

Environmental Health in Rural Family Medicine

WONCA Rural: Gramado

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WONCA WP Env

April 2014

Contents

1. Cases: Taking an exposure history
2. Children's Environmental Health
3. Climate change and health
4. WONCA WP Env Health

How many of you.....??

Case

- You assess 14 year-old, Judy, in ER with shortness of breath; worsening of her asthma
- PMH: She has had difficult to control asthma; on
 - Fluticasone/ Salmeterol Combination diskus; Salbutamol prn
- She is a track athlete, and was training yesterday. She does not smoke, and no-one at home smokes
- **What are the possible triggers for the worsening of her asthma?**

A 14 Year Old With Asthma

What are the possible environmental triggers for this episode of asthma?

- Compliance
- Infection

Personal exposure history, using CHOPD

- Community**
- Housing/Hobbies**
- Occupation/School**
- Personal**
- Diet**

Could outdoor air pollution be a trigger that is exacerbating her asthma?

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Respiratory Effects of Exposure to Diesel Traffic in Persons with Asthma

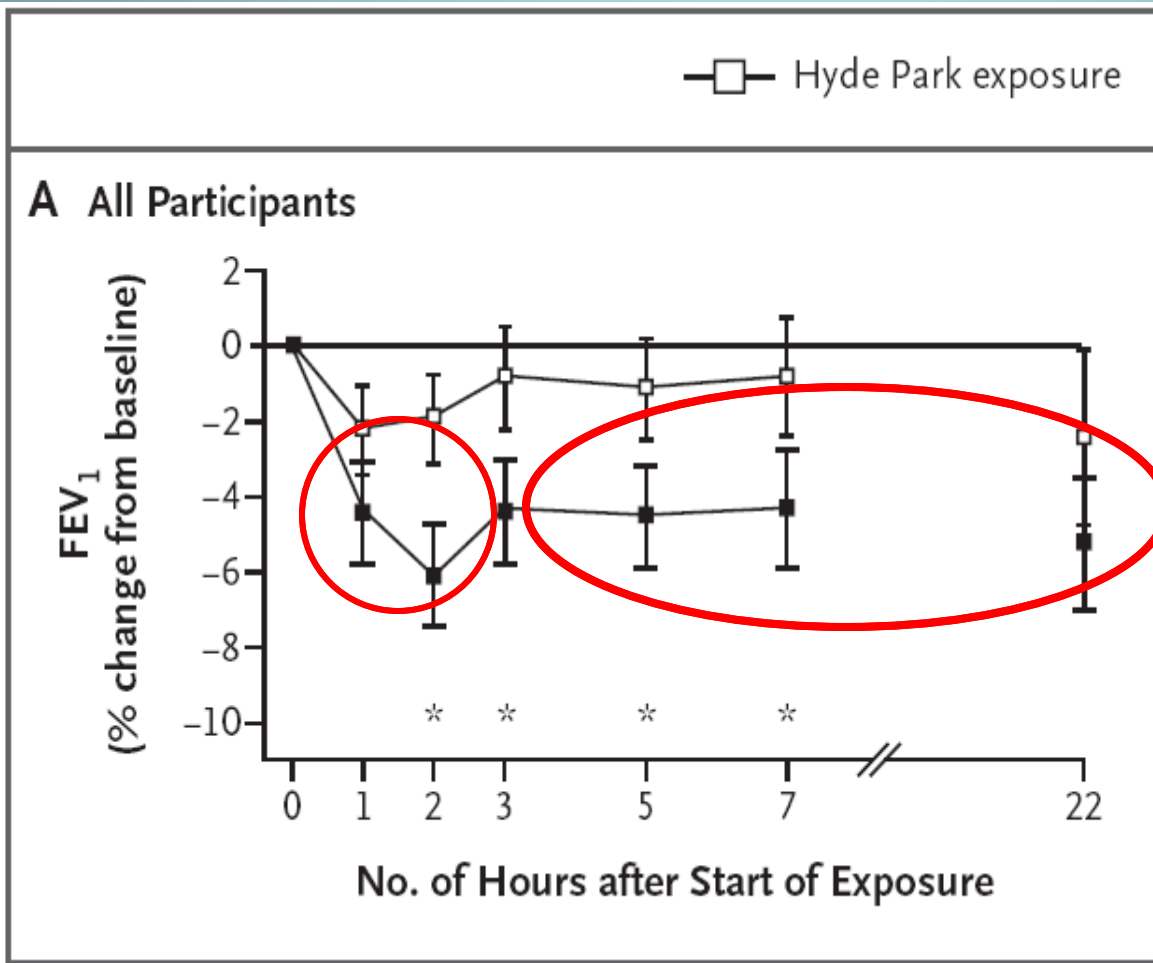
James McCreanor, M.R.C.P., Paul Cullinan, M.D., Mark J. Nieuwenhuijsen, Ph.D., James Stewart-Evans, M.Sc., Eleni Malliarou, M.Sc., Lars Jarup, Ph.D., Robert Harrington, M.S., Magnus Svartengren, M.D., In-Kyu Han, M.P.H., Pamela Ohman-Strickland, Ph.D., Kian Fan Chung, M.D., and Junfeng Zhang, Ph.D.

N ENGL J MED 357;23 WWW.NEJM.ORG DECEMBER 6, 2007



~2-7 fold

	Oxford St.	Hyde Park	p value
PM2.5	28.3	11.9	<0.001
UFP	63.7	18.3	<0.001
elemental carbon	7.5	1.3	<0.001
PM10	125	72	0.03
NO2	142	21.7	<0.001



Respiratory effects of exposure to diesel traffic on persons with asthma
 McCreanor NEJM Dec 2007

Could outdoor air pollution be a trigger that is exacerbating her asthma?

AQHI- asthma health care utilization

“each unit increase AQHI is highly and significantly associated with an increase in asthma ED visits”

AQHI	Outpatient claims
3	2278
10	3330

To, T. EHP Online Oct2012

What can she, and you as her physician do about it?



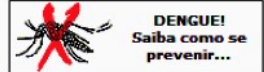
Air Quality Map Updated Hourly

Portal do Governo Cidadão.SP Investimentos.SP Destaques: [dropdown] OK Portal do GOVERNO DO ESTADO DE SÃO PAULO

Água Ar Institucional Gerenciamento de Riscos Serviços Solo Tecnologia Ambiental Publicações Mapa do Site



Companhia de Tecnologia de Saneamento Ambiental
Secretaria de Estado do Meio Ambiente
23 · SET · 2008



Ar Qualidade do Ar » Rede Automática » Mapa de qualidade do ar

Mapa de qualidade do ar: RMSP - Interior e Litoral | Dados horários | Resumo da última hora | Boletins diários: Resumo do dia - Por poluente - Meses anteriores | Configuração e localização das estações

23/09/2008 - 21h00

Região Metropolitana de São Paulo

Condição atual da RMSP

Qualidade **Regular**
A qualidade refere-se a estação com o índice mais alto na RMSP

Efeitos à saúde

Pessoas com doenças respiratórias podem apresentar sintomas como **tosse seca e cansaço**

Como proteger sua saúde

Preferir o transporte coletivo. Oferecer carona

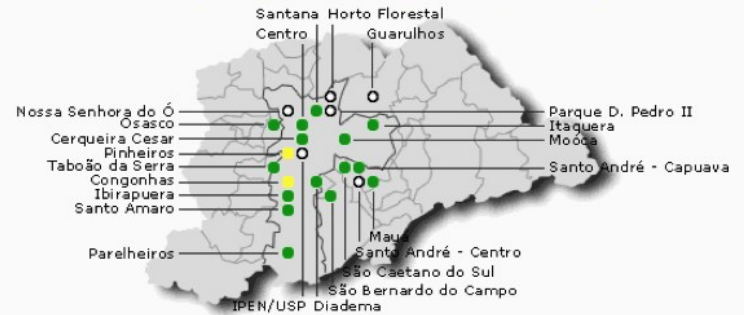
Previsão meteorológica diária

Favoráveis à dispersão dos poluentes: Dióxido de Enxofre, Partículas Inaláveis, Dióxido de Nitrogênio, Monóxido de Carbono e Favoráveis para Ozônio.



Acesse aqui as estações do Interior e Litoral

Clique no ponto para obter informações da estação desejada



qualidade índice ● Boa 0-50 ● Regular 51-100 ● Inadequada 101-199 ● Má 200-299 ● Péssima >299 ○ Sem dados

Entenda o índice de qualidade do ar

Veja aqui como está a qualidade do ar em todas as estações

Sao Paulo

health messages


exposure reduction recommendations

• www.cetesb.sp.gov.br

• Also available at AIRNow Web site www.airnow.gov



São Paulo's air pollution kills more people than car crashes

 Like 4 people like this. Be the first of your friends.



