

# IMPACT OF AIR POLLUTION ON POPULATION HEALTH IN VIET NAM



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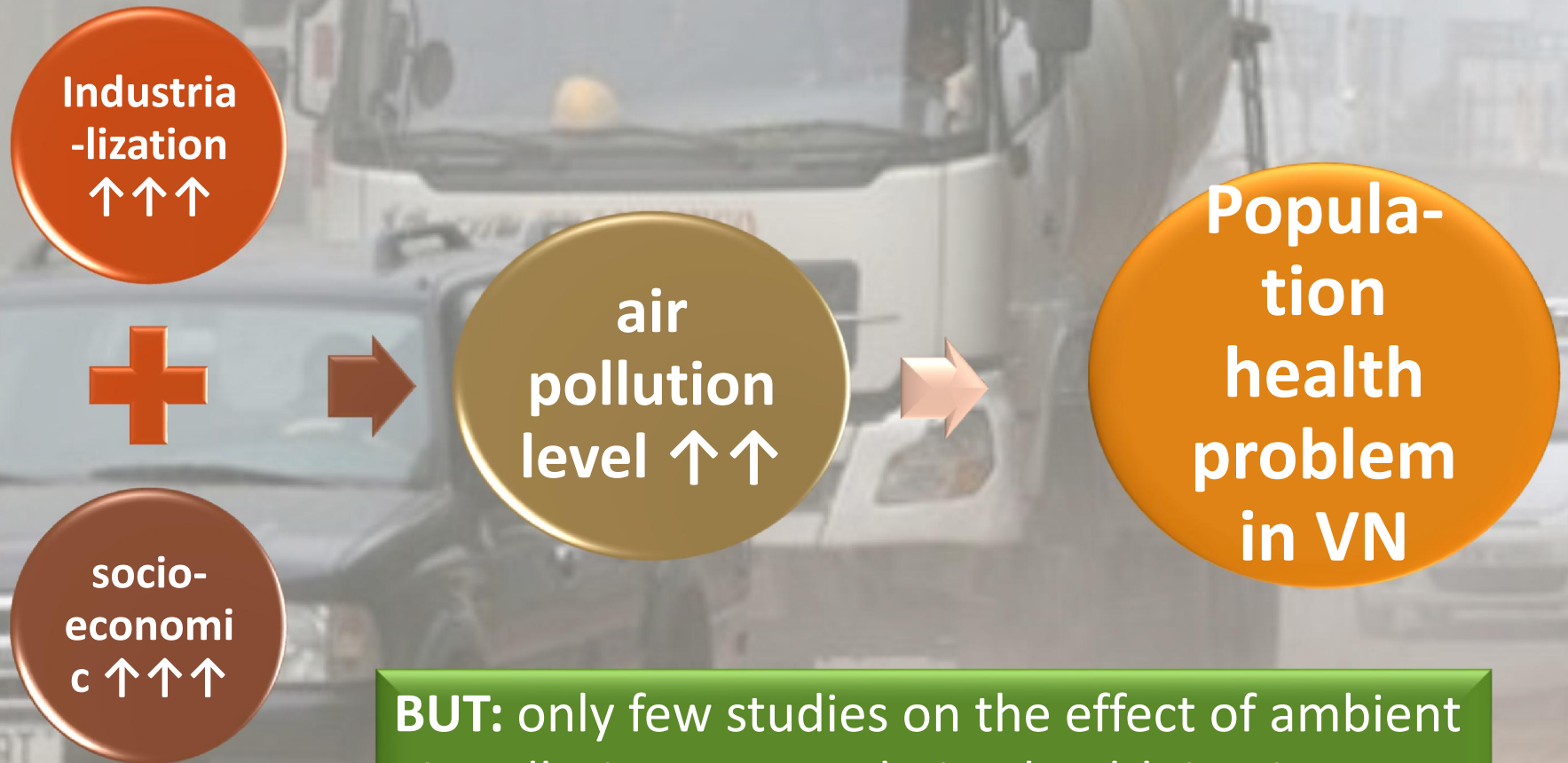
# INTRODUCTION

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- **Air pollution:** contamination of the indoor or outdoor environment by any chemical, physical or biological agent that modifies the natural characteristics of the atmosphere.
- **Sources of air pollution:** Household combustion devices, motor vehicles, industrial facilities and forest fires.



