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***Climate change is the greatest threat to human health in the 21<sup>st</sup> century.*** Climate change will have direct and indirect effects on human health, causing manifold damages. Among the direct effects are changing temperatures that trigger the outbreak of infectious diseases; heat waves that can increase morbidity and mortality; and extreme weather events, which cause an increasing number of casualties. The indirect effects of climate change on human health include droughts and floods affecting agriculture and leading to malnutrition; scarcity of clean water, which widely impairs hygienic conditions; and migration due to changing environments, which makes humans vulnerable to a whole host of diseases.

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***The poorest suffer the most from adverse effects, and Africa will be hardest hit.*** Climate change and impacts on human health are global challenges. Nevertheless, some populations are specifically vulnerable: (1) People living in coastal regions, large cities, or polar regions. (2) Elderly people and patients with preexisting conditions in developed as well as developing countries. (3) Children and the poor.

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***Human health deserves greater appreciation in climate change policies.*** Climate change has been primarily perceived as an ecological threat. In fact, it equally threatens human health. We need more scientific research in order to understand human adaptation. Public attention and political commitment are urgently needed to tackle the challenges.

# Climate change impacts human health via five major determinants

## Scarcity of clean water

Drought and excess water due to heavy rain compromise supply of potable water and hygienic conditions



## Infectious diseases

Rising temperatures, shifting rainfalls patterns, and increasing humidity affect transmission of diseases by vectors (e.g., mosquitoes) and through water and food



## Heat waves

Rising temperature adds stress to individuals with preexisting diseases, increases ground-level ozone, and lengthens pollen seasons



## Extreme weather events

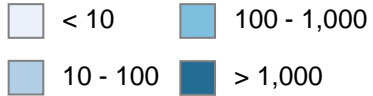
Increasing frequency of storms, heavy rain, and heat waves kill people, destroy homes, and cause outbreak of diseases



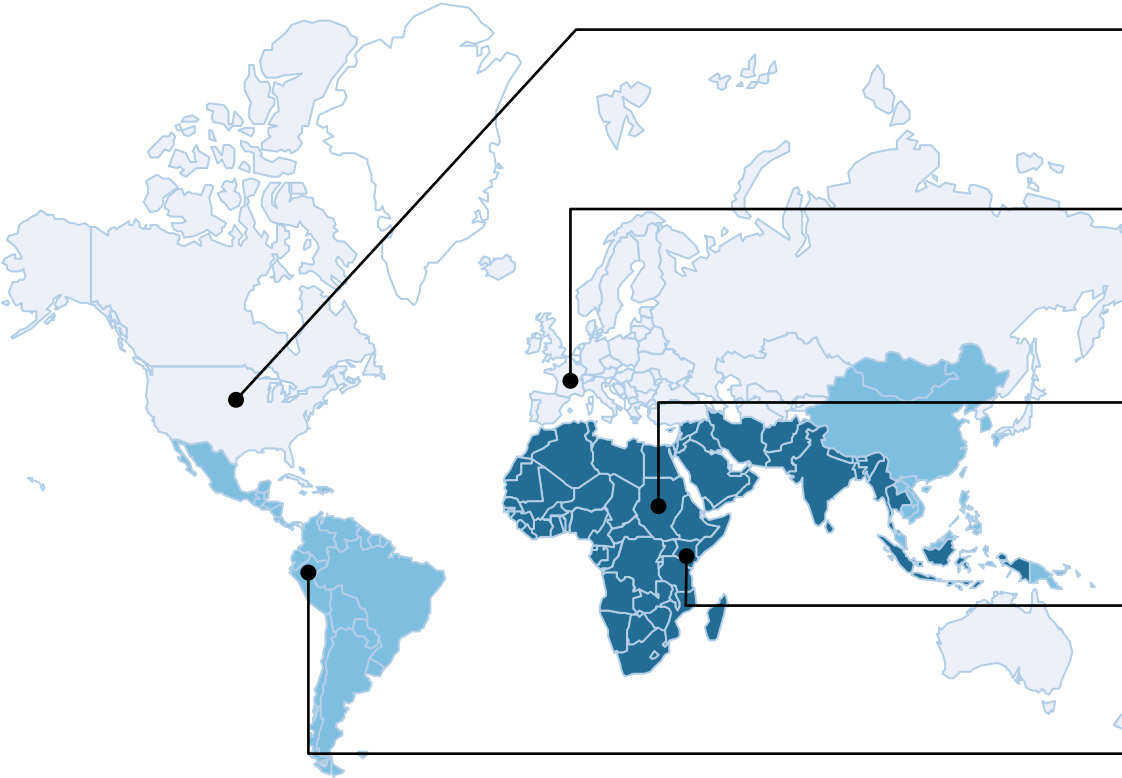
## Droughts and floods

Increasing climate variability affects agricultural yields, compromises food security, and exacerbates malnutrition






