FULBRIGHT LECTURE SERIES

Air Quality Where You Are:
The Paradox of a Livable City

Thursday, May 3, 2018
3:00-5:00 p.m.

Hotel Tibet
Lazimpat, Kathmandu
Nepal

AMERICAN EMBASSY

FULBRIGHT ALUMNI ASSOCIATION NEPAL

usef nepal

Siddhartha Bank

SPACES

Air Pollution:
Health Perspectives

Fulbright Talk Series

May 2018

According to WHO

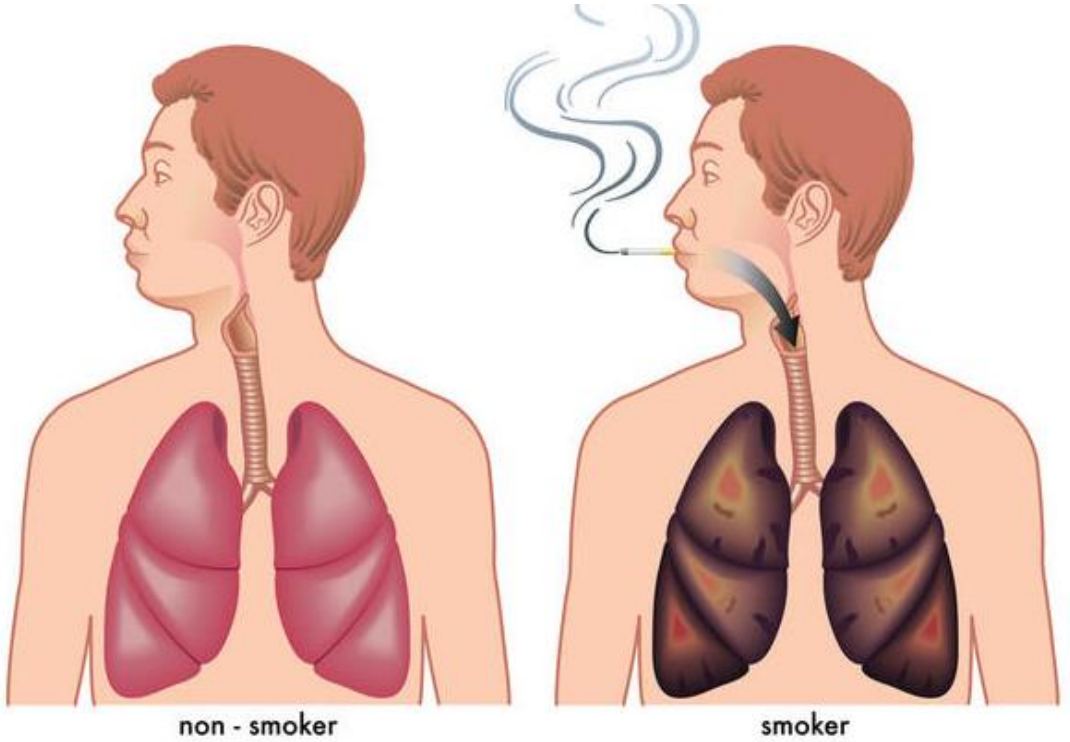
* In 2014 **92 % of world population** were living in area where air quality level was **below the WHO standard guidelines**
* Air pollution causes seven million deaths a year
* **3 biilions people** are at serious health risk due for indoor smoke
* 3.8 million people die annually because of indoor air pollution

WHO statement

* In Britain, more than half of towns and cities where measurements were taken had fine particle air pollution above recommended limits.
* “Air pollution threatens us all,
* but the poorest and most marginalized people bear the brunt

