

Public health benefits of strategies to reduce greenhouse gas emissions

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DIVERSITAS IGBP IHDP WCRP



Global Environmental Change and
Human Health



LONDON
SCHOOL *of*
HYGIENE
& TROPICAL
MEDICINE

Scope

Case studies in four sectors responsible for large emissions of greenhouse gases (GHGs)

- Household energy
- Urban land transport
- Food and agriculture
- Electricity generation

Health effects of strategies to reduce GHG emissions by ~ 50% in developed countries

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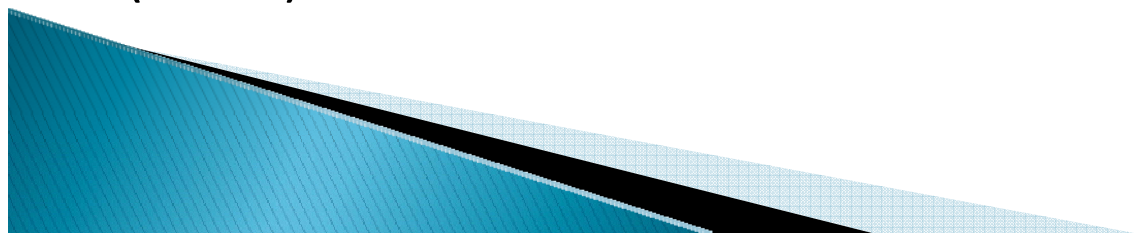
Health Effects

Comparisons

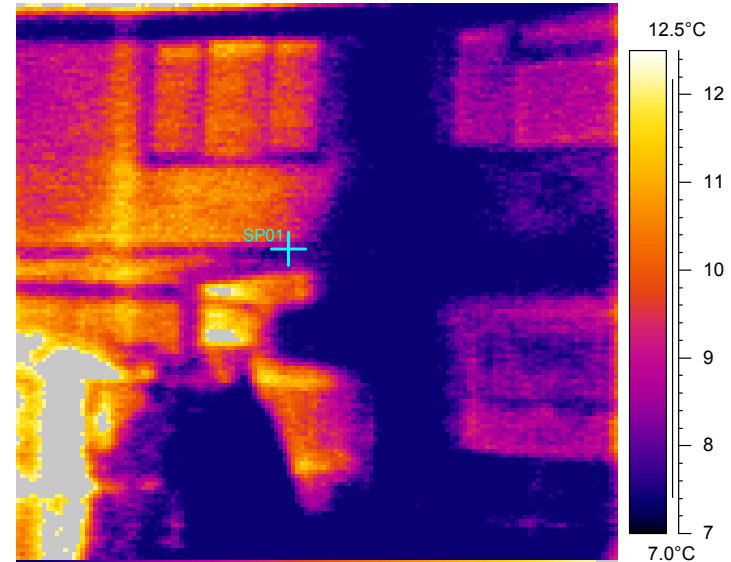
- Comparison of 2010 population with and without intervention: Household energy, Food and agriculture
- Comparison of 2010 population but using exposures derived from 2030 projections (business-as-usual vs GHG reductions): Transport, Electricity generation

Calculation

- Change in burdens of disease and premature deaths averted
- Methods adapted from Comparative Risk Assessment approach (WHO)



Health and GHG Benefits in UK households



Impact in UK 2010 population in 1 year

UK household energy efficiency (combined improvements)

Premature deaths averted

~ 5400

Mt-CO₂ saved (vs 1990)

55

1.6 m deaths worldwide from indoor air pollution, mainly in women and children



Traditional Biomass Stove

Per meal

- ~15x less black carbon and other particles
- ~10x less ozone precursors
- ~5x less carbon monoxide



Gasifier Stove with Electric Blower
(battery recharged with cell phone charger)