# INTRODUCTION



**BUT:** only few studies on the effect of ambient air pollution on population health in Viet Nam

# CURRENT STATUS OF AIR QUALITY IN HANOI

Hanoi 2016

**121** Average AQI

**50.5** Average PM 2.5 concentration

**123** Days violating national regulations

**282** Days violating WHO regulations

Hanoi Q1 2017\*

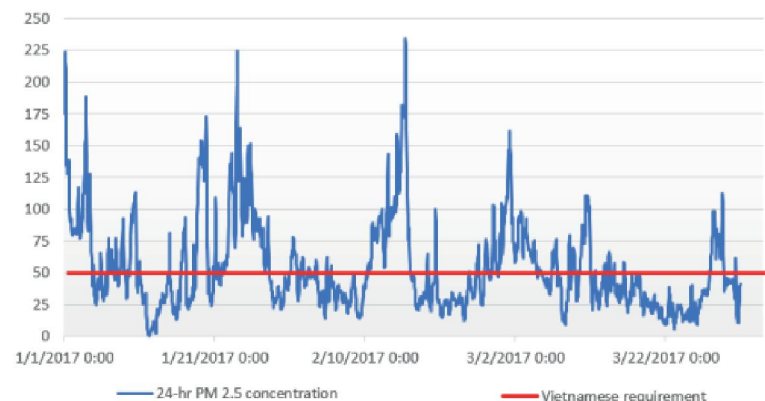
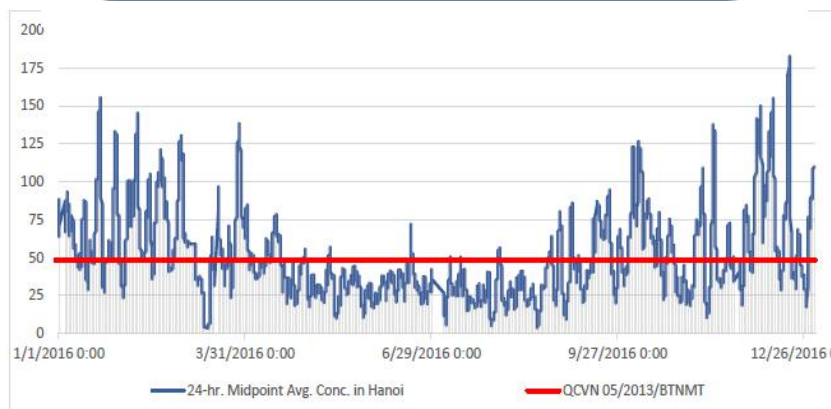
**123** Average AQI

**54.6** Average PM 2.5 concentration

**37** Days violating national regulations

**78** Days violating WHO guidelines

\*90 days



\* All data from <https://www.airnow.gov>



People in the roads protect themselves from air pollution with masks and sunglasses



Smoke from straw burning from the countryside blanket Hanoi in haze



Lang – Hoa Lac highway was dim in the smoke from straw burning from the countryside



