

### Impact of Air Pollution on child health in Bangladesh

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### **Overview of this Presentation**

- Background
- Introduction
- Objectives
- Methods & Materials
- Sources of Air Pollution
- major air pollutants ,their sources and health effects
- Impacts of Air Pollution in developed/developing count
- Child health problems
- Other health problems Discussion
- Conclusions
- Role of health and other sectors
- **Policy implications**

# Background

Air Pollution is an emerging environmental issue globally, regionally and nationally lead health concern

#### Aims of Male Declaration

- Increase the awareness on the transboundary air pollution
- Share and receive the stakeholders views and ideas on the implementation of Male Declaration
- Improve the information exchange between information generation and users



What is Indoor air pollution ?

Indoor air pollution defined here as unventilated use of household use of solid fuels

What are the Exposure-Response **Relationships?** 

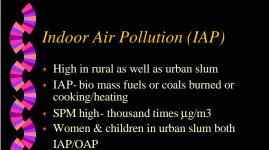
### Introduction

- IMR & NNMR extremely high in Bangladesh
- 120,000/yr death in <5 Pneumonia
- In India 400,-550,000 premature death
- 3 Million deaths among <5 globally

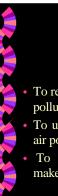
# Introduction

- Cook and live together
- 6-8 people/room, meager floor space •
- Overcrowding- leads to ARI,CD, Cold. Skin Jaundice & Other Resp. dis.
- Poors-use synthetic materials and papers with bio-mass fuel as LPG high price
- Electric stoves-
- WHO study on IAP, 2002 measuring SPM<sub>10</sub> •

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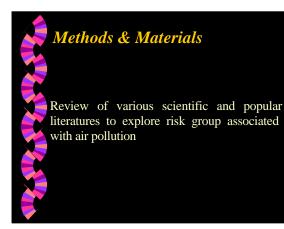


• One burner stove converting at12-18% efficiency rate - pollution



# **Objectives**

- To review the nature, distribution of the air pollution
- To understand the health consequences of air pollution
- To make awareness- policy& decision makers





# Highlights of major air pollutants ,their sources and health effects (cont...)

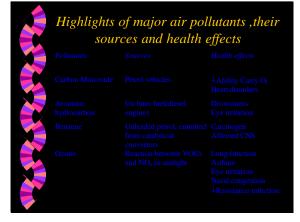
Motor vehicle, Wood-burnin Industrial activities

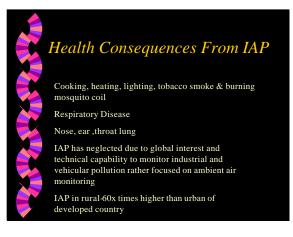
ohur Vehicle (Diesel) de Factory emissions

troge Vehicle motors Dxide Power stations

> Vehicles, Coal & Wood-burning, Phosphate fertilizer, meta

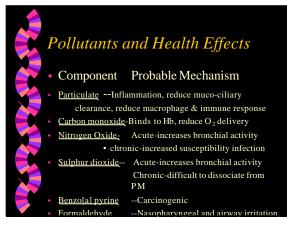
Respiratory inf. Throat irritation Aggravated asthma RT & lung damage Bronchitis Emphysema Asthma, Beans & tomatoes plant growth hl-Respiratory, chest eye irritation headache, plant growth hl-Children >3 x than dults Affected CNs Renal damage Hypertension Effects on plants







- Tobacco ----smoke Important as predisposing or exacerbating factor, because
- Contains concentrations of many indoor and outdoor pollutants.
- leads to disability and the situations are more vulnerable to e sufferings.

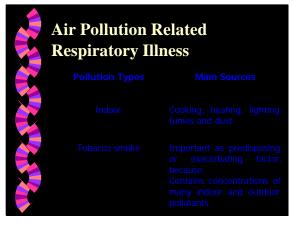


# Biofuel use leads to very high level IAP

- Typical 24 hr mean in biofuel using home is 1000+ µg/m<sup>3</sup>
- Can reach 10,000 µg/m3 PM<sub>10</sub> (or more) during use of open fire
- EPA: 150 µg/m<sup>3</sup> PM<sub>10</sub> (1% of 24hr periods); 50µg/m<sup>3</sup> annual mean
- Women and young children have greatest exposure

