



## **EFFECTS OF INDOOR AIR POLLUTION FROM BIOMASS COOKSTOVES IN RURAL AREAS OF WARANGAL, A.P.**

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### **ABSTRACT**

The effect of indoor air pollution was assessed among women and children before and after installation of improved biomass stoves at four towns in Warangal. The awareness of smoke emittance in traditional biomass stoves and indoor air pollution related diseases were studied. The health effects of indoor air pollution by using improved biomass stoves showed that reduction of respiratory infection was 40-50% among women and 20-30% among children over traditional biomass stoves. Significant improvement in breathing difficulty was found due to reduction of smoke after the introduction of improved biomass stoves.

### **INTRODUCTION**

Exposure to pollution from wood burning stoves for indoor heating is associated with severe respiratory symptoms and mortality. Domestic cooking is the main causative factor for indoor air pollution in rural areas. Locally available fuel woods, cowdung cake and crop residues are burnt in traditional stoves. Single and double pot conventional biomass stoves with low burning rate are used to prepare food. The highest exposures are probably experienced by women, infants, and young children. Laryngo-tracheobronchitis was defined in infants with brassy cough, respiratory stridor, and/or respiratory distress. Women and children in urban slums are additionally exposed to pollution from industrial and vehicular sources.

### **MATERIALS AND METHODS**

The laboratory study was conducted to find thermal efficiency of tropical traditional and improved biomass stoves. The health study was conducted in 20 households for each study area. Health profile of family members were assessed by a medical practitioner before and after installation of improved biomass cookstoves. The data given by the family members were cross checked by diagnosing the present condition of health by the medical practitioner. Parents of all infants were interviewed by a medical practitioner during the visits using a self explanatory structured questionnaire. Diagnosis of respiratory infections was made if the infant suffered from more than two episodes of suffocation or wheezing in the year. Wood smoke is the main causative factor for indoor air pollution in rural kitchens. Impact of smoke on health with respect to the symptoms like irritation to the eye, respiratory infection and injuries to health was surveyed. With modern developments in communication, the inmates are clear about the ill effects of smoke. The reasons for indoor air pollution in traditional biomass stoves were surveyed in the four selected towns.

### **RESULTS AND DISCUSSION**

Indoor air pollution study has been conducted in four towns with 20 samples taken from each town. The awareness in use of biomass stove and indoor air pollution related diseases and health effects

when using traditional and improved biomass stoves are briefly discussed in the present study. The survey of awareness of smoke emittance in traditional biomass stoves was conducted in all selected towns and the summary is presented. The moisture content of fuel and incomplete combustion were the major reasons for smoke (Table 1). The efficiency of the traditional biomass stove varied with respect to dimension and design of the stove used in that area. An upward shift towards a cleaner fuel or improved fuel was postulated to reduce the exposure with less ventilated environment (Saksena et al. 1996). Apart from these reasons insufficient air circulation in the stove for combustion was one among the main factors which directly correlate to the internal efficiency of the stove. The thermal efficiency of the improved biomass stove (25%) was almost double than the traditional stove (12%) which is directly implied to fuel burn rate.

Table 1: Reason for smoke emittance in traditional biomass stoves.

S.No.	Reasons	Mangapet	Narsampet	Mahaboobabad	Kazipet
1.	Crop residues	11	08	05	07
2.	Insufficient circulation of air	05	11	08	09
3.	Incomplete combustion	13	08	11	11
4.	Moisture content of fuel	11	19	09	09
5.	Weather condition	12	08	09	04

Table 2: Awareness about smoke related diseases.

S.No.	Reasons	Mangapet	Narsampet	Mahaboobabad	Kazipet	Total
1.	Respiratory information	20	09	20	20	69
2.	Injurious to health	19	10	15	08	52
3.	Irritation to eye	21	19	20	20	80

Table 3: Percentage of acute respiratory infection among women.

S.No.	Symptoms	Traditional biomass stove	Improved biomass stove			
			I	II	III	Mean
1.	Irritation of throat or cough during cooking	05	08	04	04	04
2.	Watering of eyes	70	30	36	21	32
3.	Irritation of eyes	80	45	47	32	42

Table 4: Percentage prevalence respiration infection among children.

S.No.	Symptoms	Traditional Biomass stove	Improved biomass stove			
			I	II	III	Mean
1.	Acute respiratory infection	19	16	15	03	10
2.	Cold	25	19	18	04	16
3.	Cough	20	16	18	14	15

Awareness about smoke related diseases from biomass stoves was gathered and summarized in (Table 2). The intensity of smoke causes irritation to throat which resulted in cough. There was smoke reduction from improved biomass stove resulting in less indoor air pollution than traditional one (Table 3). The medical practitioner addressed prevalence of respiratory infection symptoms among women and children before and after installation of improved biomass stoves. Exposure to smoke is directly related to the initial symptoms like irritation and watering of eyes. Nearly 30-40% of the symptoms like irritation of eyes and watering in eyes were reduced after the introduction of improved biomass stoves. The clinical assessment survey showed reduction in prevalence of smoke related signs among women. Also cough symptom was found to be 50% when they switched over to improved biomass stove. The smoke irritation to the eyes of the cook was expressed by all cooks irrespective of regions or towns. Eighty percent of them expressed that wood smoke caused respiratory related diseases like cold, cough asthma and wheezing.

The symptoms of cold, cough, allergy and fever with breathing difficulty before and after installation of improved biomass stoves were assessed and are presented in Table 4. Sharma et al. (1998) reported that the respiratory symptoms of children varied from 1.6 to 6.3% during indoor air pollution. Smaller respiratory particulates from stoves are more harmful to children, because they get deep into the lungs (Leaderer et al. 1990).

## CONCLUSION

Although scientific and medical experts seem to realize that indoor air pollution is potentially a significant problem, the people who are really affected by it are the poor women and children. Installation of improved biomass stoves resulted in reduction of 33.8% of cough, 50% of acute respiratory infections and 30% of cold allergy than the use of traditional biomass stoves.

## REFERENCES

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