

Health Risk Assessment of Indoor Air Quality in Developing Countries

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ABSTRACT

The health effects of many pollutants such as particulate matter, carbon monoxide, oxides of sulfur and nitrogen, and polycyclic aromatic hydrocarbons. Repairable particulate matter is now regarded as the single best indicator pollutant for review the overall health-damaging potential of most types of combustion, including that of biomass. Rural societies use fuel wood and biomass fuel for cooking and heating, which is not only expensive but also produces smokes that influences their health and pollute indoor environment. Usually, cow dung is generally put in the courtyard of rural households, which harbors insects, flies and produce vulgar smell that affects the health of the dwellers. A preliminary review of the literature reflects that there exist a substantial amount of literature and existing data in the form of published report on indoor air pollution. The overall research design is exploratory the review is related to the indoor air pollutant status among the developing countries. The main diseases according to above literature were asthma, respiratory tract infections, chronic pulmonary diseases, lungs cancer etc. the studies were conducted in the developing countries such as Pakistan, India, Bangladesh, Uganda, Africa, Sri Lanka, China, Ethiopia, Nepal.. So it concluded that developing countries had major problem of health hazards because use of biomass fuel for the purposes of cooking.

Keywords: Health risk assessment, indoor air quality, developing countries

INTRODUCTION

Indoor air pollution is known as a significant source of severe health risks to exposed populations throughout the world. The most significant issue that concerns indoor air quality in household environments of developing countries is that of exposure to pollutants released during combustion of solid fuels, including biomass or coal used for cooking and heating. The major sources of indoor air pollution worldwide include combustion of fuels, tobacco, and coal; ventilation systems; furnishings; and construction materials. Majority of rural households' burn these simple solid fuels in inefficient earthen or metal stoves, or use open pits in poorly ventilated kitchens, resulting in very high concentrations of indoor air pollutants. It is estimated that use of open fires with these fuels exposes nearly 2 billion people in the world to improved concentrations of particulate matter and gases, up to 10–20 times higher than health-based guideline values available for typical urban outdoor concentrations. Although biomass makes up only 10–15 percent of total human fuel use, since nearly half the world's population cooks and heats their homes with biomass fuels on a daily basis, indoor exposures likely exceed outdoor exposures to some major pollutants on a global scale. [1]

Air Pollution Impacts

Air pollution is the cause of damage to plants, animals, reduced visibility, damage to buildings and intensive economical loss in form of reduced and damaged growth of vegetation and deceases. It can also be fatal causing deaths. It is the cause of intangible

damage to historical buildings and monuments. So damaged or affected plant and animal life, buildings is the indicator of atmospheric impurity. [2]

Sources of Air Pollution

Industrial activities particularly in thermal power stations, chemical complexes, metallurgical industries, cement plants, oil refineries, steel plants and fertilizer complexes are the major and stationary sources of air pollution. While in mobile sources burning of diesel fuel in buses, trucks and cars headed the topic, another source of combustion is the burning of wood is stoves and fireplaces in residential settings.

While industrial process as municipal waste disposal, chemical reaction and condensation of atmospheric gasses and also contributes in air pollution. In brief sources vapors dispersal of material for earth's surface, constructions in urban areas, transportation/ stocking of material, transportation and forest fires is of major concern. Particulate matters which are the major portion of stationary, mobile and fugitive sources are of major concern (Bruce N, 2000).

SIGNIFICANCE OF THE STUDY

In Developing Countries indoor pollution is noticed as a big factor in damaging health and environment. The major contributor to this health hazard is the use of non-renewable energy sources (Biomass) and the 2nd contributor is encountered as smoking giving poor quality indoor air. In order to prevent the increase in door pollution level, we should be aware of the factor causing it and formulate a policy which controls it on national level. This need a National level public awareness campaign, on indoor pollution causing agents and their growth and their prevention could be a better idea for getting the solution to prevent the dangerous effect of indoor air pollution.

