



Evaluation of solid fuel consumption and cardiac and respiratory illnesses in the Kermanshah province villages in 2015

A. Karami¹, AR. Ejraei², M. Mohammadi³, A. Esfandnia³, Y. Zaebi⁴

¹ *Ph.D Student in Engineering in Environmental Health, Hamedan University of Medical Sciences, Hamedan, Iran*

² *MSc Engineering in Environmental Health, Kermanshah University Medical of sciences, Kermanshah, Iran*

³ *Student Research Committee, Kermanshah University of Medical Sciences, Kermanshah, Iran*

⁴ *MSc Engineering in Environmental Air Pollution, Kermanshah University Medical of sciences, Kermanshah, Iran*

Received 14 July 2014, Accepted 15 June 2015, Accepted 15 June 2015

**Corresponding Author. E-mail: yahyazaebi@yahoo.com*

Abstract

About half of the people in the world that is equal with 3 billion people use solid fuel for their daily needs at home. The most important sources of pollution inside houses in developing countries is that the families use unsuitable fuels for the warming and cooking which are very dangerous for health. This project has been done to evaluate studying of the Kermanshah province villages in 1391.

Method: this sectional study was kind of describing analysis and has been performed in 123 villages in four towns of Kermanshah province where households used solid fuel for different consumption. In this study some information were gathered about the building position of the settlement including area, the position of the kitchen and kind of heater, baking tenor for bread and its position with kind of fuel and related information about the respiratory disease. This information were analyzed after gathering in software SPSS. According to study, six percent of total rural population in studied towns, used solid fuel. The Gilan Gharb had the most consumer population of the solid fuel and Javanrood had the least consumer population of the solid fuel and the number of respiratory and cardiac diseases outbreaks in these two towns are respectively (Gilan Gharb 53, 26) and (Javanrood zero and two). 89 percent of families used wood and the other 11 percent used animal excretion as solid fuel.

Conclusions: Solid fuel consumption in rural houses can increase which can causes cardiac and respiratory diseases. Hence, it's necessary to culture making and provide possibilities to make liquid fuel or natural gas accessible for people.

Keywords: Air pollution inside rural houses - solid fuel – cardiac and respiratory diseases

1. Introduction

About half of the people in the world that is equal with 3 billion people use solid fuel for their daily needs at home The most important sources of pollution inside houses in developing countries is that the families use unsuitable fuels for the warming and cooking which are very dangerous for health.

The solid fuel has been used from past its availability and it has been always used for energy production. 2.4 billion people from biomes and 6 billion people use coal all over the world. These fuels are in unsuitable conditions in term of air ventilation or they are burnt in stoves or ovens that don't have suitable conditions and this causes large amount of smokes which contains materials due to is uncompleted fuel burning. Because women have special role in house and spend long time directly exposed to the inner air pollution especially when they are pregnant. The studies of the world health organization showed that carbon monoxide and solid

fuel particles effects on pregnancies and causes abortion or low weight baby. Being exposed to the indoor air pollution air in places that use solid fuel causes approximately 1.5 million death in each hour and these are because of acute respiratory system infections in infants under 5 years old and chronic lung diseases and lung cancer in adult. Burning biomes in closed places is one of the main reasons of illnesses in women and babies in the countries with low income. Contaminants that are produced from solid fuel are the sixth effective factors in disease and the cause of more than 420.000 death before adolescence. The results show that exposing to solid fuel pollutant are causes for more than half 1.8 million death in infants in the world because of inferior respiratory system diseases. Burning of plant masses and the coal caused the diffusion of floating particles (PM), carbon monoxide (CO), sulphur oxides, Nitrogen oxides, aldehydes, benzene and combinations of poly aromatic. These pollutants influence on lungs and their performance, air pollution at home or closed places because people spend most time in these places and there is a possibility to increase concentration and activities of harmful factors and also inside house activities like cooking, house warming and smoking considered as an important health care problem [1-3]. Several studies have emphasized on the role of IAP as one of the aetiologies of some respiratory diseases such as LRI, lung cancer, tuberculosis, asthma and COPD [4-8]. This research has been performed to solid fuel consumption and respiratory and cardiac diseases in Kermanshah province villages in 1391.

