

# Environmental Health & Children in South Asia

## Challenges and Opportunities

Bhushan Tuladhar

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12<sup>th</sup> National Summit of Health and Population Scientists in Nepal

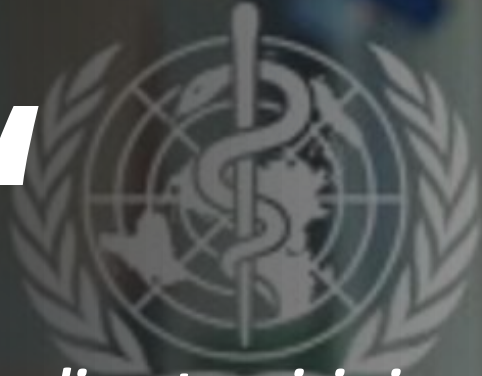
Kathmandu

# Brief bio of Presenter: Bhushan Tuladhar



- Environmental engineer with 30+ years experience
  - Team Leader, Assessment of Children Environmental Health in South Asia, FHI 360 / UNICEF ROSA
  - Chief of Party, USAID Clean Air
  - Chief Technical Advisor South Asia, UN-HABITAT
  - Executive Director/Chairperson, Environment and Public Health Organization
- Contact: [bhushan.tuladhar@gmail.com](mailto:bhushan.tuladhar@gmail.com)

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*The climate crisis is a health crisis. The same unsustainable choices that are killing our planet are killing people too...*

*Air pollution is the new tobacco, as the simple act of breathing is killing 7 million people a year and harming billions more, but a smog of complacency pervades the planet.*

Dr Tedros Adhanom Ghebreyesus,  
WHO Director-General



# Environmental impacts on children in South Asia

Exposure / Outcome	Children affected Globally	Children affected in South Asia	Source
Heatwaves	820 million	460 million	<a href="https://www.unicef.ca/en/press-release/76-cent-children-exposed-extreme-high-temperatures-south-asia-unicef">https://www.unicef.ca/en/press-release/76-cent-children-exposed-extreme-high-temperatures-south-asia-unicef</a>
Cyclones	400 million	NA	<a href="https://www.unicef.org/reports/childrens-climate-risk-index">https://www.unicef.org/reports/childrens-climate-risk-index</a>
Riverine flooding	330 million	170-200 million	<a href="https://pmc.ncbi.nlm.nih.gov/articles/PMC9240081/">https://pmc.ncbi.nlm.nih.gov/articles/PMC9240081/</a>
Coastal flooding	240 million	>19 million in Bangladesh	<a href="https://www.unicef.org/bangladesh/en/press-releases/climate-change-threatens-lives-and-futures-millions-children-bangladesh">https://www.unicef.org/bangladesh/en/press-releases/climate-change-threatens-lives-and-futures-millions-children-bangladesh</a>
Water scarcity	920 million	347 million	<a href="https://www.unicef.org/rosa/press-releases/south-asia-has-highest-number-children-exposed-severe-water-scarcity-unicef">https://www.unicef.org/rosa/press-releases/south-asia-has-highest-number-children-exposed-severe-water-scarcity-unicef</a>
Vector-borne disease	600 million	≈600M children in high-risk settings	<a href="https://www.unicef.org/rosa/press-releases/children-four-south-asian-countries-extremely-high-risk-impacts-climate-crisis">https://www.unicef.org/rosa/press-releases/children-four-south-asian-countries-extremely-high-risk-impacts-climate-crisis</a>
Air pollution	2 billion	597 million	<a href="https://www.unicef.org/rosa/press-releases/south-asia-has-highest-number-children-exposed-severe-water-scarcity-unicef">https://www.unicef.org/rosa/press-releases/south-asia-has-highest-number-children-exposed-severe-water-scarcity-unicef</a>
Lead Pollution	815 million	379 million	<a href="https://www.unicef.org/reports/toxic-truth-childrens-exposure-lead-pollution">https://www.unicef.org/reports/toxic-truth-childrens-exposure-lead-pollution</a>

# South Asia: Global Epicenter of Children's Environmental Exposure

**350 Million+** Children in South Asia live in high exposure settings



**Air Pollution**  
Large Exposure,  
Large Economic Cost

PM<sub>2.5</sub> levels in South Asia are among the highest globally, often 70–100  $\mu\text{g}/\text{m}^3$ , with peaks exceeding 150  $\mu\text{g}/\text{m}^3$



**Climate shocks**  
Recurrent Losses and  
Rising Systemic Risk

South Asia is among the most climate-vulnerable regions



**WASH Conditions**  
Persistently  
Inadequate in  
Child-Service Settings

Up to 40% of primary health facilities and 1/3 of schools in South Asia lack basic WASH services



**Lead Exposure**  
A High-Cost Silent  
Epidemic

An estimated 347 million children in South Asia have blood lead levels  $\geq 5 \mu\text{g}/\text{dL}$

