools that were used in the collection of data. Chapter II presents a review of theories that were selected. Chapter III presents the analysis of the characteristics, and management of the kitchen. The effects on the health related with the kitchen are described in Chapter IV. The aspects related with women perception and kitchens are considered in Chapter V. The last one, Chapter VI, contains the discussion and conclusion.

Regarding the methods and tools, related literature, and a questionnaire carried out in a rural area of Cochabamba Bolivia, were used in the analysis.

Considerations of the kitchen system, the description of effects on human health and the discussion about women's perceptions, show that the women do perceive the negative effects of the kitchen, however, they are not aware of them. The access to information and education are considered measures to increase the women's awareness about effects. Together with the implementation of efficient stoves, can possibly lead the change into healthier kitchens.

Chapter I

METHODS AND MATERIAL

In this chapter the methods and material used in the research are presented. The analysis is based on the review of related literature, studies about indoor pollution and human health, and a survey carried out in Bolivia. As follows the content of the questionnaire, the characteristics of the area of study, and the limitations founded in the application of the survey are described. In addition, a causal loop diagram of the research is presented

1. The questionnaire:

The survey had the objective to obtain information about kitchens in a rural area of a developing country. Having considered the need to collect a large amount of data from a lot of people at a time, the questionnaire was the best alternative.

The questionnaire was based in a previous survey presented in *The Kitchen Journey, from Black Holes to Open Spaces* by Nyström and Sims(2002). This survey is a summary of related factors and different categories of kitchen environments and can be considered as a technical approach in the analysis of the subject. Technical aspects such as the kitchen infrastructure, the stove, the kitchen functions and the culinary chain were adapted from the previous survey. Issues about accidents, women's perception and information were added. A method of tables and scales of valuation were used in this section. (See questionnaire in the appendix).

The locations of the communities, together with the fact that I visited the region in two previous occasions, were the most important reasons to select the area. In relationship with the workfield, it was necessary to first make contact with the representatives of the communities. The characteristics and purpose of the research were explained, taking advantage of the periodical meetings of the *comunarios* (people of the communities). After the representatives convinced them to participate, the survey was carried out during two days, 19th and 20th of August 2002. The communities located very closed each to the other, have approximately 448 families in total. Most of the dwellings are distributed in both sides of the main road of access. Fifty questionnaires (10% of the sample) were applied randomly, starting from the first house on each side of the road.

Due to difficulties to go back to Bolivia, two people were hired to apply the questionnaires in the study. They were previously instructed about the objectives and characteristics of the research and about the

different questions. The completed questionnaires and pictures of the communities were sent for analysis. In all the process a constant communication by e-mail, and telephone was maintained.

Part of the data was processed in Statistical Package for the Social Sciences (SPSS for Windows, v. 10). The open answers, tables of information, and pictures of the survey are presented in the figures of the analysis. On the other hand, through the application of the questionnaires, and during the analysis of the data, some limitations were found. First of all, due to resource and time restrictions, it was not possible to make a pilot test of the questionnaire in the area. Second, although the questionnaire was prepared to be answer by the women, in some cases the presence and participation of the husband impossible to avoid. In fact, sometimes the women just started to answer after the husband's participation. Nevertheless, the situation only affected the section about perception, and in consequence, the questionnaires filled in only by husbands are not included in this part of the analysis. (70 % of questionnaires were filled by women, 10% husband and wife, 8% daughter, 12% by husbands).

Finally, the analysis of the kitchen environment based in the collection of data, belong to a specific period of time. The situation in the kitchens depends on multiple factors like the climate, the season, the access to income, etc. Therefore, it should be consider that the characteristics of the kitchens in the survey are susceptible to change over time.

2. The area of study

Ayopaya and Trinitarios are the communities were the survey was carried out. These communities belong to Chimore, a small rural town (280.000 Ha.), located in a tropical lowland region of Cochabamba, Bolivia. With a total of 8.555 inhabitants Chimore is predominantly agricultural area. The climate is hot and humid, and the year is divided in a dry and a wet season.



Figure 1: Chimore in Cochabamba, Bolivia.

Source: <http://www.cia.gov/cia/publications/factbook/geos/bl.html>

With the intention to introduce the analysis of the kitchens, it is useful to look for the physical characteristics of the houses in the survey. Two types of houses are possible to be identifying in the communities. The pictures below show the characteristics of them.



Type I

Type II

Figure 2: Dwellings in the communities of Chimore

The houses in type I are distributed in two spaces. One of them is used as a bedroom for the family, and the second one, has the role of a kitchen. In type II, although it has a bigger construction, the distribution of both plants has the same functions of the previous type. The first floor is the bedroom, while the ground floor is used as a kitchen. In both types it is possible to find similarities. First, the main materials for construction are wood, and metal tile. The ground floor often consists in a clay surface. Second, the houses lack of windows; however, considering high levels of humidity and temperature, they have open sides for natural ventilation. Third, scarce furniture and the presence of animals surrounding the dwellings are common. In relationship with the availability of services, there are not sanitary, sewage or drainage systems. Due to the continual floods during the wet season, the construction of pit latrines and septic tanks is difficult. This is the reason why the population makes use of the same forest around the dwellings. In addition, although the region is one of the most important sources for hydropower generation, the population of these communities does not have electricity until now.

Regarding the water supply, there are two possibilities. A stream only used during the wet season, and an alternative bomb system. The latter is made of two tubes with a pump, to suck up ground water. On the other hand, poverty and lack of resources are common issues in the communities. A poor provision of physical infrastructure, the difficult access to basic services and the effects of the tropical and humid climate influence the way of living of the population.

The kitchen is the starting point of the analysis. The geographical location and the income of the family are determinants of the characteristics of the kitchen. The level of income is also an essential factor in order to choose the type of fuel that is used to cook. More income, major possibilities for the use of gas fuel. However, when the income is restricted, the fire stove represents the alternative in the kitchen. The fire stove requires fuel to cook. In the case of rural areas in developing countries wood, as well as different kinds of plants and manure is used to burn. The collection of biomass from the forest is becoming an important cause of deforestation. The more wood burned in household activities, the less forest there is surrounding the dwellings.

The burning of biomass to cook generates smoke, which become in high levels of indoor pollution in the kitchens. Besides, a good system of ventilation through the use of chimneys, hoods, or natural ventilation through windows, open sides in walls, and doors, can be considered as ways to reduce the levels of indoor pollution in the kitchens.

On the other hand, the cooking depends on the woman's time available for household duties. The more cooking, the greater the generation of waste, and the more water is required. The effort that the woman does while cooking depends on the conditions on the kitchen. The better the kitchen's infrastructure the more comfort for cooking. The need for biomass, and the difficulties for the water collection, represents more women's effort for cooking. (All these aspects are described in Chapter III) .In addition, the quantity of water and the correct disposal of waste are affect the hygiene in the kitchen. Thus influencing on the family's health. In addition, the access to health services depends on the family income and is a factor to keep a good health. (Chapter IV analyses the relationships between kitchens and health)

On the other hand, the research looks to know about the connection between the perception and the awareness of the women about the kitchen conditions. (Chapter V analyses the aspects about perception). The information and education can have influence in the women's awareness about the health issues. Finally, the use of more efficient stoves helps to save energy to cook and heat and to reduce the smoke in the kitchens.

Chapter II

THEORETICAL FRAMEWORK

Introduction:

The theoretical framework of the thesis is based in the consideration of three cornerstones that supports the analysis. The description of the theoretical approach, followed by a brief review of the theories involved: women and environment, environmental psychology, and a review of kitchen studies are presented.

In addition, the theoretical framework is conceived as part of a disciplinary and primarily cognitive context that supports the development of the research. However, since the approach involves a transdisciplinary, and heterogeneous effort, the research contributes to what is considered as tacit knowledge, a knowledge that is perceived but not expressed. The reasons of this consideration can be found in Gibbon's (1994) argument about the creation of new knowledge.

“ The new mode of knowledge production involves different mechanisms of generating knowledge and communicating them, more actors come from different disciplines and backgrounds, but above all different sites where knowledge is being produce. Mode 2, the new kind of knowledge, is transdisciplinary and heterogeneous. While mode 1, the traditional, is hierarchical and tries to preserve its form, Mode 2 is hieratical and transient, it includes a wider, more temporary and heterogeneous set of practitioners, collaborating on a problem defined in a specific and localized context. The tacit knowledge is not available as a text and may conveniently be regarded as residing in the heads of those working on a particular transformation process” (Gibbons, 1994)

In this context, the research contributes to the discussion of the kitchen subject, integrating technical, and architectural approaches with the biological premises of human health effects, and the sociological and psychological considerations of the women's behavior in polluted environments. The transdisciplinary approach, looks for the understanding of the reality of the kitchens in the communities of the fieldwork, and tries to analyze the complexity of the environment based in the analysis of data collected in a specific moment. These are the reasons why the research is creating tacit knowledge. As follows a brief description of the different theories is presented.

1. Women and environment:

The baggage of interpretations about the *women and environment* relationship are considered essential to the understanding of the kitchen as subject of study. Since the women are the main users of kitchens and collectors of food and fuel, the analysis needs to be considered in a gender perspective.

