

*Full Length Research Paper*

# Perception of female population health hazards associated with indoor air pollution in Karachi

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**This study identified health hazards associated with indoor air pollution (IAP) in Karachi. The main purpose of the paper was to examine the extent to which female domestic cook experience health threats related with cooking environment, and to understand their perceptions of the link between IAP exposure and poor health outcomes. One hundred female domestic cook in Karachi City, Pakistan, were interviewed using a semi-structured questionnaire interview method; educational level, oven and fuel types were used as proxy determinants of class, based on educational level, respondents were categorized into three classes: illiterate, graduate and above, and in-between (from level one to level 12). It was found that the higher the educational level the respondents had, the more likely they were to be aware of health effects associated with IAP. The author drew a conclusion that respondents with minimum levels of education, using wood fired mud-ovens, were more likely to be exposed to IAP and, as a consequence, had greater health risks than other women.**

**Key words:** Health hazards, indoor air pollution, women, Karachi.

## INTRODUCTION

Indoor air pollution is a greater public health hazard in developing countries than malaria or lack of access to clean water and sanitation, resulting in a fatality every 20 s (Smith et al., 2005). Nonetheless, wood fires remain an important resource in food preparation. People in developing countries generally use both bio-mass fuels (such as animal dung, crop residues, wood) and fossil fuels (such as gas and kerosene). Approximately, half the world's population and up to 90% of rural households in developing countries rely on traditional bio-fuels for cooking and heating (WHO, 2000). The international energy agency (IEA) estimated that biomass accounted for approximately 14% of fuel energy consumption (IEA, 2002).

The smoke generating from biomass fuels contains a large number of pollutants that include carbon monoxide, benzopyrene and benzene, formaldehyde, nitrogen

dioxide, fine particles and sulphur dioxide (Bruce et al., 2000). Several studies have been conducted on households all over the world and reported that indoor air pollution level in homes is much higher than the limit set by the national standards, the U.S Environmental Protection Agency (EPA) and World Health Organization (WHO) (Ahsan and Afrin, 2007; Smith et al., 2000; WHO, 2007).

Recently, numerous studies have reported that these pollutants are dangerous for the cook and render indoor environment unlivable (Khushk et al., 2005; Mirza et al., 2008; Janjua, 2008; Akhtar et al., 2007; Khudadad and Shah, 2008; Duflo et al., 2007; Dona and Harding, 2005). They argue that exposure increases the risk of acute lower respiratory infections (ALRI) in children, chronic obstructive pulmonary disease (COPD) in adults and lung cancer in case of extensive coal use. In addition, evidence has now emerged showing a link of IAP with a number of other conditions, including asthma, cancer of the upper airway, cataracts, low birth weight, otitis media, prenatal mortality (stillbirth and deaths in the first week of

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life), and tuberculosis (WHO, 2007). IAP is one of the four most critical global environmental problems and might be responsible for nearly 4% of the global burden of disease (Smith, 2000; WHO, 2007).

As women are primary cooks and caregivers for children in nearly all cultures, they with their children are prone to receive the greatest exposure to the smoke from solid fuel combustion. This exposure ultimately leads to higher risks for women as well as children (Dasgupta et al., 2004a; Smith et al., 2005; WHO, 2007).

In Pakistan, biomass fuel users usually cook indoors, using open fires or poorly functioning stoves with inadequate ventilation facilities. Several researchers, Khushk et al. (2005), Mirza et al. (2008), Janjua (2008), Akhtar et al. (2007), Khudadad and Shah (2008), found a linkage between indoor smoke exposure and possible negative health effects on women and children.

World Bank estimated that IAP cause over 280,000 deaths a year and around 40 million cases of acute respiratory illnesses in Pakistan (World Bank Report, 2007).

According to the WHO estimates, the total number of deaths in Pakistan attributed to solid fuels is 70700, while the percentage of national burden of disease attributed to solid fuel use is 4.6%, as compared to less than 1% seen in the developed world (WHO, 2007). These figures put Pakistan among the 21 worst affected countries by IAP along with Afghanistan, Niger, Ethiopia and Rwanda, among others, according to WHO estimates (WHO, 2007).