# What This Means for Children



Irreversible cognitive deficits from lead



Heat-related illness and dehydration



Health outcomes of air pollution including ALRI & neonatal deaths



Frequent schooling disruption

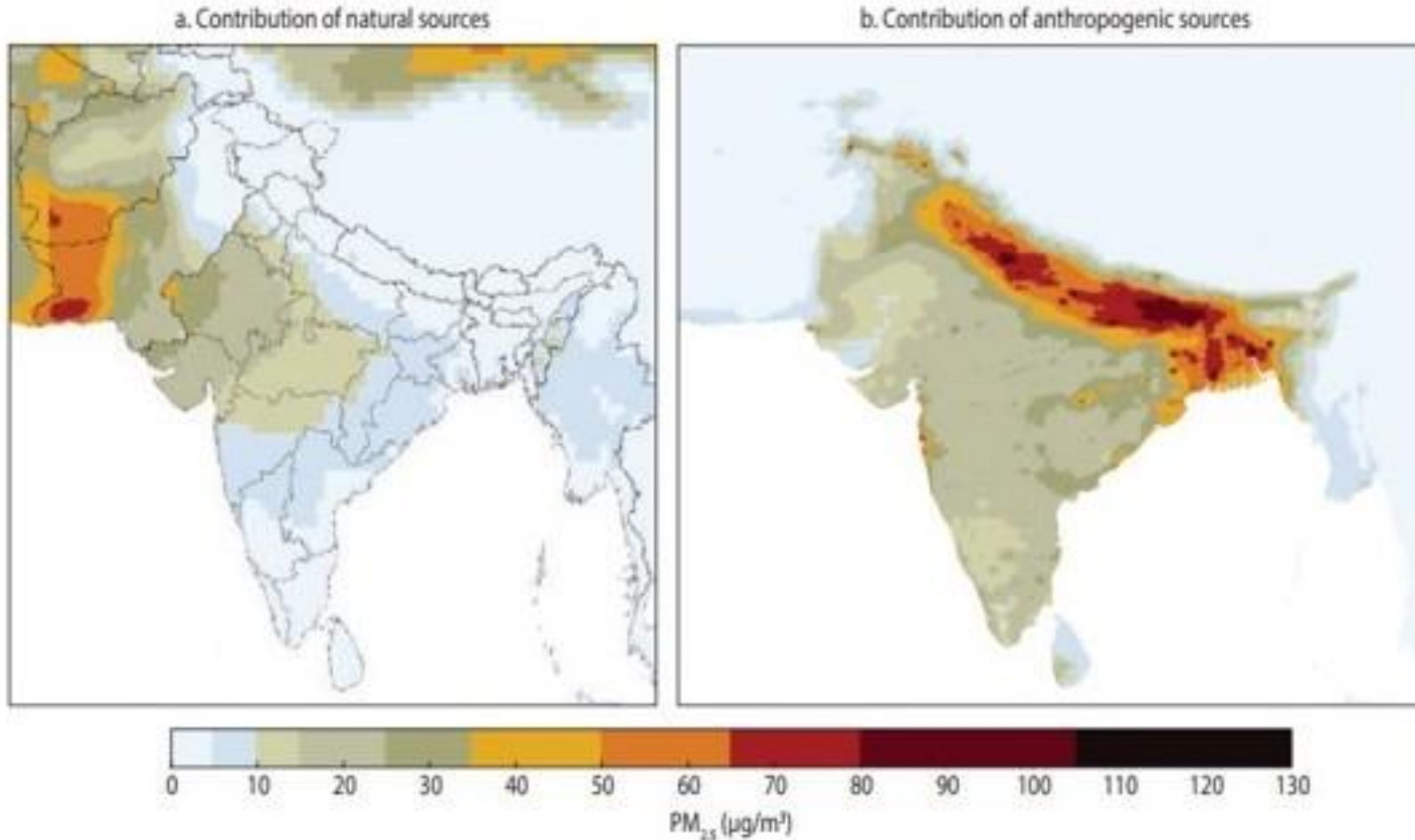


Social Impact:  
Reduced access to social protection



Climate Hazards: Increased exposure to flooding and droughts

# Indo-Gangetic Plain – a global hotspot for air pollution

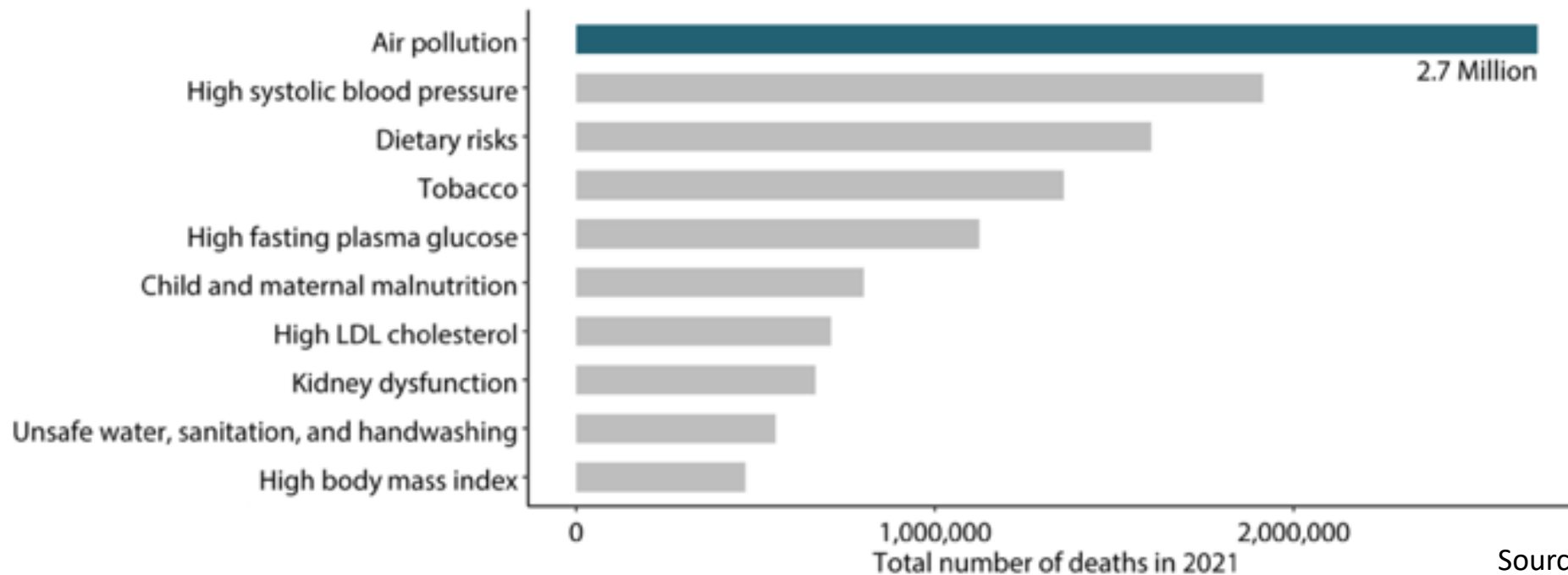


- Annual Avg PM<sub>2.5</sub> in 2019: 42.6  $\mu\text{g}/\text{m}^3$  – 8.5 times higher than WHO guidelines and 2.5 times higher than global average