The origin of the connection between women and environment started with the fuel crisis in the 1970s. A growing interest in women's relations with the environment in the countries of the South emerged within the development discourse.

In 1984, the United Nations Environmental Program (UNEP) initiated a program to enhance women's participation in environmental management; as a result the topic of women and environment entered in UN's agenda. (Braidotti et al., 1994:84). In the years following the publication of the Brundtland Report, *Our Common Future*, where the concept of Sustainable development was defined, the Women, Environment and Development (WED) debate focused on the imperative for women's involvement in strategies and programs aimed at 'sustainable' development. Gradually, 'women, environment and development became women, environment and sustainable development' (Braidotti, et al., 1994:87)

In the consideration of the relation between women, environment and development it is possible to find different trends of interpretation. Terms like Women in Development (WID), ECOFEMINISM, Gender and Environment (GAD) represent some of the different views of the discourse. Each term is associated with a specific set of assumptions and values leading to the formulation of strategies for the participation of women in the development process. (Salazar, 2000: 2). A summarized review of the theoretical considerations of these approaches is presented as follows.

The WED movement emerged as a theme in the context where the planners were looking for strategies for people in the South who would be depending upon wood fuel as their major energy source. (Salazar, 2000). The ECOFEMINISM approach, with Vandana Shiva as main representative, proposes a supramaterial bond with nature that endows women with a privileged understanding of the environment and an innate need to care for it (Zein, 1996). Shiva characterizes development as a Western masculine project of modernization that has involved the subjugation of women and nature (Zein,1996). Her thinking stems from a search for an alternative development model. (Braidotti, et al., 1994)

In the Women In Development (WID) approach, Esther Boserup (*Women's Role In Economic Development, 1989*) brought out clearly the dimension and importance of gender within the processes of development. As an initiative of the World Bank, WID theory is based in a doctrine that “emphasizes the need to rise women’s productivity as means of raising rates of return on development projects and proclaims the cost- effectiveness of investment in women, e.g. through education and better health care ” (Zein, 1996).

In contrast, the Gender And Development (GAD), approach “not only integrates women into development, but looks for the potential in the development initiatives to transform unequal social/gender relations and to empower women”(Braidotti, et al., 1994). Instead, in *Development, Gender, and the environment: Theoretical or contextual link?* Elabdin Zein presents an alternative view in which the relationship between women and nature is contextual. Zein’s proposal explains that unlike the theory of WID and ECOFEMINISM, where the former tends to disproportionately implicate women in ecological destruction, and the latter tends to exempt women from all ecological accountability (Zein, 1996), women’s awareness of and responses to environmental exigencies are determined by the institutional conditions governing their activities, rather than by universal affinity to nature or by a tendency for rational optimization (Zein, 1996). An approach that is considered as a framework for the analysis in the present research.

3. Theory of adaptation

Environmental psychology perspectives support the discussion about the women’s behavior, and perception of the kitchen environment. An aspect to consider in the study of the kitchen and the women is the links that exit between the pollution and the behavior or reaction of the women to it. Cultural practices, and the learning baggage seem to be important factors that determine the way that the people can react to certain stimuli. The principles of learning motivation, perception, attitude formation, and social interaction help to explain why we ever engaged in and accepted polluting behavior in the first place (Bell et al., 2000).

Furthermore, it is common to find people living in unpleasant environments with a consequent effect on their health and state of well being. Air, soil and water pollution, noise, lack of light, lack of space and unsafe conditions are some of the characteristics of these environments. However, it seems that in given situations human being’s capacity of adaptation can make it possible to accept these conditions. (Bell et al., 2000).

In this context the study defines the term of *adaptation* as “a shift in our judgmental or affective responses to a stimulus following continued exposure to it. It refers to changing the response to the stimulus; whereas *adjustment* refers to changing the stimulus itself adjustment in this case not refer to the adjustment-maladjustment continuum conceptualized in clinical psychology (i.e. an internal, psychological state), but rather to a mechanism by which we change the environment”. (Bell et al, 2000)

4. Review of kitchen's studies:

The studies about kitchens have been gaining importance through time. The crisis of fuel and energy in the 1970s can be considered as a starting point for the studies about stoves and the use of wood fuel in developing countries. A parallel moment is when the woman's role started to get international attention.

The study of the kitchen subject, has been considering three main aspects: the stove, the function and the climate. A considerable number of research, projects and documents have been written about the introduction of more efficient stoves and stove projects are developed in contexts of developing countries . In most of the cases, the stove projects have the objectives to save energy and reduce of the deforestation rates. However, as Nyströms (1994) mentioned, “many stove projects suffer from not having a *success story* to tell, and experience shows that it is difficult to introduce new stoves. All too often, not enough attention has been paid to the user. The cultural and social context and the stove's immediate environment, the kitchen, were seldom taken into account: women do not always consider energy efficiency of a stove to be important”.

In relationship with the studies about function in the kitchen, most of them have a technical and architectural perspective. The lay out, the ventilation systems, light provision, distribution of space, and design in the kitchens are analyzed. Finally, research about the climate have been considering issues such as the effects of the smoke, indoor air pollution, humidity, and temperature in human health. Although, the considerable efforts in this aspect, more research about the significance of the effects in human health is needed.

In this context, in a transdisciplinary approach, the studies carried out by Maria Nyström (1994), integrates the three aspects mentioned above. The work of Nyström's about the kitchen design is considered then as the main reference in this research. On the other hand, in order to establish the context for the analysis, the definition of kitchens and the relationship with the dwelling are presented as follows.

The kitchen is “the area for all culinary activities; typically preparation of food, cooking, dishing up, dining, washing up and drying. The kitchen is not necessary walled, and the presence of a cook stove is a necessary and sufficient condition. It is the abode of the cook stove(s) that is the essential feature that defines a kitchen as different from other rooms in a dwelling” (Nyström, 2002). The kitchen is a part of the dwelling where the process and transformation of meals, and water takes place. In other words, it is the part of the dwelling where the culinary activities takes place. The relationship between the dwelling and the kitchen is presented in the next figure

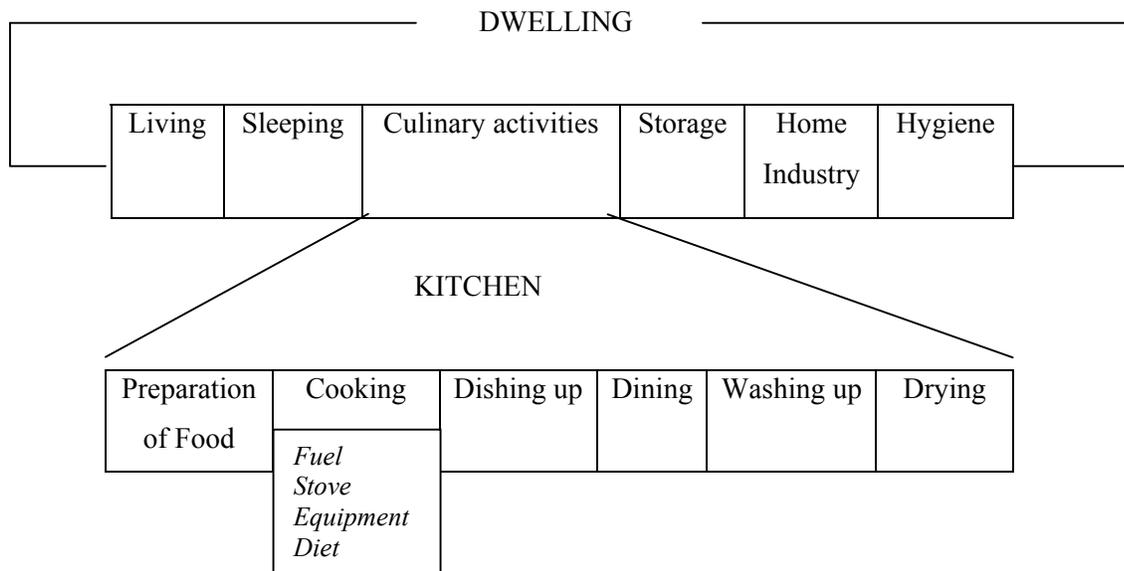


Figure 4: Diagram of the relationship between kitchen and dwelling, Nyström, 1994

The characteristics of kitchens depend on the context where it belongs culture, traditions, geographical location. However, the accesses of income can be considered determinant for the kitchen infrastructure and the comfort that it provides.

Chapter III

THE KITCHEN SYSTEM

Introduction

In this chapter the kitchen system, its characteristics and functions are analyzed. The kitchen is conceived as a system where the components work as subsystems in constant interaction. Energy, water, food, and garbage are the subsystems. The nature of the components determines the characteristics and of the kitchen.

1. The Kitchens in Chimore:

Aspects about the location in the dwellings, the materials of construction and the ventilation systems in the kitchens of the survey are described as follows. In 52% of the dwellings, the kitchens are located inside the houses in the ground floor. In other cases, the kitchen is a small room located in front or in the back, but outside the main building, although connected with it. The rest, 36%, were independent constructions separated from the house. The picture below shows a common type of kitchen in the survey.



