

# Household smoke exposure: Its effects and prevention

<sup>1</sup>Dr. M Rajendra Prasad, <sup>2</sup>Dr. Ramkumar Boopathirajan, <sup>3</sup>Dr. Nishitha G,  
<sup>4</sup>Dr. Sai Sravan Kumar R

<sup>1</sup>Associate Professor, Department of Community Medicine, TRR Institute of Medical Sciences, Warangal, India

<sup>2</sup>Associate Professor, Department of Community Medicine, Nandha Medical College and Hospital, Tamil Nadu, India

<sup>3</sup>Assistant Professor, Department of Pharmacology, Narayana Medical College Nellore, Andhra Pradesh, India

<sup>4</sup>Assistant Professor, Department of Community Medicine, Narayana Medical College Nellore, Andhra Pradesh, India

**Corresponding Author:**

Dr. Sai Sravan Kumar R

## Abstract

**Background and objectives:** Smoke inhaled from factories, wildfires, factories, motorbikes, and wood stoves has an impact on household pollution and its effects. The effects of smoke pollution have been studied.

**Method:** From December 2021 to November 2022, a thorough assessment of papers and reports conducted utilising the accessible resources to identify possible health concerns associated with smoke pollution in homes by Department of Community Medicine, TRR Institute of Medical Sciences, Warangal, India. Researchers gathered 125 publications and reports, 15 investigations were chosen.

**Result:** Lower respiratory ailments, heart disease, liver and kidney damage, pneumonia, asthma, and harm to the brain have all been linked to smoke pollution. Homelessness may worsen due to the increased burden of illnesses brought on by harmful pollutants in the atmosphere from smoke pollution, including dwarfed crops, water shortages, and water running dry. In many countries, it may also become impossible to pay for the costs of collective medication. The hazards are partially attributed to the combustion of biofuels like wood, manure, or coal, which affects the mechanisms that influence the accumulation of greenhouse gas emissions, particularly carbon dioxide, and the associated changing weather.

**Conclusion:** Our study suggests enduring new policies that advance public health and quality of life all throughout the globe.

**Keywords:** Health, climate, rural households, plants, water

## Introduction

The most recent World Health Organization (WHO) report estimates that 8 million people worldwide pass away each year as a result of air pollution <sup>[1]</sup>. In addition to using solid cooking fuels, there are more than 60 other risk factors linked to the rise in household air pollution <sup>[2]</sup>. Many individuals are exposed to smoke from the burning of wood, coal, and charcoal, which has an impact on inhabited areas. In high-, middle-, and low-income nations alike, food cooked with biomass fuels exacerbates health issues. The effects of hazardous air pollution on health, such as lung diseases, are severe, but it is often difficult to obtain precise data because monitoring equipment is expensive, limiting the release of information on related factors like low income levels, a lack of appropriate technology, the inadequacy of community medicine precautionary measures, and the inadequacy of government policy implementation <sup>[3]</sup>. The production of colloidal particles from burning biomass is typically associated to the scattering of air contaminants such gases, smoke, and aerosols. Because it is

required for heating and cooking, biomass energy must be used everywhere, but especially in urban areas and isolated rural areas<sup>[3,4]</sup>. Despite how conveniently biomass fuels can be used in these places, there aren't many modern energy sources available there. When biomass fuel is used for indoor cooking, it frequently results in the production of polycyclic aromatic hydrocarbons (PAHs), particulate matter (PM), and carbon monoxide (CO) (PAHs). It is estimated that the disease burden, which includes ambient air pollution, will result in 3.5 million preterm deaths worldwide<sup>[4, 5, 6]</sup>. The production of greenhouse gases from the burning of biomass in urban areas is now widely accepted to play a substantial role in weather changes. Black carbon is a pollution that results from burning biomass that lowers crop yields and may have an impact on the monsoon and glacier melt cycles. Although a large portion of the world's population spends a large portion of their time indoors in many nations, little is known about indoor exposure<sup>[6,7]</sup>.

### Material and Methods

From December 2021 to November 2022, a thorough assessment of reports and papers was conducted utilising the resources that could be found by searching various databases as well as other resources by Department of Community Medicine, TRR Institute of Medical Sciences, Warangal, India. Researchers gathered 125 publications and reports, but only 15 research were ultimately chosen<sup>[8,9]</sup>. The terms "home smoke," "air quality," "illnesses," "smoke kills," and "stoves" were among those employed.

### Inclusion criteria

Documents that specifically addressed smoke in earlier years.

### Exclusion criteria

Documents mentioned smoke alone without the word "household" following it in prior year.