- High risk countries – Afghanistan, Bangladesh, India, Nepal, Pakistan

Source: World Bank, 2023

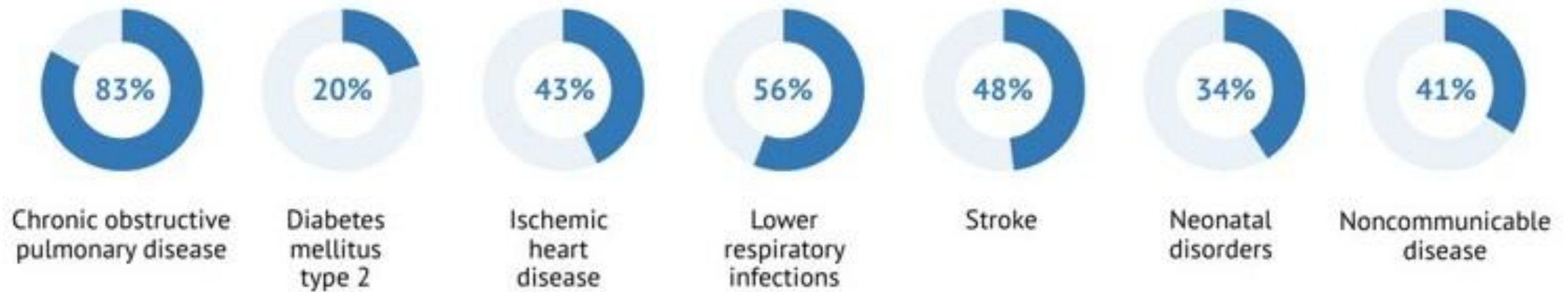
# Impacts of Air Pollution on Health & Economy in South Asia

- Air pollution is the biggest risk factor causing 2.7 million deaths – 1.5 million from household air pollution and 1.2 million from ambient air pollution – in 2021
- 6–10% GDP losses annually through productivity decline and healthcare costs due to air pollution in South Asia (World Bank, 2023)