POLLUTION

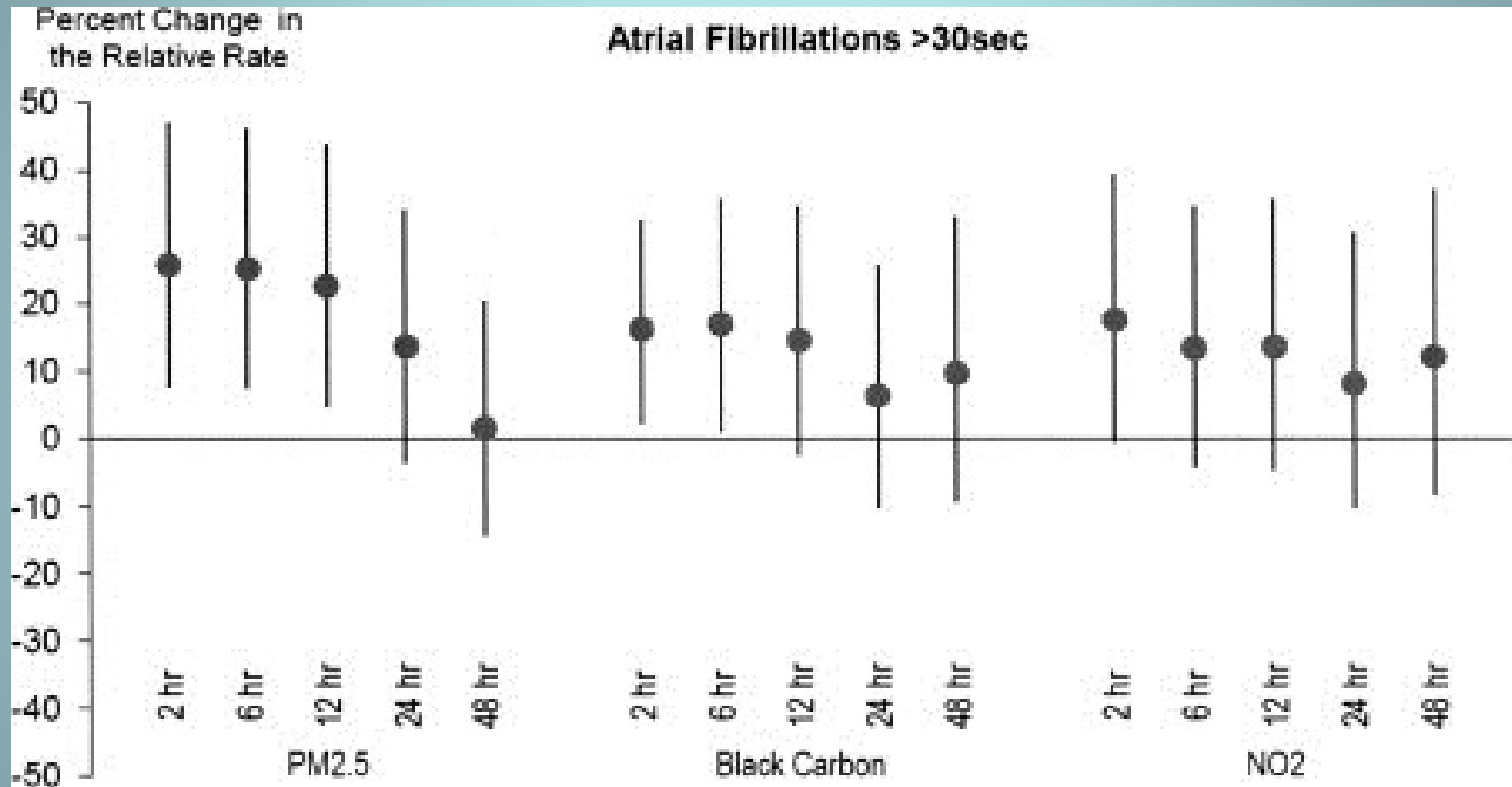
Ahead of World Cup, Sao Paulo's smog still killing thousands

Smog in Sao Paulo kills more people annually than road accidents, AIDS and breast cancer combined says a recent report. While the city seeks a solution ahead of next year's World Cup, local residents remain frustrated.

Case

- You assess 55 year-old male in ER with atrial fibrillation x 4hrs
- PMH: Hypertension; on HCT 12.5mg od
- He is a track athlete, and was training this morning.
- Is air pollution a possible trigger for his arrhythmia?

Air Pollution-Atrial Fibrillation



Link MS. J American Coll Cardiology 2013 62(9)

Exposure history

A clinical tool

What are the possible other environmental triggers for this episode of asthma?

Personal exposure history, using CHOPD

- Community
- Housing/Hobbies
- Occupation/School
- Personal
- Diet

Principais locais de exposição, CCLOPD

- Comunidade
- Casa
- Lazer
- Ocupação
- Pessoal
- Dieta

Community Triggers

Ambient air pollution

Traffic related air pollution

Point sources

Smoke

- Forest fires
- Crop burning
- Wood smoke

Housing triggers

Allergens

- House Dust Mite
- Cats
- Cockroach
- Mold/dampness

Particulate Matter

- ETS
- Woodsmoke
- Outdoor air particulates: PM 2.5

Gases

- NO₂
- Formaldehyde and VOCs

Case 2

60 year old with chronic cough and loss of weight

- Differential?

What exposures might be related?

- CH2OPD?

Case 2- Ca Lung CH2OPD

C- Particulates PM2.5

H- Radon; ETS

H ?

O- Asbestos

P- Smoking

D ?

What is “ENVIRONMENTAL HEALTH”?

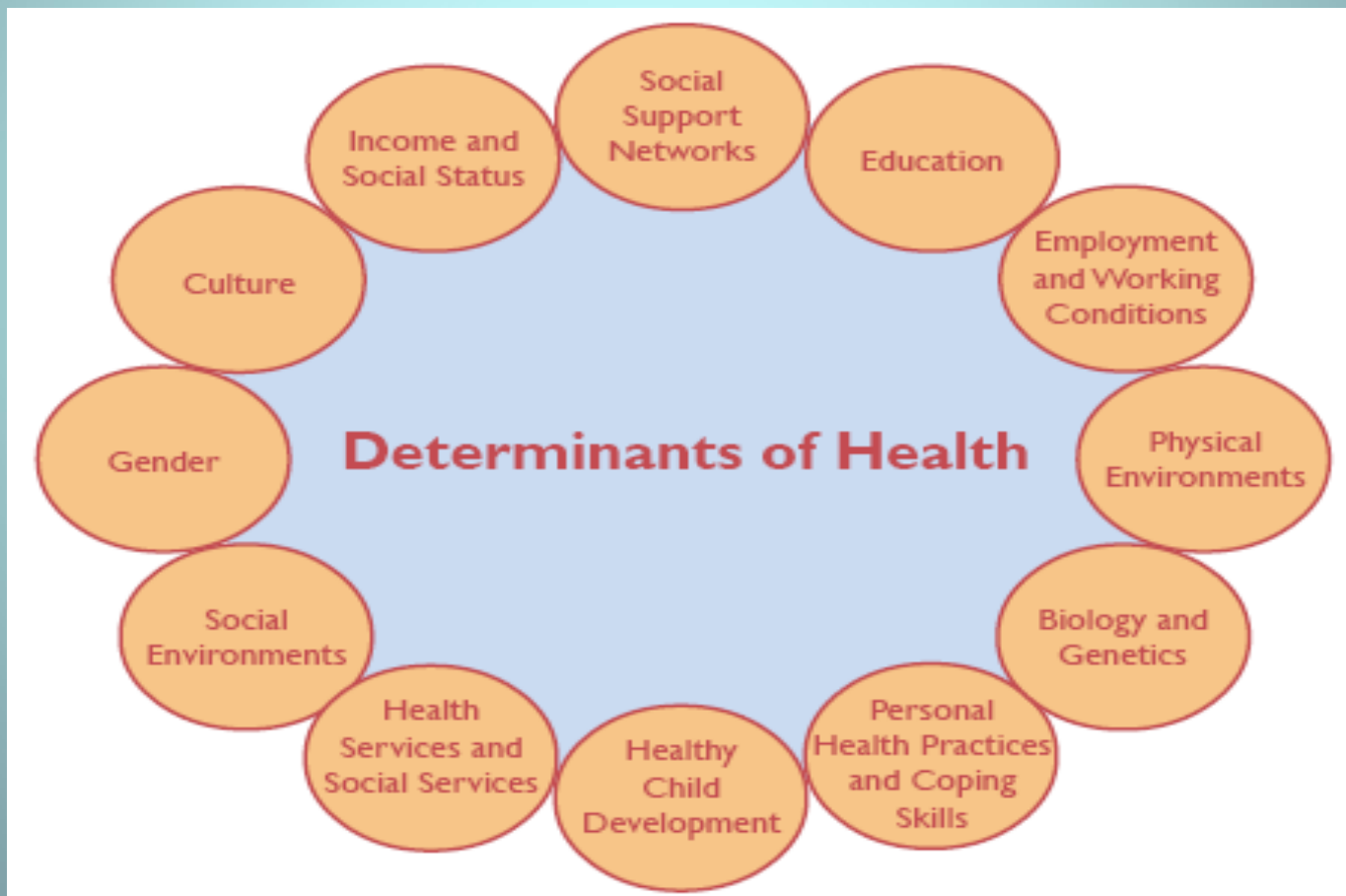
“Environmental health includes both the **direct** pathological effects of chemicals, radiation and some biological agents, and the effects (often **indirect**) on health and wellbeing of the broad physical, psychological, social and aesthetic environment which includes housing, urban development, land use and transport.”

- *World Health Organization*

www.euro.who.int/eprise/main/WHO/Progs/HEP/20030612_1

Multiple Determinants of Health

*Source: World Health Organization, undated,
from Child Health and the Environment- A Primer*



Environment- A forgotten determinant of health?



An estimated 24% of the global disease burden and 23% of all deaths can be attributed to environmental factors

Preventing Disease through Healthy Environments. WHO 2006
http://www.who.int/quantifying_ehimpacts/publications/preventingdisease/enindex.html

Children's Health and the Environment

WHO Training Package for the Health Sector

World Health Organization

www.who.int/ceh

ision

Improving the capacity to diagnose, prevent and manage childhood diseases linked to the environment

To understand the special vulnerability of children to environmental exposure

WHO Children's Environmental Health Modules

[Why children](#)

[Children are not little adults](#)

[Indoor and outdoor air pollution](#)

[Chemicals](#)

[Lead and Mercury](#)

[Pesticides](#)

[POPs](#)

[Water, Sanitation and Hygiene](#)

[Food safety](#)

[Global climate change](#)

[Noise](#)

[Radiation](#)

[Injuries](#)

[Occupational exposure](#)

[Cancer](#)

[Respiratory diseases](#)

[Paediatric environmental history](#)

