

Impact Of Indoor-Air Pollution On Women And Children In The Rural Communities Of Ikom Local Government Area Of Cross River State Nigeria

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Abstract: The study focuses on the study of indoor air pollution in the rural communities in Ikom Local Government Area of Cross River State, Nigeria. Women and children are the main subjects of the study due principally to the fact that they are those who spend more time in domestic chores. The problem statement derives from the quest to existing findings elsewhere. The findings or expected result was clarified on the true perspectives of the health status of the subjects of the study. In line with this three objectives were stated to give direction to line of inquiry. The literature was accordingly reviewed along the line of objective based on two broad thematic areas – a general overview of indoor air pollutants and the particular incidents of health impact of the pollutants with emphasis on solid biomass fuels. The methodology encapsulates the description of the area, study population, sampling techniques, instrument for data collection, procedure for data collection and analysis as well as expected results. In keeping with the decision rule, it was evident that the F-Calculated is greater than the F-Critical at 0.05 degree of significance. The null hypothesis is accepted. This means that there is significant impact of air pollution on children and women in the area (Ikom rural communities) Cross River State, Nigeria.

I. INTRODUCTION

Indoor Air pollution is a form of pollution that occurs within an enclosure, mostly inside a building or a moving object like an automobile vehicle. This form of pollution, like all others, has a negative impact on human health. The pollutants derive from many sources and are of many categories. Some of the sources include wall paints, deodorants, repellents or insect killers, emulsifiers, Biomass or wood smoke and so on. These pollutants vary in their degree of effects and according to the level of exposure.

Indoor air pollution in rural communities derive principally from biomass sources where the rural women use wood stove in cooking and preservation of items like fish and other edibles. Rigorous investigations have been carried out about rural women and children concerning the health impact of the pollution.

The world resources Institute's (WRI) 2000 findings revealed that indoor air pollution has a very deleterious effect on humans because it is associated with incidence of respiratory ailments like asthma, bronchitis and so on. Besides the impact of biomass contamination, acid pollution effect and other pollution incidents are also prevalent in the rural communities' indoor environment. For instance fugitive particulate matters are common incidents experienced when sweeping or reorganisation of home. Aerosols and fine dust particles hover and are circulated internally for reasonable length of time due to the absence of air vents for expulsion of the dust caused by ignorance or lack of environmental health orientation. These rural women and children remain indoors with the circulating poorly combustible biomass sometimes fanning it vehemently to ensure that it gets aglow. The situation is worsened during the rainy seasons where the firewood which are the principal sources of energy are brought

in from the farm in completely damp or wet state to be subjected to the arduous process of causing it to burn. Most times the children are compelled to do the fanning or bellowing to ensure that the wood stoves are ignited under such a state. Following this ordeal by women and children, their health status is impaired in the short and long run. In the immediate aftermath of burning process the children and/or women are seen gasping for breathe or wearing dilated eye balls or tending towards a state of suffocation.

In the long run a cursory observation of the physical appearance of these women particularly informs one of rapid ageing and fatigue from stress and strain.

STATEMENT OF THE PROBLEM

Children and women in the rural communities of Africa and other developing regions of world suffer a great of environmental health damage than men. The explanation lies in the fact these group are closer to nature and most of their activities relate directly to the natural environment. The second reason also is that most members of this population have no gainful civil service employment and they depend on the land for their survival. That is why it has been said by Bassey (2005) that women bear the greatest burden of environmental degradation.

Indoor air pollution is a common phenomenon that reduces the environmental air quality of indoor environment in the rural communities. It is caused by the incidence of rural poverty, poor housing quality and the peoples ignorance. All three factors can be mitigated if there is proper awareness by the people of livelihood sustainability and alternative strategies of environmental friendly behaviour for instituting the ethic of exocentric attitudes towards oneself and the natural environment in general.

The research is challenged by the need to adequately appreciate the true perspective of indoor air quality in the domain of study and then further ascertaining the overall health status of the population in relation to the incidence of the indoor air pollution.

JUSTIFICATION OF THE STUDY

Environment is our dwelling place, a good knowledge of it is worthwhile to properly care for it. Adequate environmental knowledge is a fundamental starting point to environmental capacity building. Well informed environmental information is necessary for the avoidance of risks and hazards caused by environmental ignorance.

Environmental health workers or planners require contribution from this study to generally embark on public campaign against indoor cooking and burning of biomass in a confined enclosures. Environmental health departments of our local governments need information from this study as a tool for embarking on public campaigns against the dangers of air pollution in the domestic environment.