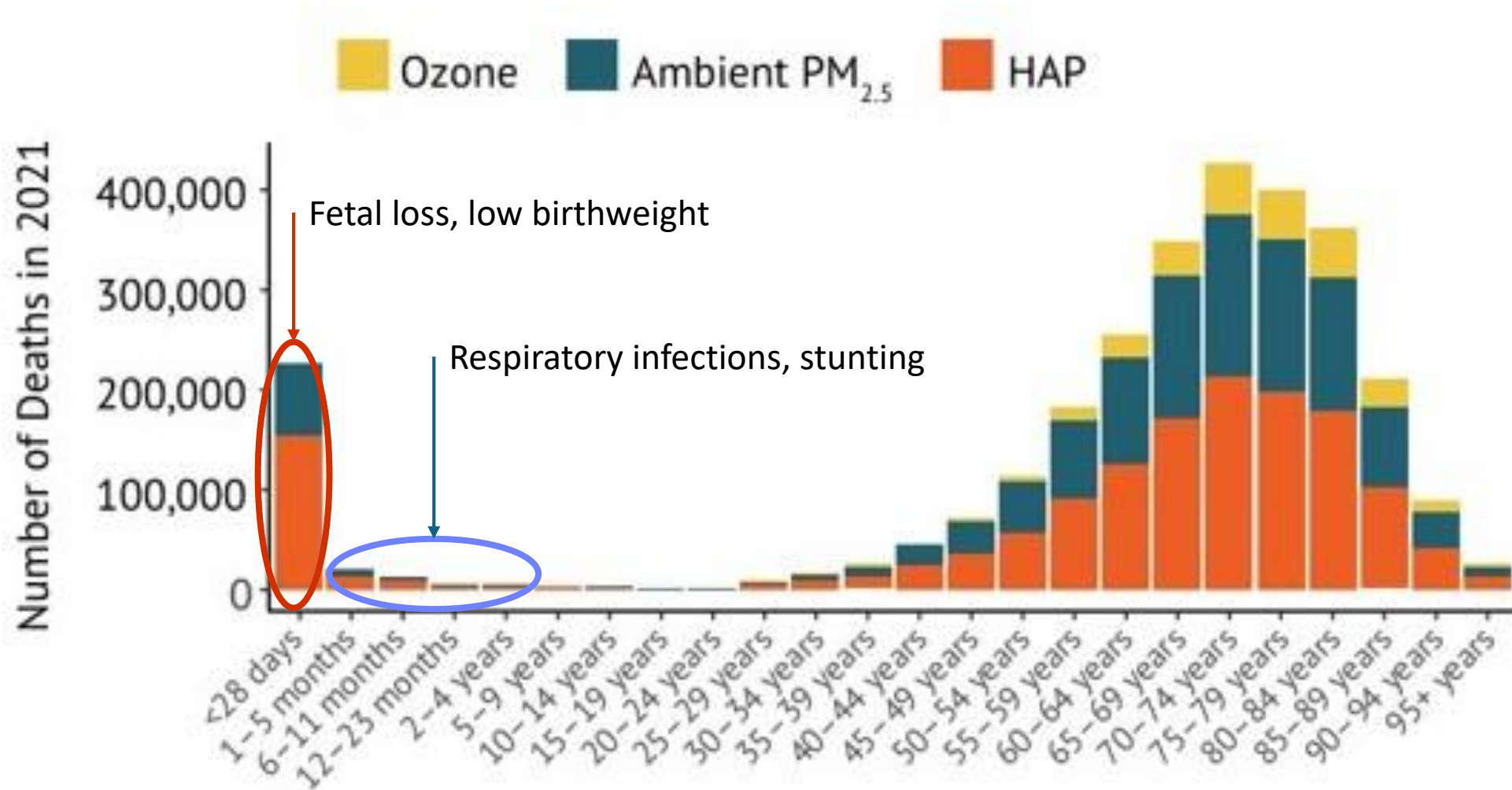
# 41% of all NCDs in South Asia linked to Air Pollution

Percentage of Deaths from Various Causes Attributed to  
■ Air Pollution in South Asia in 2021



Source: HEI & IHME, 2025

# Distribution of deaths by age in 2021 attributable to air pollution in South Asia





**73%**  
COPD



**40%**  
Ischemic Heart Disease



**39%**  
Stroke



**36%**  
Lower Respiratory Infections (LRI)



**33%**  
Neonatal deaths

# Main Causes of Deaths, Risk Factors & Percentage of Deaths Attributable to Air Pollution in Nepal

What causes the most deaths?

- Communicable, maternal, neonatal, and nutrition
- Non-communicable diseases
- Injuries

Cause	2013 rank	2023 rank
COPD	1	1
Ischemic heart disease	2	2
Stroke	3	3
Lower respiratory infect	5	4
Neonatal disorders	4	5
Diabetes	7	6
Cirrhosis	8	7
Tuberculosis	6	8
Self-harm	10	9
Rheumatic heart disease	11	10

What risk factors drive the most death and disability combined?