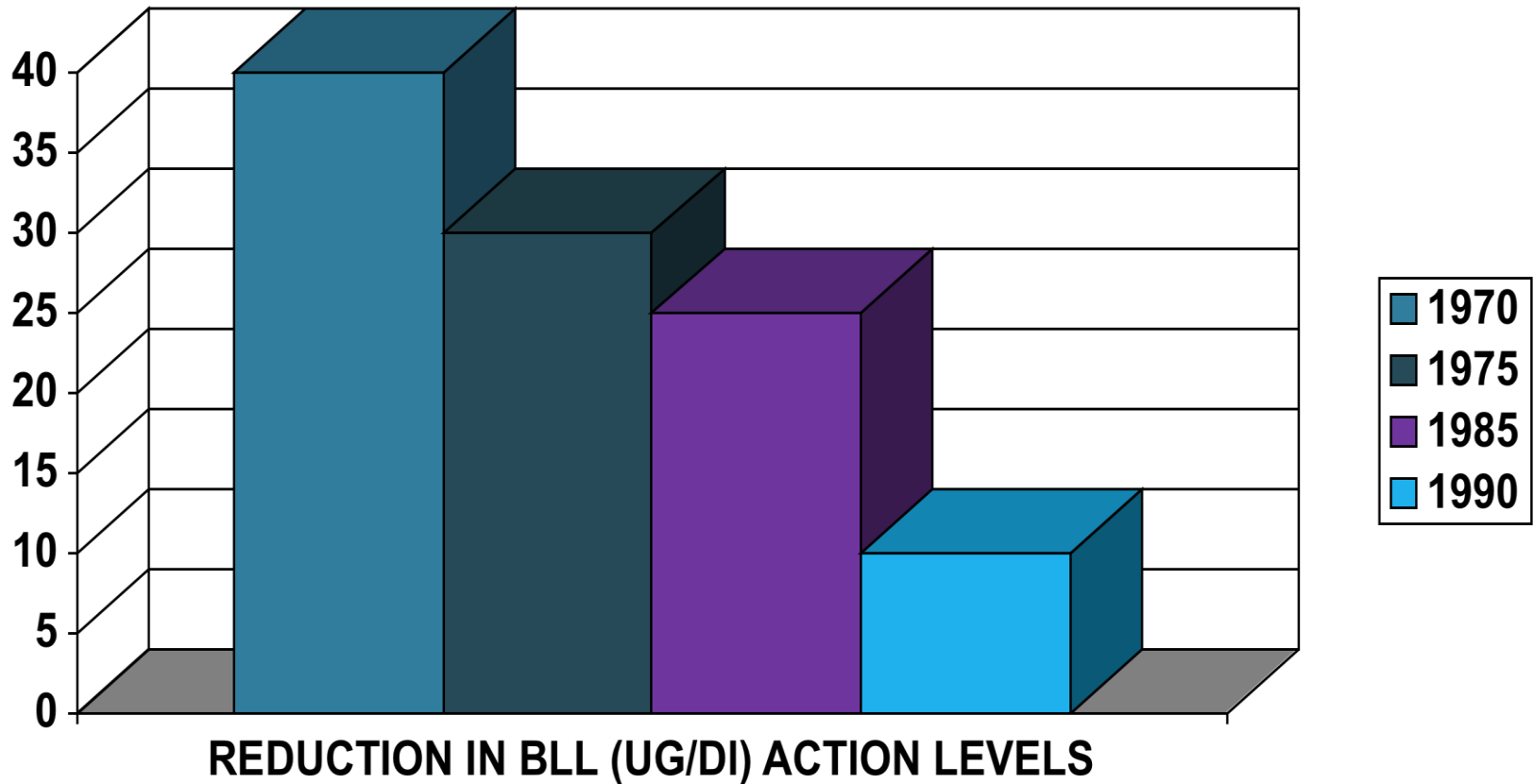
Case: 3 year old

Not meeting milestones

Exposure history

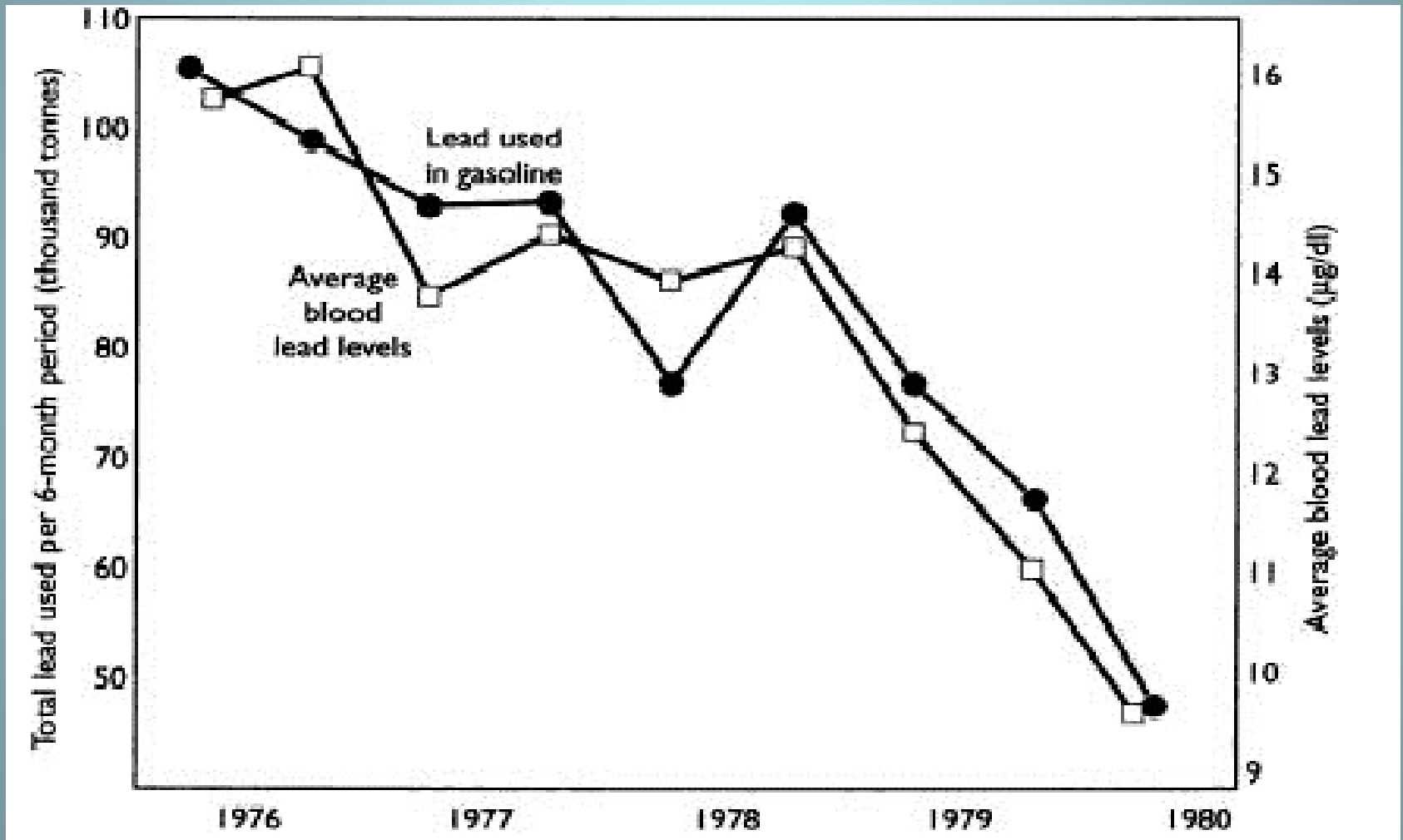
CH2OPD

A Success Story: The Science Improves (1970–1990)



CDC "Action level"

A Success Story: LEAD in Gasoline and Children's Blood



WHO Collaborating Center of CEH Porto Alegre

Emerson R. da Silva, MD, PhD
Department of Pediatrics
University of Caxias do Sul / Brazil
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Renato T. Stein, MD, MPH, PhD
Head, Pediatric Respiratory Medicine, Department of Pediatrics
School of Medicine
Pontifícia Universidade Católica RGS (PUCRS)
Porto Alegre, RS – Brazil
rstein@pucrs.br

December 24, 1968
9:35 PM ES



EARTHRISE

Climate change and health

1. Are you involved in climate change issues in any way; how?
2. Do you think climate change is affecting the health of your patients; how?
3. Do you think climate change will affect the health of your patients; how?

Outline

- The science of climate change
- The health effects of climate change
- Solutions
 - Calculating your Carbon footprint
 - Greening the office
 - Advocate in the community

Climate change is a health issue

- Climate change related to global warming is “the world’s most urgent public health problem” (Stott BMJ 2006)
- Climate change has been called “the defining issue for public health in the 21st century” (Chan 2007)
- Climate change and human survival (BMJ editorial, March 2014)

2009

The State of the Climate

HIGHLIGHTS

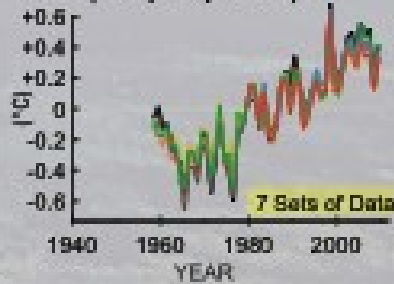


National Oceanic and Atmospheric Administration:

Arndt, D. S., M. O. Baringer, and M. R. Johnson, Eds., 2010: State of the Climate in 2009.

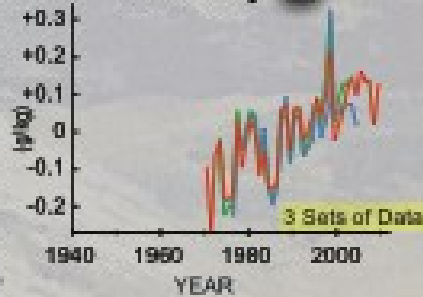
Bull. Amer. Meteor. Soc., **91** (6), S1-S224.