In spite of the aforementioned truth, studies have not yet explored whether women in Pakistan had any understanding of health risks associated with indoor air pollution. It is more likely that majority of the women are unaware of these threats in their homes, just as millions of smokers were unaware of the hazards of tobacco until the 1960s (Donna and Harding, 2005). Accordingly, the aim of the present study was to examine the extent to which female domestic cooks experienced health problems linked with indoor cooking environment and to understand their knowledge about the relationship of IAP to various diseases.

## MATERIALS AND METHODS

The study was undertaken using a survey method (face to face interview). The main reasons for following this method was that it allowed for the collection of data within a limited time framework, was relatively cost-effective and provided a minimal imposition on respondents' time compared with other methods. The primary data were collected using the semi-structured questionnaire interviews. A research team consisting of two principal investigator and two research assistants was formed. Initially a draft questionnaire was developed on issues such as socio-economic background of the respondents and the perception about the health hazards of IAP. The questionnaire used in this study had three parts. The first part asked some general questions, such as age, occupation, household size, income and marital status. The second part of the questionnaire incorporated questions on health issues, such as

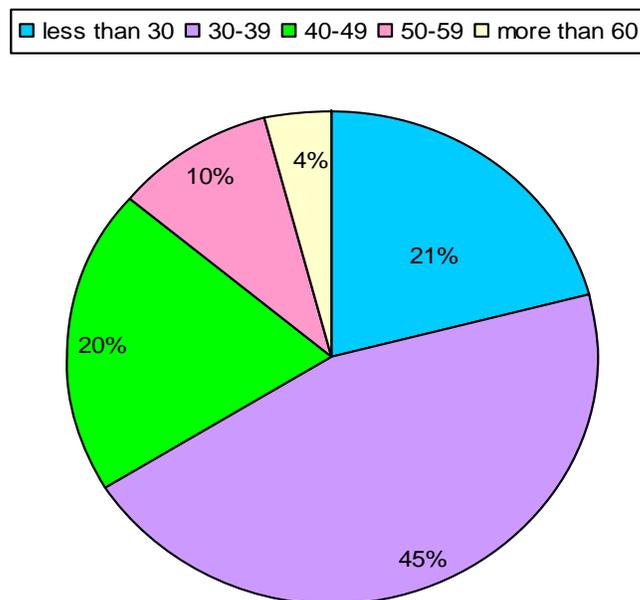


Figure 1. Respondent women according to the age group.

what types of health problems the respondents faced before, during and after cooking. In the last part of the questionnaire were questions about the effects of IAP on health. Several discussions were held among the researchers who found certain anomalies regarding ordering of the questions and then felt the necessity of adding few more questions with changes and adjustments in the questionnaire. With some addition and correction, the questionnaire was finalized for testing. Both open and close-ended questions were also incorporated in the questionnaire.

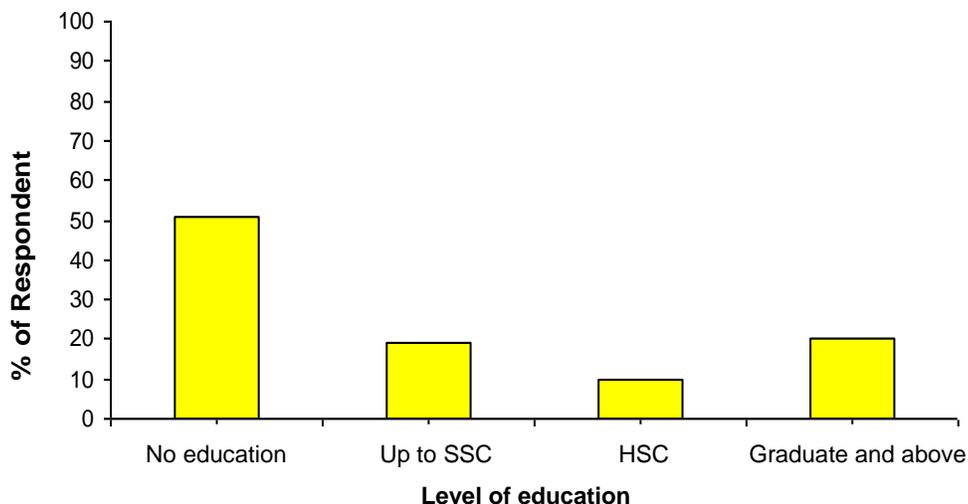
Field investigation was carried out during the year 2008. The site selected for this study was uptown area and were selected purposively based on different social backgrounds such as educational, households, and income levels. 100 female cooks were interviewed. It is worthwhile to mention here that they all gave responses voluntarily. The underlying reason for doing this was to examine variation among female cooks from diverse socio-economic backgrounds in terms of the perception of the health hazards of IAP. Frequency distribution figures with percentage are provided to describe responses. All kinds of data processing activities were done manually.