2. Methodology

This sectional study that is a kind of descriptive analysis performed in 123 villages in f towns in Kermanshah province where people used solid fuels for different home consumption. The primary studying was done with considering the literatures and previous researches in this regards. One observation has been done in 5 towns in Gilan province in 1387 and it evaluated the communication between diseases and solid fuel consumption.

In this evaluation forms about building characteristics prepared like: menstruation, kitchen position, bread cooking position, ventilation system, kind of the building materials and quantity and kind of solid fuel were considered. Then they used these forms information in the villages in the mentioned towns where they used solid fuels. They were gathered and evaluated by software SPSS and on the basis of following indexes.

The index of the number of families consuming the solid fuel [9].

$100 * \frac{\text{the number of total families}}{\text{the number of families use solid fuel}} = \text{index}$

Index of the population consuming solid fuel.

$100 * \frac{\text{under covering population}}{\text{the solid fuel consumer population}} = \text{index.}$

The index of the number of families use solid fuel in suitable residential area.

$\frac{\text{The number of total families}}{\text{the number of families use solid fuel in suitable residential area}} = \text{index.}$

$100 * \text{solid fuel consumer.}$

The index of the number of families uses solid fuel with suitable bread baking place:

$\frac{\text{The number of total families}}{\text{the number of families use solid fuel in suitable bread baking place}} = \text{index.}$

$100 * \text{of solid fuel consumer.}$

The index of the number of families consuming solid fuel with suitable place for kitchen:

$\frac{\text{Total number}}{\text{total number families consuming solid fuel with suitable place for kitchen}} = \text{index.}$

$100 * \text{families consuming solid fuel}$

The index of incidence of the breathing diseases in the consumer families of the solid fuel.

$\frac{\text{The number or the entire number of the persons that catch illness to the breathing disease in the consumers of the solid fuel}}{\text{the solid fuel}} = \text{index.}$

$100 * \frac{\text{the entire of the population the village families of the consumer of the solid fuel.}}$

The index of cardiac and respiratory system in families consuming solid fuel.

$\frac{\text{Number}}{\text{The entire number of cardiac and respiratory system in solid fuel}} = \text{index.}$

$100 * \text{rural families consuming solid fuel}$

Findings:

In this evaluation of settlement indexes and the cases of cardiac and respiratory system in villages consuming solid fuel was evaluated. The solid fuel consuming in villages is 89 percent families consuming wood as solid fuel and 11 percent sludge exertion.

According to evaluation 6 percent from total number of the rural population in studied used the solid fuel. Gillan Gharb had the most solid fuel consumer population and the town of Javanrood has the least and the cases of cardiac and respiratory system in families consuming solid fuel respectively are: GhilanGharb (53,26 and Javanrood zero and two).

Table 1. Diseases

The number of cardiac diseases	The number of respiratory diseases	Towns
37488	8275	GilanGharb
36515	8652	Harsin
20605	5696	Ravansar
22446	5058	Javanrood

Table 2. Population information

number of families using solid fules	Families using solid fuel	Total number of undercover population	Total number of undercover families	Towns
7276	1537	37488	8275	GillanGharb
806	194	36515	8652	Harsin
473	98	20605	5696	Ravansar
223	50	22446	5058	Javanrood