Also the proper use of Stove and liquid petroleum gas should be known to everyone as the use of stove at open air environment is batter choice and the use of Natural Gas and liquid petroleum gas should need to be explored further, and modern fuel should be accessible and economical. Everyone should have knowledge on Smoking in closed public spaces and should be banned there. Developing Countries are in fight to environment problems which can relate with poverty like degradation, different types of pollution and poor human health also little attention to the types of hazardous gases and particulate pollutants which are directly refer to indoor air quality in Developing Countries. The Study based to make the policy about the indoor air pollution in socioeconomic and health scenario at national as well as region level.

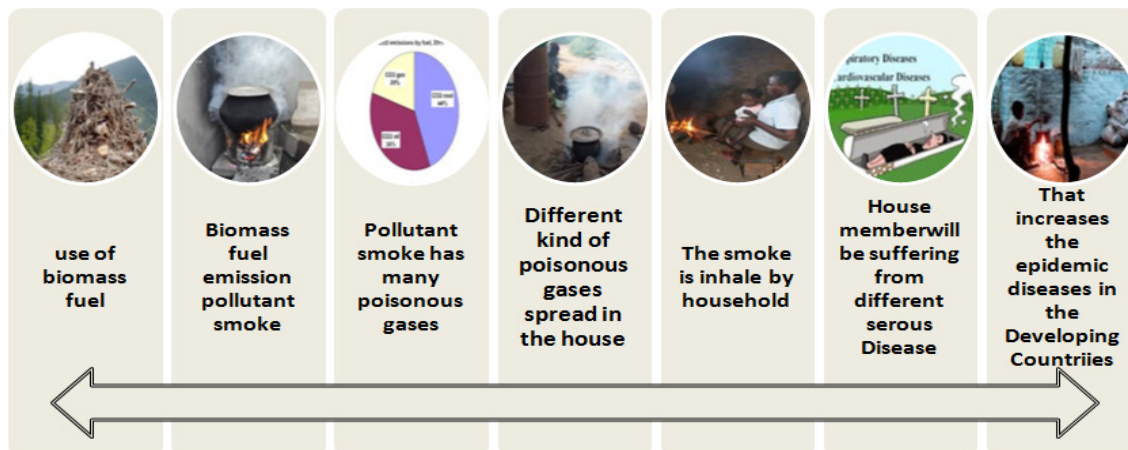
OBJECTIVES OF THE STUDY

1. To assessment of impact of indoor air pollution among the developing countries.
2. To study literature related to indoor air pollution.

METHODOLOGY

Indoor air pollution is a well established field of a investigation and a mode data collection. It is an interdisciplinary method to tap the effect of indoor air pollution on the developing countries peoples who are effect by it. A preliminary review of the literature reflects that there exist a substantial amount of literature and existing data in the form of published report on indoor air pollution. The overall research design is exploratory.

STUDY MODEL



LITERATURE RELATED TO INDOOR AIR POLLUTION

Behera, et al (1991) the study explained that the domestic cooking fuel had producing many respiratory symptoms. From the 3,701 women 3,608 were nonsmoker but they used different type of fuel for cooking such as biomass, Liquefied Petroleum Gas, kerosene, and mixed fuels. There is 13% of patient have respiratory infection. There is 12.6 percent which using bio mass fuel stove (11.4 percent), and Liquefied Petroleum Gas, kerosene, (9.9 percent). Smoking women who are also exposed to cooking fuels experienced respiratory symptoms more often than nonsmokers (33.3 percent vs. 13 percent. [3]

Colbeck et al, (2010) the study conducted about the relationship between the urban and rural environment condition. The high level of indoor air pollutants use of biomass fuel in the traditional stove which produce many air pollutants which have adverse effect on the health. There was 58% in the urban and 94% rural household were using biomass fuel in the Pakistan. The study investigated variations in indoor/outdoor concentrations of particulate matter while activities for three different micro-environments in Pakistan. The study concluded that there was high level of concentration of particulate matter in the kitchen because of the using biomass fuel for the cooking than the living area. So the women had to spend mostly time in the kitchen so she faced greatest exposure. [4]