## RESULTS

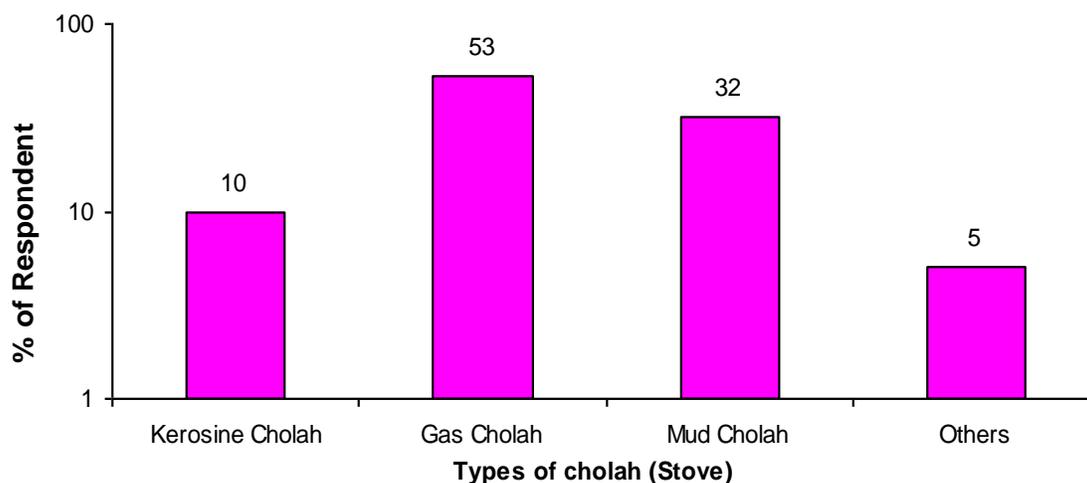
Data on socio-economics characteristics of the respondent women's are presented in Figures 1 to 5.

Figure 1 presents the percentage of the respondents according to the age limit in year. Approximately 80% of the respondent women were aged between 30 and more than 60 years, of these a large number (45%) belongs to 30 to 39 years age group.

Figure 2 presents the percentage of the respondent women according to the level of education, 51% of the respondents had no education, whereas 19% of the respondents were educated up to secondary school certificate (level 10) and from the remaining 30%



**Figure 2.** Level of education of the respondent women.



**Figure 3.** Types of cholah (stove) used by the respondent women.

respondents, 10% were educated up to higher secondary school certificate (level 12) and 20% were graduate and above.

Figure 3 presents the percentage of the respondents according to the use of types of stoves, a significant number of women (53%) that were questioned used gas stoves, followed by mud oven 32% (the surrounding of the oven are covered by mud/clay), the remaining 15% use kerosene stoves and others.

Figure 4 presents the percentage of the respondents according to the use of types of fuels, approximately 22% of the respondents women used wood, 53% used gas, 10% cow dung, 10% kerosene and the remaining 5% other sources.

Figure 5 presents the percentage of the respondent women according to the time spent in the kitchen, as half of the respondent women (51%) daily spent more than 5 h

in the kitchen.