Figure 5: Kitchen in the communities of the survey

On the other hand, in relationship with the material for the construction, the kitchens are similar to the dwellings, mainly built of wood, in most of the cases they are rudimentary structures without windows. The table below shows the relationship between the kitchens materials and the location in the house.

Location in the house	Materials		
	Wood	Brick	Others
Inside-ground floor	60%	-----	36%
Back	8%	50%	9%
In front	3%	-----	-----
Separated	30%	50%	55%
Total	100%	100%	100%

Figure 6: Location and materials of construction of the kitchens

* The tables with data and the pictures presented in al the document have the survey of Chimore as source.

In relationship with the smoke produce by the burn of biomass; windows, doors, chimneys and hoods are different systems of evacuation. The table below shows the evacuation systems used in the kitchen of the survey. In addition, it shows the results of the cross tabulation between the evacuation systems and the existence of black wall and roofs in the kitchens.

Ventilation system	Total of dwellings	Black roof and walls
Chimney	8%	5%
Windows	12%	14%
Open sides	62%	70%
Others	4%	3%
No answer	4%	-----
Total	100%	100%

Figure 7: Systems of ventilation and black roof and walls in the kitchen

An effective system of ventilation let the smoke evacuate easier. However, the efficiency of the ventilation depends on some aspects. The distribution of space, location of the windows, the doors, the use of chimneys and hoods are important. However, the excessive ventilation can also affect the combustion of fuel. Too much wind around the stove will require bigger amounts of fuel (biomass) to cook and heat, which can produce another negative effects. Thus efficient ventilation in the kitchen depends of a combination of technical factors. A situation that is not usually considered in the design of the house, especially in rural areas.

In the case of the survey, most of the dwellings have open sides in the walls (*see in Fig.2*). Observing inside of the kitchen, in 70% of the cases, the walls and roof are black. Then, it is possible to see that although the ventilation due to the open sides of the walls, the smoke remains concentrated inside. In contrast, it is not common to see black walls and roofs in the dwellings with chimneys. A situation that shows that this is a more efficient system of ventilation.

Finally, in relationship with the construction of the kitchens, in the communities, it was possible to see that it is mainly a man responsibility. In most of the cases the man is the one in charge of the construction

and design of the kitchen. In the questionnaires it was found that the woman participate just in some cases, and usually it is just to built up the stove.

1.1. Water, garbage and food in the kitchen:

As was mentioned before, the kitchen system has another subsystems, like energy, water, food and garbage, that are in constant interaction with the cooking activity. The quantity of garbage is related with the quantity of food prepared. The water is used for cooking, and latter for washing and cleaning of the utensil and the kitchen. The next figure shows the sources of it' s collection.

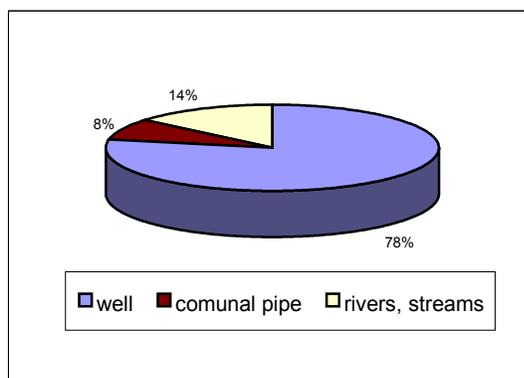


Figure 8: Sources of water collection in the communities.

The main source of water collection in the communities is the well. In the case of food, meals are most of the time produced by the same family and storage in the kitchen, exposed to the air and insects. Finally, regarding the management of the garbage, in 92% of the dwellings, it is stored in any place outside the dwelling, and then disposed in the woodlands. A factor has to be considered as negative since the accumulation of the non-biodegradable garbage becomes a source of soil and water pollution.

1.2. The Stove:

Besides water, food and garbage, energy is another important subsystem in the kitchen. Having considered that the stove is the sufficient condition for a kitchen, it becomes the main component of it, and it is directly related with the requirement of energy as fuel to cook .In relationship with the characteristics of the stoves, almost 70% of the dwellings stoves were fixed in the kitchens, mostly are made by clay.

In the case of portable stoves, they are metallic structures, located in the spaces founded by the women to cook and prepare the meals. Usually in the surroundings of the house. Different from the fixed stoves, the portable ones require more fuel and are more exposed to the wind and sun. Moreover, they represent a major risk for burns and accidents. An important factor considering that during the household duties and the culinary chain activities, the women used to be surrounded by the children.

1.2.1. The Fuel:

Most households use energy primarily to meet the basic human needs of cooking. Energy use for all the purposes would only increase as the household income increase. “Burning wood and manure for heating and cooking supplies about 12% of the world’s energy. Almost 70% of the people living in developing countries heat their homes and cook their food by burning wood or charcoal.” (Miller, 2002). The main reasons for the predominant use of wood fuels in satisfying energy requirements are fourfold:

- Most wood fuel users are poor and unable financially to exercise the privilege of fuel choice;
- The cost of wood fuel are low relative to other fuels;
- The cooking devices which use wood fuels are inexpensive (the traditional charcoal stoves) or free (traditional tree stone fuel wood fire), and
- The distribution and marketing systems for modern fuels are, generally speaking, inadequate, unreliable and underdeveloped (Nyström, 1994)

In the communities of the survey, the most used fuel is biomass. 66% of the dwellings use it to cook. In 30% of cases, the needs for energy are covered by a combination of biomass and gas for cooking. The income, the conditions of the weather, and the availability of gas are factors that influence the decision to choose a fuel. On the other hand, four percent of the dwellings only use gas to cook.

In relationships with the use of fuel, these are some of the factors that are take in consideration in the communities:

“ the wood is easy to use, if it is dry, is a problem when is humid”, “humid takes time”... “Wood is difficult because of the smoke”, “sometimes there is no wood”, “the gas is faster, gas is expensive”

Moreover, asking for the reasons to select a fuel to cook, we found the next relationships.’

Reasons for the use of fuel	Fuel type		
	Wood	Gas	Wood-gas
Cheap	58%		33%
Best	3%	50%	20%
Last more	3%		
Always used it	2%		13%
The only one	3%		
Cheap and best	12%		27%
Other		50%	7%
Total	100%	100%	100%

Figure 9: Reasons for the use of fuel

From table above, the major reason to use biomass is related with the economic cost. In some cases, the wood is considered not only the cheapest, but also the best fuel. In addition, it seems that the use of wood is also considered as tradition; it was always used.

The access to wood fuel obviously depends on the location of the house. In some cases it was mention that is easier to get wood because is close by. Others said, it is difficult, because they have to walk a lot to find dry wood and it is necessary to break it, so the men have to help. However, although they express some difficulties for the use of wood, these are just related with the distance, the weight and time. Conversely, the use of gas is related to the cost, due to expensive prices, and the difficulties to bring it from another bigger towns.

2. The kitchen functions:

The culinary chain it is the main function in the kitchens of the survey; however, laundry, sleeping, and other activities are also carried out in the same space. As Nyström (1994) explains “many activities can take place in a kitchen room. Normally it means a place where the food is cooked, and sometimes where the family eats, but it can accommodate other functions, such as storage of fuel or bicycles, the keeping of domestic animals or facilities for home industries”.

As it is possible to see in the figure 11, when asked about the functions of the kitchen space, 74% of the cases mentioned that the kitchen is only used for culinary activities; however, it was common to observe that the kitchen space was used as deposit of clothes, products, storage of wood, working tools, a place to dry clothes and to keep the animals at night. In some cases, besides bathing and laundry, the culinary activities are carried in the same place where the family sleep. This represents a potential exposure to pollution, considering that in most of the cases biomass is burned.

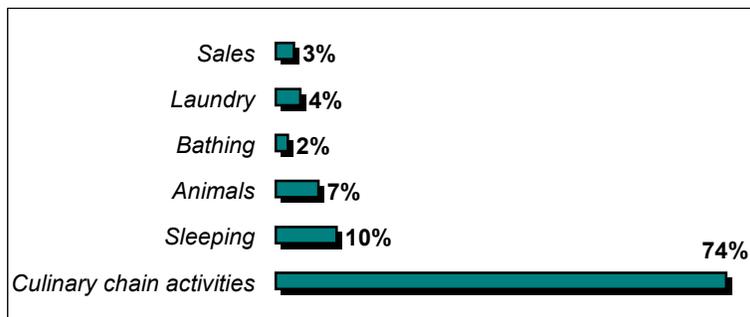


Figure 10: Kitchen functions

3. The Culinary Chain:

Since the culinary activities are the most important functions of the kitchens, they are analyzed in this section. In addition, the roles of the family members in the chain, and the relationship with the time spend in the kitchen, are described. Having in considered the rural context, culinary activities can be developed inside or outside the kitchen room. These situations depend on diverse factors like the weather conditions, the space available, the stove and the fuel used. As is possible to see in the figure 12, in the case of the communities of the survey in most of the cases the “cooking” is inside of the kitchen.