Health benefits of the Indian stove programme

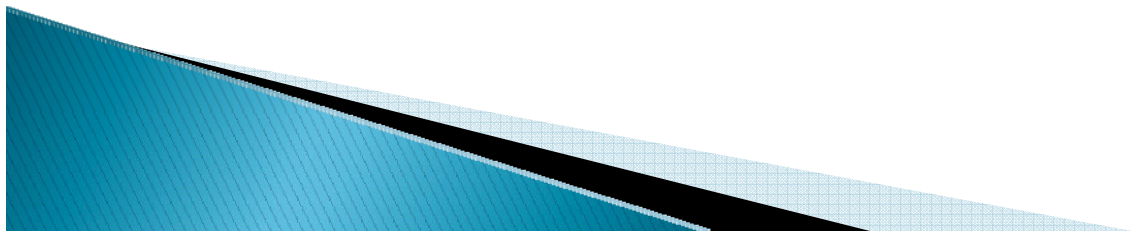
	Deaths from ALRI	Deaths from COPD	Deaths from IHD
Avoided in 2020 (%)	30.2%	28.2%	5.8%
Total avoided 2010-20	240,000	1.27 million	560,000

ALRI=acute lower respiratory infections. COPD=chronic obstructive pulmonary disease.
IHD=ischaemic heart disease.

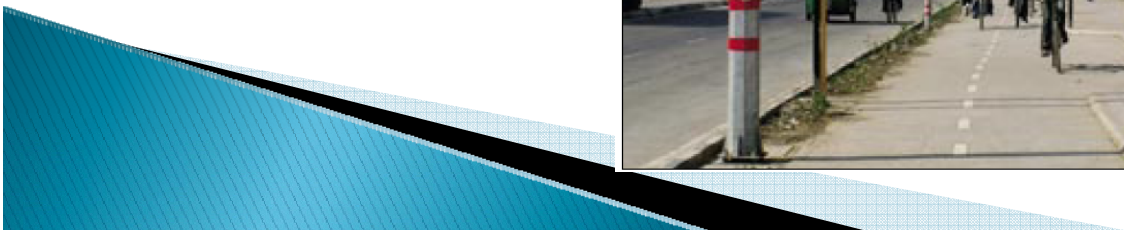


GHG benefits of Indian stove programme

- Reductions in black carbon, methane, ozone precursors could amount to the equivalent of 0.5-1.0 billion tonnes of CO₂ eq over the decade
- Cost <\$50 per household every 5 years



Urban Transport Pathways modelled: London and Delhi



Estimated Health Effects of Increased Active Travel in London

	Change in disease burden	Change in premature deaths
Ischaemic heart disease	10-19%	↓ 1950-4240
Cerebrovascular disease	10-18%	↓ 1190-2580
Dementia	7-8%	↓ 200-240
Breast cancer	12-13%	↓ 200-210
Road traffic crashes	19-39%	↑ 50-80

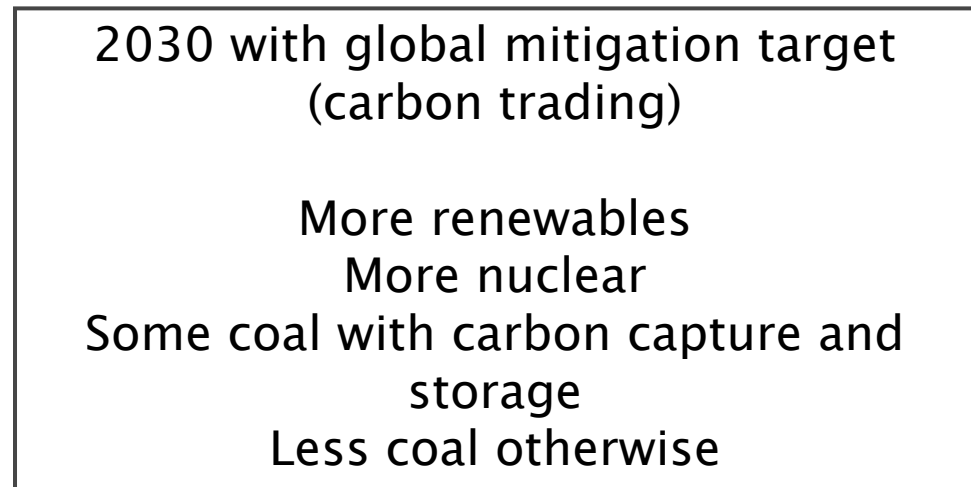
Health effects of sustainable transport strategy: by disease (Delhi)