Air Temperature Near Surface (Troposphere)

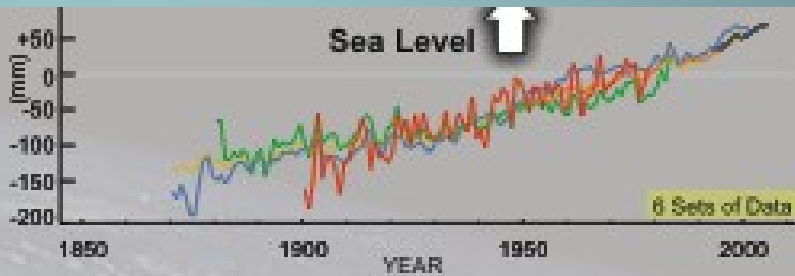
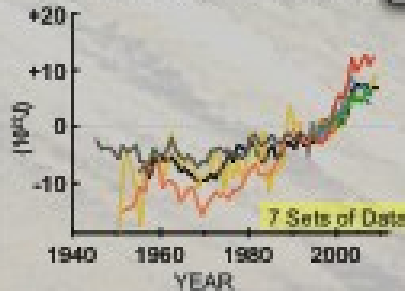


Change from Average

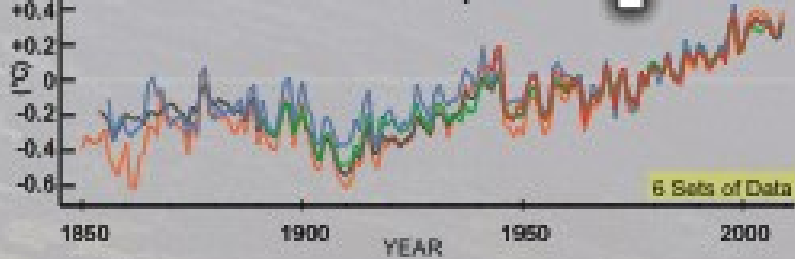
Specific Humidity



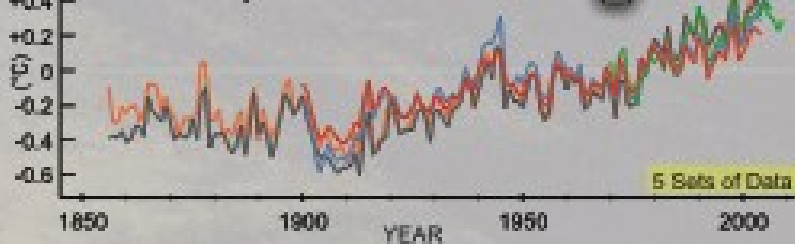
Ocean Heat Content



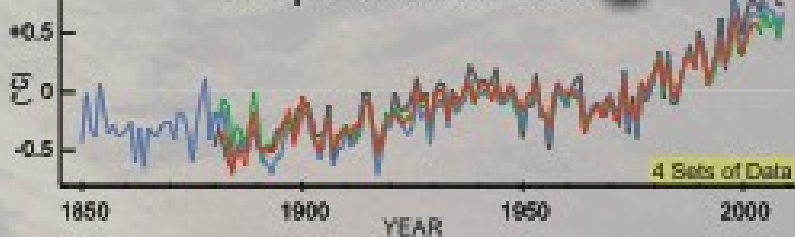
Sea-Surface Temperature



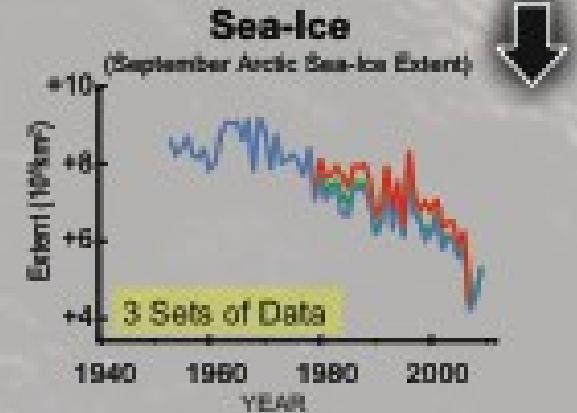
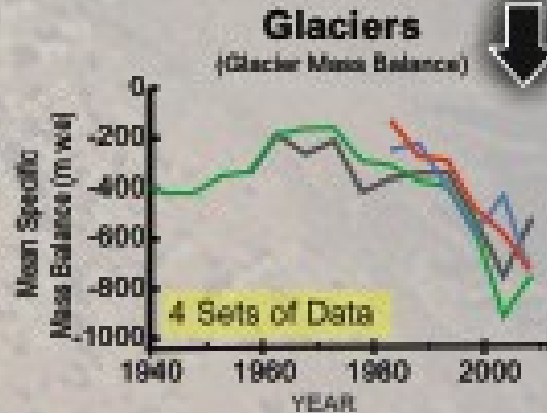
Temperature Over Oceans



Land Surface Air Temperature Over Land



These indicators all decrease in a warming world



IPCC Scientific Panel Report 2013

“Most of the observed increase in globally averaged temperatures since the mid-20th century is ***very likely*** due to the observed increase in **anthropogenic** greenhouse gas concentrations”

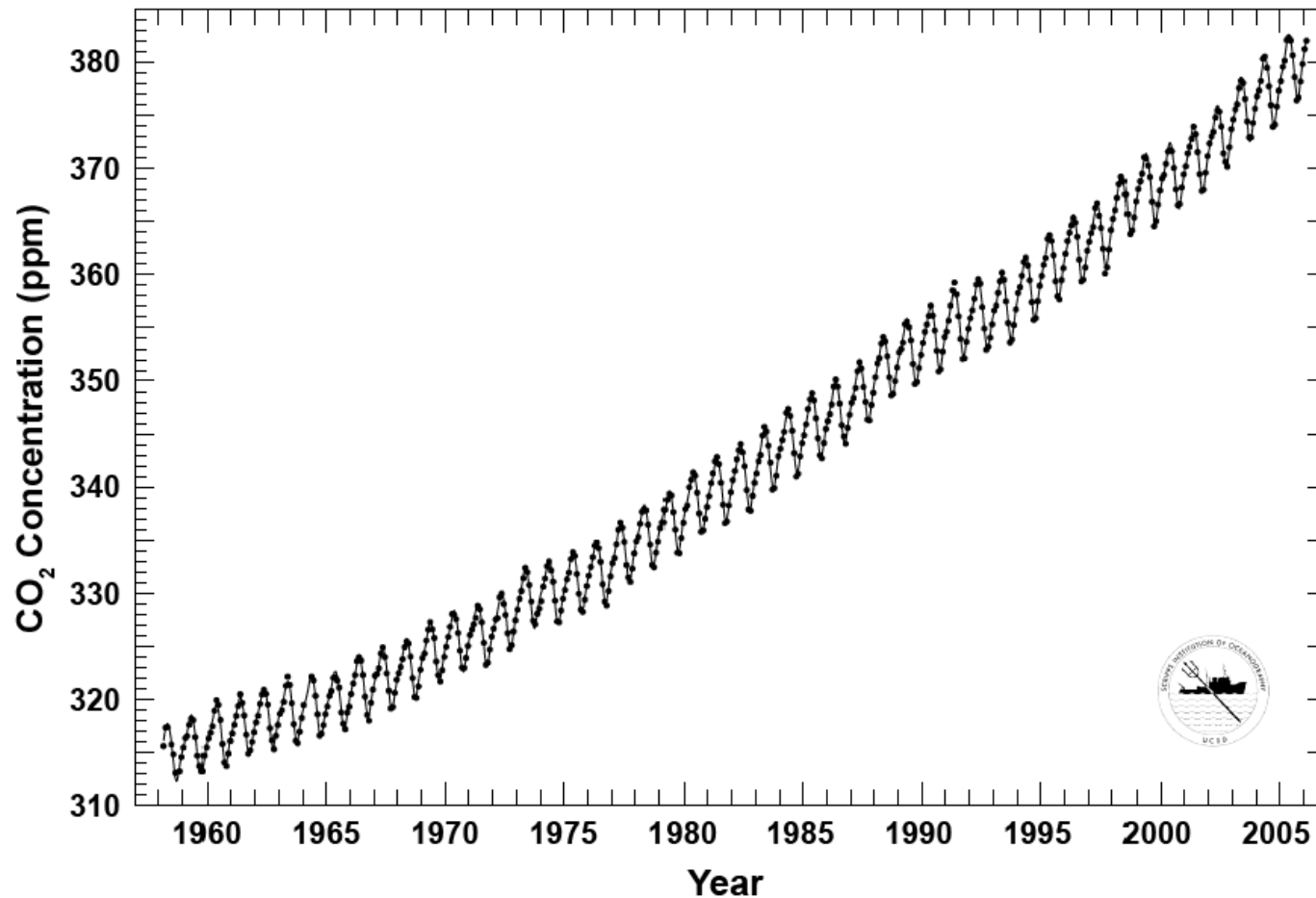
Very likely = 95%

CO₂ Concentrations

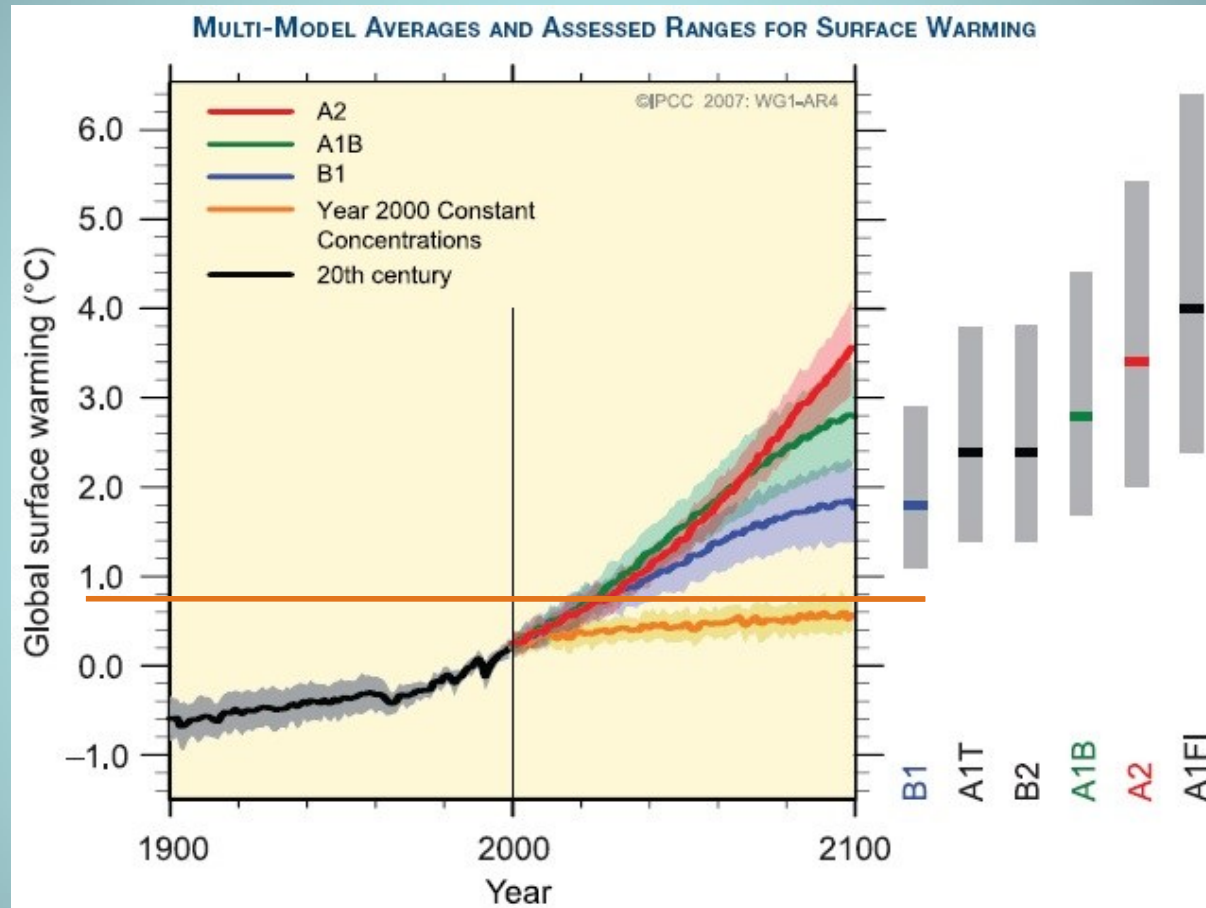
Mauna Loa Observatory, Hawaii Monthly Average Carbon Dioxide Concentration