Culinary chain activities	Inside kitchen	Outside kitchen	Total
Preparation of the food	62%	38%	100%
Cooking	98%	2%	100%
Dishing up	84%	16%	100%
Dining	64%	36%	100%
Washing dishes	52%	48%	100%

Figure 11: The culinary chain and the kitchen

However, the owners of the portable stoves, have a major mobility, that allow them to cook in different places, especially during the wet season when the floods make necessary to look for a safer, drier and higher place to stay. Besides, the preparation of the food, the dishing up, and especially the washing of dishes can also take place indoors or outdoors. In some cases the bedroom is used to eat, whilst in others, the surroundings of the house can provide the space needed for eating, preparing food, and washing the dishes. In relationship with the responsibilities around the culinary chain, as is possible to see in the table, in 86% of the cases the woman is the only person in charge of the cooking activities, sometimes the role is also carried out by the daughters. Men just cook in cases where the woman is sick or when she is not in the house for a long period.

The opinions about the participation of the man in the kitchen are different. It was possible to see that even though, the help of man is accepted in the kitchen, and can even be demanded, it is mainly for help.

“ Yes men can cook, when I am sick”, “ they have to cook when there is no woman”, “Yes, they can help”.” No men can ‘t cook, is a woman’s job”, “ No is a woman right, they can’ t”, “ They just can help”

Finally, in the relation between the time spent in the kitchen and the time dedicated to cooking activities, we can see that the kitchen is just used during hours per day and in most of the cases the culinary activities take maximum three hours.

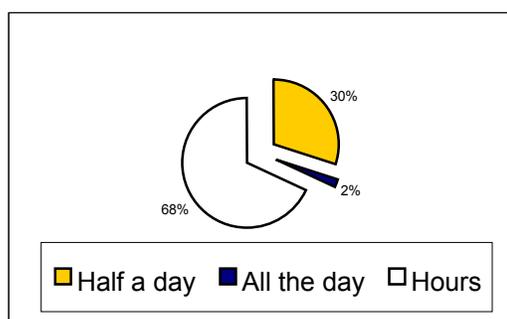


Figure 12: Time spend in the kitchen

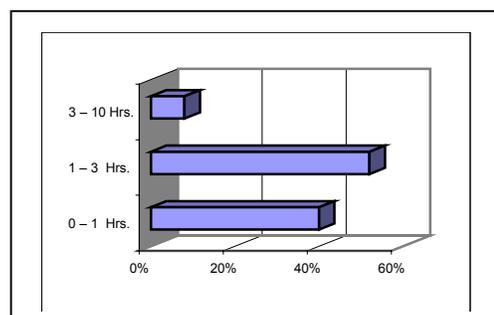


Figure 13: Time spend cooking

The time spent in cooking in the communities is also a time of direct or indirect exposure to the smoke. It was found that in most of the cases this activity takes no more than 3 hours. However, since cooking is a daily activity, the effects of the exposure to smoke can have health effects in the long term. The aspects related with the health effects are going to be described in the next chapter.

Chapter IV

KITCHENS AND HEALTH

Introduction:

In this chapter the objective is to look for the links between kitchen and health. The definition of healthy kitchen is presented in order to establish the ideal conditions of the management of the kitchens. In addition, the consideration of different factors that can possibly have effects in human health is described. The exposure to indoor pollution, hygiene in the kitchens and the working position are analyzed. Moreover, some aspects related with the safety in the kitchen are included.

1. Healthy kitchens

Before defining the characteristics healthy kitchen, features of the housing environment that have direct or indirect effects on the occupant's physical and mental health are presented.

“The house structure and shelter, the quality of the housing site, the extent to which the provision of water supplies is adequate, the effectiveness for the provision of excreta, sewage, and solid waste disposal, the indoor pollution associated with fuels using for cooking and /or heating, the effects associated with overcrowding, including household accidents, the increasing transmittion of airborne infections, acute respiratory infection diseases; the food safety, including the extent to which the shelter has adequate provision for storing food, to protect it against spoilage and contamination are some of them” (Sims,1993).

The intention was to show that in most of these features, the kitchen system plays a role. In consequence, is possible to establish that there is an effect and relationship between the kitchens and the human health.

Since we are talking about the kitchen as a factor that has influence in health, it is important to determinate what we understand as a good kitchen environment, or in other words what a “healthy kitchen”¹ is.

Consequently, a “healthy kitchen” needs to consider the necessity of safe water supply, the disposal of solid wastes, personal and domestic hygiene, safe food preparation, adequate storage of fuel, food and

¹ The concept of Healthy Kitchen was adapted from the principles of a Healthy Housing of the WHO. (WHO, 1997: 113)

water, and structural safeguards. Moreover, it needs protection against injuries, poisonings and chronic diseases, attention to structural features and furnishing, ventilation, light, indoor air pollution, and chemical safety. It also requires a reduction to psychological and social stress through adequate location, comfort, security and protection against noise.

2. Kitchens and health

The level of indoor pollution, the hygiene in the management of the kitchen and the working position while cooking are some of the aspects that can have a possible effect in the health of the family.

2.1. Indoor pollution in the kitchen:

One of the characteristics of kitchens in developing world is the indoor pollution level caused by the use of biomass as fuel for cooking and heating. “High levels of indoor pollution arising from the use of open fires, unsafe fuels and inefficient stoves for cooking and/or heating probably represents the single most serious health impact from air pollution worldwide. Recognized as an environmental health risk affecting hundreds of millions of people”. (WHO, 1991).

Studies have shown high emission factors for many important pollutants, including respirable particulate matter, carbon monoxide, polycyclic aromatic hydrocarbons, such as benzo-a-pyrene, and volatile organic compounds, such as formaldehyde and benzene. Biomass fuels emit hundreds of chemicals during small-scale combustion, such as in household cooking or heating stoves. By comparison to modern cooking fuels, such as kerosene and gas, unprocessed solid fuels produce 10-100 times more respirable particulate matter per meal as the result of low (combustion and heat-transfer) efficiencies. Although biomass makes up only 10-15% of total human fuel use, compared to modern fuels a much larger fraction is burned indoors, since nearly one-half of humanity cooks and/or heats with simple stoves burning traditional biomass fuels (WHO, 1999).

2.1.1 Health effects from indoor kitchen pollution:

“The issue of health effects from cooking fuel pollution in developing countries still receives limited attention from policy makers and researchers. To some extent this could be because cooking fuel pollution is not considered as a problem, since it is a traditional situation that has prevail for centuries. A contributing cause could be that the vulnerable groups are women, children and elderly, groups that do not yet carry strong political clout in many countries. Another reason may be that the linkage between cooking fuel pollution and health is by no means direct and simple to grasp”. (Ellegård, 1997)

In relationship with the diseases the World Health Organization (WHO, 2000) explains that the exposure to smoke increases the risk of acute lower respiratory infections (ALRI) in children, chronic obstructive lung diseases (COPD) in adults and lung cancer. In addition, evidence is now emerging of links with a number of other conditions, including tuberculosis, perinatal morbidity (stillbirths and deaths in the first week of life), low birth weight, asthma, otitis media (An ear's infection), cancer of the upper airway, and cataracts(WHO, 2000).

In relationship with the eyes irritation, in a research about *Household Fuel Pollution* among urban women of developing countries, Anders Ellegård (1997), found a correlation between the tears and the exposure to pollution from smoky cooking fuels. Tears while cooking is a good indicator of exposure to cooking fuel pollution and such pollution is conducive to certain health effects. In the case of the communities, the questionnaire asked about the most common affections in the family. The intention was to look for a connection between the use of biomass as fuel and the affections and diseases related with the smoke exposure that was mentioned before. The results are showed in figure below.

Main effects		Main fuel used to cook		
		Wood	Gas	Wood and Gas
Eyes	2%	0 %	0%	7 %
Lung	14%	12 %		20 %
Stomach	34%	30 %	50%	40 %
Lung and Stomach*	8%	9 %		6 %
Eyes and Stomach*	16%	15 %		20 %
Others	16%	18 %	50%	6 %
All the mentioned	10%	15 %	0%	0 %
<i>Total</i>	<i>100%</i>	<i>100 %</i>	<i>100%</i>	<i>100 %</i>

Figure 14 : Health affections and fuel used for cooking.

**The questionnaire mentioned a list of possible affections. In some cases the people mentioned the presence of more than one at the same time. Since the percentages of cases with a double affection were important the results are presented in the table as separated categories. In the case of "all mentioned" these families mentioned to have all the affections in the moment of the survey*

It is possible to notice that all the effects have the management of the kitchen (stove-fuel-water-food) as possible origin. From stomachache, to very serious diarrheas, the stomach diseases are the most common.

Besides this, in the category of others diseases, high temperatures, headaches, and skin irritations were described.

On the other hand, relating the effects with the main fuel used to cook, it is possible to notice that between the wood users the stomach, lung and eyes affections are common. Conversely to the users of gas, who only mentioned stomachaches and temperatures. This situation can be a caused by another factors, such the hygiene and the quality of water consumed.

2.2. Hygiene in the kitchen

“Many people using smoky cooking fuels also live in circumstances of poor hygiene, crowding and generally substandard conditions which makes bacteria infection rather likely”(Ellegård, 1997). The hygiene in the management of the kitchen is an important factor that influences in the health of the family. The water, food and garbage subsystems have to be carefully management in order to avoid infections and diseases. In addition, the cleaning of the kitchen room, as well as the washing of kitchen tools and utensil, have also be considered as part of the hygiene of the kitchen. In most of the case of the communities the management of the kitchen is not manage in hygiene conditions, with the consequent effects in health. The situation can be observed in the next figure.