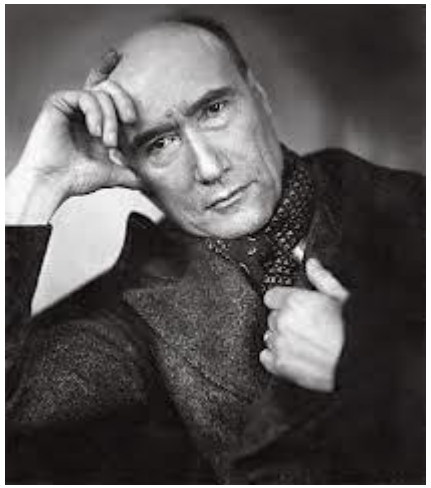
Outdoor and Indoor air pollution

Smoking is a big issue



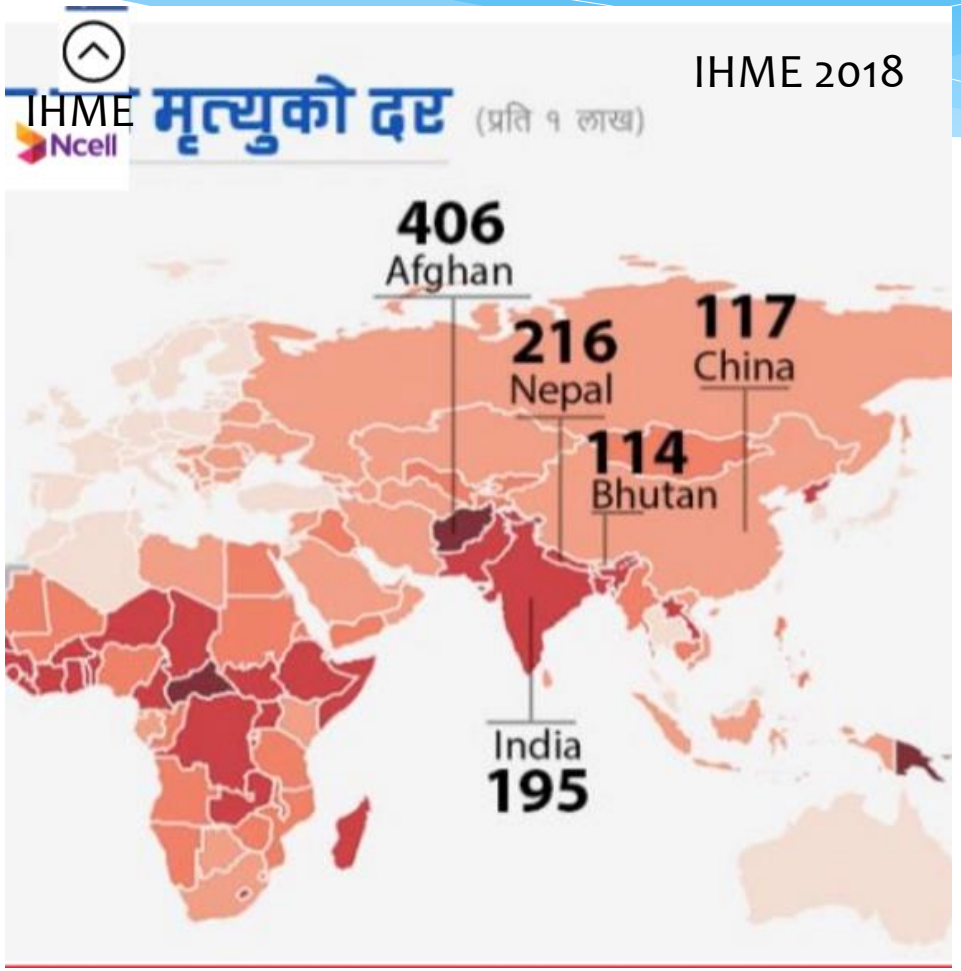
Need for Reminder

"Everything has been said before, but since nobody listens (*or forgets*) we have to keep going back and begin all over again."