Health institutions such as hospitals generally need information from the findings of this study to achieve proper/effective diagnosis of clinical conditions of patients. Women and children themselves require a good knowledge of

this situation to properly adapt and or mitigate the effect of the indoor air pollution in the areas.

OBJECTIVES OF THE STUDY

This study is backed up by the following specific objective:

- ✓ Identification of the prevalence of morbidity cases among the population of women and children in the area.

RESEARCH HYPOTHESIS

In line with the stated objective the following hypothesis was formulated.

HYPOTHESIS I

This follows Objective 1 and is stated as:

Ho: Indoor air pollution does not have a significant impact on the health of Rural women and children in the study area

Hi: There is a significant impact of indoor air pollution on the health of Rural women and children in the study area

Note: The Hypothesis I is analysed using one way Analysis of Variance.

II. LITERATURE REVIEW

AN OVERVIEW

Indoor air pollution remains one area of environmental knowledge that scant attention has been paid but it has enormous implications for human health. In line with this Montgomery (1995) held that most people associated air pollution with city streets, in heavily industrialized towns or factories belching smoke. Accordingly, he said that increasingly scientists are coming to realize the hazards associated with air pollution in offices and homes. He cited asbestos as a form of mineralogic pollutant contained in ceilings of houses, which he said can be carcinogenicous. Another case cited is bloan-in foam which he said releases formaldehyde, a dangerous volatile or organic compound as its cures. Many homes, according to the report, (Montgonxny 1995) are trapped in with toxic gases whose concentration build up with time.

The report features a number of categories of indoor air pollutants to include, smoke and carbon monoxide from furnaces gas appliance and cigarettes, radon from walls, disinfectants, pesticides, insecticides, cleaner, solvent (paints) aerosols/ and glues.

An important member of the indoor air pollutant is Radon (Udo 2000) Radon is said to be colourless, tasteless, odorless gas that is also radioactive. It is said to be produced in small quantities in nature by the decay of natural trace elements, uranium and thorium. Radon is said to be radio-active and that it also decay's into radioactive isotopes of lead, bismuth and other metals that stick to dust particles. These particles may be inhaled and lodged in the lungs and sometimes cause lung cancer. The report also had it that tightly seals homes

have radon levels two times higher than that found in uranium mines. The report had it that the average concentration of radon in home in the United States is high enough that corrective measures should be taken.

Radon sources are traceable the original sources of occurrence of uranium and thorium which are rocks and soils and building materials. Being a gas radon, it was reported can diffuse into the house through unsealed foundation. It is also said to seep into the house through plumbing.

Hardoy et al (1992) reported concerning other ways by which indoor air pollution could occur as in the case of Third World cities where some live in cramped overcrowded environment without space leading to the presence of pathogens and the incidence of putrefaction and decay caused by filth and poor sanitation. This situation is typical of those living in slum, ghettos or squatter settlements in parts of cities which are occupied by the urban poor.

It is reported that in modern residences cooking and space heating needs are met by fossil fuels such as natural gas, liquefied petroleum gas, heating oil (petroleum product) and electricity (Basic and Samet 1999). There are also findings from studies carried out on exposure to Nitrogen dioxide from gas stoves. It was reported equally that compared to combustion of solid fuels, gaseous fuels in simple devices emit smaller amounts of pollution and particulate matter (PMO), or eye irritating organic compounds (e.g aldehydes) and carcinogenic compounds such as benzene and 1, 3 – butadiene and polycyclic aromatic hydrocarbons whereas, pollution from fuel use in homes is less compared to solid fuel use. There are other important sources related to nature of materials used in construction of buildings some of which are briefly highlighted as follows:

Fine particle – from fuel, tobacco combustion, changing, cooking

- ✓ Carbon monoxide – from fuel and tobacco combustion
- ✓ Polycyclic aromatic carbons – fuel, tobacco combustion, cooking
- ✓ Nitrogen oxides – fuel combustion
- ✓ Sulphur oxides – coal combustion

HEALTH AND OTHER IMPACTS OF INDOOR AIR POLLUTION

Indoor air pollution as a significant environmental Health threat requires adequate attention following a world Bank Report indoor air pollution in developing countries is one of the most critical environmental problems (World Resources Institute 1988).

Epidemiological studies in developing countries of indoor air pollution falls within at least four categories of ailments acute respiratory infection (ARI) in children, chronic lung cancer and still birth and other problems at birth. Those with ARI appear to have the greatest impact in terms of number of people affected and the time lost due to illness.

The World Bank report further provided that in South Africa, Zulu children living in houses with woodstoves were three times more likely to develop a respiratory infection severe enough to require hospitalization. The report further added that exposure to wood smoke from cooking fires in poorly ventilated conditions may increase the risk of a young

child contacting a severe respiratory infection five to six times (World Bank 1996).