Figure 15: A kitchen in the communities of Chimore

Regarding the management of water, it was described previously that most of it is collected from wells, storage in plastic containers outdoors or inside the kitchen, and usually, not protected from the dust, insects and animals. Hence, in order to avoid diseases the water to drink has to be boiled. However, in 60% of the cases the dwelling don't boil it. The families drink water directly from the river or the well. This factor becomes a cause for stomach affections and diseases. In the next table the relationship

between the affections in the dwellings from the survey and the possibilities to boil water to drink are presented.

Affections	Boil water		
	Yes	No	Total
Eyes irritation	-----	-----	-----
Lung	29%	71%	100%
Stomach	41%	59%	100%
Lungs and stomach	50%	50%	100%
Eyes and stomach	50%	50%	100%
All	20%	80%	100%
Others	50%	50%	100%

Figure 16: Health affections and the practice to boil water in the dwellings of the survey

As it is possible to see, the dwellings where the water is not boiled have more affections, specially stomachaches, diarrheas, and infections.

On the other hand, the cost and availability of fuel seems to be one of the main factors that influences the practice of boiling water. However, the practice is also related to habits or customs, a possibility that will be analyzed in the next chapter.

3. Working position:

Another factor that has to be considered in relationship with the kitchen effects in health is the working position. “Ideally the working position should be adapted to the height, body size and position of the cook(s), but unfortunately in practice this is rare. Cooking position varies greatly within and between cultures; there is no universal position used in any setting, whether rural, semi-rural or urban. The level of available technology, energy and equipment usually govern the working position adopted, along with the positioning of fixtures and fittings” (Nyström and Sims, 2002).

In the case of the survey, due to some factors such as lack of furniture and the position of the stove, women used to cook sitting in the floor (See figure below). In slightly 26% of the cases squatting and just some of them, standing .



Figure 17: Common working position while cooking in the communities.

The working position depends also on cultural conditions. However, sitting in the floor for hours every day, affects not only the comfort, but it requires more effort and energy in the women's work.

4. Kitchen's safety:

The last factor to consider in the relationship between kitchen and health is the safety. In the survey there were not found cases of accidents related with the stove of fire. However, in the case of the use of biomass fuel, and moreover, when the stove is portable, the risks of burns and accidents increase. These stoves are usually placed in the ground floor, the fire, smoke, and ashes are part of the cycle during the cooking time. In most of the cases the children, even adults are exposed to the fire of the stove, and to the hot meals that are boiling.

On the other hand, although the gas is more efficient in terms of the time it's use is related with risk of explosions and unsafe conditions. The high humidity, temperature and the unsafe conditions for the transport, plus high cost to maintain the connections are factors that increase the risk of explosions.

Chapter V
KITCHEN AND PERCEPTION

Introduction:

In this chapter the objective is to look the kitchen from the point of view of the woman, as main user. Having in consideration that cooking used to be a daily activity, carried out in specific periods of time, frequently as a routine, we look to know what do woman think about the kitchen? Do they perceive the effects of the smoke? Do they realize that the smoke affect their health? Do they want to change the conditions. These are some of the questions that would be answered in this chapter.

1. Women's perception of the kitchens:

One of the objectives is to try to understand how the women see the kitchen. The answers in the survey were diverse. As it is possible to see below, most of them were related with the responsibility in the family. In other cases, the meaning of kitchen is linked with the experience of personal situations.

What is the kitchen for you?

“ The place to cook , to eat”, “ my place of work”, “ responsibility of the women”, “ place of the women”, “ my house”, “ a place of distraction”, “ where you can find the women”, “a place to rest”, “ where I go to cry”.

It is possible to mention that in some cases the women refers about the kitchen as a place where she can organize and arrange, *their own territory*, a place that belongs and depends on them. However, it is necessary to make some considerations, although they can assume a feeling of property in the kitchens, in many situations, due to economic, social and cultural reasons, the kitchens lack of security or comfort, can be dark and polluted. Besides, the possibilities to invest in the kitchens usually are out of the women's control, depending on different factors as the family income, and the husband's decision.

Then, considering the importance of the kitchen in the dwelling; to what extent the women are able to decide about the characteristics of it? The participation of women in the construction of the kitchen seems to be limited. In 54% of the cases, they help in the construction of the kitchens. In most of the cases they helped to transport the materials and also were in charge of the stove construction; however, issues like location, size, materials of the kitchen seems to be a man's decision.

On the other hand, the wood fuel with ashes, the smoked, and black surroundings, the darkness, in sum the use of biomass as fuel is a factor that affects the appearance of the kitchen. As a result, in 30% of the cases the women mentioned that is an “ugly” place to stay because is dirty and black.

Asked about how safe feel the women inside the kitchen, these are the results:

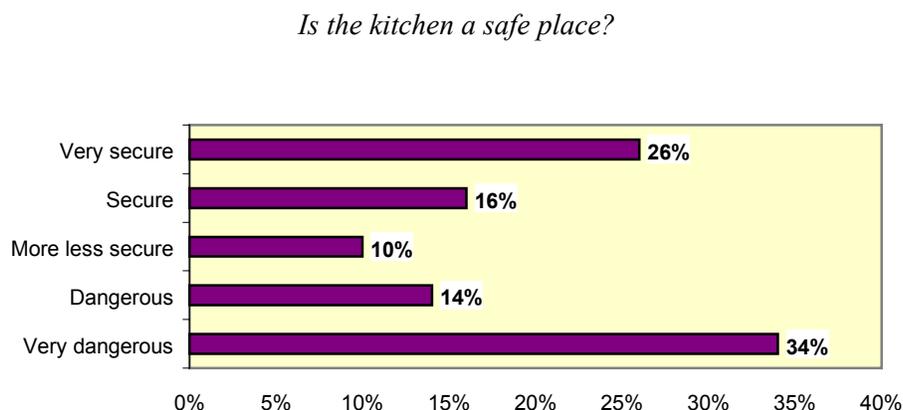


Figure 18: Perception on kitchen's safety

As it is possible to observe, most of the women consider that the kitchens have at least some security conditions for them. However, in 44% of the cases it is perceived as a dangerous environment. The reasons are related with the fuel used. Conversely to the assumption that the gas is faster and easier to manage, there is concern about the risk of possible explosions. The perception of risk is also related with the fire from the stove, and the lack of light at night.

1.2. The cooking:

The most important activity of the culinary chain is the cooking. The characteristics of it depend on the food and water availability, cultural traditions, time for household duties and even the kind of stove that is used. In spite of the lack infrastructure and the difficult conditions of the kitchen, when asked about the “cooking” the women consider it a very pleasant activity. Although, it is perceived as a woman obligation, they mentioned that is fast and easy and that the use of wood fuel is the only negative aspect (dirty, ugly). The figures below show the opinion of the women in relationship with the cooking activity:

Is cooking a pleasant activity?

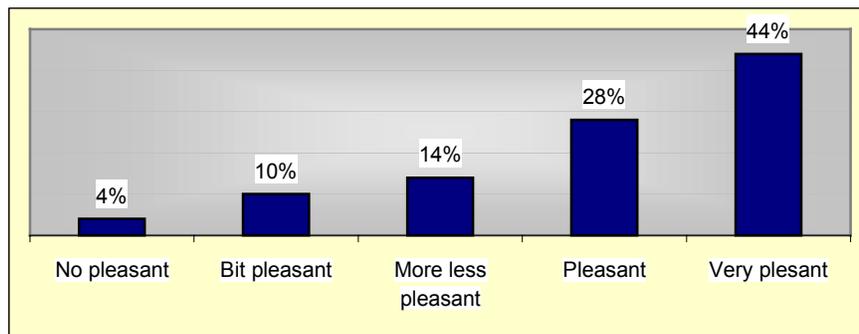


Figure 19: Perception of cooking activity. From not pleasant to very pleasant

Some of the answers were:

Is pleasant: *“I am always there”, “I like it”, “it makes us eat”, “is fast”, “is a woman obligation”, “women have to cook...there is no option”, “I am used to”*. Is unpleasant: *“for the woodfuel”, “I am lazy”, “when there is no enough”*

Is cooking difficult for you?

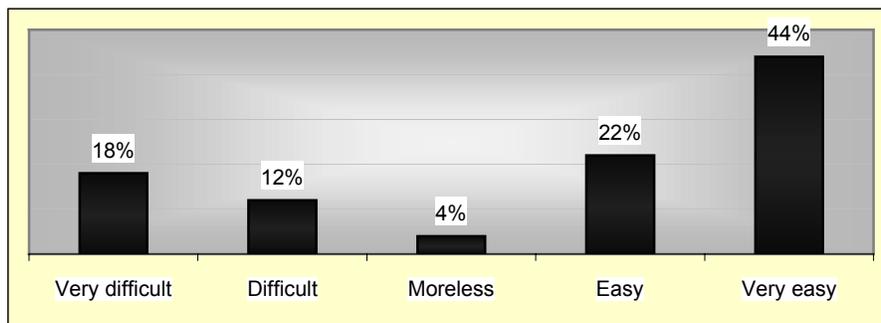


Figure 20: Perception of cooking activity. From very difficult to very easy

About the reasons:

“it is easy, I like it”, “I am used to cook”, “easy is fast”, “easy when there is everything”, “it is difficult because I have to work”, “difficult for the wood fuel”

As is possible to see, the availability of fuel, especially wood fuel, is one of the most important factors that influence the perception of the women about the kitchen and the cooking.