Health Effects of Exposure to Smoke from Solid fuel Use							
Health	Population Affected	Relative	Risk liah	Evidence			
Acute Lower Respiratory	< 5 years	2.0	3.0	Strong			
Asthma		1.4	2.5	Intermediate/			
Blindness (cataracts)	Females>15 yr.	1.3	1.6	Intermediate/			
COPD		2.0	4.0	Strong			
Lung Cancer		3.0	5.0	Strong			
Tuberculosis		1.5	3.0	Intermediate/ moderate			

DOES	IAP INCR	EASE RISK O	F ALRI?
Standar alta	-	F	
Study site	Туре	Exposure	OR/RR (95%CI)
Nepal	Cohort	Reported time by	<b>2.2</b> (1.6-3.0)
Pandey 1989		fire	
Gambia	Cohort	Carriage on back	M: 0.5 (0.2-1.2)
Armstrong1991		(cooking)	F: <b>1.9</b> (1.0-3.9)
Africa	Case-	Open fire VS	<b>2.2</b> (1.43-3.33)
Collings 1990	control	cleaner fuels	
Navajo	Case-	Use of wood	<b>4.8</b> (1.69-12.91)
Morris 1990	control	stove	
S India	Case-	Smoke producing	<b>0.8</b> (0.46-1.43)
Shah 1994	control	stove	
Gambia	Prospective	Carriage on back	<b>2.6</b> (0.98-6.65)
Collings 1990	Case-control	(cooking)	



# AURI-OTITIS MEDIA

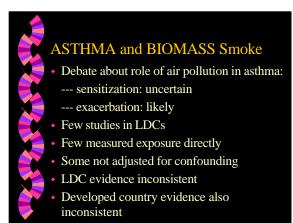
• LDC Acute Upper RI(AURI) studies not specific for Otitis media

- Case-control (NY State): OR 1.73 (1.03-2.89) for wood stove use (Daigler 91)
- ETS meta-analysis: 1.48 (1.08-2.04) for OM with either parent smoking; 1.38 (1.23-1.55) for effusion (Strachan 98)

AVERAG	AVERAGE CONCENTRATIONS			EXPOSURES (%) GLOBA TOTAL		
Region	Indoor µg/m³	Ambient µg/m <sup>3</sup>	Indoo r %	Ambie nt %	Tot %	
Develo ped	100	70	7	1	8	
Urban Rural	80	40	2	ο	2	
Develo ping Urban Rural	250	280	25	9	34	
	400	70	52	5	57	
		Total	86	15	100	

# Chronic Lung Disease

- More than 20 observational studies in LDCs' community and hospital based
- Studied Chronic Bronchitis (symptoms), COPD (spirometry), also more severe sequellae. Up to 15%-20%+ of those exposed are affected, full range of pathology seen.
- Similar limitations as for ALRI in respect of direct exposure measurement and confounding
- Strong supportive evidence from smoking and ambient pollution
- Emerging evidence of possible association with fibrosis (+ silica dust) and ILD





## **TUBERCULOSIS**

- 3 studies: India(2), Mexico(1)
- Largest- an analysis of 1992-93 Indian NFHS found adjusted OR of (self-reported) TB= 2.58(1.98-3.37)
- Both other studies consistent; one age adjusted only
- If confirmed, increased risk may be due to reduced resistance to infection



#### Cancer

- In LDCs relatively high proportion with lung cancer non-smokers
- China-review: OR in range 2-6 for exposure to coal smoke in home
- No evidence reported of association with wood smoke

#### Cancer

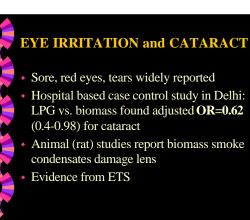
### Nasopharynx and Larynx:

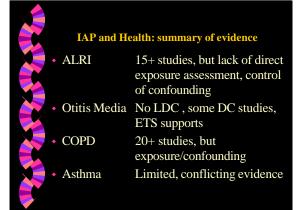
• Several studies (Africa, S America)

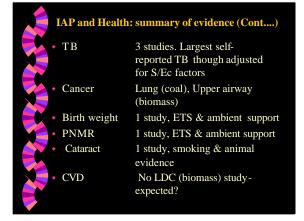
 Adjusted OR for wood smoke=2.68(2.2-3.3) [Pintos 98]