Figure 6 presents the types of stoves used by the respondent women according to the Level of Education. It was found that 10% respondent women used kerosene stove (Figure 3), of these 7% users were illiterate and the remaining 3% respondents were in between 10 to 12 level of education. In terms of gas oven total users were 53% (Figure 3), of these 13% were illiterate, 20% in between and 20% were up to graduate level of education. Total mud oven users were 32%, from which 27% were illiterate and 5% were in between level of education and from the remaining 5% respondents, 4% were illiterate and 1% was in between 10 to 12 level of education.

Figure 7 represents the percentage of respondent women using different types of fuel according to the level of education. It revealed that from 51% illiterate respondent women (Figure 2), 17% used wood, 10% cow

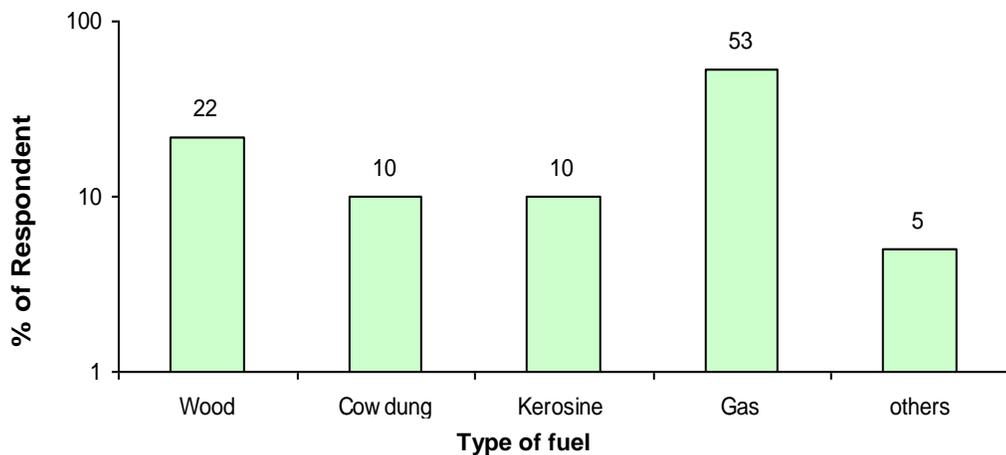


Figure 4. Types of fuel used by the respondent women.

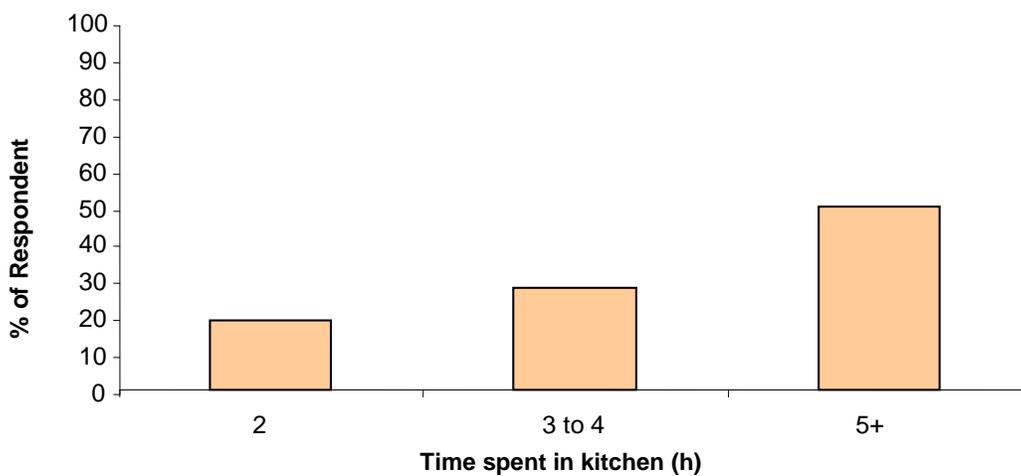


Figure 5. Time spent in the kitchen by the respondent women.