2. Perception of health:

In this section the objective is to look for the perception about health effects. Factors as the water management, and smoke generation are considered. In addition, the link between the level of education and the perception about the health effects is described.

As was presented in the previous chapters most of the water is collected from a well, and managed with not hygienic conditions, which has negative effects for the health. In addition, in 60% of the cases, was mentioned that to boil water is not important. Most of the families do not use to boil the water to drink. Between the reasons, besides the cost of time and energy, to boil the water is not a traditional practice in the communities.

Do you boil the water? Why?

We don't boil water because *"it doesn't get cold", "there is no wood", "the gas can be finish", "I don't like to boil", "I'm lazy", "there is no time", "we are not used to"*

Although in some cases they realize that boiling can prevent diseases for the children, in most of the cases it is not consider as necessary. "The percentage of gastrointestinal disorders attributed to domestic food preparation is very high in all developing countries; much of this is linked behavior and practices are rather to any intrinsic defect in the food product itself". (Nyström & Sims, 2002).

Another factor considered is the perception of indoor kitchen pollution and the effect on the woman's health. When asked about the smoke and health, 78% the women mentioned that the smoke affects their health. However, in some cases they did not find negative health effects because of it.

Does the smoke makes you sick?

Yes, *"It makes us sick and damage the eyes", "make my eyes burn" "I have headache" "my husband coughs"*.

No, *"Nothing happens", "what is that", I never got sick" there are plants that purify the air", "it makes the flies scape"*.

In the same way, when asked about the effects of cooking in their health, the answers were also diverse. In half percent of the cases the women perceive that the smoke produce health effects, the other half do not perceive the effects at all.

Does cooking affect your health?

Yes, “ the smoke comes to my eyes, burn the eyes, goes into the nose”, The smoke is hot makes you bad” , “ the hot air affects the women”, “ it affects the lungs”, “ it pollutes”

No, “ I never get sick while cooking”, “ it doesn’t affect my health”, “smoke make ask cry but no sick”, “it is just a moment and nobody gets sick”, “ It says that smoke gives bad eyes, but I never got sick” I don’t think so, because cooking is good”

In spite of the different reactions, it is possible to say that these women perceive the negative effects to the smoke exposure. However, although, they feel external effects, the link with the possible diseases and health is not clear. They are not aware of the consequences, especially in the long term. Moreover, it seems that they get used to the situation. Then, having in consideration the effects of the smoke, it was interesting to look for the reaction to it, or in other words, to see the women’s disposition for the improvement of the negative conditions. In this context, the next figure show the answers when they were asked to mention a change that they would like to make in their kitchens.

What would you change in your kitchen?	Total
Roof	8%
Walls	4%
Floor	22%
Windows	2%
Stove	18%
Kitchen room	26%
Other	4%
Nothing	16%

Figure 21: Disposition for possible changes in the kitchens .

The wishes were more related to change the physical structure of the kitchen, such as walls or roof, or even to build another kitchen room. In some cases they mentioned the need to change for a new stove. However, they did not mention the possibility to change to another type of fuel, moreover, in 16% of the cases they did not want to change anything at all. Although, the use of biomass is perceived as negative, there is no disposition or intention to change to other kind of fuels. The reason can be related with the

cheap costs and easier availability of wood from the forest, but also, because the effects are just related with lack of comfort or inconveniences, however, it is not perceived as a hazard for the health. Moreover, it seems to be assumed as traditional and accepted as part of the kitchen functions.

3. Level of education and perception:

With the purpose to see if the level of education of the woman has an influence in the perception of the health effects of the smoke and the management of water; a relationship between the variables was considered. However, the differences in the perception between the illiterate women and the ones that read and write is small.

In relationship of the level of education and the habit to boiling water there were not big differences. A similar situation with relationship with the perception about the smoke. 80% of both groups (illiterate and primary), mentioned smoke effects, as irritations. However, in relationship with the perception of the smoke, 49% of the literate women said that cooking affects the health, while 60% of the illiterate women did not find a connection between the cooking, the smoke and health.

4. Possibilities to improve the kitchen conditions:

Two possibilities to change the kitchens into healthier environments are analyzed as follows. Technical interventions such as the dissemination of more efficient stoves and the access of information for education are described.

In relationship with the first one, projects of improved cook-stoves, introduction of alternative fuels, change of kitchen layouts are the most important technical interventions.

During the 1970s and a large part of the 1980s, macro level strategies domined, and the wide dissemination of stoves were seen as a way to stop deforestation and desertification. The reason was that cooking is the most energy consuming activity in a household, which is why so much attention has been paid to firewood and energy saving stoves.. (Nyström, 1994: 27)

Most of these projects consist in the introduction of better stoves, from a technical point of view. The new stoves, different in styles, sizes and materials try to be more efficient in the use of energy, reducing indoor exposure, and giving safer conditions in order to avoid risks for burns and scals.

Nyströms (1994) explains that “ the stove must be consider in its own context. It is not enough to supply fuel –efficient stoves. The kitchen itself must also be considered. Many stove projects suffer from not having a “success story” to tell, and experience shows that it is difficult to introduce new stoves. All to

often, not enough attention has been paid to the user. The cultural and social context and the stove's immediate environment, the kitchen, were seldom taken into account: women do not always consider energy efficiency of a stove to be important”.

In other words, since the process of intervention does not take in consideration, or involve the woman into the problem and the solution, there will be limits for the success. The woman has to understand the necessity to change the stove or to modify it. Then any intervention will be not only possible, but sustainable in the long term.

Besides the technical interventions that intent to look for solutions to indoor pollution and energy savings, the dissemination of information for education can also represent an important factor to involve the population, especially the women in order to reduce the negative effects and to look for possible solutions.

Information about the effects of smoke, about hygiene in the management of meals and water, about the use of better stoves, prevention of accidents related with the fire stove and gas, can probably become part of a strategy to have healthier kitchens

DISCUSSION

Kitchens, health and development.

The relationship between kitchens and health can be analyzed from two perspectives. The first one is the hygiene in the management of the kitchen subsystems; the second is the effect of the indoor kitchen pollution on health.

The management of water, food and garbage depend on factors as the family income and the time that is dedicate to the household duties. The availability and the quantity of water is essential for the culinary activities. The quality of it has a direct effect on health. In similar conditions, the food have to be manage, and storage with hygiene in order to avoid infections and diseases. Besides, the disposal of garbage generated from the culinary activities, has to be dispose correctly, otherwise it can be a source of pollution, also harmful for the family's health.

On the other hand, the indoor air quality of the kitchen can be affected by the type of fuel used to cook and heat. The smoke produced for the biomass used to cook, produces various types of affections and severe diseases in the long term. These are the relationships between the kitchen conditions and health.

However, besides the above considerations, and having especial consideration to rural areas in developing countries, the kitchens are a factor that affect the heath, then a healthy population is necessary for in the economic growth and consequently, for the process of economic and social development.

In order to explain this influence between kitchens and development, some definitions have to be previously considered. First , WHO, (2002), defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”. A good health is a conditional for the well being of the population. Second, the well-being is understood as the state of good function of the physique and psychological mechanisms of a persons. In a state of well being the persons can look for a better quality of life, can have a better performance in their responsibilities; moreover, can be able to look for possibilities of growth and realization, can develop their potential in accord with their needs and interests.

On the other hand, in relationship with the link between the health and development, Von Schirnding (2002) mentioned, “health is not only a key indicator of the success or otherwise, of the development process, but also a key determinant of, and a resource for sustainable development”. Thus, development is understood in terms of generating major opportunities for personal improvement. It means possibilities to

work, possibilities to study, to have a healthy and a better quality of life”. In addition, UNDP (2002) proposes that “ development is about creating an environment in which people can develop their full potential and lead productive, creative lives in accord with their needs and interests. The objective of development is to create an enabling environment for people to enjoy long, healthy and creative lives”.

Therefore, as it is shown in the figure below, due to the indirect or direct effects of kitchens in health, and considering the importance of health in well-being, and then in the process of development; the kitchen can be considered as a factor of influence in the social and economic development of the population.

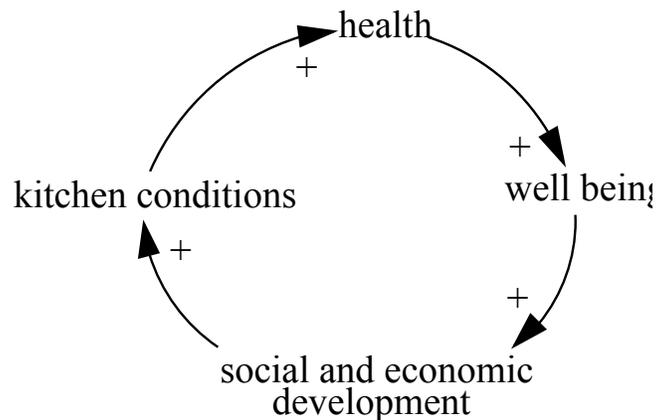


Figure 22: Causal loop diagram II

The better the kitchen conditions (hygiene, clean indoor environment), the more possibilities for the good health of the family, and especially for the women. Having good health in the family, there are more possibilities for the well being. More capacity to look for better opportunities in jobs, studies and personal realization. The last ones are conditions for a process of development, where the healthy population is more capable to assume the challenge of social and economic development.