- Metabolic risks
- Environmental/occupational risks
- Behavioral risks

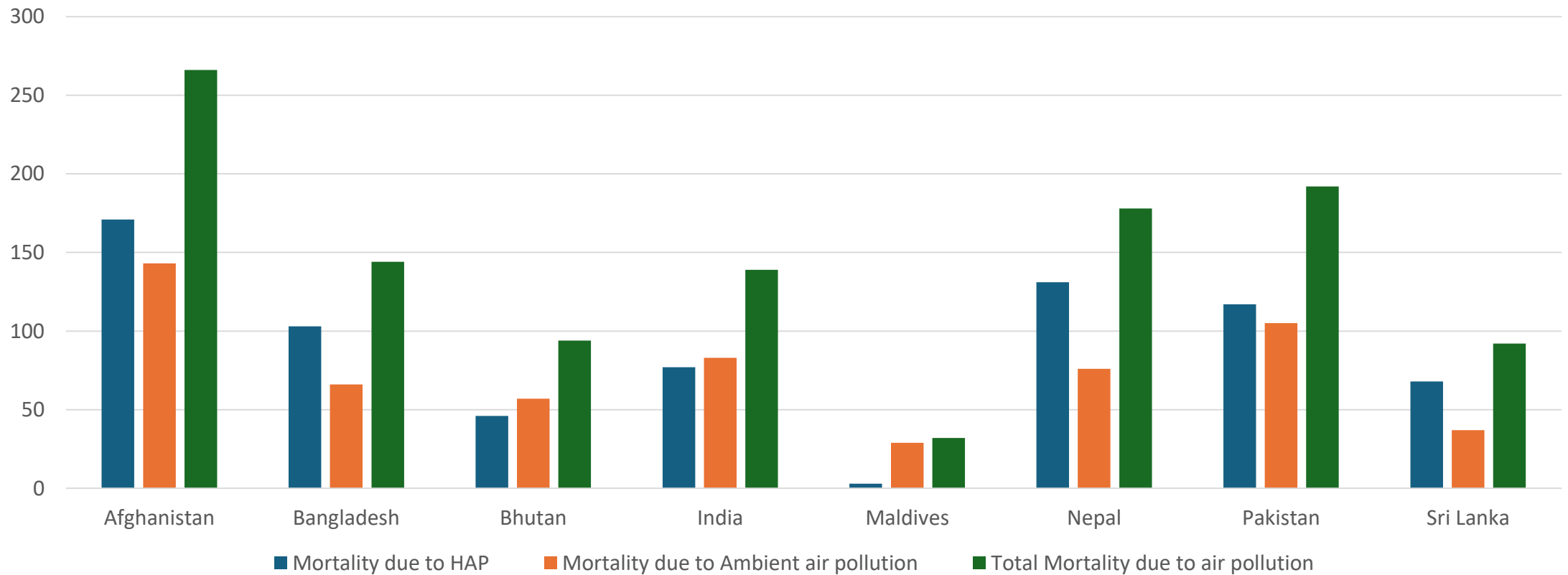
Risk	2013 rank	2023 rank	Change in DALYs per 100k, 2013-2023
Air pollution	2	1	↓ -362.0
Malnutrition	1	2	↓ -2,276.0
Tobacco	3	3	↑ +77.1
High blood pressure	5	4	↑ +204.1
Occupational risks	4	5	↓ -40.3
High fasting plasma glucose	7	6	↑ +318.5
Dietary risks	6	7	↑ +207.4
High body-mass index	11	8	↑ +333.5
Kidney dysfunction	10	9	↑ +178.9
Other environmental	9	10	↑ +75.3

Top 10 risks contributing to Disability-Adjusted Life Years (DALYs) per 100k in 2023 and rate change 2013-2023, all ages combined

Top 10 causes of deaths per 100k in 2023 and rate change 2013-2023, all ages combined

# Mortality rate attributed to household and ambient air pollution per 100,000 population (SDG 3.9.1) in South Asia in 2019