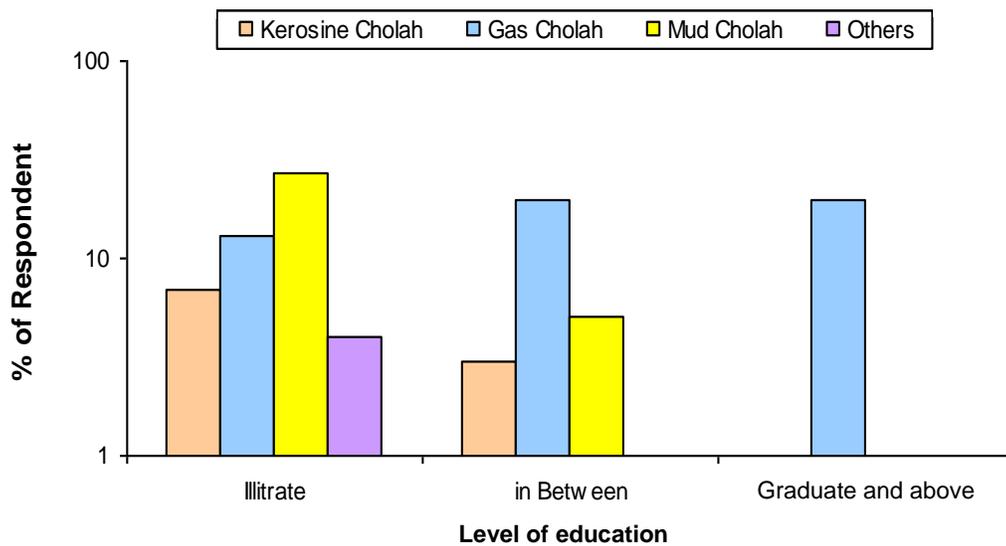
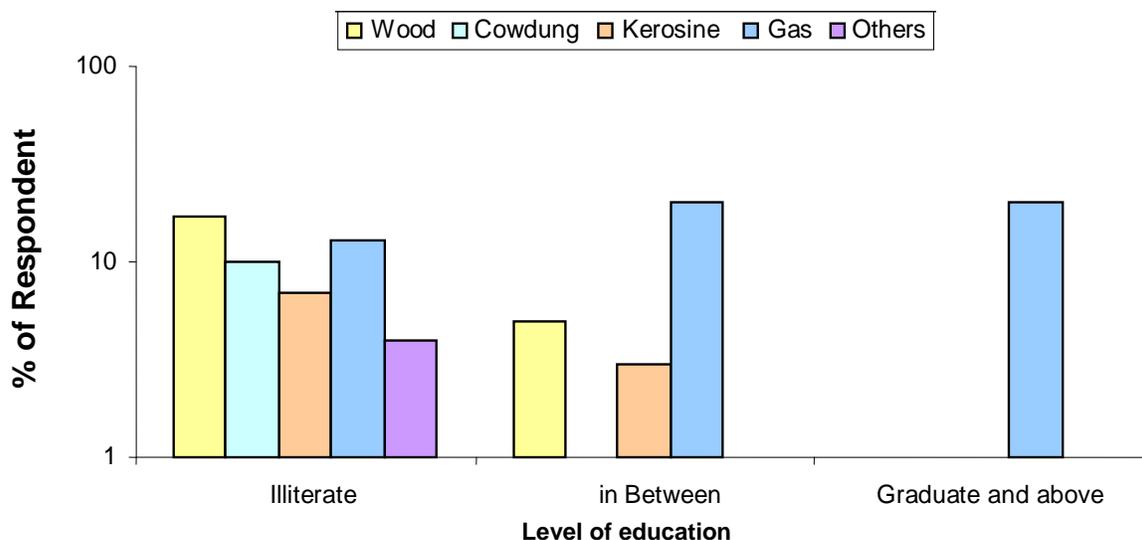
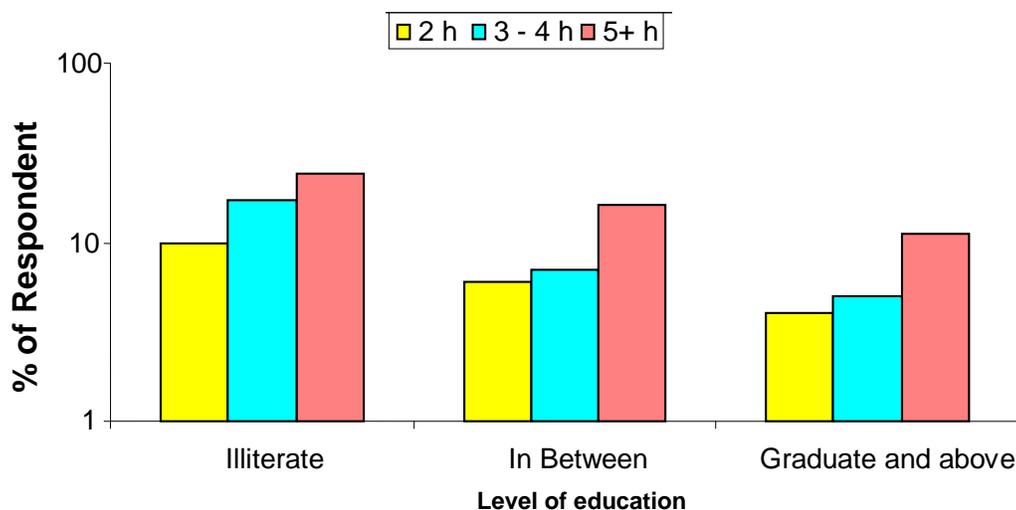