Data from Scripps CO₂ Program

Last updated February 2006



Future scenarios



IPCC AR4 WG1

And tipping points (IPCC 2014)

Health Impacts of Climate Change

- **Direct impacts**
 - **Extreme weather events**
 - **Temperature related**
- Indirect impacts
 - Air pollution related
 - Vector borne and zoonotic diseases
 - Increased scarcity of food and fresh water
 - Rise in sea level
 - Loss of biodiversity
 - Areas becoming uninhabitable
 - Mass human migration, conflict and violence

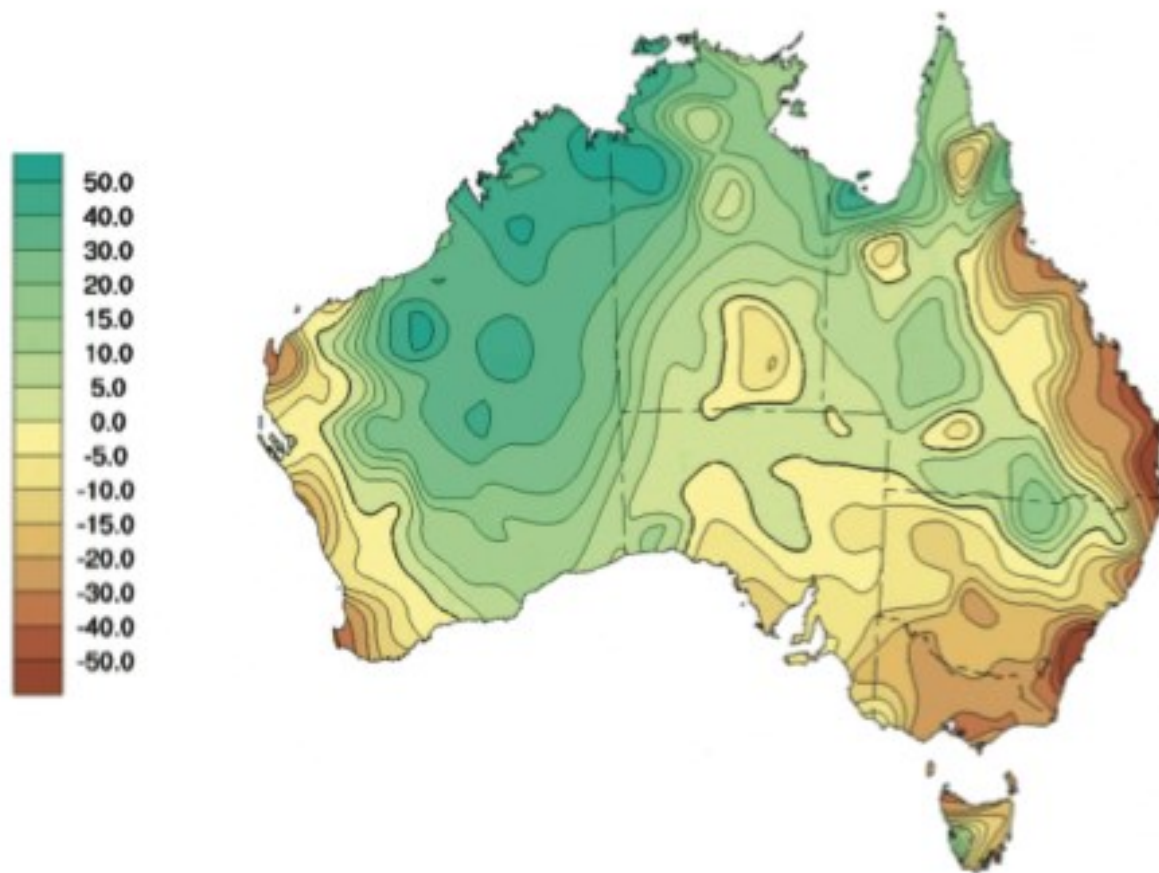
Extreme Weather Events



Vulnerability

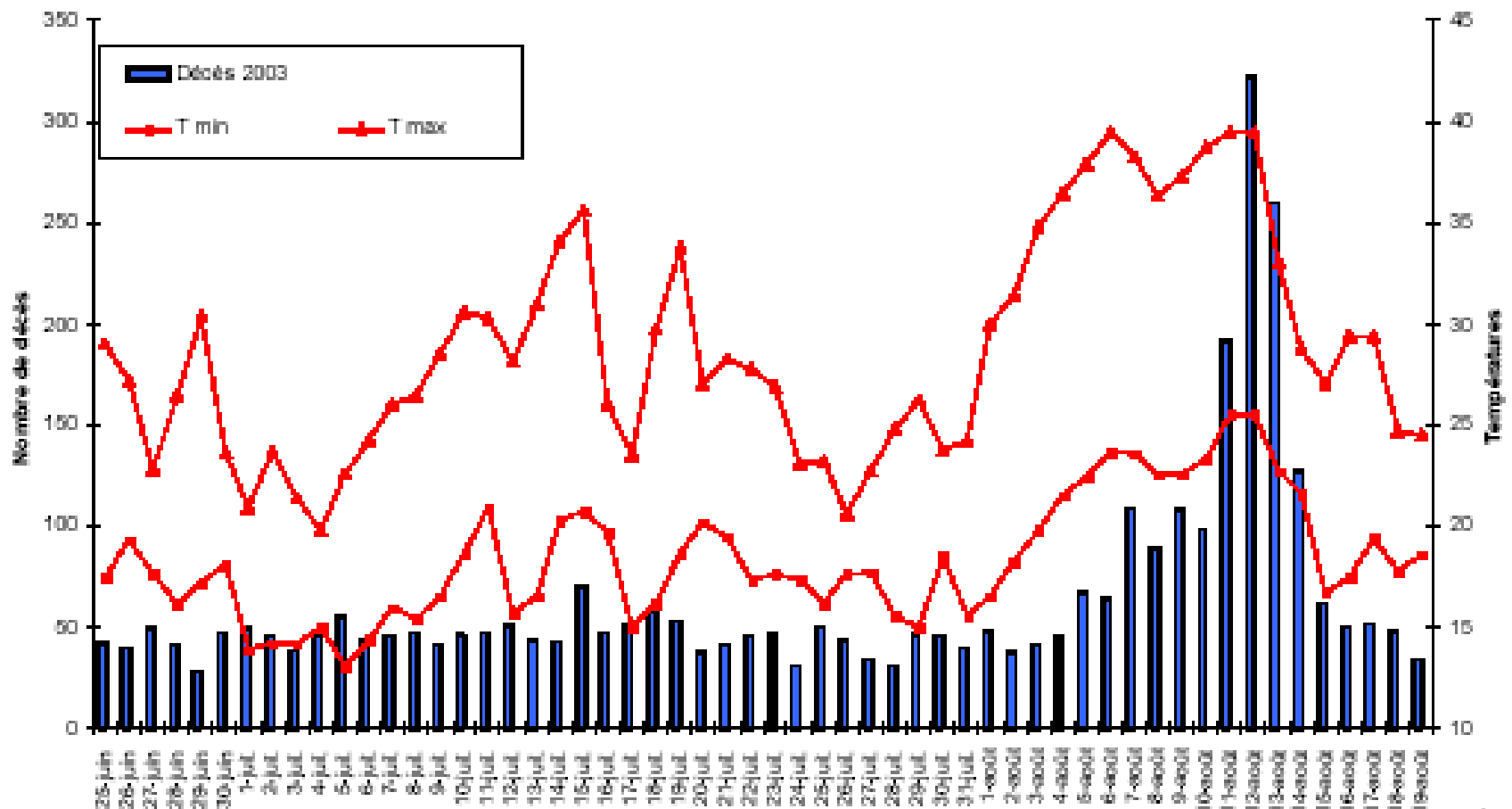
Drought in Australia

Trend in annual rainfall 1960-2009 (mm per decade)



The French Heat Wave 2003 Daily Mortality in Paris

Graphique n°1 : Nombre de décès journaliers à Paris et températures minimales et maximales entre le 25 juin et le 19 août 2003



Health Impacts of Climate Change

- Direct impacts
 - Temperature related
 - Extreme weather events
- **Indirect impacts**
 - **Air pollution related**
 - **Vector borne and zoonotic diseases**
 - Increased scarcity of food and fresh water
 - Rise in sea level
 - Loss of biodiversity
 - Areas becoming uninhabitable
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Case #4

- Can you identify this rash?