- **Andre Gide**
  Nobel Laureate (1891)

Air pollution world wide



WHO Guidelines on Air Quality Standards

$PM_{2.5}$ 10 µg/m^3 annual mean; 25 µg/m^3 24-hour mean

PM_{10} 20 µg/m^3 annual mean; 50 µg/m^3 24-hour mean

O_3 100 µg/m^3 8-hour mean

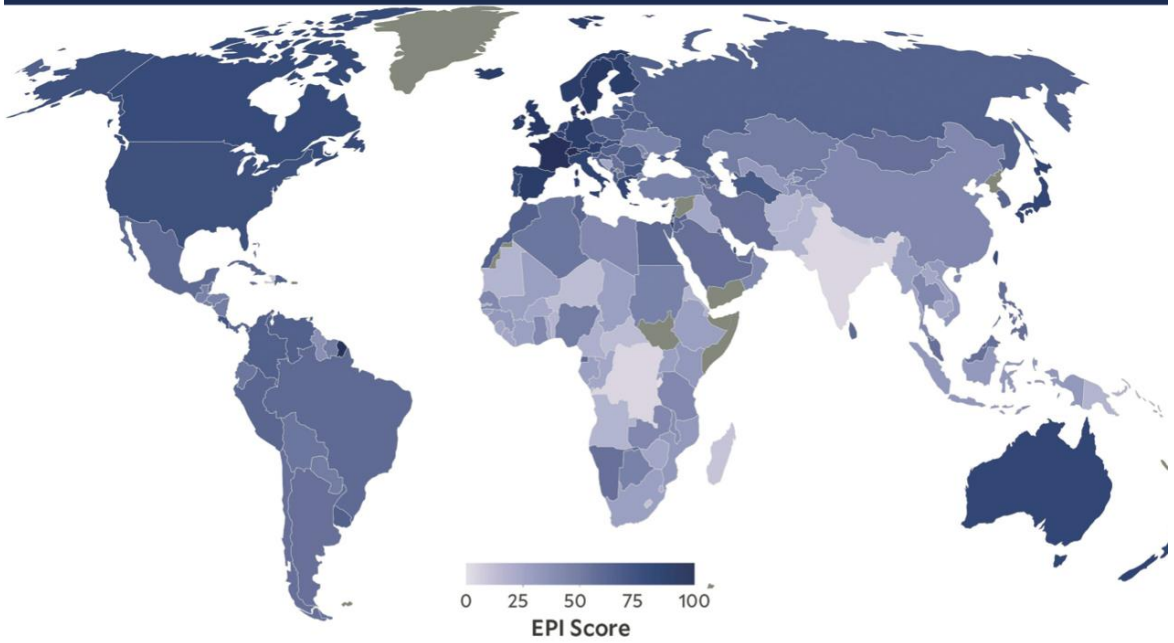
NO_2 40 µg/m^3 annual mean; 200 µg/m^3 1-hour mean

SO_2 20 µg/m^3 24-hour mean; 500 µg/m^3 10-minute mean

Major Pollutants

* Particulate matter (PM10 and PM 2.5)
* Ozone (O_3)
* Nitrogen dioxide (NO_2) and
* Sulfur dioxide (SO_2),

2018 ENVIRONMENTAL PERFORMANCE INDEX



Global metrics for the environment: Ranking country performance on high-priority environmental issues