Figure 6. Types of stoves used by the respondent women according to the level of education.



**Figure 7.** Types of fuel used by the respondent women according to the level of education.



**Figure 8.** Time spent by the respondent women in the kitchen according to the level of education.

Wood, 7% kerosene, 13% gas as source of fuel, whereas 4% used other sources (Burdish gas, electricity). In between level of education (level 10 to 12) from 29% respondent (Figure 2), 5% used wood, 3% kerosene, 23% gas as source of fuel and 1% only used other sources of fuel; whereas, the entire graduate level respondent used gas as a source of fuel.

Figure 8 shows the time spent by the respondent women in the kitchen according to the level of education for 2 h, 3 to 4 h and 5 h timing. The trend for all timings shows that illiterate > in between > graduate and above level of respondents women.

Figure 9 demonstrates the respondents' opinion about the cooking related physical problems. 31% of the

respondents experienced asthma out of which 16% were illiterate, 10% in between and 5% were graduated and above level of education. In more than half of the respondents, 59% experienced breathing problems and 58% eye irritation, the majority of the respondents with breathing problems and eye irritation problems were illiterate.

Figure 10 presents the awareness of the respondents about the linkage between exposure to IAP and various diseases. Most of the respondents mentioned that pulmonary diseases (49%), TB (58%), asthma (53%), lung cancer (44%), eye problem (67%), burning during cooking (70%), and cardiac (52%) could be the result of IAP. Most of the respondents acknowledging the link