Khushk et al (2005) the study was comparison between the household using improved stove and the population using traditional stove in the two villages of district Thatta and Hyderabad Sindh Pakistan. the was conducted from April to May 2002.the questionnaire was filled by the 114 women who were using traditional stove and 45 questionnaire filled by the women who were using improve free smoke stove. Level of the carbon monoxide was measured from the both sample groups. Different results was found by the adjust for confounders. The focus group discussion was held to determine the view of women regarding acceptability and impact of free smoke stove on women. The majority of women said they less smoke to use free smoke stove and found good impact on their health. more result analyzed that dry cough (AOR=0.61; 95% CI 0.26-1.41), sneezing (AOR=0.54; CI 0.22-1.30) and tears while cooking (TWC) (AOR=0.51; 95% CI 0.21-1.21) 95% were less reported in the women which using free smoke stove than the women who were using traditional smoke stove but the results were not statistically significant possibly due to the small sample. The level of CO was 15.4+/-3.4 ppm in free smoke stove and 28.5+/-5.7 ppm in the traditional stove. The mean different were -13.1 (95% CI and 3.-29.5 2). The result showed a favorable trend for the free

smoke stove. In order to increase the indoor air quality in developing countries of the world stoves for burning of biomass should be constructed in a way that the emission of fuel gases is low. It would be reduction the negative health risk.[5]

Mehta, (2004)Conducted the study about the air pollution associated health benefits of interferences to reduce indoor air pollution cooking heating with solid fuels were estimated in South and South- east Asia, Africa, and the Americas using widespread cost- helpfulness method. Three circumstances are considered: offering part of the population with access to cleaner fuels, providing access to improved stoves, and providing part of the population with approach to cleaner fuels and part of the population with improved stoves. All interference circumstances are associated with the existing condition that the business as normal. Two major health results with indoor air pollution are attended, namely severe lower breathing pollutions in young children under five years of age and chronic disruptive lung disease in adults over twenty. While providing approach to cleaner fuels has a larger health impact on the population than improved stoves, there is much health benefit associated with improved stove use. Expanded stoves were also much more price than cleanser fuels, oil, or paraffin, is more cost- active than watery gas , since fuel is cheaper than liquefied petroleum gas. Concerns about kerosene use, comprising harming, blasts and possible poisonous outcomes, should be carefully considered before mentioning its prevalent use over liquefied petroleum gas, however. Investigation deals spread support for the elevation of improved stoves, as well as other locally proper means to decrease disclosures within solid fuel using households, until everyone can be given access to cleaner fuels. [6]

Qasim, M (2013) the study was conducted in Pakistan. Indoor pollutants have health special effects. Health effects related with indoor biomass burning particularly in rural areas that are Acute Respiratory Infections in children, Lung Cancer, Tuberculosis, poor pregnancy outcomes. Children are more vulnerable to health evils by indoor air pollutants as compared to the young. The inhabitants which is depending on biomass fuel in the Pakistan is 94% in the countryside areas and 60% in the city areas.. The aim of the study was to study health difficulty by the indoor pollution so data obviously proved that biomass fuel have adverse outcome for health. Some common infection and such warn diseases evaluated in the dwelling of Sabour village. There 50.3% family member had Chronic Obstructive Pulmonary disease. 12.7% family member had Respiratory Infection. 9.6% had asthma and 6.4 respondent's family member had lungs cancer. Majority of woman of village depend on biomass fuel because of for reasons poverty, lack of knowledge level, facility of natural gas is not accessible and easily availability of biomass fuel. Effected population is considered trouble on the society that area cannot development properly [7].