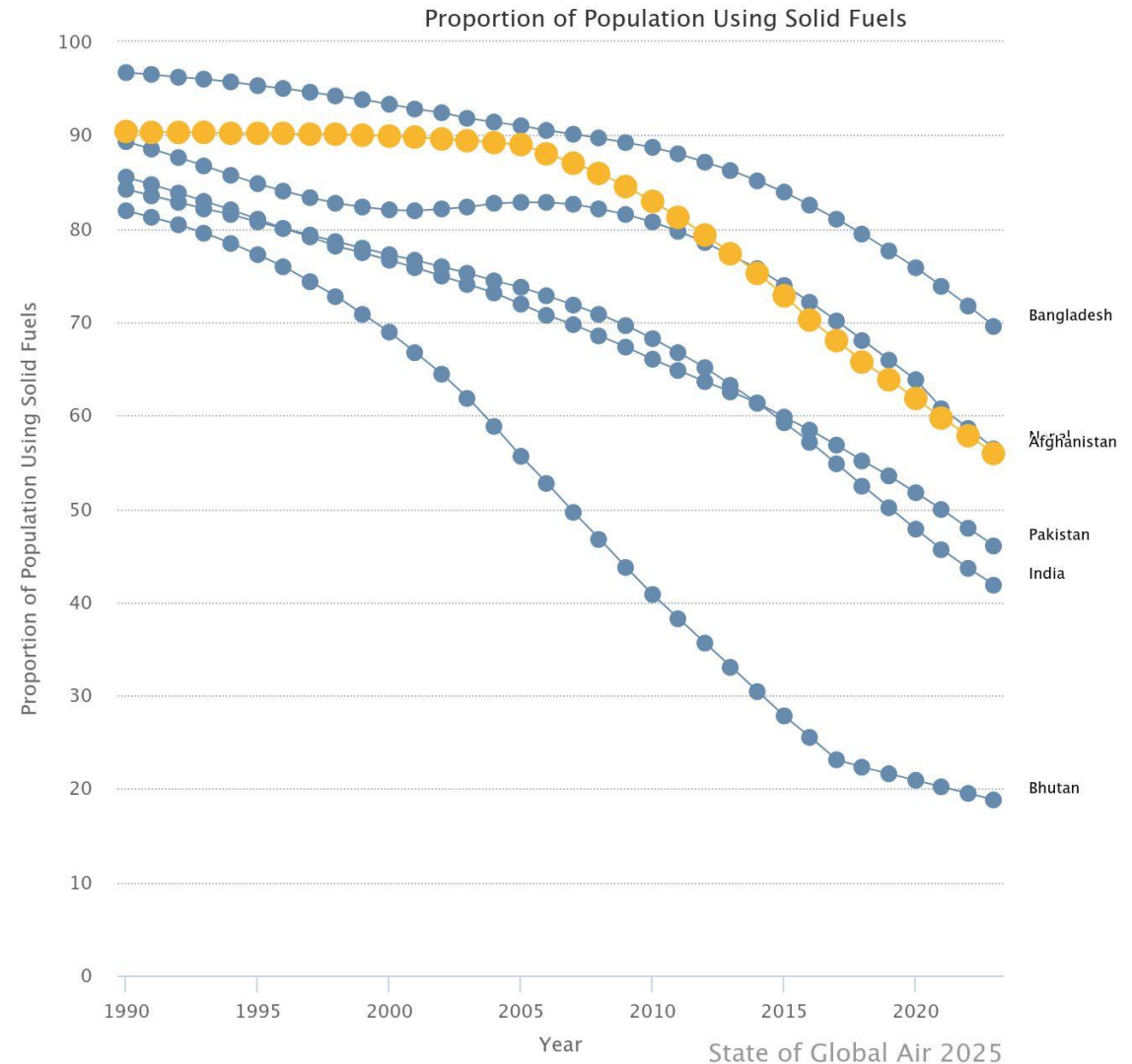
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Source: Global SDG Indicators Database

# Reduction in household air pollution

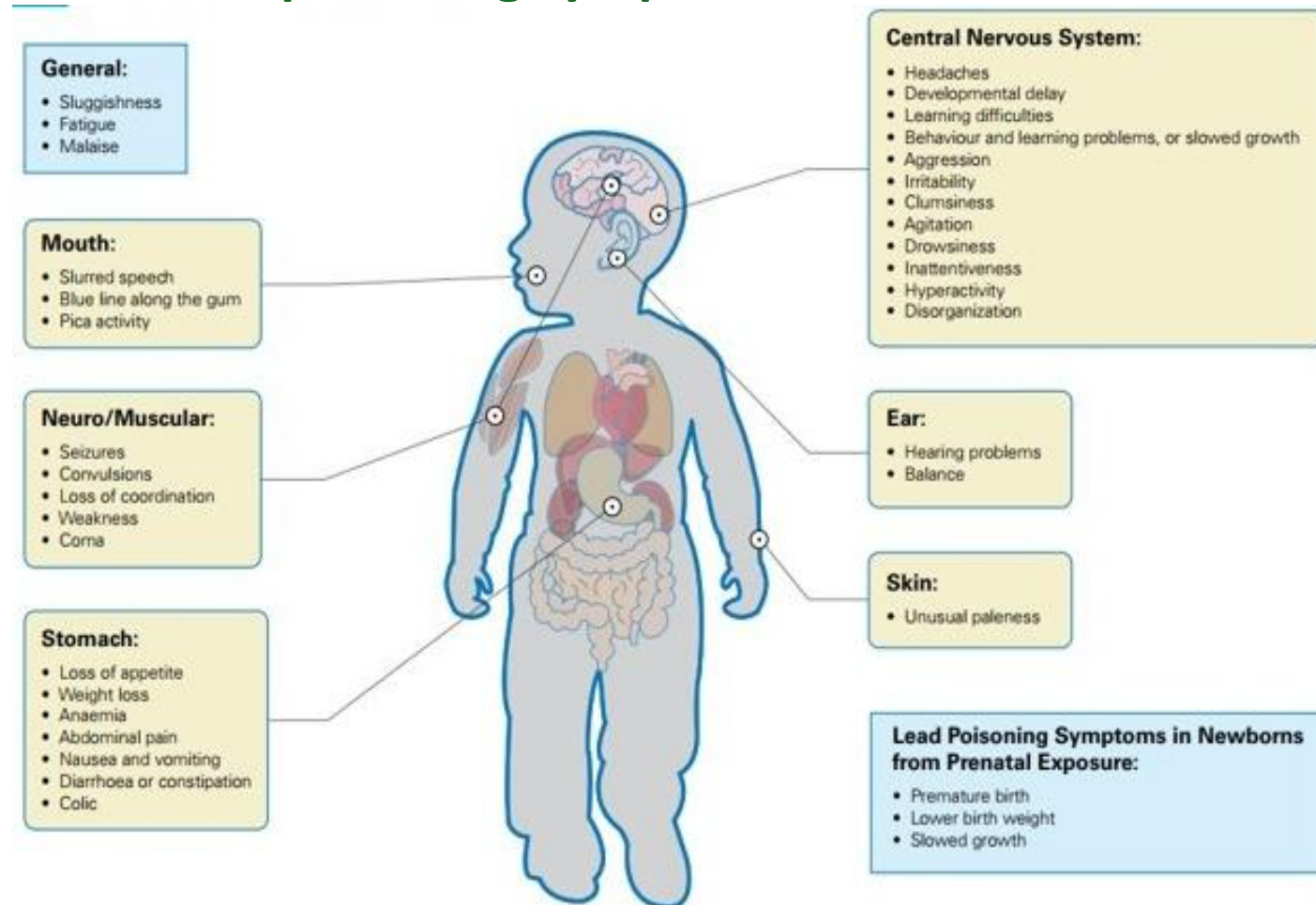
- Decrease in solid fuel use resulting in improved indoor air quality
- However, proportion of population with primary reliance on clean fuels and technologies for cooking is still very low in Afghanistan, Bangladesh, Nepal and Sri Lanka and above 90% in Bhutan and Maldives