# An increased incidence of climate-related calamities has been seen in recent years



## Estimated effects of climate change in 2000 Disability adjusted life years (DALYs) per million population

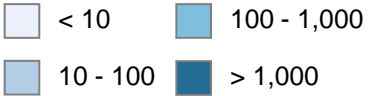


## Examples of health consequences

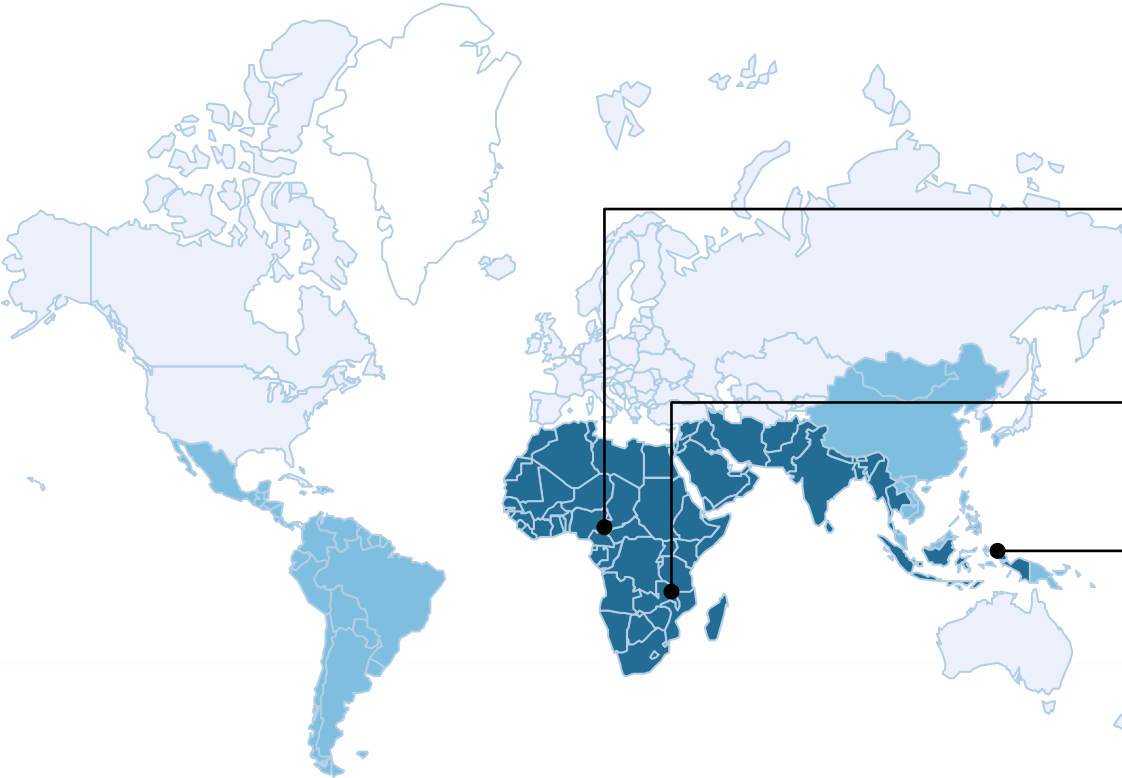
<p><b>USA, 2005:</b> Hurricane Katrina kills 1800 people and causes USD 81bn. In damages.</p>	
<p><b>Europe, 2003:</b> 70,000 excess deaths during extreme heat wave</p>	
<p><b>Northern Darfur, since 1920s:</b> 30% decrease in precipitation causing desertification, starvation, conflict</p>	
<p><b>Western Kenya, since 1970s:</b> 8-fold increase in malaria prevalence</p>	
<p><b>Peru, 1970 - 2003:</b> Total area of glaciers reduced by 22%, affecting water supply for 60% of population</p>	