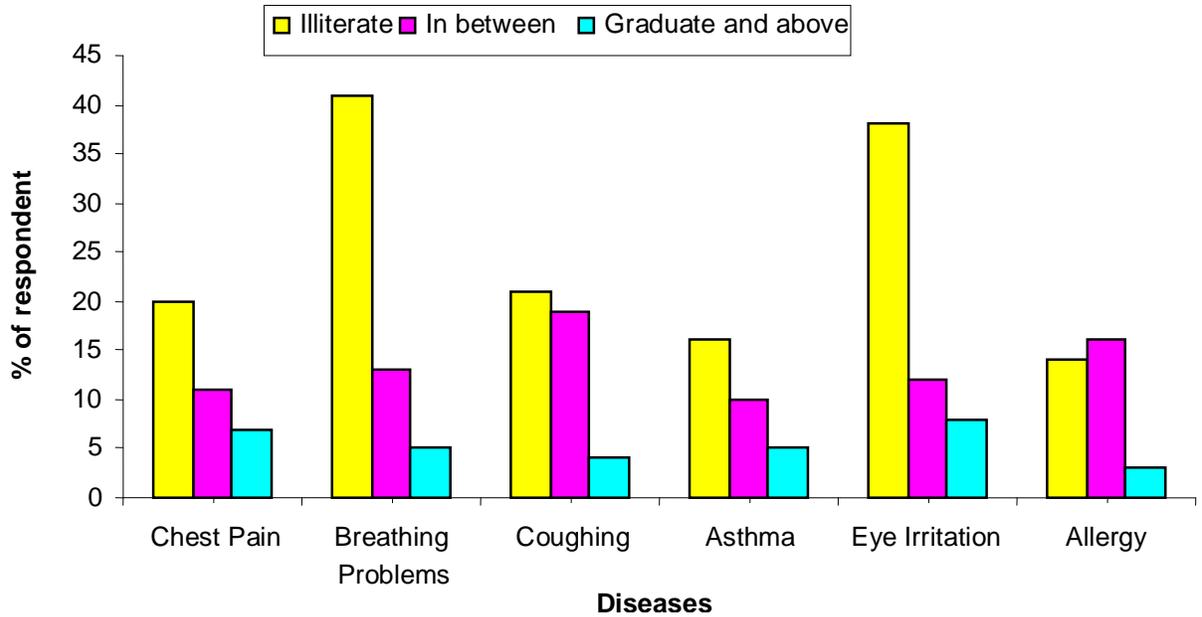


Figure 9. Opinion of the respondents' women to various diseases.

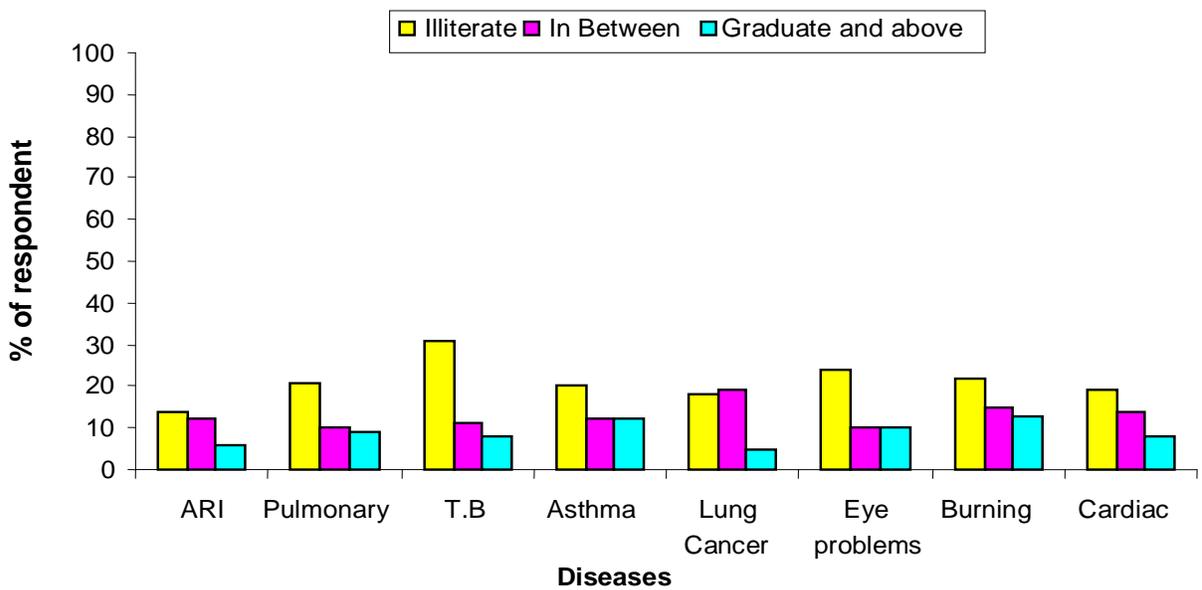


Figure 10. Awareness of the respondent women to various diseases.

between IAP and various diseases were illiterate.