Buses in Ha Noi



# Out-of-date factories release tons of air pollutants into the atmosphere



A factory in Kinh Mon, Hai Duong Province



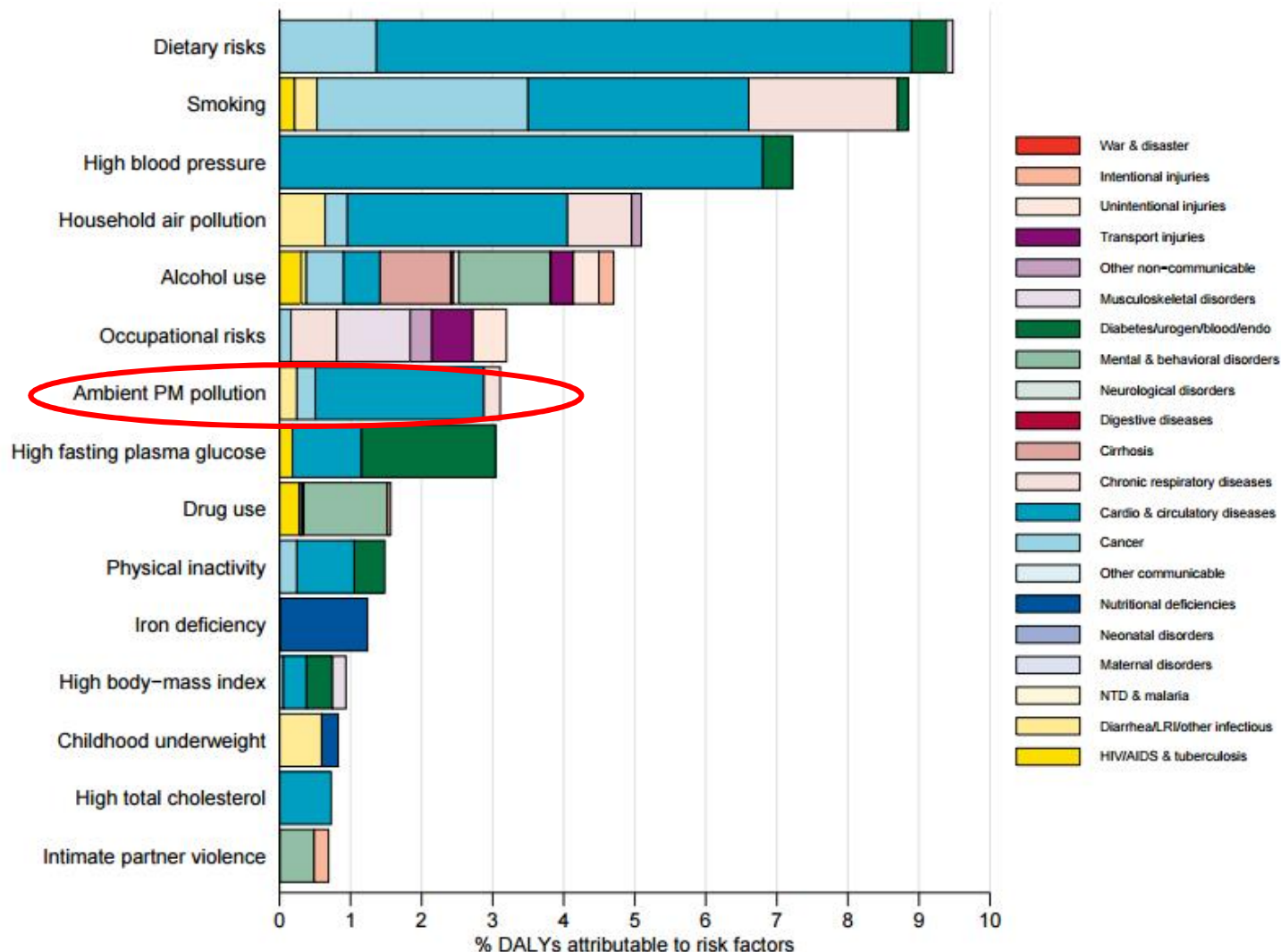
Straw burning in the countrysides not only pollutes air in the rural areas but also can send haze to the urban areas nearby






# AIR POLLUTION AND PUBLIC HEALTH IN VIET NAM

Burden of disease attributable to 15 leading risk factors in 2010, expressed as a percentage of Vietnam DALY's