1 DALY: Disability adjusted life years, a measure of burden of disease, which denotes the years of life lost as a consequence of premature death as well as the years of full productivity lost as a result of disability caused by a disease or condition (WHO)  
 2 The Lancet, May 2009

# "Climate change is the biggest global health threat of the 21<sup>st</sup> century<sup>2</sup>"



## Estimated effects of climate change in 2000 Disability adjusted life years (DALYs) per million population



## Predicted health consequences

**Air** – Global: A 1°C rise in temperature will increase deaths from air pollution by over 20,000 per year

**Food** – Africa, 2020: Yields from rain-fed agriculture could drop by 50%, aggravating starvation

**Disease** – Africa, 2030: Population at risk of malaria may swell by 90 million

**Shelter** – Coastal areas, 2090: More than 100 million people per year exposed to coastal flooding

**Water** – Global, 2050: 3-6 billion people living in water-stressed water basins

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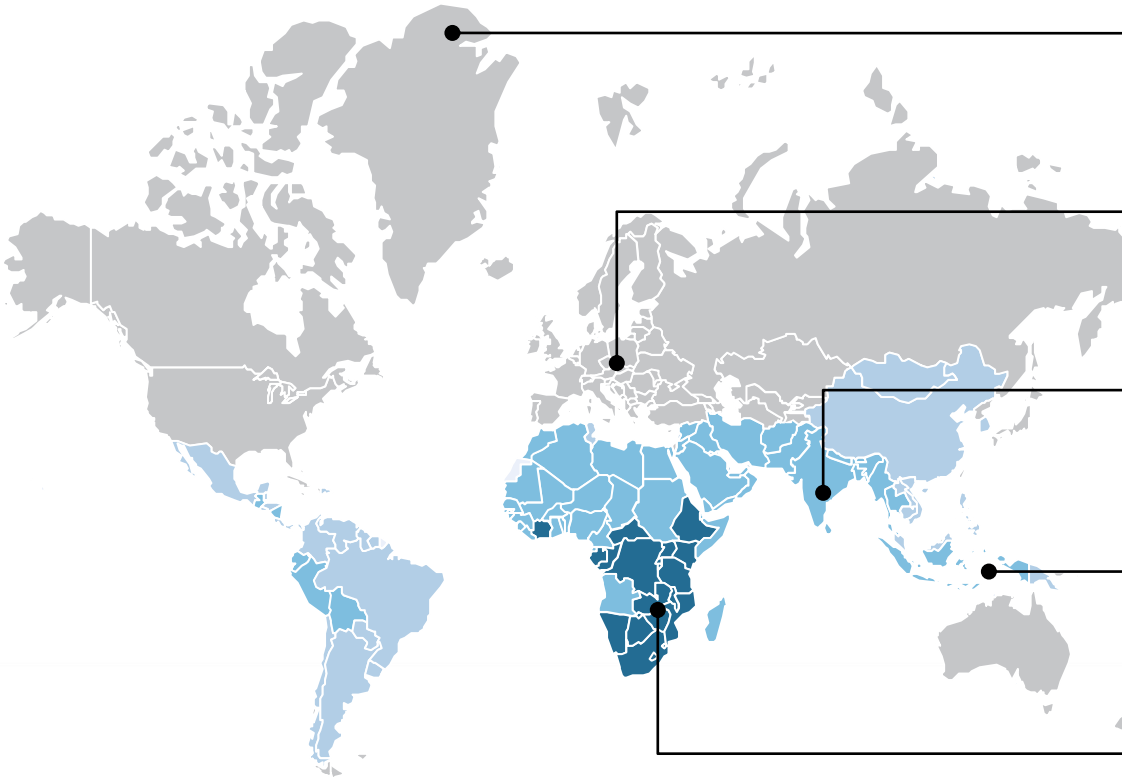
2 The Lancet, May 2009