**DISCUSSION**

**Biomass fuel use generates high indoor air pollution**

Per capita energy consumption, an indicator of the physical quality of life is very low in Pakistan. Only 20% use natural gas for cooking, whereas more than 80% of

households depend on unsustainable supply of biomass fuels for cooking. The share of fuel wood as cooking fuel is 68.83%, kerosene oil 3.72%, others 7.25% and natural gas only 20.2% [www.census.gov.pk]. In this study about 32 and 53% of the female participants used mud cholah and gas stoves for cooking purpose, respectively. These findings contradict with national statistics which reports that 42% urban households use open-fire stoves and 58% gas stoves, and the share of fuel wood as cooking fuel is 31.98%, kerosene oil 7.06%, others 2.82% and

natural gas 58.14% [www.census.gov.pk ].

One of the reasons for using wood and cow dung is that they are locally available and / or cheaper compared with other fuels. Women from poor families collect fuels at the expense of their opportunity costs. Furthermore, gas cylinder is very costly as compared with natural gas supply. This high cost restricts poor households from using environment friendly fuels.

### IAP and risk to health hazards

IAP, from both biomass and fossil fuels, affects the health of people, particularly women and children, who usually spend their major time of day in their kitchen. The fact that IAP causes many health problems is well known in the literature. As mentioned earlier, many health problems could arise from the result of exposure to IAP. From the present study, 44% of the respondents had cough, while 59% breathing problems. More than half of the respondents (58%) which experienced eye irritation were also found. In addition, the respondents identified IAP as one of the possible causes of these diseases. Moreover, Janjua (2008), Akhtar et al. (2007) and Khudadad and Shah (2008) show that the women of developing countries are likely to exhibit greater symptoms of respiratory illness as they have more attachment to the kitchen.

### Poor women are more vulnerable

Women are responsible for the preparation of domestic foods in every culture of developing countries and spend a large portion of their daily life in the kitchen. As a result, women are more likely to be affected by the smoke generated from the use of un-processed fuels in indoor environment than their male counterparts. For example, several researchers came to the conclusion that females were affected by asthma, blindness, chronic obstructive pulmonary disease (COPD), lung cancer, and tuberculosis from IAP. However, all females in Pakistan are not affected in the same manner (Tobassum, 2007; Dasgupta et al., 2004; Smith et al., 2000, 2005). It has been found that around half of the respondents (51%) do not have any level of education which is similar to national data [www.census.gov.pk/level of education]; and of most of the women studied, 32% used mud cholah with wood and cow dung. All these variables, cited thus far, indicate the social condition of the respondents. In this study most of respondents were poor and there was a link between health problems resulting from exposure to IAP and poverty. For instance, most of the respondents with physical troubles had less than 10 level of education. Moreover, as of Smith et al. (2000) indeed women in households using biomass fuels were found to be 3 times more likely to have tuberculosis than women

in households using cleaner fuels, even after correction for a range of socioeconomic factors. Dasgupta et al. (2004a) indicated the same scenario: that the poorest, least educated households have twice the pollution level as compared with high-income households with highly educated adults. In addition, as it has also been found in the study, poor women are less aware about the health effects of IAP. More than half of the illiterate respondents do not have knowledge on this connection.

### Conclusion

Women's health issues in Pakistan have for long been neglected, though their contribution in cooking and domestic care is immense. Both biomass and fossil fuels generate smoke that pollutes the indoor environment. The polluted air inside the kitchen might cause many health problems for women who spend a large part of their day devoted to food preparation duties. It has been found higher educational level and ability to use refined fuels was associated with respondents having less identifiable health problems and greater awareness about the health impacts of IAP. Female domestic cook with minimum levels of or no education and using mud-oven are more likely than other women to have health risks associated with exposure to IAP. No clear-cut relationship between IAP and health hazards can be drawn without scientific investigation.

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