Indoor air pollution: A look through cooking practice with traditional and improved stoves in rural Bangladesh

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Background

Killer in the kitchen: facts and figures

- i. IAP is mainly caused by the burning of biomass (wood, dung, and agri-residues)
- ii. Exposure to IAP:
 - a. Doubles the risk of pneumonia and other ALRI among children under 5
 - WHO estimates >32,000 ALRI deaths in children under 5 in Bangladesh
 - Globally, 900,000 deaths annually





b. Triples the risk of COPD in women

- In Bangladesh, nearly 14,000 COPD deaths in adults (WHO figures for 2002, published in 2007)
- Globally, 500,000 deaths annually
- iii. IAP also contributes to TB, asthma, cardiovascular disease, low birth weight
- iv. More than half of the world's population still use biomass and coal





v. The resulting IAP is responsible for more than 1.6m deaths a year- mostly of them young children and their mothers

It must be minimized, prevented......how?

Needs study at first



Overall objective

Assessing the status of cooking practice and indoor air pollution with traditional and improved cook stoves in rural Bangladesh



Specific objective

To know:

- 1. what types of cook stoves are popular
- 2. the types of fuels commonly used
- 3. characteristics of the kitchen
- 4. particulate matter (PM 2.5) emissions during cooking
- 5. combustion efficiency of cook stoves
- 6. peoples' preferences regarding stove characteristics
- 7. peoples' perceptions about indoor air pollution
- 8. any link between stove type and female health





- 2400 households, selected randomly from 120 upazilas across all 6 divisions in Bangladesh
- Tools: Questionnaire, checklist
- Methods: Interview, observation, discussion, focus group discussion, and laboratory test





Type of stove used for cooking purpose

- Less than 2% of the households were using some type of an improved cookstove (ICS)
- Conforms to another study (World Bank 2007) that estimates ICS use in Bangladesh of 1.7%



Ways of getting stove

Ways	(%)
Make themselves	95.1
Buy from local market	5.4
Others	.3
n	2400



Type of fuel used in rural areas

- Majority (80%) of the households used agricultural residue for cooking purpose in dry season
- Use of agri-residue in flat in-land areas was higher
- About 50% of the households used fuel wood in rainy season
- Use of fuel wood in hilly, forest, coastal and mangrove areas was higher



Fuel collection methods

Method	Dry season	Rainy season
Gathering free of cost	89.6	87.4
Process themselves	40.3	40.6
Buy from local market	31.2	36.4
Others	.2	.1
n	2400	



Type of kitchen

- □ Closed kitchen (45%)
- □ Semi-closed kitchen (35%)
- Open kitchen (20%)
- More than 80% of kitchens had no window



- About 54% of the users were completely satisfied with ICS
- Remaining 46% of the households were partially dissatisfied



Causes of satisfaction

- Less smoke in the kitchen during cooking
- Less time to cook
- Less energy needed
- Portability of ICS
- Less blackening



Causes of dissatisfaction

- Constrained from using biomass fuel
- Needs full attention of the cook
- ICS is suitable only for using certain types of fuel wood
- ICS limits the design of pots that can be used



Use of other stoves besides ICS

- About 56% of the households used another cook stove in addition to ICS
- Most of them (87%) were traditional with clay fixed stove



- □ Comfortable as habituated (78%)
- Fuel easily available
- Permits different sizes of cooking pot
- Majority of the households collected fuel free of cost that was suitable for traditional stoves



Involvement of family members in fuel collection

- Involvement of female members was much higher in fuel collection
- Wife in the family was responsible to collect fuels free of cost in most of the cases



Factors affecting use of cook stove

- Fuel cost
- Availability of fuel
- Provision of using more types of fuel
- Cooking time
- Smoke in the kitchen
- Taste of food
- Portability of the stove
- Less coughing and feeling better



'smoke in the kitchen', 'portability of stove', and 'less coughing and feeling better' were ranked as most important



Smoke emissions (PM2.5) during cooking

- Rate of emission of particulate matter during cooking with traditional portable stove was about 3.7 times higher than portable improved cook stove (ICS)
- Chimney based ICS released about 90% less smoke than traditional stove
- ICS with chimney released about 86% less smoke than ICS without chimney
- Pollution level was almost double during cooking with agricultural residues compared to fuel wood





Traditional Portable

ICS Portable







ICS with grate and chimney using agri-residues

ICS with grate and chimney using fuel-wood





Efficiency of cook stove

ICS used fuel more efficiently. It required about 30% less time and 50% fuel than traditional stove



People's perception on indoor-airpollution

Is smoke from cooking harmful to health?		
Subject	(%)	
Yes, it is harmful	94.1	
No, it is not harmful	5.9	
n	2400	



Disease state and cook stove

Diseases among household members	HHs with traditional cook stove (%)	HHs with improved cook stove (%)
Cough/congestion/ trouble breathing	39.0	28.0
Headache	41.4	32.0
Burning/irritation in the eyes	10.1	4.0



Rate of diseases especially cough/trouble breathing, headache, and burning/ irritation in the eyes among female members was higher compared to male members



Learning

- Almost all of the households in rural areas for cooking depends on biomass fuel. Biomass fuel is a major source of IAP
- Traditional stoves releases more smoke during cooking that is most harmful to human health
- People are habituated to use traditional stove. It will take time to replace traditional stove with ICS if new intervention are not taken



Most of the households do not consider ICS in terms of fuel efficiency as most of them collect fuels free of cost Effective monitoring on regular basis may lead to increase ICS adoption



The way forward

Awareness raising about IAP

Research

- Piloting intervention approaches
- Commitment



Ongoing study

Objective

To know the factors affecting ICS adoption

<u>Methods</u>

- 4000 households for survey
- 2000 households with ICS
- 200 tests
- Follow up
- Evaluation



Thanks