Yale Center for Environmental Law & Policy, Yale University

Center for International Earth Science Information Network, Columbia University

In collaboration with the World Economic Forum

With support from The McCall MacBain Foundation and Mark T. DeAngelis

epi.yale.edu

EPI Environmental Performance Index

Country Profile

NEPAL

Environmental Performance Index

2018 EPI Country Rank (out of 180)

176

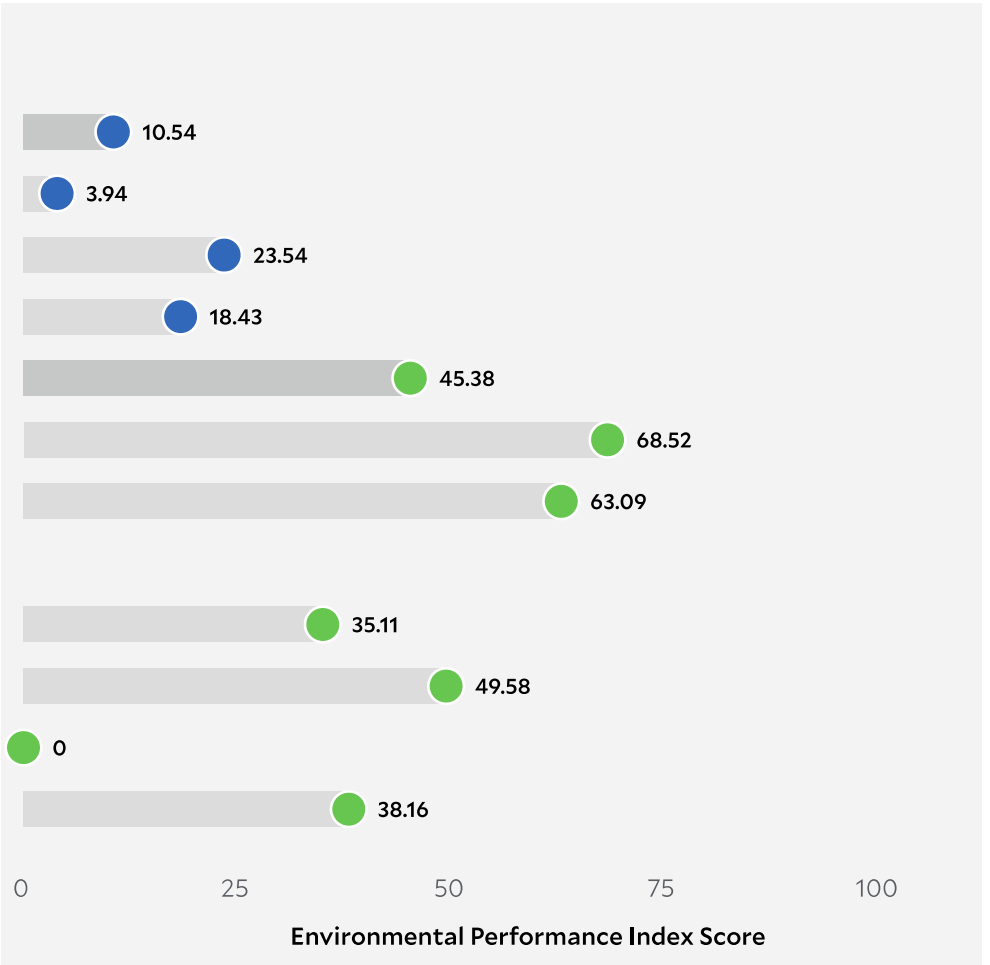
EPI Score [0=worst, 100=best]

31.44

Population (millions)	29.0
Land Area (sq. km)	143,350
GDP (PPP 2011$ billions)	66.6
GDP *per capita*	2,298
SDG Index*	61.6

Country Scorecard

Issue Categories	Rank	
Environmental Health	179	10.54
Air Quality	180	3.94
Water & Sanitation	135	23.54
Heavy Metals	173	18.43
Ecosystem Vitality	136	45.38
Biodiversity & Habitat	109	68.52
Forests	13	63.09
Fisheries		
Climate & Energy	150	35.11
Air Pollution	87	49.58
Water Resources	143	0
Agriculture	49	38.16



Situation Analysis of Ambient Air Pollution and Respiratory Health Effects in Kathmandu Valley 2015

Government of Nepal
Nepal Health Research Council

Methods

* Measured Air Pollution level for 1 year (Feb 2014 – Feb 2015) from 3 different locations within the valley.