# Lead exposure: large, silent and irreversible

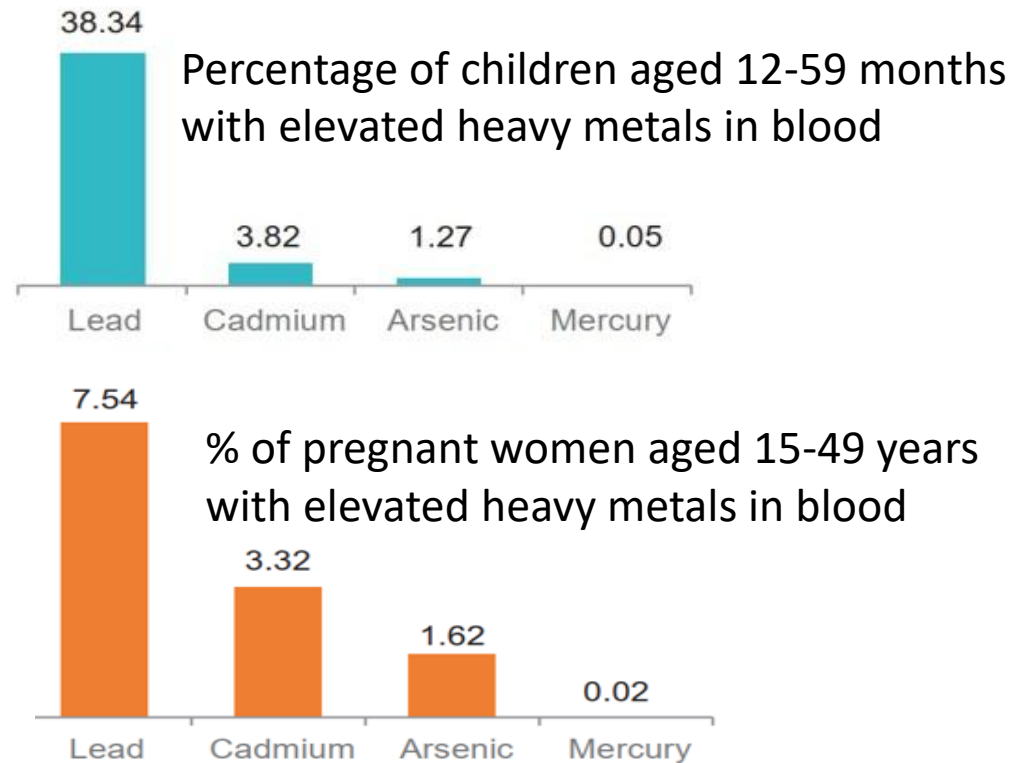
- About 378 million children in South Asia (globally 800 million) with Blood Lead Level  $\geq 5 \mu\text{g/dL}$ 
  - India, Pakistan, Bangladesh and Afghanistan: highest number of children with elevated BLL.
- Average loss 2–5 IQ points
- >US\$1 trillion global productivity loss (2-5% of GDP in South Asia)
- Country-wide bio-monitoring of lead in children and pregnant women have kick started action for a lead-free future (Bangladesh + Bhutan)