Edelstein et al (2011) the study was conducted in the Ethiopia. This study explained the women awareness about health problem related to the indoor air pollution caused by the use of biomass fuel for the cooking. This study is about to give education to the women to change cooking practices and its impact on the health on the willing choice of the women. Ethiopian society is characterized by extremes of household income and exposure to indoor air pollution n. there were 80% population lived in the rural areas and using biomass fuel for the cooking. Women are often cooking indoor in non-ventilated areas. It has poor living conditions. There was no access of clean water. There was no sewage system and no electricity. The household member are living, cooking, and sleeping at the same place. The middle class family has good condition than the poor family they have access of clean water, electricity. Good sewage condition, comfortable living house, they had good income so they had ability to get better fuel for the cooking. If the women have knowledge about the biomass smoke that has negative impact on their health and their children health. It would help to

dropped 20% in the rural population, the most vulnerable group, in which biomass smoke is not seen by the majority as a cause for concern. They have less awareness about the health although the women interviewed did consider some fuels as cleaner than others. There was respiratory disease more two three time than the urban areas or the middle class family which were not using biomass fuel for cooking.[8]

Mariana (2002) the research was conducted at Bolivia. Study was about indoor air pollution and human health. The data was collected through the questionnaire and household survey. The survey was carried out during two days, 19th and 20th of August 2002 .448 families in total. Most of the residential were distributed in both sides of the main road of access. The questionnaire distribute randomly data was analyzed by the spss. Sometimes the women were started to answer after the husband's participation. 70 % of questionnaires were filled by women, 10% husband and wife, 8% daughter, 12% by husbands. First asked question about the kitchen environment. Them about the climate and source of income etc. therefore, it should be. Ayopaya and Trinitarians were the communities were the survey was collected. These communities belonged to Chimore, a small rural town located in a tropical lowland region of Cochabamba, Bolivia. With a total of 8.555 inhabitants Chimore was mostly agricultural area. The climate was hot and humid, and the year is separated in a dry and a wet season. In 52% of the residents, the kitchens were located inside the houses in the ground floor. The rest, 36%, were independent structures separated from the house. 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 were common. The user of gas only pointed out temperature. The investments in the kitchen were out of women control because of depending factor on family income and husband decision. The women thought that kitchen was inly depending on them. but the management of the kitchen and responsibility of fuel due to economic condition were also responsibility of men There were no reaction to the negative effects of the smoke .there was somehow willingness to do some changing in the kitchen, The women were not expressed a need to change the fuel.[9]

Colbeck et al (2010) this study is about the indoor pollutant which caused by the use of the biomass fuel. The Tobacco smoke was the highlighted as the indoors pollutant in the both scientific journal by the international and the government originations. It was significant effect of the indoor pollutant in the Pakistan. it is because of the use of biomass fuel for the cooking mostly in the rural Areas it contributes in the poor indoor quality by the smoke of biomass fuel. There were need to recognized it major health hazard by the national policy of the Pakistan. It need be country wide awareness to the public by the advocacy campaign which was association with the air pollution and ill health the development and adaptation of the improve cooking stove is most suitable choice for the population according to the current socioeconomic conditions of the country. Thus it needs to be exploring further biogas as a fuel. It should be banned smoking at the public places and need to be quantified knowledge about the effect of smoking on the indoor air quality. [10]

Zafar Fatima at el (2010) indoor air pollution was the major concern with the health in both developed and developing countries. But the condition was worse in the developing countries the developed countries. Biomass fuel was based on plant and animal waste material which was burn incompletely by the human. It mostly used for the cooking purpose as a fuel. It included wood, Coal, Agricultural residues and dung. It was estimated that about 3 billion population of the world were depended on the biomass fuel. 2.4 were using coal and mostly used in the china. there were regional variation in the use of biomass fuel only 20% biomass fueled used in the Europe and majority were about 80% were used in the central Asia, sub Saharan Africa and south Asia.. Social and economic development was necessary

requirement for the access of modern energy. The majority population of the world had not yet access to the modern energy. Because lack of availability of energy and due to low economic status. Incompletely burn of biomass fuel was the cause of many diseases it had adverse effect on the health because incompletely burned fuel emission many pollutants gases such as to carbon dioxide, a multitude of complex chemicals including suspended particulate matter (SPM), carbon monoxide. These pollutant gases increase the risk of the pneumonia, chronic respiratory diseases and lung cancer and skin infections were.[11]