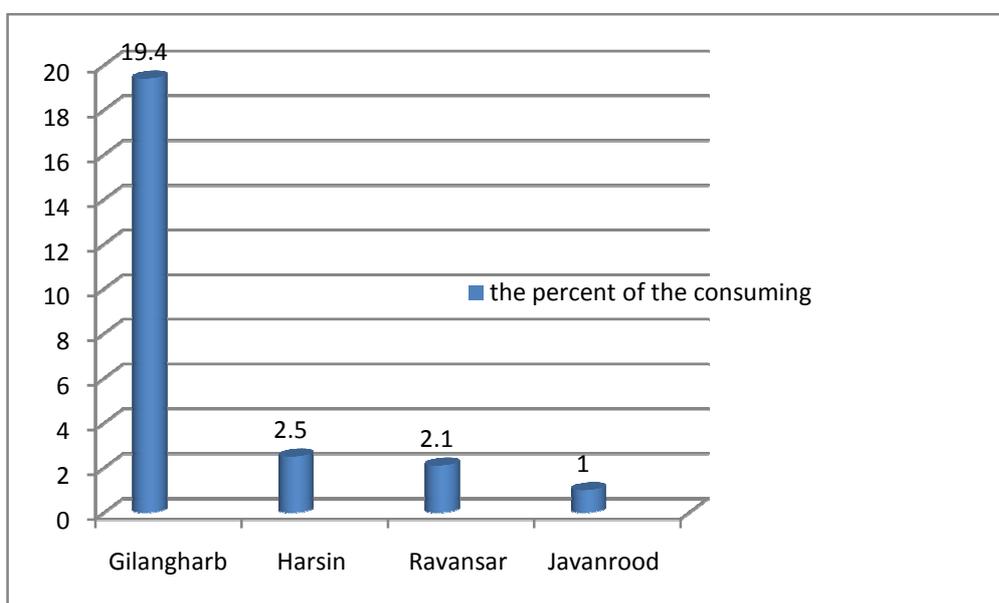


Figure 1. The percent of the consuming

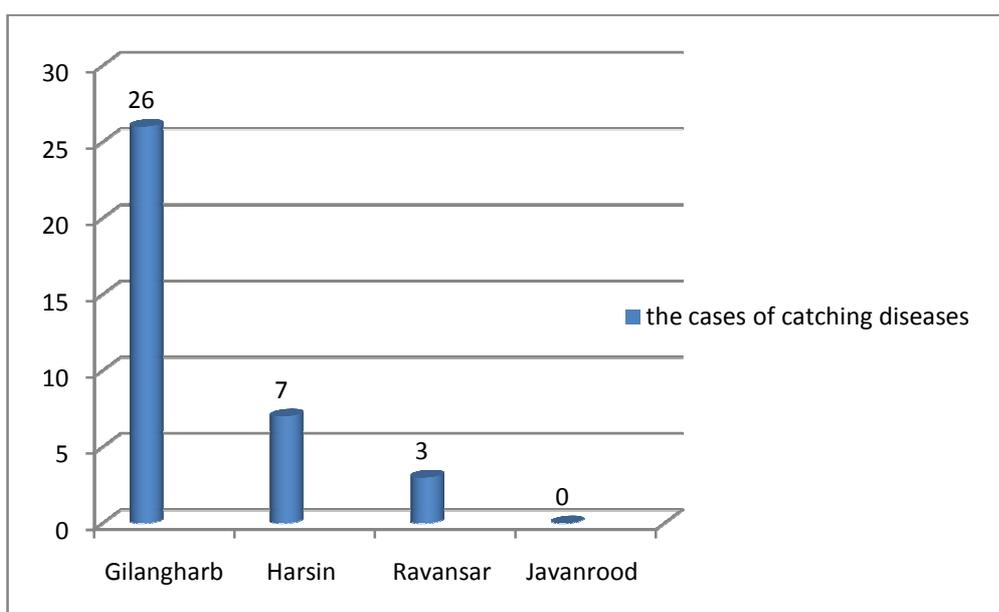


Figure 2. The consuming percentage of the solid fuel in towns

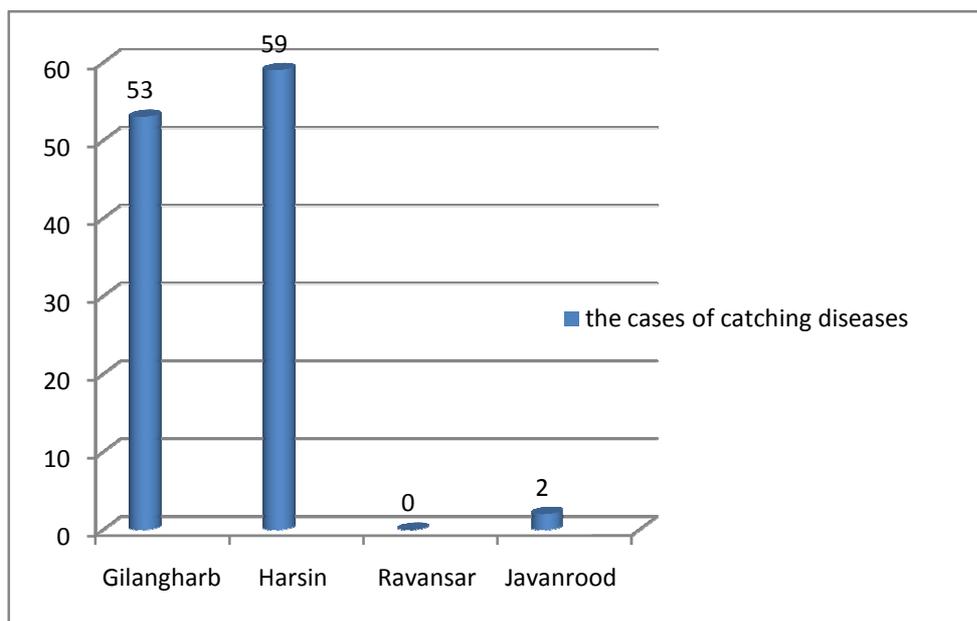


Figure 3. The cases of cardiac diseases in studied towns

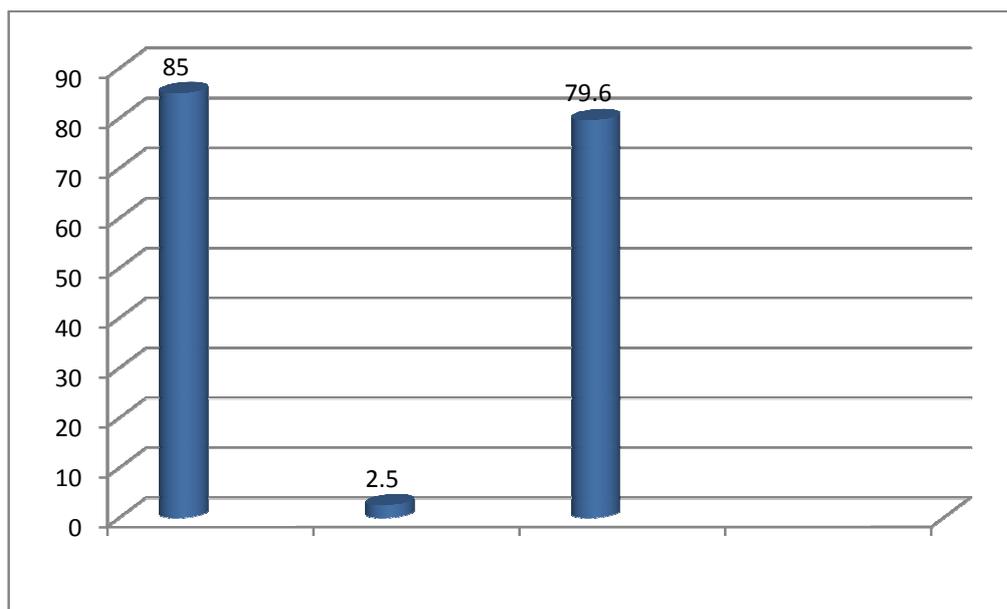


Figure 4. The cases of cardiac diseases in studied towns

3. Discussion and conclusion

Ghorbani et.al [10] evaluated the relation between exposure with BHBs and OAD positively and in another study which was done by Roy [11] all women suffered from obstruction in respiratory systems who weren't smoker and they didn't have any background contact with particles but all of them used solid fuel for baking. Sinha et.al [12] declared that using solid fuels especially wood is an important factor in lung destruction and the exposing people had weaker performance in lungs than non-exposing people.