* Analyzed 11, 300 In-Patients Records of major hospitals in Kathmandu valley

* Tried to correlate the air pollution level with health effects

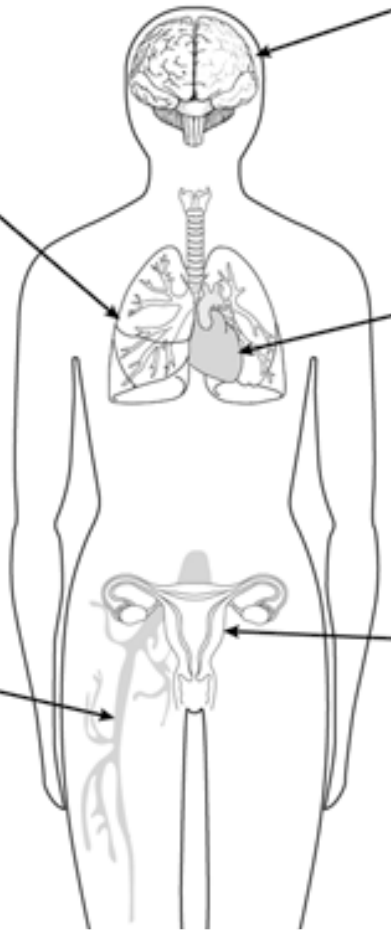
Some key findings

* Daily averages of PM 2.5 are 3 – 5 times higher than the national standard (40µg/m3)
* 1 – 2 % rise in hospitalization of COPD patients with every 10µg/m3 increment in PM 2.5
* 3.7 % rise in mortality with every 10µg/m3 increment in PM 2.5

Human Organs affected by Air Pollution

- Respiratory mortality
- Respiratory symptoms
- Rhinitis/Pneumonia
- Airway inflammation
- Decreased lung function
- Decreased lung growth
- Lung cancer

- Stroke
- Diseases of the central nervous system



- Cardiovascular mortality
- Cardiovascular hospital admission
- Changes in heart rate variability
- ST-segment depression

- Changes in blood pressure
- Endothelial function
- Increased blood coagulation
- Systemic inflammation

- Premature birth
- Decreased birth weight
- Decreased foetal growth
- Intrauterine growth retardation
- Decreased sperm quality

Peters et al., J Occup Environ Med 2011 Jun; 53(6 Suppl)

Air Pollution

* Acute Lower Respiratory Infection
* Ischemic Heart Diseases
* Stroke
* COPD
* Lung Cancer
* Urinary Bladder Cancer

Noncommunicable Diseases

	Tobacco Use	Unhealthy diets	Physical Inactivity	Harmful Use of Alcohol
Cardio-vascular				
Diabetes				
Cancer				
Chronic Respiratory				