CONCLUSION

Indoor kitchen pollution are caused by the burning the traditional biomass fuel included crops residues, wood, dung. It damage the health of pollution particularly women, children and elderly are more effected by it. The study is conducted at the rural area about the indoor air pollution. Indoor air pollution is a main health threat for a huge worldwide poorest pollution. This threat of indoor air pollution will increase the burden of disease. The result of the indoor pollution has great contribution to the women and children disease such as acute lower respiratory infection. The indication on which the study estimate the burden of diseases is based however limited. Supply of energy and there use should include assessment of pollution exposure reduction, fuel efficiency and effect on global and local environment, availability of household need, affordable, safe and sustainability. Therefore there is need to organized set of studies to improve and calculate involvement in a variety of setting about Marco-economic studies on the issue of socio economic caused to use the biomass fuel at the nation level and some policy implication such as reduction in the price of natural gas and increase access to the poor. It needs a systematic, standardized approach to monitoring.

The health effects of particles deposited in the airways depend on the defense mechanisms of the lung, such as aerodynamic filtration, and in situ detoxification. Most studies on the health effects of biomass combustion have been observational in nature and have relied on proxy measures of exposure(such as reported hours spent near the stove, years of cooking experience, or child being carried by mother while cooking), the reliability of evidence from studies utterly carried out in developing countries, together with loyal evidence provided by outdoor air pollution and environmental tobacco smoke studies, indicates that there is likely to be a strong association between indoor smoke exposure and acute respiratory infections in children and chronic bronchitis in women. The evidence for other health outcomes including asthma, tuberculosis, and cataracts is in need of further amplification from studies that have better indicators for exposure and control for confounders. Associations with adverse pregnancy outcomes(including low birth weight and stillbirth) and ischemic heart disease are biologically reasonable, as they have been associated with outdoor air pollution smoking (passive and active), but have not been satisfactorily explored for exposures from of solid household fuels.

The review is related to the indoor air pollutant status among the developing countries. The main diseases according to above literature were asthma, respiratory tract infections, chronic pulmonary diseases, lungs cancer etc. the studies were conducted in the developing countries such as Pakistan, India, Bangladesh, Uganda, Africa, Sri Lank, China, Ethiopia, Nepal.. So it concluded that developing countries had major problem of health hazards because use of biomass fuel for the purposes of cooking. Mostly women and children were effects it because they had mostly time at home. Asthmatics problem often caused by the not properly ventilation system in the houses. . The studies were about health effect include illness, chronic pulmonary, weakling of the immune system, respiratory. Lung cancer and reduction in lung function. Poisonous coal was emission of the Arsenic poison and fluorosis which

observe in some region of the china. The coal smoke had adverse effect on the health. The indoor air was measurement by most of only particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide. The factors to use of biomass fuel were poverty and availability of natural gas and traditionally and culturally use of mud stove the data were collected through the questionnaire Different studies was about to give education to the women to change cooking practices and its impact on the health on the willing choice of the women. The middle classes family has good condition than the poor family they have access of clean water, electricity. Good sewage condition, comfortable living house, they had good income so they had ability to get better fuel for the cooking. If the women have knowledge about the biomass smoke it had negative impact on their and their children heath. It would help to dropped 20% in the rural population, the most vulnerable group, in which biomass smoke is not seen by the majority as a cause for concern. Uneducated had less awareness about the health although the women interviewed did consider some fuels as cleaner than others. There was respiratory disease.

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