Women’s perception and awareness:

In what was written about kitchens until now, little is referred to the users. The consideration about women’s perception of the kitchen conditions in the communities of Chimore is the contribution of this research to the tacit knowledge about the kitchen subject.

The perception of the women about the kitchen, in the communities of Chimore, has influence in the way that they behave and manage it. As it was described in a previous chapter, in many cases the perception of the indoor kitchen pollution is limited to temporal health effects. Such as eyes irritations, coughs or headaches. However, there is not awareness about the effects in health in a long term.

In this context, there is a process of adaptation to the polluted environment in the kitchens. In relationship with the adaptation, Bell (2002), mention that “psychological explanations of habituation emphasize the notion that the receptors themselves fire less frequently upon repeated presentation of stimulus. Cognitive explanations of this phenomenon propose a cognitive reappraisal of the stimulus as less deserving of attention after repeated presentation. If a stimulus is constant, the response to it typically becomes weaker over time. The more people were familiar with pollution, the less they were bothered by it”. Then, the acceptance to the polluted indoor environment in the kitchen, is a result of the continuous stimuli of smoke. Certainly, in the communities, it was possible to see that the women considered the polluted condition in the kitchen is part of their daily life, and as part of their responsibility with the family.

In addition, this attitude of acceptance and adaptation, it is also supported by the dependence to the beliefs and thoughts that come from the past, and are transmitted through generations. In other words, they are used to cook with wood fuel because their mothers and all the community used to cook in the same way. Due to these reasons, the possibilities for reaction in order to prevent negative effects of the kitchen conditions are limited.

However, what if we consider that the women do not really know about the negative effects of the smoke on health? Has anybody explained them that the headaches and the coughs are caused for the smoke, and are in the long term, susceptible to turn into asthma, bronchitis and even cancer?

To this respect, is possible to say that the lack of knowledge and information about the risks of the smoke exposure are factors that let the process of adaptation to the polluted environment of the kitchen. Consequently, the access to information can be a factor that influence the perception and the behavior of the women in the kitchens.

In order to aware the women, the dissemination of information of hygiene, smoke and health effects can be useful. Then, it is possible to suggest two possibilities in the communities. One, through the educational system, and second, through dissemination of health campaigns in mass media.

In relationship with the education system, in the case of the communities of Chimore, the level of education and the access to information about health issues and prevention of risks is usually limited. The threat of epidemics, and the influence of important organizations as United Nations, USAID, or certain NGO's have been the motivation for the development of health campaigns. However, subjects as the effects of smoke in health, the benefits of boiling water that are part of the daily life of the population, receive less attention from the authorities. Therefore, the dissemination of information through alternative means can be more practical and efficient.

The campaigns of information can be design to reach the families, but specially the women. With the objective to analyze the possibilities, the questionnaire asked about the access to sources of information in the communities. The results are presented in the next table:

Frequency	Means of information						
	Tv	Radio	Newspaper	*Church meetings	*Community meetings	*School meetings	*Women's organizations
Always	4%	26%	2%	36%	30%	30%	6%
Sometimes	18%	38%	6%	32%	36%	36%	4%
Seldom	20%	16%	14%	8%	10%	10%	6%
Never	58%	20%	76%	20%	24%	24%	82%
No answer	----	-----	-----	2%	-----	-----	2%
Total	100%	100%	100%	100%	100%	100%	100%

Fig 23: Frequency of the access to information in the communities

**Different kind of meetings is part of the organization of the communities. Because the importance and the discipline in the attendance to them, the meetings were considered as possible sources of information.*

From the figure above, the radio, and the different meetings in the communities can be considered as potential sources of information. The radio is the more accessible source for the women. It does not require special attention or extra time, and can be combine with the household activities.

The information can have the objectives to generated adjustments in the kitchen conditions. The adjustments required are related with possible changes in the kitchen structure. Such as better ventilation, the use of more protected stoves and so on. Besides, they can also look for changes in women's habits in

relationship with the culinary activities. Changes related with hygiene, protection, energy savings, and so on. These aspects can only be possible if the woman is integrated and has understood the consequences, effects and benefits of the change. The health campaigns and the diffusion of information, has to go beyond the simple distribution of pamphlets or statistics. It might to be necessary to create a mass communication program that pretend to create a new image of the kitchen and the use of the stove and fuel. The change of the women's habits and behavior in the kitchens might be possible if there is a new conception of the kitchen. The idea of the campaign is to involve the people in the problem. Man and woman have to realize that there are problems in the kitchen, and the have to be part of the solution, in order to improve the kitchen conditions.

Finally, the use of a cleaner fuel, different from biomass to cook will be the ideal solution, not only for the health prevention, but also for the reduction of levels of deforestation. However, due to poverty, scarce resources, and the characteristics of the rural areas in developing world, there is a need for the implementation of another alternatives solutions to the indoor kitchen pollution for now.

CONCLUSIONS

1. Because they spend more time inside, due to their activities, the women are the most affected group to the kitchen conditions.
2. In many cases, the women consider the kitchen as their own territory, a space that belongs and depends on them. However, in most of the cases, due to the economic, social and cultural conditions, the kitchens lack of security or comfort, they can be polluted and dark, moreover, the main decisions about the kitchen's construction and investments depend on the husband and factors such as the family income. However the management of the kitchen is a woman responsibility.
3. Although the effects of the smoke are perceived, the women are not aware of the effects of kitchen air pollution on health. They adapt to the smoke, and accept the polluted conditions as part of the daily life and part of their responsibilities in the family.
4. There is no reaction to the negative effects of the smoke. Although, there is a willingness to change things in the kitchens, they are more related with the infrastructure and comfort. The women do not express a need to change the fuel or to protect the health from the smoke.
5. The access of information, and the integration of more efficient stoves can be considered as a factor to aware woman about the health effects of the kitchens and to possibly provoke an adjustment to the adverse conditions in the kitchens.

REFERENCES

- Bell P, Greene T., Fisher J. and Baum A., Environmental Psychology, 5th Edition, Harcourt College Publish. United States, 2001.
- Braidotti Rosi, Charkiewicz Ewa, Häusler Sabine, Wieringa Saskia, Women, the Environment and Sustainable Development, Towards a Theoretical Synthesis, Zed Book publish. New Jersey, USA, 1994.
- Ellegård Anders, Tears of Smoke, Household fuel pollution and health among urban women in developing countries, Humanekologiska Skrifter 14, Sweden, 1997
- Gibbons Michael, Limoges Camille, Nowotny Helga, Schwartzman Simon, Scott Peter, Trow Martin, The New Production of Knowledge: The dynamic of Science and research in contemporary societies, Sage Publ., Stockholm, 1994
- Miller, Tyler, Living in the Environment principles, connections and solutions, Brooks/Cole Publish., 12th ed, USA, 2001.
- Nyström Maria, Kitchen and Stove, the selection of technology and design, 2nd Ed. Lund University 1988
- Nyström Maria, FOCUS Kitchen Design, A study of Housing in Hanoi, Lund University, Lund Sweden, 1994
- Nyström Maria and Jacqueline Sims, The Kitchen Journey, from black holes to Open spaces, Sweden, 2002
- Sims Jacqueline, Health and Energy in Kitchens, Living environment and Household Energy in Vietnam, (LCHS) Report on the Urban Building and Energy Project and the Seminar in Lund, 27-30 April 1993
- United Nations, Agenda 21, The United Nations program of action from Rio, UN, 1993
- World Health Organization (WHO), Health and Environment in Sustainable Development, Five years after the Earth Summit, Geneva, 1997
- World Health Organization (WHO), Epidemiological, Social and Technical Aspects of Indoor Air Pollution from Biomass Fuel (Report of a Consultation), Geneva, 1991.