Air pollution

Air Pollution is a risk factor for

* Neurodevelopmental Disorder in Children
* Neurodegenerative Diseases in Adults

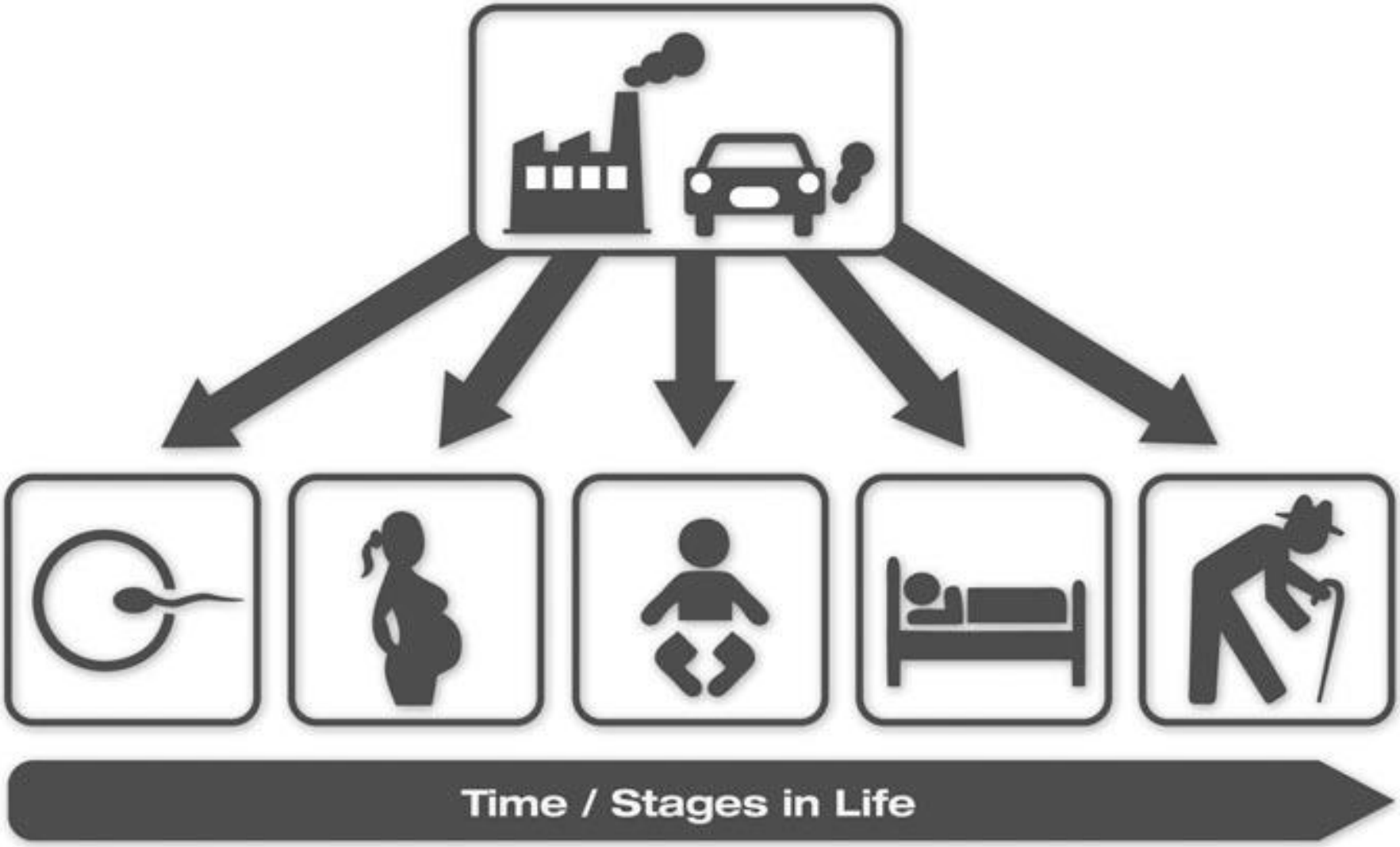


Figure 1. Stages in life of special susceptibility toward air pollution.

Ruckerl R et al, Inhalation Toxicology, 2011

Air Pollution Kills People

* 6.4 Million Premature Deaths in 2015

  2.8 Millions (Household AP)

  4.2 Millions (Ambient AP)

* 7 Million Deaths – Tobacco
* 1.2 Million – AIDS
* 1.1. Million – TB
* 0.7 Million – Malaria

- Lancet (Jan 2017)

In 2015 Air Pollution caused:

* 19 % of all Cardiovascular Deaths
* 20 % of Ischemic Heart Diseases Deaths
* 21% Stroke Deaths
* 23% of Lung Cancer Deaths

* ***88% of these deaths occurred in Low and Middle Income Countries***

Lancet, January 2017

Latest WHO release

Air pollution causes:

* Approx 43 per cent of deaths from COPD,
* 29 per cent from lung cancer,
* 25 per cent from stroke and
* 24 per cent from heart disease are caused by air pollution.

Health and Economic Impacts of AP

* High Medical Expenditures ($21 Billions 2015)
* Lost Economic Productivity (patients + family)
  due to : Disease related disability and Premature Deaths
* Projected Deaths in 2060 AD (due to Ambient Air Pollution) :
  6 – 9 Millions / Year if not controlled aggressively
* Impact on the environment
* Impact on the Economy of the nation: Tourism