Lyme Disease

- Localized or disseminated
 - Erythema Migrans (up to 1 month)
- Later
 - Neurologic, cardiac (weeks to months)
 - Arthritis, encephalopathy, polyneuropathy

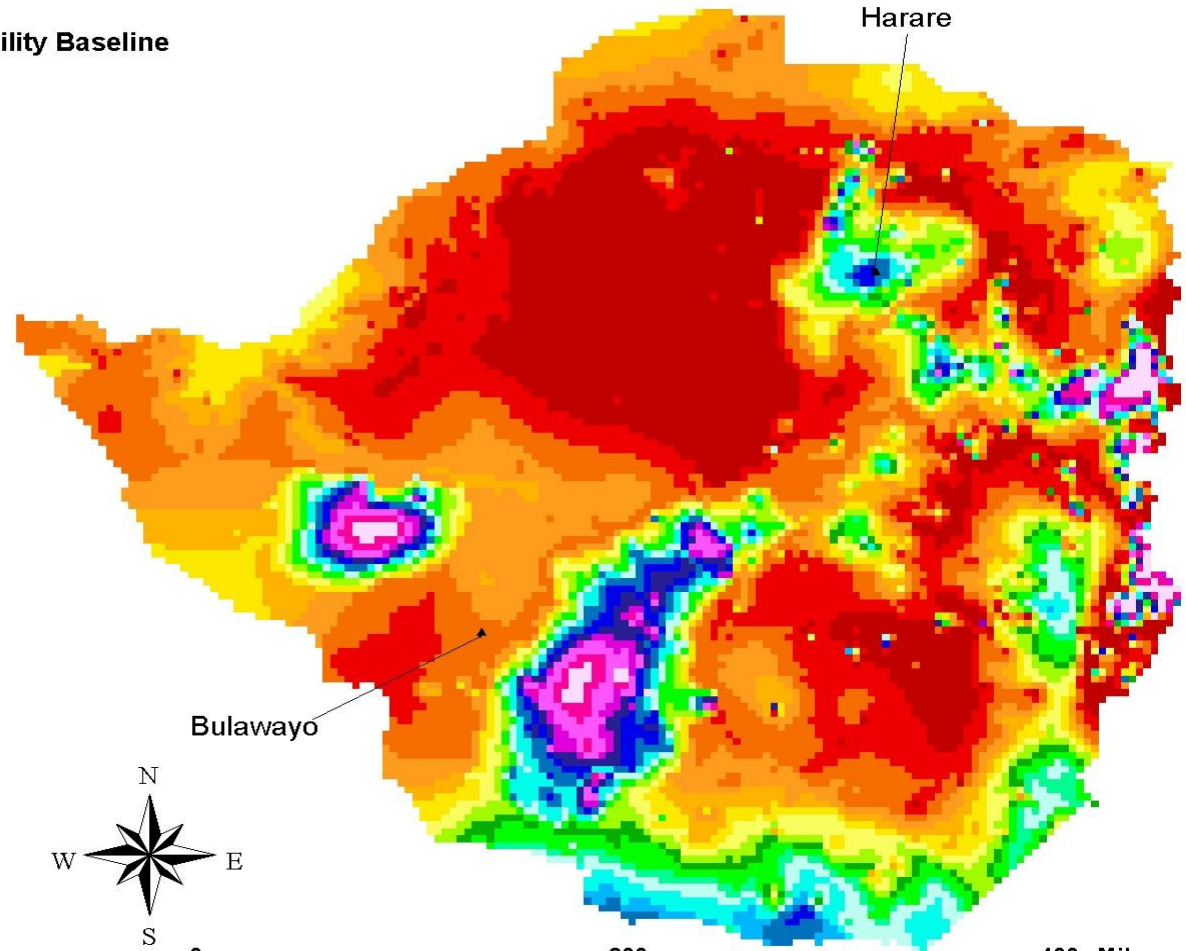
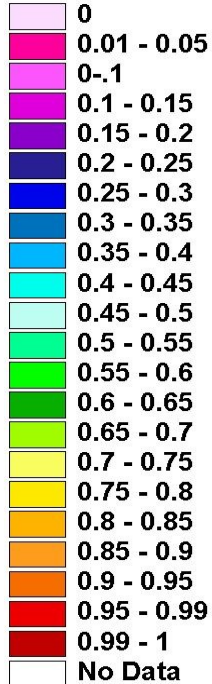
Potential Spread of Lyme Disease



Malaria in Zimbabwe 2000

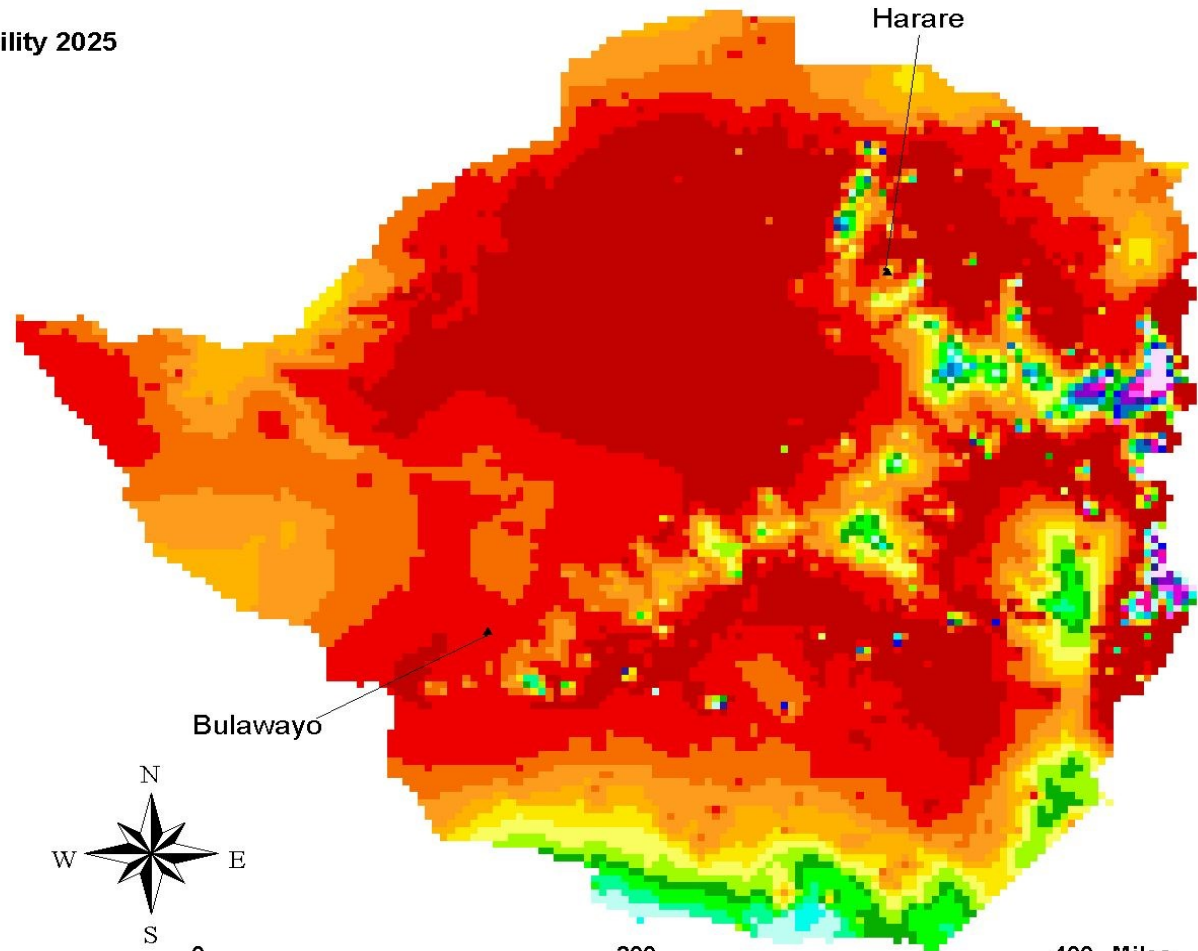
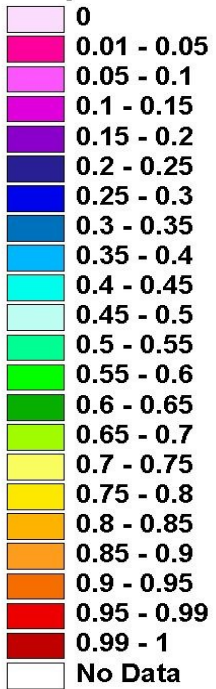
Baseline

▲ Cities
Fuzzy Climate Suitability Baseline



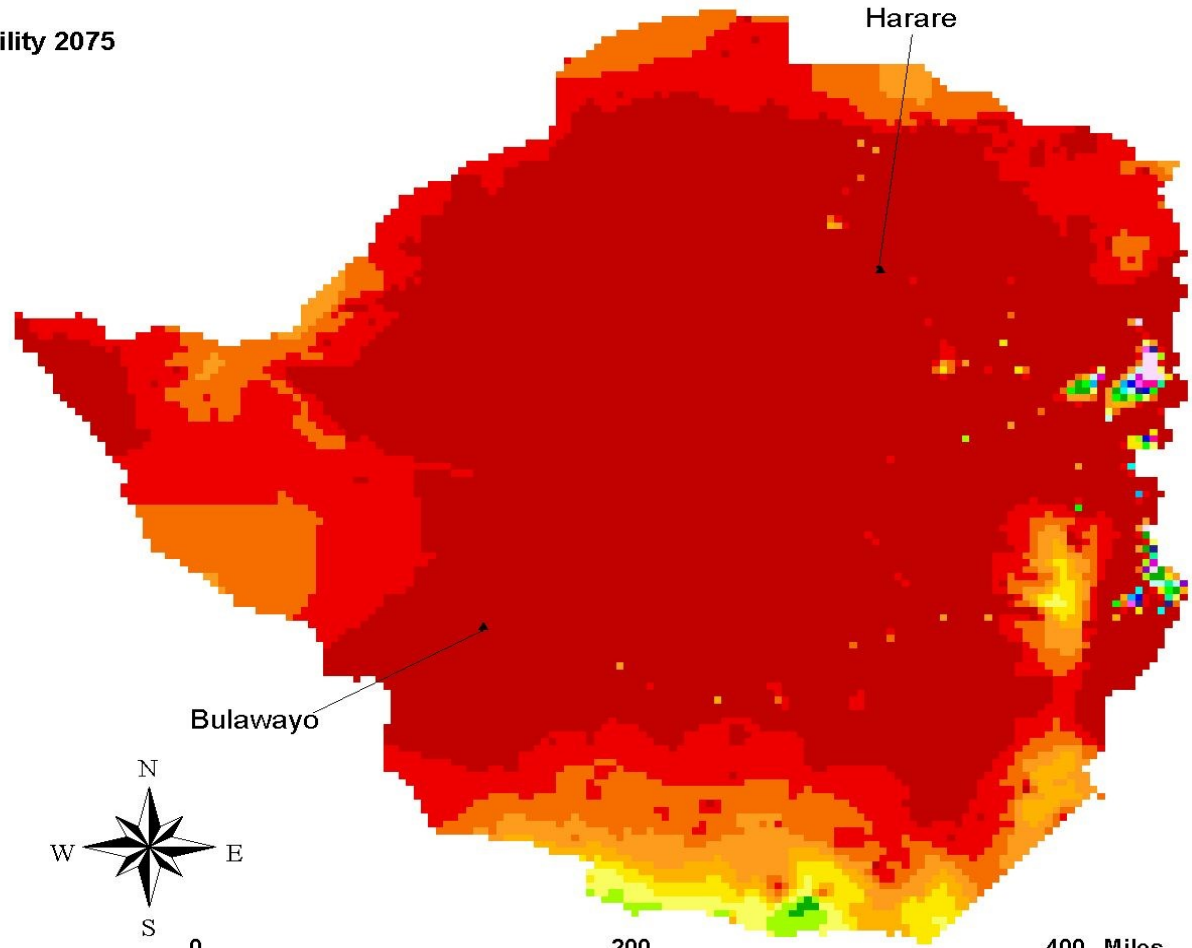
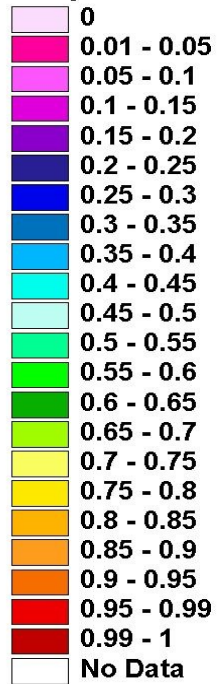
2025