### Result

**Table 1:** The averages and standard deviations ( $x \pm s$ ) of the primary PM<sub>2.5</sub> emissions (EF; g kg<sup>-1</sup>), thermal efficiency ( $\eta$ ; %), and net caloric values (NCV; MJ kg<sup>-1</sup>) for various sources of energy

Description	N	EF, kg <sup>-1</sup>	NCV, MJkg <sup>-1</sup>	$\eta$ , %	References
Crop straw	15	5.6 $\pm$ 4.2	17 $\pm$ 1	17 $\pm$ 2	[11-12]
Firewood log	24	2.9 $\pm$ 1.3	17 $\pm$ 3	17 $\pm$ 6	[7,12,13,14]
Wood branches	3	2.9 $\pm$ 1.6	18 $\pm$ 1	13 $\pm$ 1	[6,10,14,15]
Anthracite chunk	3	1.0 $\pm$ 1.3	20 $\pm$ 4	13 $\pm$ 3	[12-16]
Bituminous chunk	24	10 $\pm$ 10	27 $\pm$ 3	13 $\pm$ 3	[11-15]
Anthracite briquette	1	0.59 $\pm$ 0.59	20 $\pm$ 4	31 $\pm$ 10	[12-16]
Bituminous briquette	19	7.2 $\pm$ 4.9	27 $\pm$ 3	31 $\pm$ 10	[12-15]
Crop straw pellet	13	2.2 $\pm$ 1.5	15 $\pm$ 2	38 $\pm$ 6	[5-6]
Wood pellet	21	0.80 $\pm$ 0.19	17 $\pm$ 1	30 $\pm$ 7	[8,16]
Natural gas	1	0.22 $\pm$ 0.15	51 $\pm$ 1	55 $\pm$ 5	[13]
LPG	1	0.28 $\pm$ 0.37	50 $\pm$ 1	43 $\pm$ 2	[13]

Villagers utilised crop straws. Grain and rice husks were among the plant materials studied. Limited sample numbers contributed to small differences in PM<sub>2.5</sub> categorization ( $p > 0.05$ ). Households burned plant fuels. Trees and shrubs and fuels wetness explain the higher pollution levels.

Log and twigs produce various pollutants. Logs and branches averaged 1.9 $\pm$ 1.2g/kg and 2.7 $\pm$ 0.6 g/kg-1 PM<sub>2.5</sub> ( $p < 0.05$ ). The analysis revealed the impacts of indoors PM<sub>2.5</sub> pollution, notably during in the winters. Compatible with Asian studies.

## Discussion

According to the findings of the current study, homeowners can upgrade their living spaces by replacing traditional stoves. For instance, using briquettes can cut down on the PM<sub>2.5</sub> emissions generated by homes burning bituminous coal. Additionally, the usage of biomass can be replaced with more efficient cook stoves, such as forced-draft stoves and gasified burners, potentially reducing harmful health concerns. Compared to homes that utilise cook stoves that burn pellets or are gasified, residential buildings that burn wood logs emit more pollutants [9,10,11]. It was discovered that kerosene was frequently utilised as home fuel. Additionally, it was discovered that many residences lacked properly ventilated kitchens, which can be harmful to the residents' health.

Concerns about the climate could eventually affect problems with emissions. It may be important to develop strategies to boost the efficacy of present adaptation efforts due to the rising amounts of greenhouse gases like carbon dioxide. The results of numerous epidemiological studies that show an increase in health risks linked to kerosene smoke [10,11,12] provide support for this information. Given concerns about handling, emission production, and simplicity of use when cooking, the majority of the women who took part in the review concluded that improved charcoal stoves (ICS) are preferred to conventional charcoal three-stone stoves (TCS) for women who reside in rural regions [13,14,15]. An impact may lessen the health risks connected to headache, lung disease, and eye discomfort, according to prior study. On modern stoves, however, elderly ladies might not be able to prepare significant quantities of food. For instance, preparing a lot of food could be costly, and the money might not always be available [16].

Since tobacco smoke increases the risk of heart disease, including stroke, in adults and children who do not smoke, it has also been deemed to be a health hazard. Middle ear issues, reduced lung function, and asthma in children could all be hazards. Due to their quick physical growth-related breathing rates, lack of control over their breathing environment, and global environmental accords, children are particularly vulnerable to second-hand exposure. The new study's conclusions indicate that some children reside in homes with strict no-smoking policies and are consequently less likely to disclose exposure to second hand smoke.

## Conclusion

The current research aimed at identifying indoor air pollution effects. Improper kitchen use can harm many susceptible people. Smoke pollution is connected to bronchitis, pneumonia, bronchitis, heart disease, kidney, liver, and brain damage. Smoke inhalation increases the likelihood of disease, which in turn reduces increases family expenditure on health and makes the family vulnerable for poverty. Wood fires, factories, chimneys, cigarettes, car and motorbike emissions all pose health hazards. Incorrectly ventilated burners and the combustion of biomass fuels (such as coal) contribute to the formation of greenhouse gases, mainly carbon dioxide. This report recommends policies to enhance living standards and health sciences globally. There is need to conduct larger multi-centric studies in this regard to understand and control indoor air pollution.

## Funding source

None

## Conflict of interest

None

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