## Change in estimated number of health impacts in 2010 and 2020 compared to 2005 in Ha Noi

Health Endpoint	Number of Cases Incurred		Change from 2005 BAU	
	2010	2020	2010	2020
Mortality	1,260	2,824	688	2,252
Adult Chronic Bronchitis	2,174	4,872	1,187	3,885
Child Acute Bronchitis	19,580	43,889	10,690	34,999
Respiratory Hospital Admission	513	1,150	280	917
Cardiac Hospital Admission	450	1,008	246	804
Emergency Room Visit	21,181	47,479	11,564	37,862
Asthma Attacks	260,942	584,916	142,464	466,438
Restricted Activity Days	3,444,434	7,720,888	1,880,524	6,156,978
Respiratory Symptom Days	16,466,340	36,910,203	8,989,967	29,433,830

- Annual averages on total PM10: expected to  ~ 50% in the urban parts of Hanoi. An unabated emissions scenario for 2020 → > x2 of the ambient PM10 concentrations. → PM10 levels are expected to be average > 200µg/m<sup>3</sup> (WHO: 80µg/m<sup>3</sup>).
- Under business as usual, for the estimated ambient levels → health impacts incurred compared to 2005 BAU are calculated → N° of mortality cases is expected to ~ x2 (2010) and > x4 (2020)

# Effects of Short-Term Exposure to Air Pollution on Hospital Admissions of Young Children for Acute Lower Respiratory Infections in Ho Chi Minh City, Vietnam

HEI Collaborative Working Group on Air Pollution, Poverty, and Health in Ho Chi Minh City (Le Truong Giang, Long Ngo, Sumi Mehta, et al.)

- Exposure to air pollutants:
  - (+) associated ~ hospital admissions for ALRI (dry season - Nov–Apr)
  - (-) associated ~ hospital admissions for ALRI (rainy season - May–Oct).
- ↑ concentrations of NO<sub>2</sub>, SO<sub>2</sub>, and PM<sub>10</sub>: associated ~ ↑ hospital admissions for ALRI in young children of HCMC in the dry season.
- PM<sub>10</sub>: associated ~ ↑ hospital admissions in the dry season, but the high correlation between PM<sub>10</sub> and NO<sub>2</sub> ( $r = 0.78$ ) limited our ability to distinguish between PM<sub>10</sub> and NO<sub>2</sub> effects.

# Air pollution and risk of respiratory and cardiovascular hospitalizations in the most populous city in Vietnam



Dung Phung<sup>a,\*</sup>, To Thi Hien<sup>b</sup>, Ho Nhut Linh<sup>b</sup>, Ly M.T. Luong<sup>c</sup>, Lidia Morawska<sup>d</sup>, Cordia Chu<sup>a</sup>,  
Nguyen Duy Binh<sup>e</sup>, Phong K. Thai<sup>d,\*\*</sup>



Ho Chi Minh City



- A time-series regression analysis, 2004 - 2007 in Ho Chi Minh City
- $\text{NO}_2$  and  $\text{PM}_{10}$   $\uparrow$ : **strongly** associated  $\sim$  respiratory + cardiovascular diseases (CVD) hospital admissions
- $\text{SO}_2$   $\uparrow$ : moderately associated  $\sim$  respiratory + CVD hospital admissions
- $\uparrow 10\mu\text{g}/\text{m}^3$  of each air pollutant
  - $\rightarrow$  risk of respiratory admissions  $\uparrow$  0.7% - 8%
  - $\rightarrow$  risk of CVD admissions  $\uparrow$  0.5% - 4%