▲ Cities
Fuzzy Climate Suitability 2025



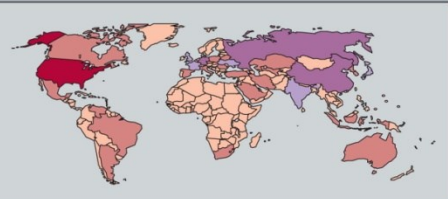
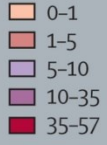
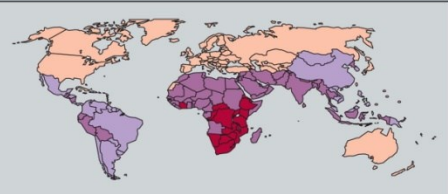
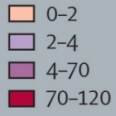
2075

▲ Cities
Fuzzy Climate Suitability 2075



Health Impacts of Climate Change

- Direct impacts
 - Temperature related
 - Extreme weather events
- Indirect impacts
 - Air pollution related
 - Vector borne and zoonotic diseases
 - **Increased scarcity of food and fresh water**
 - **Rise in sea level**
 - **Loss of biodiversity**
 - **Areas becoming uninhabitable**
 - **Mass human migration, conflict and violence**
 - **(IPCC 2014)**

A**Billion tons carbon****B****Mortality per million population**

Many low carbon policies good for health

Case studies in four sectors responsible for large emissions of greenhouse gases (GHGs) showed major health benefits

Sector	Health benefit
Household energy	Outdoor/ Indoor air
Transportation	Air pollution; active transportation ^exercise
Food production./ agriculture	Eat lower on the food chain
Electricity generation	Air pollution

So what can we as health professionals
do?

So what can we as health professionals do?

Calculate your Carbon footprint

Greening healthcare

Promote active transportation

Advocacy as medical/health organisations/alliances

WONCA Working Party Env Health

eBook

Climate change

Workers Health (with ICOH)

Radiation from Medical Investigations (with WHO)

Children's Environmental Health (with WHO)

Contents

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Obrigada!

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Objetivos de Aprendizado

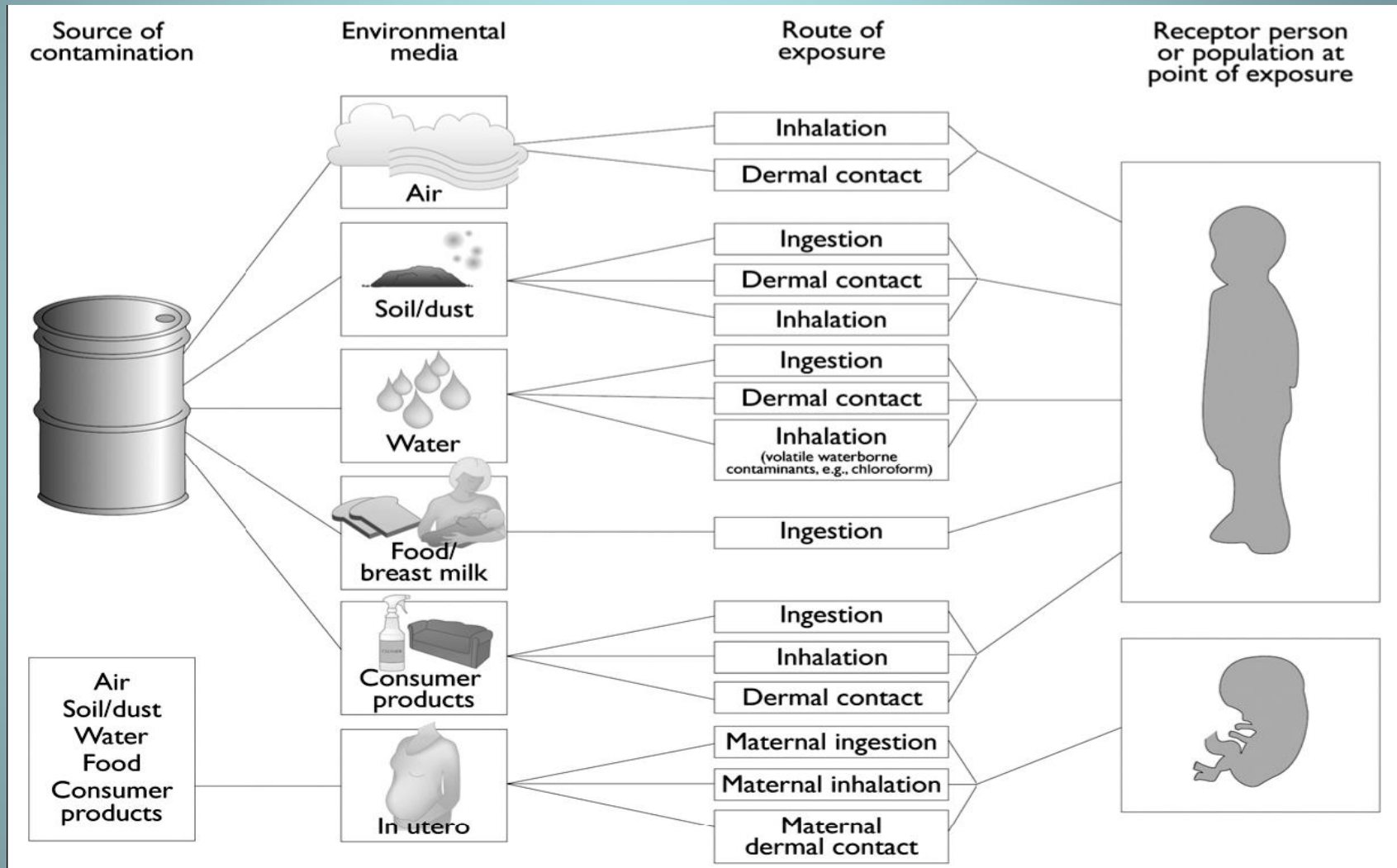
- Listar maneiras pelas quais os riscos ambientais são diferentes para crianças do que para adultos
- Ilustrar as vulnerabilidades aumentadas e únicas da criança em relação à ameaças ambientais
- Entender a relação entre a criança e o ambiente – começando antes da concepção e continuando por todo o desenvolvimento
- Propor ações de prevenção e remediação

Área Emergente da Saúde Ambiental

- Extensas novas evidências sobre questões de saúde ambiental e crianças na literatura científica.
- Reconhecimento de que Saúde Ambiental diz respeito à crianças e que isso deve ser avaliado e cuidado imediatamente



Rotas de Exposição



Principais Fontes de Poluentes

- Água
- Ar
- Comida
- Produtos de Consumo
- Solo / pó
- Leite Materno



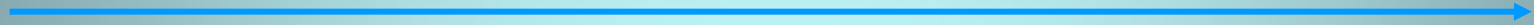
Photo Credit: CPCHE

Preocupações Atuais com a Saúde Humana Relacionadas a Contaminantes Ambientais

- Câncer
- Dano herdado
- Defeitos de nascimento
- Dano reprodutivo
- Efeitos no desenvolvimento e no comportamento
- Dano ao sistema imune
- Efeitos nos sistemas respiratório e circulatório
- Infecções virais e bacterianas

Exposição ao longo da vida: Carga sobre o corpo

Air



Água Potável



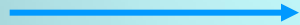
Ambiente doméstico



Solo: pele



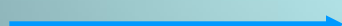
Solo: ingestão



Comida "Normal"



Aleitamento Materno



Intrauterina



Exposição ocupacional



Nasc.

6 m

1 a.

5 a.

16 a.

45 a.

65 a.