Online references:

- ESMAP, Energy Sector Management Assistance Program, < <http://www.worldbank.org/html/fpd/esmap/>> [accessed 5, September,2002]
- Salazar Melinda, Women, Environment and development, applying the Baha'í Technics too the Environmental Challenges Facing the world in International Environment Forum, United States, 2000. Pag. 12. Online < [http:// www.bcca. Org/ief / dsala ooc.html](http://www.bcca.Org/ief/dsalaoc.html)> [accessed 25/august/2002]
- PADER,COSUDE, Promoción económica para el Municipio de Chimoré, < [http:// www.municipio-productivo-pader.com/f2aplica.16.html](http://www.municipio-productivo-pader.com/f2aplica.16.html)> [accessed 4, September, 2002]
- United Nations Development Program (UNDP)
< [http:// /hdr.undp.org /statistics/ default.cfm](http://hdr.undp.org/statistics/default.cfm) > [accessed 27/October/2002]
- Von Schirnding, Yasmin, Public Health: Health and Sustainable Development: can we rise to the challenge?, in the Lancet, Vol 360: 632-37, August 24, 2002 <www.thelancet.com> , [accessed: 30, September, 2002]
- World Health Organization (WHO), <[http:// www.who.org](http://www.who.org)>, [accessed 12, november, 2002]
- World Health Organization (WHO),Addressing the links between Indoor Air Pollution, Household Energy and Human Health, Washingtwn D.C, 2000. < http://www.who.int/mediacentre/events/HSD_Plaq_10.pdf> [accessed: 9, October,2002]
- World Health Organization (WHO) Air quality guidelines, , 1999, <http://www.who.int/environmental_information/Air/Guidelines/Chapter4.htm> [accessed: 30 / September/2002]
- Zein Elabdin Eiman, Development, Gender, and the environment :Theoretical or contextual link? Toward and institutional analysis of gender in Journal of Economic Issues, 1996. Pag 27. < http://hugin.lub.lu.se/cgi-bin/ftx/ebSCO/00213624_1996_30_4/9701145218> [Accessed 20 /August, 2002]

LIST OF ACRONYMS

ESMAP: Energy Sector Management Assistance Program,
 GAD: Gender and Development
 PADER:Programa de Acción para el Desarrollo Rural
 UNDP: United Nations Development Program
 UNEP: United Nations Environmental Program
 WED: Women Environment and Development
 WHO: World Health Organization
 WID: Women in Development

APPENDIX A

The questionnaire of the survey



LUNDS
UNIVERSITET

LUND UNIVERSITY MASTER IN ENVIRONMENTAL SCIENCES

BENEFITS OF HEALTHY KITCHENS

Date:	Time:	Responsible:	Questionnaire #:
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I. SOCIODEMOGRAPHIC CHARACTERISTICS

1. Members of the family

<input type="checkbox"/>	Wife, housewife	Age-----
<input type="checkbox"/>	Husband	Age-----
<input type="checkbox"/>	Daughter, How many? -----	Age (s)-----
<input type="checkbox"/>	Son, How many? -----	Age (s)-----
<input type="checkbox"/>	Grandmother	Age-----
<input type="checkbox"/>	Grandfather	Age-----
<input type="checkbox"/>	Others -----	Age (s)-----

2. Which is the level of education of the mother?

<input type="checkbox"/> Illiterate	<input type="checkbox"/> Primary	<input type="checkbox"/> Secondary	<input type="checkbox"/> Technical	<input type="checkbox"/> University
-------------------------------------	----------------------------------	------------------------------------	------------------------------------	-------------------------------------

3. Which is the level of education of the father?

<input type="checkbox"/> Illiterate	<input type="checkbox"/> Primary	<input type="checkbox"/> Secondary	<input type="checkbox"/> Technical	<input type="checkbox"/> University
-------------------------------------	----------------------------------	------------------------------------	------------------------------------	-------------------------------------

4. Which is the main economic activity of the wife? (Could choose more than one)

<input type="checkbox"/> Household duties	<input type="checkbox"/> to sow	<input type="checkbox"/> Take car of the cattle
<input type="checkbox"/> Employee	<input type="checkbox"/> Merchant	<input type="checkbox"/> Other -----

5. Which is the main activity of the husband?

<input type="checkbox"/> Unemployed	<input type="checkbox"/> to sow	<input type="checkbox"/> take care of the cattle
<input type="checkbox"/> Employee	<input type="checkbox"/> Merchant	<input type="checkbox"/> Other -----

II. THE KITCHEN

1. Location in the house

<input type="checkbox"/> Inside in ground floor	<input type="checkbox"/> Top floor	<input type="checkbox"/> Back	<input type="checkbox"/> In the middle
<input type="checkbox"/> In the front	<input type="checkbox"/> Separated		

2. Who built up the kitchen?

<input type="checkbox"/> Husband	<input type="checkbox"/> Housewife	<input type="checkbox"/> All family	<input type="checkbox"/> Others
----------------------------------	------------------------------------	-------------------------------------	---------------------------------

3. Intervention of the housewife in the construction of the kitchen

<input type="checkbox"/> Helped in the construction	<input type="checkbox"/> Helped to design it	<input type="checkbox"/> No intervention
---	--	--

4. Does the kitchen have an easy access?
 Yes No
5. Materials of the kitchen
 Wood Bricks Clay Others-----
6. Does the kitchen have windows? How many?
 No Yes -----
7. What type of light?
 Natural Artificial
8. How is smoke evacuated in the kitchen?
 No smoke Chimney Smoke fan Windows
 Open sides Cook outside Other-----
8. The smoke in the kitchen
 Is easy to evacuate Gets concentrated inside Cook outside No smoke
- Why?

9. Are the walls smoked?
 Yes No

III. COOKSTOVE(FOGON, KONCHA)

1. How many stoves are there in the kitchen?
 One Many
2. Material of the stoves
 Ceramics Bricks Clay Metal Mixed Others-----
3. What is the type of the stove?
 Portable Fixed
4. Is it protected from the rain, sun, and wind?
 Yes no
5. Is there enough space around the stove?
 Yes No

IV. KITCHEN MANAGEMENT

1. Where is the food storage?
 In the kitchen Out of the kitchen
2. The water in the kitchen is available in:
 A recipient Pipe Metal container Other-----

3. Place from where the water is collected:
 Communal pipe Curuchi River Well Other-----
4. Who brings the water?
 Housewife Husband Daughter Son Other adults Everybody
5. Place to dispose the garbage:
 In the kitchen Out of the kitchen
6. How many types of fuel are used at the same time?
 One Many
7. What fuels are used?
 Wood Dung Gas Kerosene Charcoal Others-----
8. Why ?
 Cheapest The best Last more Always use the same Only one
 other reasons-----

V. GENERAL FUNCTIONS OF THE KITCHEN

1. Is there a special place to cook in the house?
 Yes No
2. Besides cooking, the kitchen is used for:
 Nothing else Sleeping Domestic animals Bathing
 Small scale food or drink industry Laundry

VI. CULINARY CHAIN

1. Who cook with more frequency in the house?
 Wife Husband Daughter Son Others-----
2. Where do these activities take place:
- | | | |
|-----------------------|---|--|
| Preparation of food | <input type="checkbox"/> Inside the kitchen | <input type="checkbox"/> Outside kitchen |
| Cooking | <input type="checkbox"/> Inside the kitchen | <input type="checkbox"/> Outside kitchen |
| Dishing up | <input type="checkbox"/> Inside the kitchen | <input type="checkbox"/> Outside kitchen |
| Eating | <input type="checkbox"/> Inside the kitchen | <input type="checkbox"/> Outside kitchen |
| Washing up and drying | <input type="checkbox"/> Inside the kitchen | <input type="checkbox"/> Outside kitchen |
3. How is the working position?
 Standing Sitting Squatting
4. How much time is spent in the kitchen?
 Half a day All the day Just some hours-----
5. How much time is spent in cooking?
 Half a day All the day Just some hours-----

VII. DESEASES/ACCIDENTS

1. The more frequent diseases in the family are
 - Eyes irritation
 - Lung diseases (cough, bronquitis, asthma others)
 - Stomach diseases
 - Others
 - None

2. Did any accident occur in the kitchen last year?
 - Electricity shocks Burns Fire None

3. Do you consider that your son/daughter were born with
 - Good weight Low weight

VIII. PERCEPTION/INFORMATION:

1. Which is the most important place of the house?
 - Bedroom Living room Kitchen Garden/yard Bathroom Other

2. What is the kitchen for you?

3.Perception about cooking:

Negative Aspects	1	2	3	4	5	Positive aspects	Why?
Cooking is difficult						Cooking is easy	
Cooking is not pleasant						Cooking is pleasant	
Cooking needs time						Cooking does not need to much time	
Cooking is expensive						Cooking is cheap	
Cooking is a risk for your health						Cooking is not a risk for your health	
The fuel is difficult to find						The fuel is easy to find	
The fuel to cook is difficult to use						The fuel to cook is easy to use	

4. Perception about the kitchen:

Negative aspects	1	2	3	4	5	Positive aspects	Why?
The kitchen is ugly						The kitchen is nice	
The kitchen is a dangerous place						The kitchen is a safe place	
The kitchen is dirty						The kitchen is clean	
The kitchen is a mess						The kitchen is organize	
The kitchen is noisy						The kitchen is a quiet place	
The kitchen is in a bad place of the house						The kitchen is well located in the house	
The kitchen does not have enough tools						The kitchen has enough tools to cook	

6. Can men cook? Why?
 Yes No

 7. The kitchen is just responsibility of the women. Why?
 Yes No

 8. Is boiling the water important? Why?
 Yes No Don't know

 9. Does the smoke make you feel sick? Why?
 Yes No

 10. If possible, what would you change in your kitchen? Why?

Roof Floor Walls Windows Stove Kitchen
 Size None Other-----

 11. Possible sources of information to which the woman has access:

Source	Always	Sometimes	Seldom	Never
Watch Tv.				
Listen to the radio				
Read Newspaper				
Assist to the church				
School meetings				
Women's organizations				
Community meetings				
Heart about health campaigns?				