Akhtar et al. [13] have done similar research in Pakistan that shoed relationship between severe bronchitis in women and whom used animal sludge (biomes) as the solid fuel inside family.

The consuming of solid fuel on the bases of this study result and similar researches inside rural houses can increase cardiac and respiratory diseases. Hence, culture making and providing probabilities for people to access fluid fuel and natural gas has so much importance.

Reference

1. Elizabeth H., Mestl S., Aunan K., Seip, H. M. Health benefits from reducing indoor air pollution from household solid fuel use in China - Three abatement scenarios. *Environment International* 33 (2007) 831–840
2. Kadir M., Elizabeth M., McClure M., Shivaprasad, S., Ana, L., Garces, J., Onyamboko, M., Kaseba, C., Althabe, F., Eduardo, E., Castilla, F., Freire, S., Pardia, S., Saleem, S., Linda, L. Exposure of pregnant women to indoor air pollution: a study from nine low and middle income countries. *Acta Obstetrica ET Gynecologica*. 89 (2010) 540–548.
3. Lee M.S., Hang J.G., Zhang, F.Y., Dai, H.L., Su, L., Christiani, D. In-home solid fuel use and cardiovascular disease: a cross-sectional analysis of the Shanghai Putuo study. *Environmental Health* 11 (2012), 18.
4. Cortez-Lugo M., Moreno-Macias H., Holguin-Molina F., Chow J.C., Watson J.G., Gutierrez-Avedoy V., Mandujano F., Hernandez-Avila M., Romieu I., Relationship between indoor, outdoor, and personal fine particle concentrations for individuals with COPD and predictors of indoor-outdoor ratio in Mexico City. *J. Expo. Sci. Environ. Epidemiol.* 18 (2008) 109–15.
5. Blay F., Respiratory diseases related to the indoor environment. *Rev. Mal. Respir.* 26 (2009) 573–584.
6. Dı́az E., Smith-Sivertsen, T., Pope, D., Lie, R., Dı́az, A., McCracken, J., Arana, B., Smith, K., Bruce N. Eye discomfort, headache and back pain among Mayan Guatemalan women taking part in a randomisedstoveintervention trial. *J. Epidemiol. Community Health* 61 (2007) 74–79.
7. Smith K., McCracken, J. Weber, M., Hubbard, A., Jenny, A., Thompson, L. M., Balmes, J., Diaz, A., Arana, B., Bruce, N. Effect of reduction in household air pollution on childhood pneumonia in Guatemala (RESPIRE): a randomised controlled trial. *Lancet* 378 (2011) 1717–26.
8. Hawley B., Volckens, J. Proinflammatory effects of cook stove emissions on human bronchial epithelial cells. *Indoor Air* 23 (2013) 4–13.
9. Qorbani M., Yunesian, M. Solid fuel smoke exposure and risk of obstructive airways disease. *Iranian Journal of Environmental Health Sciences & Engineering* 9 (2012) 8-13.
10. Semple S., Garden, C., Coggins, M., Galea, K. S., Whelan, P., Cowie, H., Thorne, S.P., Hurley, J. F., Ayres, J., Contribution of solid fuel, gas combustion, or tobacco smoke to indoor air pollutant concentrations in Irish and Scottish homes. *Indoor Air* 22 (2012) 212–223.
11. Roy A., Chapman, R.S., Hu, W., Wei, F., Liu, X., Zhang, J. Indoor air pollution and lung function growth among children in four Chinese cities. *Indoor Air* 22 (2012) 3–11.
12. Sinha N., Kulkarni, P.K., Shah, S.H., Desai, N.M., Patel, G.M., Mansuri, M.M., Saiyed, H.N. Environmental monitoring of benzene and toluene produced in indoor air due to combustion of solid biomass fuels. *Science of the Total Environment* 357 (2006) 280– 287.
13. Akhtar T., Ullah Z., Khan M.H., Nazli R., Chronic Bronchitis in Women Using Solid Biomass Fuel in Rural Peshawar, Pakistan. *CHEST* 132 (2007) 1472–1475.

(2015) ; <http://www.jmaterenvirosci.com>