FIRST WHO GLOBAL CONFERENCE ON AIR POLLUTION AND HEALTH

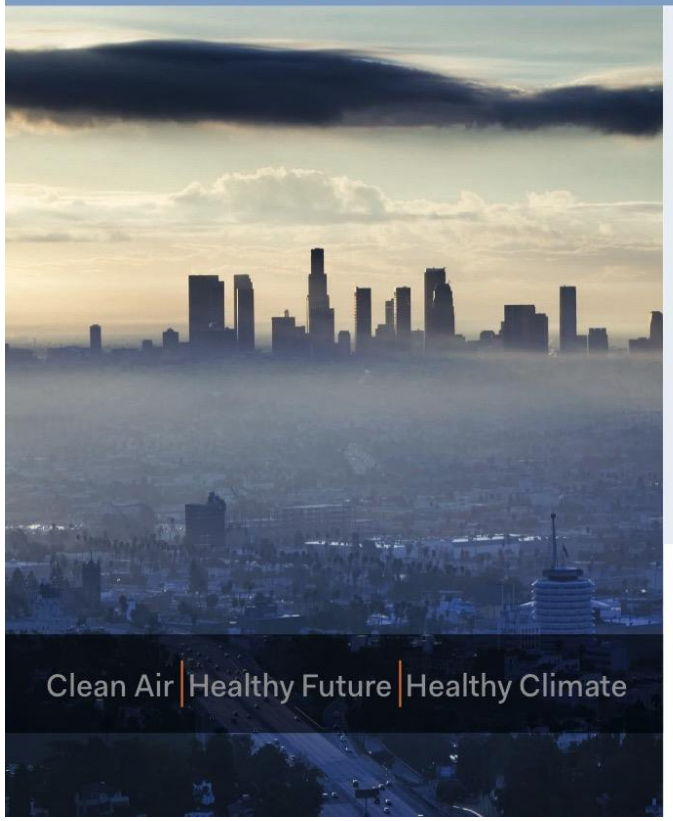
IMPROVING AIR QUALITY, COMBATTING CLIMATE CHANGE – SAVING LIVES

30 October – 1 November 2018

WHO Headquarters, Geneva, Switzerland

save the date

World Health Organization



LET'S ACT TOGETHER ....

BECAUSE THE COST IS FAR TOO HIGH

Air pollution claims 6.5 million lives a year

Air pollution is a major driver of the non-communicable disease epidemic

Air pollution accelerates climate change

AND WE HAVE SOLUTIONS

Affordable and clean urban, transport, waste & household energy strategies

Health, environment & development sectors can lead the way to change

Organized in collaboration with

UN environment
United Nations Environment Programme

WMO

CLIMATE & CLEAN AIR COALITION
TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS

Constitution of Nepal (2015) : Right to Clean Environment (Article 30)

1. Every citizen shall have the right to live in a clean and healthy environment

2. Those affected by the environmental pollution or erosion shall have the right to get compensation from the polluters as per the law.

Intent - Action Gap

* In Societies where RULE OF LAW and civic sense of responsibility are yet to mature, intent alone is NOT sufficient.

* While scientific evidence is critical for policy formulation, public pressure is equally important for the implementation of the policies

* Professionals must engage with politicians to formulate policies and with Media to raise public awareness.


NEPAL POLICE
HEALTH CLUB
DON'T BE MEAN,
KEEP OUR AIR CLEAN
MANDU
वायु प्रदुषण विरूद्धको
हाम्रो अभियान
#स्वच्छहावा
@swachchhahawa


हामी कालो रेलको
धुँवाले, मेरो फोक्सो
काली बजुर
काठमाडौंको धुँवाले
काठमाडौंको धुँवाद
जीवन नै दुखद

Words of Wisdom

Knowing is not enough, we must apply

Willing is not enough, we must do

- Goethe

Policies to control Air Pollution

- **For Industry:** clean technologies that reduce industrial smokestack emissions; improved management of urban and agricultural waste, including capture of methane gas emitted from waste sites as an alternative to incineration (for use as biogas);
- **For Transport:** shifting to clean modes of power generation; prioritizing rapid urban transit, walking and cycling networks in cities as well as rail interurban freight and passenger travel; shifting to cleaner heavy duty diesel vehicles and low-emissions vehicles and fuels, including fuels with reduced sulfur content;
- **For Urban Planning:** improving the energy efficiency of buildings and making cities more compact, and thus energy efficient;
- **For Power Generation:** increased use of low-emissions fuels and renewable combustion-free power sources (like solar, wind or hydropower); co-generation of heat and power; and distributed energy generation (e.g. mini-grids and rooftop solar power generation);
- **For Municipal and Agricultural Waste Management:** strategies for waste reduction, waste separation, recycling and reuse or waste reprocessing; as well as improved methods of biological waste management such as anaerobic waste digestion to produce biogas, are feasible, low cost alternatives to the open incineration of solid waste. Where incineration is unavoidable, then combustion technologies with strict emission controls are critical. (WHO)


KOREA