#### Mechanism:

• Smoke contains high levels of known carcinogens e.g Benzo[a]pyrene







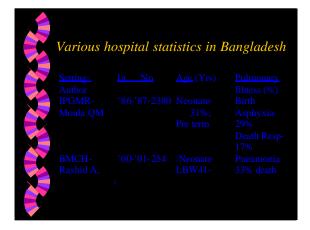
# IAP and Childhood ARI

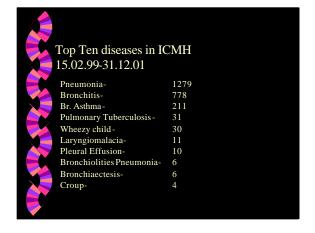
- 9 Case-control: South Africa, Zimbabwe, \*Nigeria, Tanzania, Gambia, \*Brazil, \*India, Argentina adjusted for confounders; n = 4311; Odds Ratios = 2.2-9.9
- 3 Cohort: Nepal, Gambia 2 adjusted for confounders; n = 910; Odds Ratios = 2.2-6.0
- 1 Case-fatality:Nigeria Hospitalized patients; n = 103;
   Odds Ratios = 8.2
- 2 US Case-control; n = 206 Adjusted for confounders. Odds Ratios = 4.8
- Result of meta-analysis: 2.3 (CI 95% : 1.9, 2.7).

CCOPD
3 Case-control studies: Saudi Arabia; Columbia; Mexico 2 adjusted for confounders; 2 show exposure response with years of cooking; n = 498
Odds Ratios = 3.3 - 1.5
5 Cross-sectional studies: Nepal; India; Bolivia All partly adjusted; 2 show exposure - response with years of cooking; n = 5528
Odds Ratios = 1.4 - 7.9
Women: 3.2 (CI 95% : 2.3, 4.8).
Men: 1.8 (CI 95% : 1.0, 2.8).

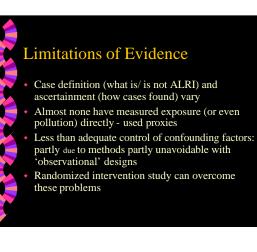
Diseases	< 1 year	1-4 year	5-15 year	16+ year	Total
Acute Respiratory inflammation	9.37 %	6.34%	5.63%	5.88%	6.10%
Asthma	0.29 %	1.12%	2.42%	2.80%	2.32%
Eye diseases	1.80 %	2.49%	6.09%	4.40%	4.37%

Various ho	ospital sta	tistics in E	Bangladesh
			<u>Pulmonary</u> Illness (%)
			32%
			Pneumonia 27%
			ARI 24%





PERINAT	TAL. INFANT N	IORTALITY
Setting	Exposure/outcom	
India	e Biomass smoke	<b>1.5</b> (1.0-2.1)
Mexico City	Perinatal mortality PM <sub>2.5</sub> (3-5 days prior to death)	<b>6.9%</b> (2.5-11.3) increase in IMR f
USA	IMR PM <sub>10</sub> Perinatal mortality	+ 10 μg/m <sup>3</sup> <b>1.10</b> (1.04-1.16) high vs. low
Czech <del>Republic</del>	TSP, SO <sub>2</sub> , NOx Still	No association (b



# Potential roles for 'Sectors' working in collaboration

# Summary of the Evidence (Smith and Mehta, 2000) Evidence Diseases

	trong	ARIS, COPD, Lung
		Cancer
	Noderate (	Cataract, TB
1	Limited .	Asthma
		BW, Perinatal deaths, Ieart diseases



#### **Conclusion**

- IAP is critically important health in developing country like Bangladesh
- Less attention has been paid by the researchers and the programmers
- It is the woman's and children right to aware about the threat pose by IAP which will help to take preventive measures



# **Recommendations:**

- Short Term Plan Provision for ventilation Introducing biogas plant Medium Term Plan Social forestry & Plantation of Fuel wood Ventilation \*Promotion and training on usage of biogas plant & improved stove
- •Promotion of LPG and gas cylinder Long Term Plan •Improved type of stove
- •Promotion and usage of LPG & Gas cylinder throughout the country