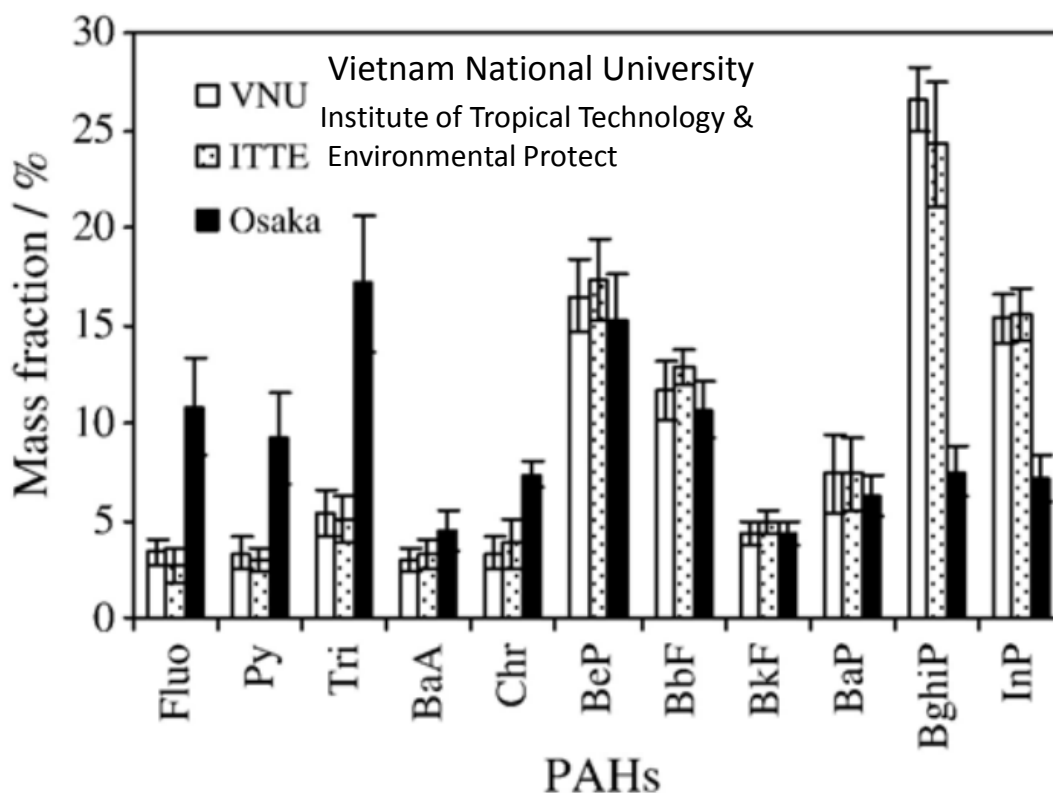
# Comparison of particle-phase polycyclic aromatic hydrocarbons and their variability causes in the ambient air in Ho Chi Minh City, Vietnam and in Osaka, Japan, during 2005–2006

To Thi Hien <sup>a,b,\*</sup>, Pham Phuong Nam <sup>b</sup>, Sadanaga Yasuhiro <sup>a</sup>, Kameda Takayuki <sup>a</sup>, Takenaka Norimichi <sup>a</sup>, Bandow Hiroshi <sup>a</sup>

5- and 6-ring PAHs (BeP, BbF, BkF, BaP, BghiP and InP)  
↑↑↑ in total suspended particulate samples in HCM City, ~ 82% of total PAHs.

>>> Osaka

→ these PAHs are highly carcinogenic and mutagenic in humans.



# CHALLENGES ON AIR QUALITY MANAGEMENT

1. Vietnam doesn't have Law on Clean Air
  2. Standard on emission concentrations is still lower than international standard.
  3. Implementation the regulations in the Environmental Protection Law 2014 is still limited and not enough.
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# WHAT WE ARE GOING TO DO?

“Cleaning up the air we breathe prevents non-communicable diseases as well as reduces disease risks among women and vulnerable groups, including children and the elderly...”

**Dr Flavia Bustreo, WHO Assistant Director-General Family, Women and Children's Health**

Practical policy measures	Communities or individuals measures
Housing	Stop waste burning
Transport	Promote green spaces
Waste	Walking/cycling
Energy systems	

# WHAT WE ARE GOING TO DO?



**Issuing the Laws and regulation on clean air and revising the standard to match with international ones (WHO)**



**Taking prompt action to reduce emission from coal-fired power plant**



**Promoting development and application of renewable energy**



**Reducing emissions from means of transportation**



# CONCLUSION

1. Air pollution in Vietnam is increasing, major risk for public health and negative impacts of air pollution on whole population.
2. Challenges on Air Quality Management in Vietnam: Law on Clean Air,
3. More studies should be conducted in order to provide evidences for policy makers to reduce air pollution.

# THANK YOU FOR ATTENTION