	Change in disease burden	Change in premature deaths
Ischaemic heart disease	11-25%	2490-7140
Cerebrovascular disease	11-25%	1270-3650
Road traffic crashes	27-69%	1170-2990
Diabetes	6-17%	180-460
Depression	2-7%	NA

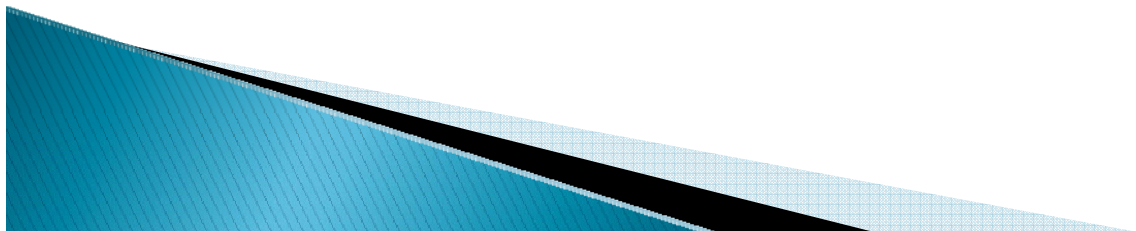
Electricity Generation EU, India, China



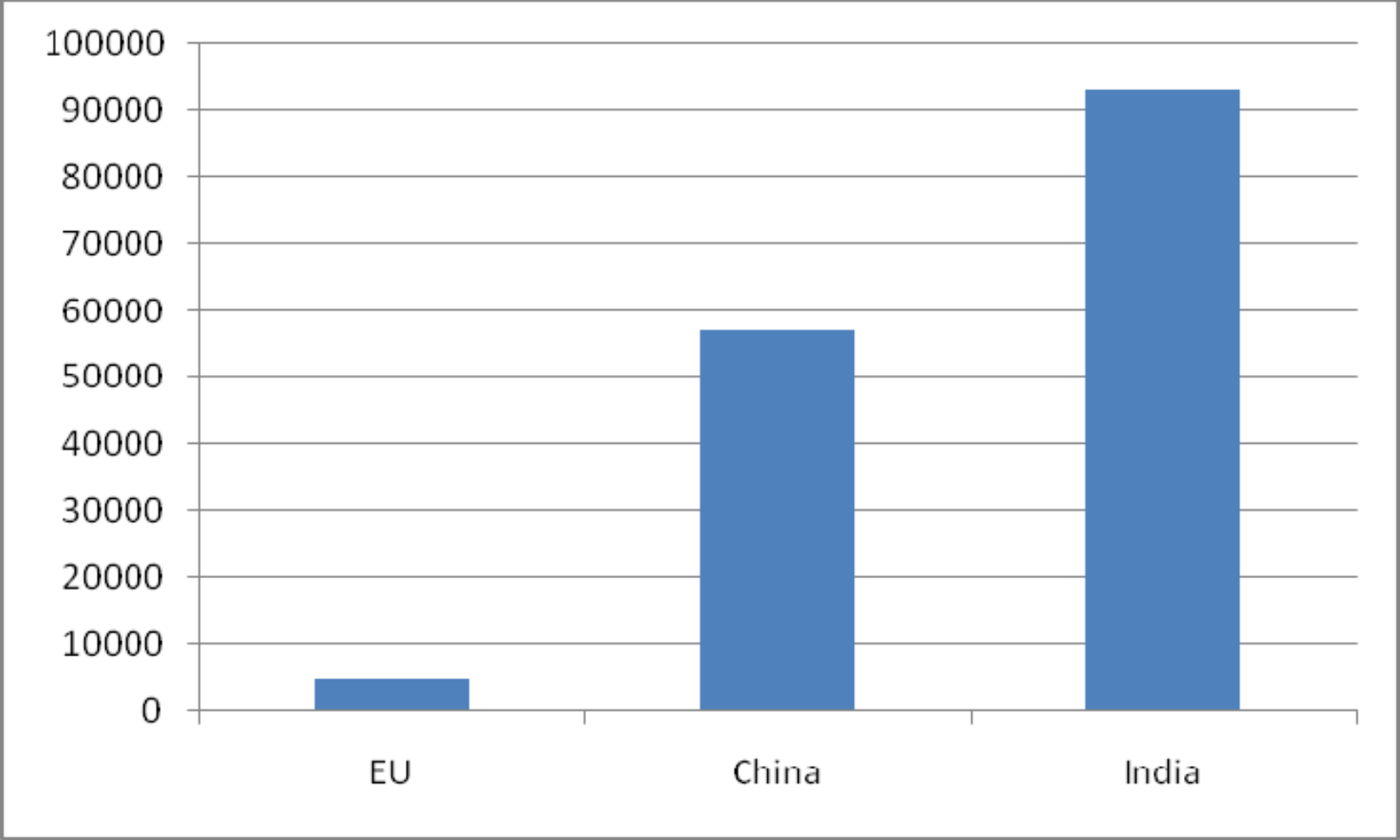
Vs



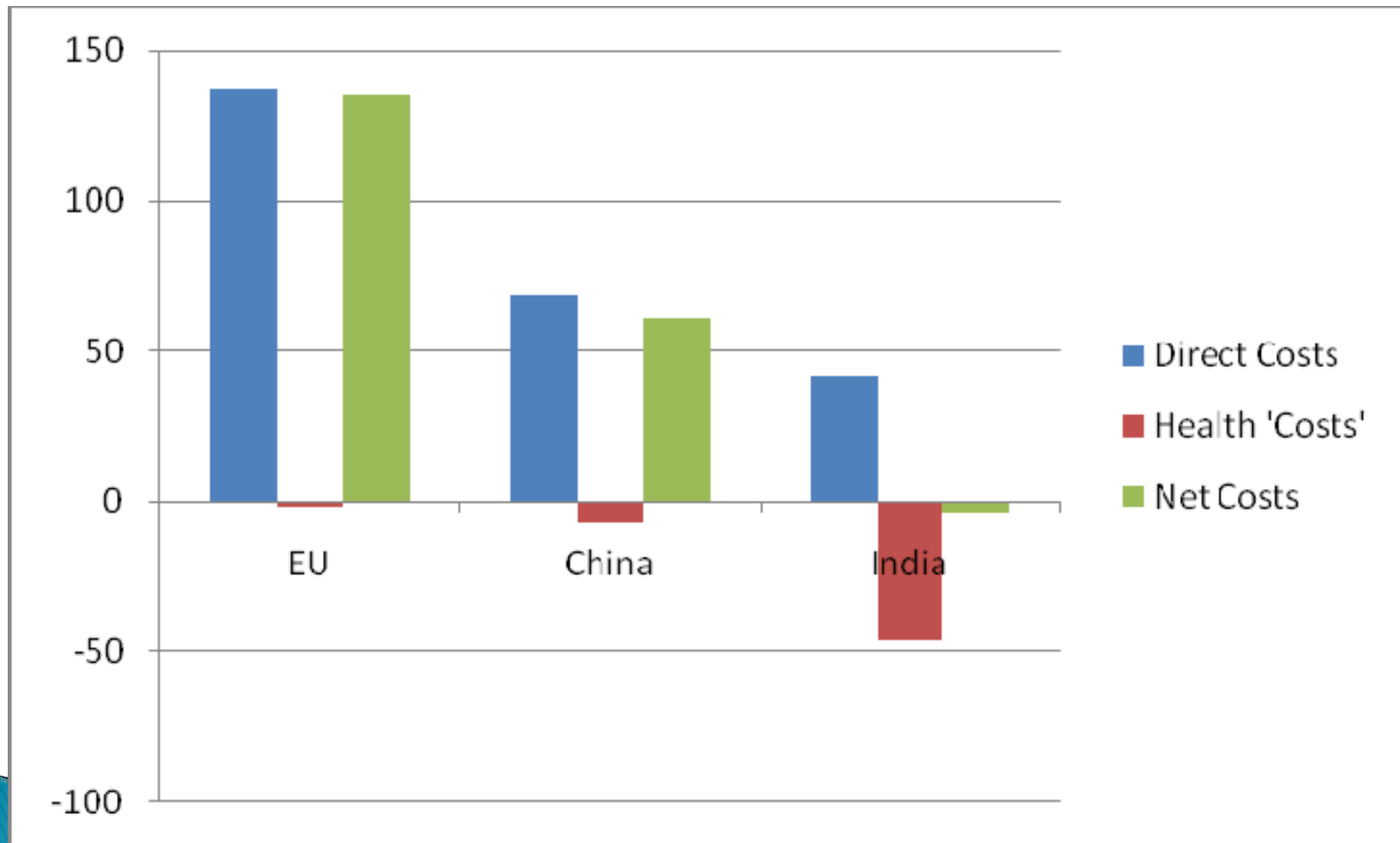
Comparison calculated: Deaths due to particulate
air pollution from electricity generation, and costs.