One Columbian study found that women exposed to wood stove smoke during cooking were three times more likely to suffer chronic lung diseases. Smith et al (2004) carried out a systematic review of the evidence for the impact of indoor air pollution (IAP) on a wide range of outcomes. Studies of the key outcomes used in the burden of disease calculations – acute lower respiratory infection (SARI), chronic obstructive pulmonary Disease (COPD) and lung cancer were analysed.

In some countries, house hold fuels carry locally specific risks. It has been estimated that more than 2 million people in China suffer from skeletal fluoridise in part resulting from the use of fluoride rich fuels. (Ando et al (1988). Arsenic, another contaminant of coal is associated with an greatest risk of lung cancer in China (Finkelmann, Belkin and Zeng (1999).

A recent World Health Organization (WHO) report estimated that, indoor smoke from solid fuel ranked as one of the greatest top ten for the global burden of disease, accounting for an estimated for any estimated 1.6 million premature death each year. Also among all environmental risked indoor air pollution is second to poor water sanitation hygiene. (WHO 2002/2002)

The existing literature provides strong evidence that smoke from solid fuels is a risk factor for acute respiratory infections (ARI), Chronic obstructive pulmonary Discas (COPD) and Lung cancer (from coal smoke) (Smith 2002). It was reported that evidence from studies in developing countries indicates that young children living in solid-fuel using households have two or three times more risk of serious ARI than unexposed cones (Smith 2000).

Another evaluation of studies in developing countries indicates that young women cooking over biomass fires for many years have two or four times more risk of (COPD) than those unexposed. Generally speaking, environmental health significance of indoor air pollution has become an established fact and must be taken seriously.

CONCLUSION

Previously indoor air pollution has been on residual list of environmental agenda but currently a great of concern is being shown going by plethora studies directed at it. From existing evidences it has been recognised that pollution from solid fuel use has more impact on human health than other sources of domestic energy or chemical indoor pollution.

Another fact is that women and children are more susceptible because of the length of exposure. And again, that other liquid or gaseous pollutants have less deleterious effects.

METHODOLOGY OF THE STUDY

AREA OF STUDY

Ikom falls among the eighteen Local Government areas of Cross River State. It is located in the central Senatorial District politically and in the tropical rainforest belt geographically. The former tangle of equatorial forest vegetation have been decimated by human activities in farming, housing development and lumbering. Due to its

location in the tropical forest biome it received abundant supply of rainfall that supports agricultural activities. Both arable farming and stabilized of agriculture are embacked capon. Arable farming is carried out in the derived savannah areas of Nde, Afi, Baleip, Alok and Nkarasdi while stabilized agriculture involving the cultivation of cocoa as the major cash crop is carried out in the southern regions of Akparabong, Ajijingkpo, Olkuni and other contiguous tentories.

The central Business District focused on the FOUR CORNER” axis thrives with business (commercial) and has an urban outlook while all other areas outside of this commenced hub have rural characteristics.

POPULATION OF THE STUDY

The population of the study comprises all rural women and children of primary school age.

SAMPLING TECHNIQUE

Purposive sampling shall precede other techniques. Using ecological criteria the area was be demarcated into three – upper savannah area, middle derived forest zone and the southern humid region.

- ✓ From each region or cluster specific number of households shall be determined using systematic procedure.
- ✓ Then stratified sampling shall be carried based on selection of women and children of equal ratio.

The entire sample size comprises 200 subjects with equal ratio of Women and children.

METHOD OF DATA COLLECTION

Data was collected based on the following procedure

- ✓ Site analysis/area demarcation for population sampling
- ✓ Baseline information collection on socio-cultural and ecological baseline of the area
- ✓ Familiarization/groundwork contact of local key resource persons.
- ✓ Field entry formal and data collection
- ✓ Collection of secondary data from nearby health institutions on health history of residents.
- ✓ Information was garnered on equal ration of 100 women and 100 children choses from sampled house holds.

Primary source data was generated through interview with respondents. Secondary source data was derived from hospital records in the area.

INSTRUMENTS FOR DATA COLLECTION

The primary instrument for data collection is the research structured questionnaire designed to elicit information from respondents on their livelihood patterns and their past health records.

DATA ANALYSIS TECHNIQUE

Data was analysed using One way Analysis of Variance (ANOVA) and the student t-test.

III. DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDING

The obtained field data collected from sampled rural communities in presented in tables as shown below. Table 1 predicates on hypothesis I which seeks to analyse the spatial incidents of indoor air related ailments among women and children in the area.