SOURCE: The Lancet, WHO

# Climate change challenges human health globally – but the poorest are the most vulnerable



## Deaths attributed to climate change Per million people



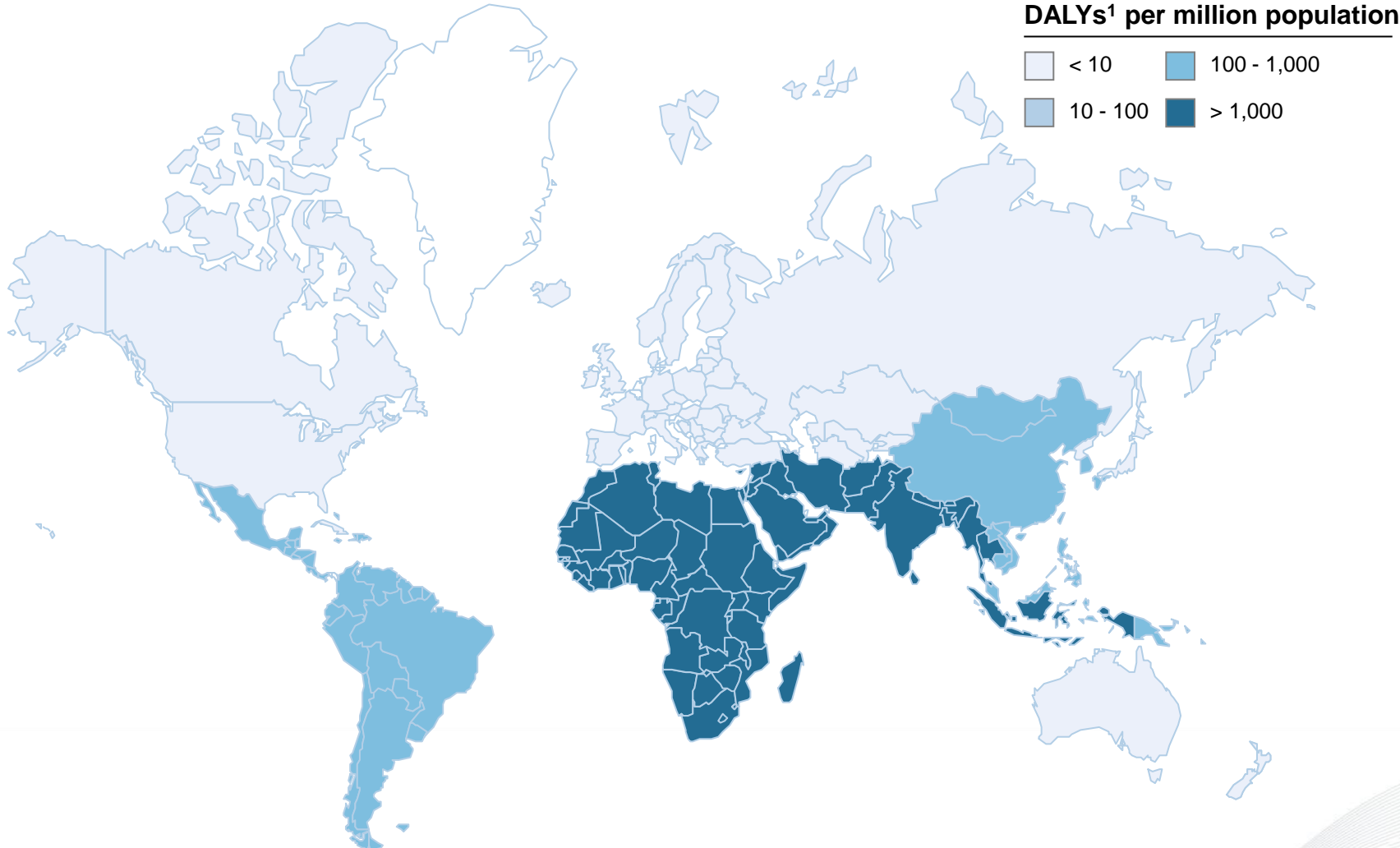
## Populations most vulnerable

- Polar regions and mountain populations** 
- Elderly people and individuals with preexisting medical conditions** 
- Densely populated megacities** 
- Coastal regions and small islands** 
- Children and the poor** 

SOURCE: WHO; The Lancet

# Climate change challenges human health globally – but the poorest are the most vulnerable

Estimated effects of climate change in 2000



<sup>1</sup> DALY: Disability adjusted life years, a measure of burden of disease, which denotes the years of life lost as a consequence of premature death as well as the years of full productivity lost as a result of disability caused by a disease or condition (WHO).

SOURCE: The Lancet, WHO