Crianças não são adultos pequenos



- Fisiologia do desenvolvimento dinâmica
- Maior expectativa de vida
- Politicamente fracos
- Exposições exclusivas e diversas

Exposições exclusivas e diversas

Transplacentária

Lições de fármacos:

- Talidomida
- Dietilbestrol (DES)

Vários produtos químicos atravessam a placenta

- Chumbo
- Mercúrio
- PCBs (Bifenil Policlorados)
- Drogas de abuso: álcool, metadona
- Radiação

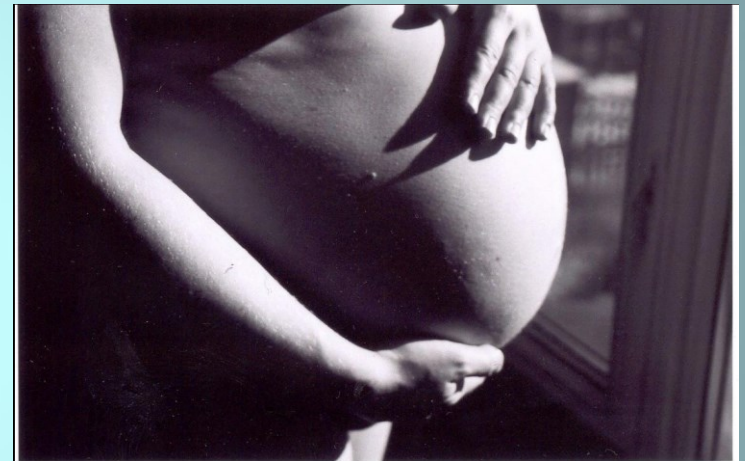
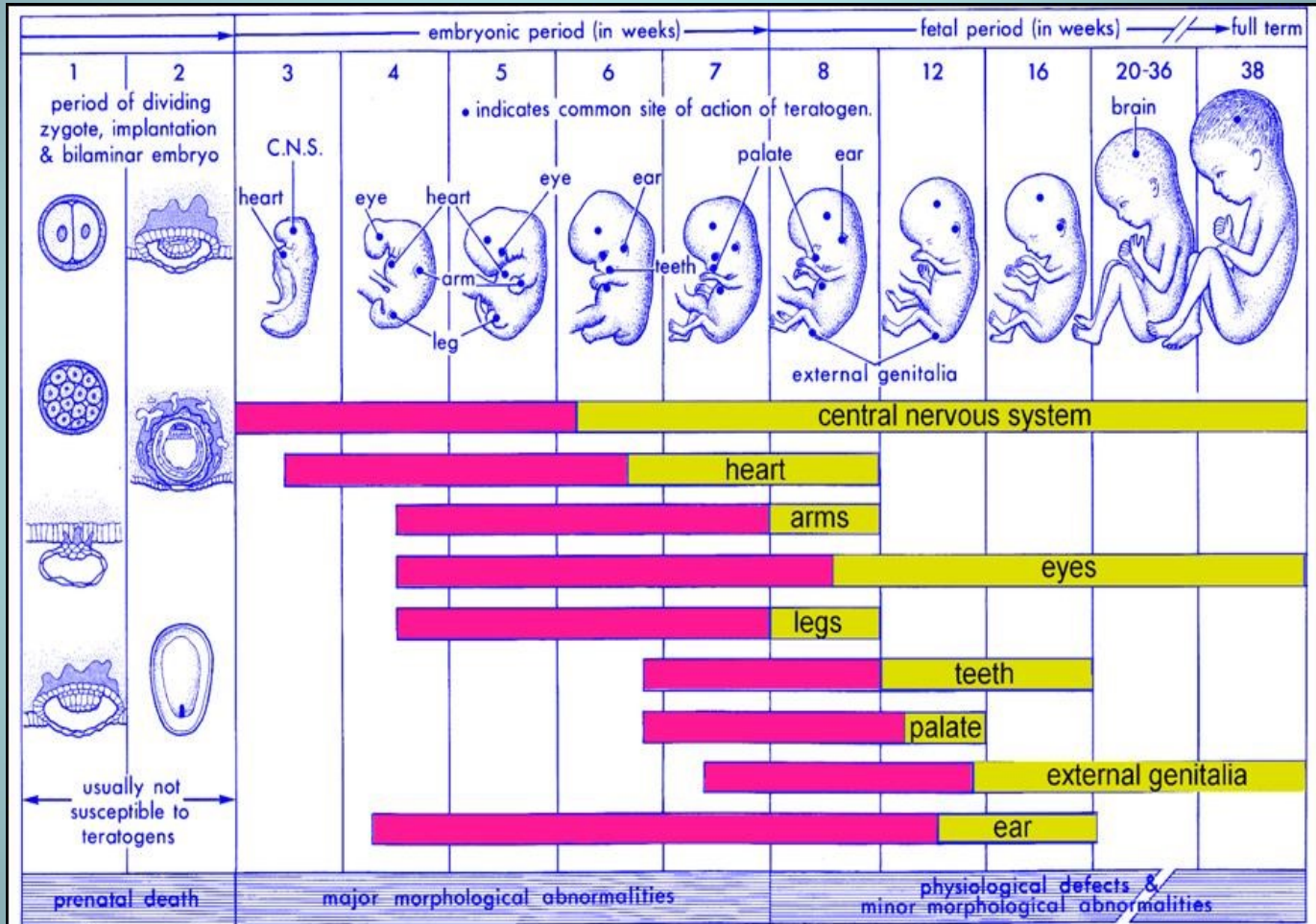


Photo Credit: CPCHE

Janelas do Desenvolvimento



Schematic illustration of the sensitive or critical periods in human development. Red denotes highly sensitive periods; yellow indicates stages that are less sensitive to teratogens.

Moore KL. The Developing Human: Clinically Oriented Embryology. Philadelphia: W. B. Saunders Company, 1973.

Exposições Exclusivas e Diversas

Aleitamento Materno

- O leite materno é a nutrição mais completa e segura para lactentes
- Mães devem tentar evitar exposições tóxicas a:
 - ✓ DDT, DDE, PCBs, Dioxinas
 - ✓ Mercúrio
 - ✓ PBDEs
- O leite materno pode servir de marcador para contaminação ambiental



Photo Credit: WHO

Exposições Exclusivas e Diversas

Comportamento Exploratório

- Mão para boca
- Objeto para boca



Exposições Exclusivas e Diversas

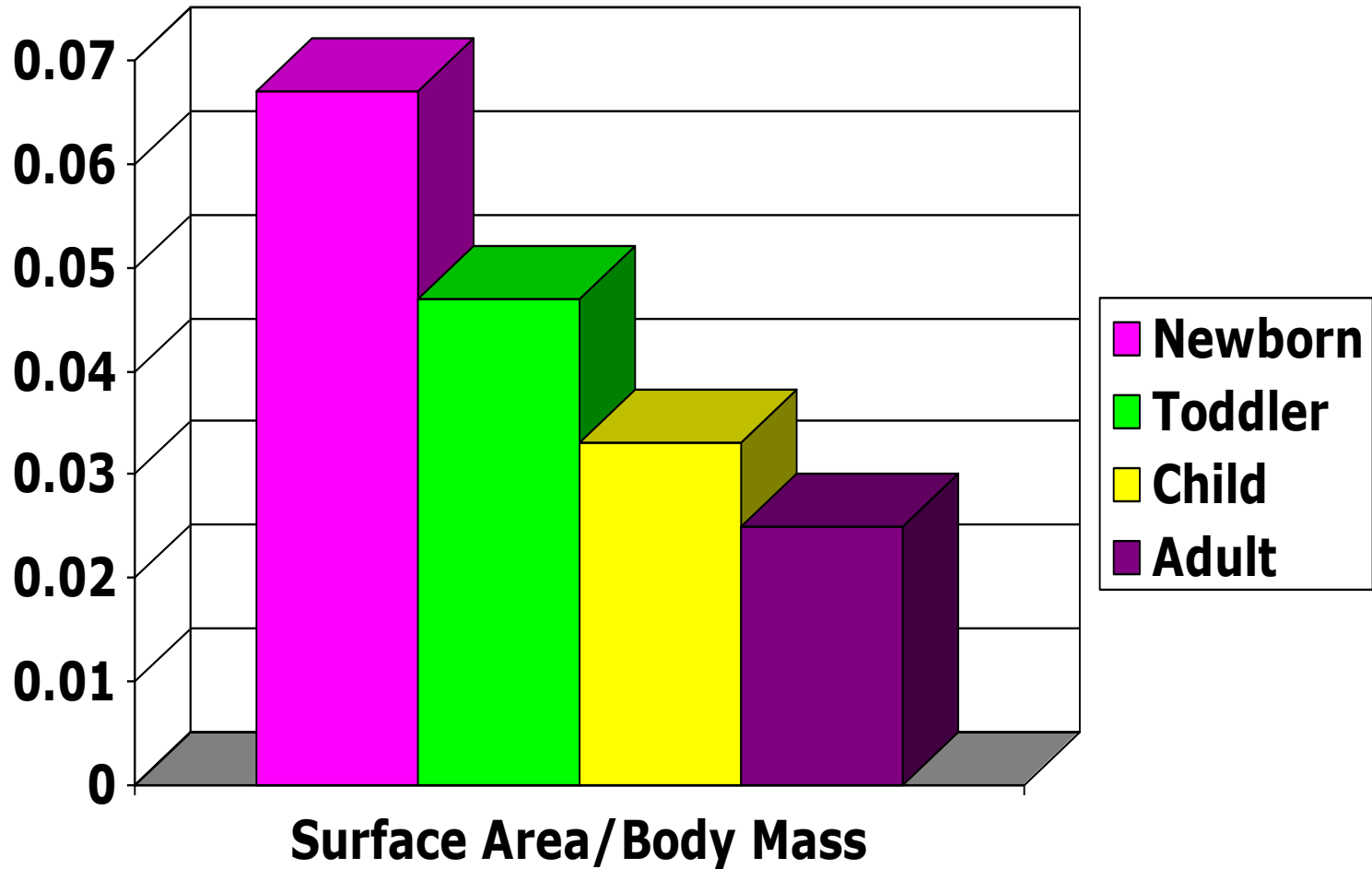
Estatura e zonas de respiração



Photo Courtesy: WHO

Exposições Exclusivas e Diversas

Tamanho e Superfície Corporal



Exposições Exclusivas e Diversas

Crianças / Adolescentes Não Reconhecem Perigo

- Crianças que não caminham não conseguem se afastar do perigo
- Crianças não-alfabetizadas não conseguem ler avisos e sinais
- Pre-adolescentes / adolescentes podem assumir riscos não razoáveis por imaturidade cognitiva e comportamentos de risco

Exposições Exclusivas e Diversas

MAIS VULNERÁVEIS

Xenobióticos são processados de maneira diferente por um corpo imaturo

- Aumento do consumo de energia, água e oxigênio em estado anabólico
- Absorção
- Biotransformação
- Distribuição
- Eliminação
- Janelas Críticas do Desenvolvimento



Photo Courtesy: WHO

Ambiente Complexo da Criança



Photo credit: US NIEHS CERHR logo