S/NO	DISEASE CATEGORY	PREVALENCE RATE IN DIFFERENT COMMUNITIES					
		Nkarashi	Balep	Nde	Okuni	Ofutop	Total
1.	Acute respiratory infection (ARI)	20	12	08	6	10	56
2.	Lungs Cancer	4	6	5	8	10	33
3.	Still Birth (Miscarriage)	25	18	16	13	17	87
4.	Visual Impairment	18	22	26	31	15	112
5.	Chronic obstructive pulmonary disease	14	19	16	14	15	78
6.	Asthma	08	10	-	08	14	40
7.	Fluorosis (From floride)	4	6	8	-	10	30

Note: The values represented in the table are actual of the subjects who responded in affirmative to the prevalence of ailment or incidence. From the sample of 200 respondents were used in the study others who responded negative fall without the scope of this representation.

Table 1: Spatial Distribution Of Indoor Pollution Health Realted Ailments Among Women And Children In Ikom Local Government Area Of Cross River State

This is also following hypothesis I using One-Way Analysis of Variance (ANOVA).

HYPOTHESIS ONE

SUMMARY

Groups	Count	Sum	Average	Variance
Acute Respiratory infection ARI	5	56	11.2	29.2
Lung Cancer Still Birth Miscarriage	5	33	6.6	5.8
Visual Impairment	5	89	17.8	19.7
Chronic Obstructive Pulmonary Diseases	5	112	22.4	40.3
Asthma	5	78	15.6	4.3
Fluorosis	5	40	8	26
	5	28	5.6	14.8

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1200.286	6	200.0476	9.995241	6.5E-06	2.445259
Within Groups	560.4	28	20.01429			
Total	1760.686	34				

DECISION RULE

Here, we can see that the F-Calculated is greater than the F-critical at alpha level of (0.05). We therefore reject the null

hypothesis and accept the alternative hypothesis and conclude that there is a significant impact of indoor air pollution on the health of Rural women and children in the study area

IV. RESULTS/FINDINGS

The results derived from the hypothesis testing following the decision rule is that since the F-calculated is greater than the F-critical value at alpha level of 0.05, the null hypothesis was rejected while the alternative hypothesis was accepted, indicating that there is significant impact of air pollution on women and children in Ikom rural communities of Cross River State, Nigeria. This report further substantiates the report of earlier studies carried out by World Bank on Pollution incidents in developing countries. It states categorically that indoor air pollution in developing countries is one of the most critical environmental problems (World Resources Institute 1988).

Practical field enquiries by the research team supports the premise of the World Bank report as illustrated on table I. depicting spatial distribution of indoor air pollution health related ailments seven of which were investigated. As can be gleaned from the data on the table, visual impairment ranked the highest, which is followed by birth with a value of 87 and thirdly by chronic obstructive pulmonary disease. Acute respiratory infection also ranked next and then asthma came after. Judging from the field reports the earlier documented findings of the World Bank's (1996) study in south Africa becomes evident. The report provided that in South Africa, Zulu children living in houses with Wooden stoves were three times more likely to develop a respiratory infection severe enough to require hospitalization. The report further emphasized that exposure to wood smoke from cooking fires in poorly ventilated conditions may increase the risks of young children contracting a severe respiratory infection five to six times higher. This situation is akin to the case of the Epidemiological survey investigated by this team. In the rural communities. Sampled and explored in this study, their domestic energy use and the environmental scenario featured in the World Bank Report (1998) are synonymous.

In most rural homes in the domain of study the commonest energy source for domestic cooking is fossil fuel wood biomass with adequate carbon which impels combustion causing profuse production of smoke. This falls in line with reports from findings by Ando et al (1998) that in some countries house hold fuels carry locally specific risks. This predicates on the estimation that more than two million people in China suffer from skeletal fluorides from fuels.

In keeping with our findings, Epidemiological investigations have established that indoor air pollution in developing countries fall within four categories of ailments, acute respiratory infections (ARI), chronic lung cancer, still birth and other ails. Accordingly, the high degree of prevalence of still birth in our domain of study clearly substantiates this point.

One Columbian study by Smith et al (2004) equally found that women exposed to wood stove smoke during cooking were three times more likely to suffer chronic lung diseases. Similarly, another investigation by Smith et al (2004) on

disease burden outcome revealed that prevalent disease associated with indoor air pollution from fossil fuels were Acute lower respiratory infections (ARI), Chronic Obstructive pulmonary disease (COPD) and lung cancer.

Grossly, our field investigations revealed that children are more susceptible to the risk of the indoor air pollution for a factors to be adhered such as, lower level immunity caused by age, longer hours spent indoor while cooking and the frequency of their engagement in domestic cooking chores.

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