## Lead poisoning symptoms in children



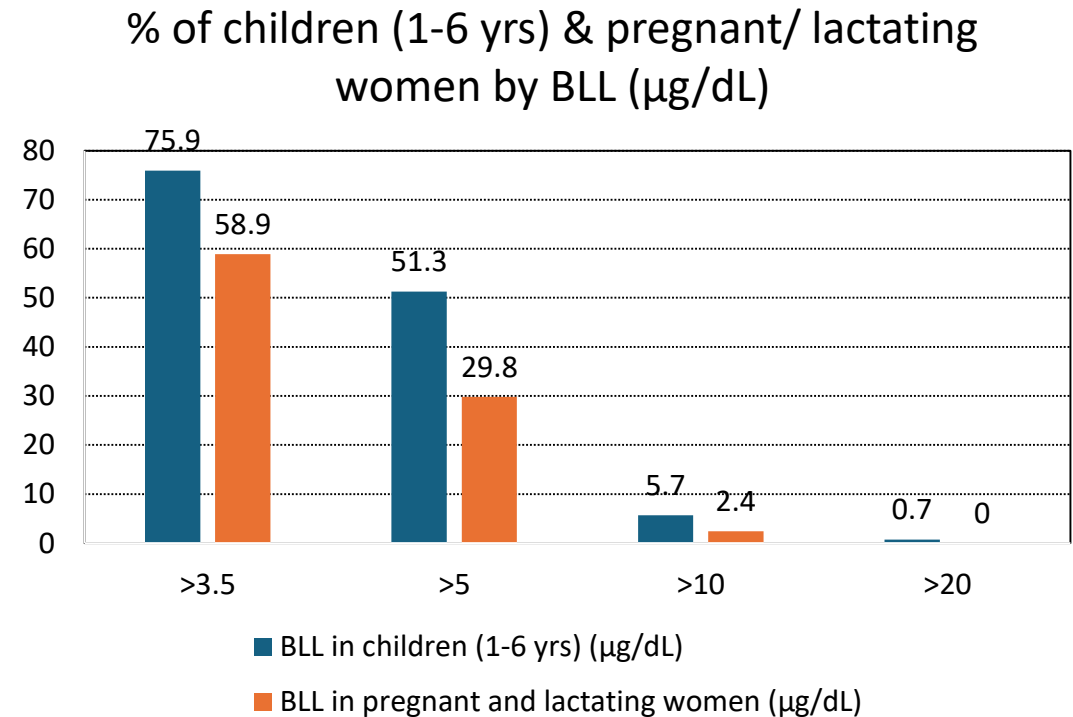
# Data to Action: Bio-monitoring in Bangladesh & Bhutan

## Bangladesh



Source: BBS, UNICEF, MICS 2025

## Bhutan



Source: Ministry of Health, Royal Government of Bhutan, 2024

**Bangladesh:** Multisectoral Steering Committee with 19 ministries is formulating national strategy for lead-free Bangladesh by 2040

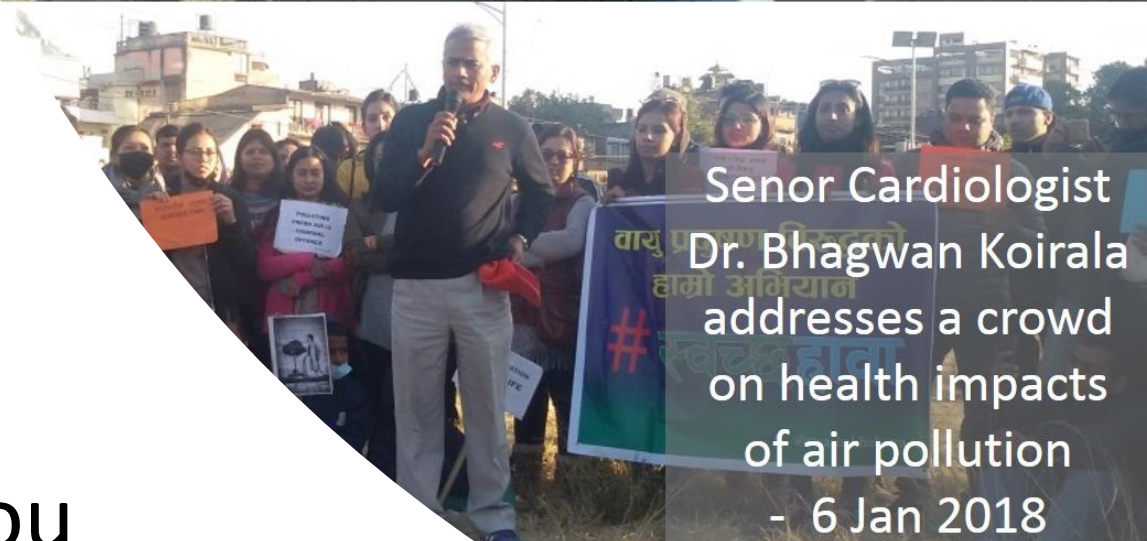
**Bhutan:** National Task Force to set and enforce standards, create surveillance system and continue awareness campaigns

# Takeaway Messages

- Environmental risks: A major public health concern, particularly in South Asia
- The costs, particularly for children, are large but are measurable and preventable
- Solutions are available & Actions are necessary now, particularly from health professionals



Senior Pulmonologist  
Dr. Arjun Karki  
participates in a street  
play for Clean Air  
– 30 Dec. 2017



Senior Cardiologist  
Dr. Bhagwan Koirala  
addresses a crowd  
on health impacts  
of air pollution  
- 6 Jan 2018

Thank You