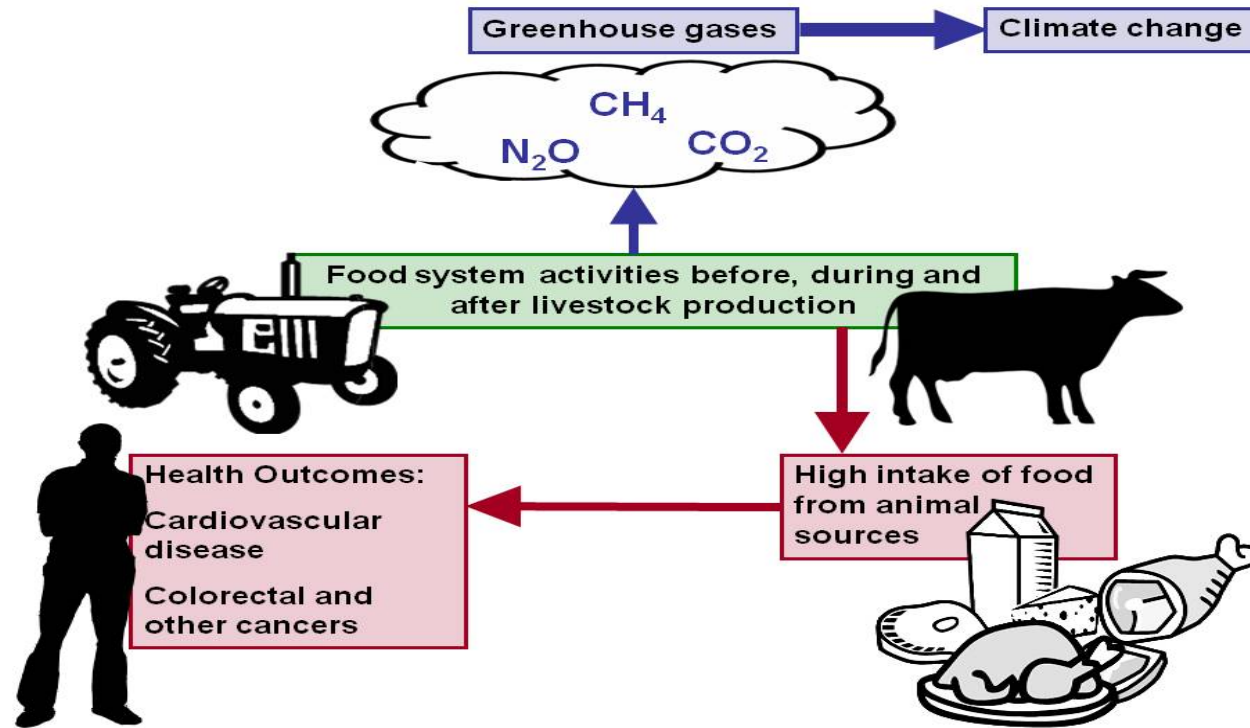
Premature Deaths Avoided in 2030



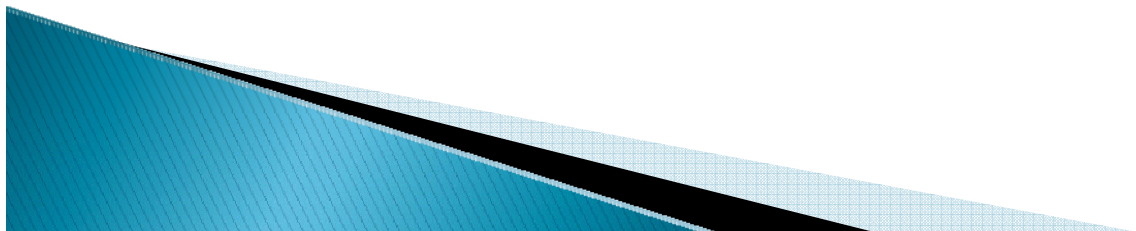
Costs of Mitigation US\$/Tonne CO2



Food and Agriculture Sector



- ▶ 80% of total emissions in sector from livestock production



Strategies modelled

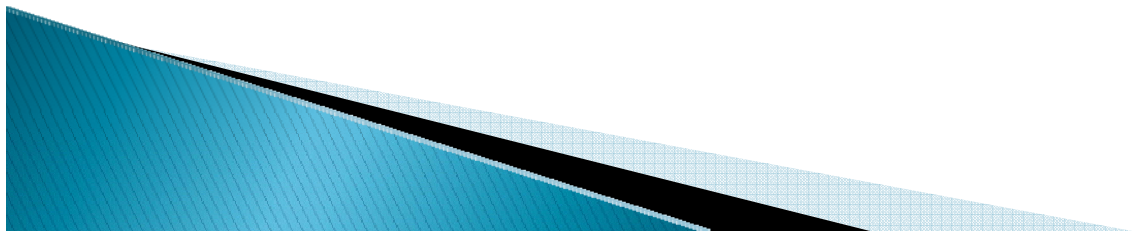
To meet UK target of 50% reduction in GHG emissions on 1990 levels by 2030 with focus on livestock sector

Assumed agricultural technological improvements

- necessary but not sufficient to meet target

Decrease overall livestock production

- estimated that a 30% cut in production, in addition to technological improvements would meet GHG target



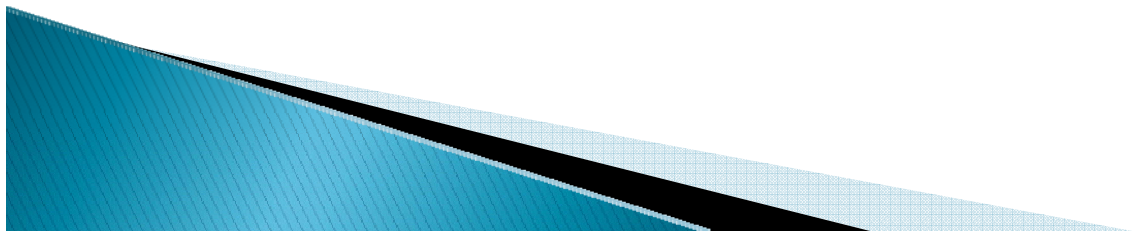
Health effects

- Case studies: UK and the city of São Paulo, Brazil
- Assumed that 30% reduction in livestock production would decrease consumption of animal source saturated fat by 30%
- Estimated association of intake of animal source saturated fat with risk of ischaemic heart disease
- Substantial benefits from decreased burden of heart disease
 - UK: ~15%↓ (~ 18,000 premature deaths averted)
 - São Paulo: ~16%↓ (~ 1000 premature deaths averted)



Conclusions

- Many climate change mitigation strategies can result in major benefits for public health
- Impact assessment is needed because not all strategies are beneficial e.g. Biofuels
- The co-benefits can (partly) offset the costs and are additional to those benefits from reducing climate change.



Thank you

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