Climate Change and Health

CO2 COALITION

Climate Change and Health

CO_2 Coalition Comment on
Reconsideration of 2009 Endangerment Finding
and Greenhouse Gas Vehicle Standards

Dr. D. Weston Allen, MBBS, FRACGP

Dr. Jan Breslow, M.D.

Dr. Daniel Nebert, M.D.

October 2025

CO_2 COALITION

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Human health, morbidity, mortality and longevity are significantly impacted by climate. This review examines the evidence for past, present and possible future human health impacts of climate change and its ramifications. It will also examine the health impacts of different energy sources and climate actions. It will not examine every link in the literature to a range of conditions where attribution is implausible or tenuous, or where association assumes causation.

WARMTH, WEALTH AND HEALTH

For over 2 million years, Earth has been in the grip of an ice age interspersed every 100,000 years or so with interglacial warm periods. Our furless species evolved on the hottest continent, probably during the warm Purfleet interglacial, spread during the Eemian, also several degrees warmer than now, and populated the planet during the present Holocene, dating from 9700 BCE when South Greenland warmed by 7°C in just 50 years (Callaway 2017, Candy et al. 2010, Oppenheimer 2009, Lozhkin et al. 1995, Dansgaard et al. 1989). Agriculture began and civilizations arose during the Holocene Climatic Optimum, which was warmer than now for several millennia in Russia and up to 7°C warmer in the Arctic (Lamb 1988, Cuffey et al. 2000, McBean et al. 2005, Briner et al. 2006).

Humanity flourished and multiplied during the Minoan and Roman warm periods, after which rapid cooling ushered in the dreadful Dark Ages. The bubonic plague of Justinian (541–542 CE) killed 25 million people, 13% of the world's population, and twice that number died from plague over the next two centuries (Rosen 2007). After flourishing again during the Medieval Warm Period, humanity endured a miserable Little Ice Age (LIA) with frequent widespread crop failures, mass starvation, disease and depopulation (Lamb 1965, Patterson et al. 2010). Crop failures over successive summers from 1315 produced the Great Famine of Europe. The Black Death of 1346–1353 wiped out 30–60% of Europe's population and up to 200 million people across Eurasia (Austin Alchon 2003).

Global rewarming since the 18th century—associated with increasing prosperity, better housing, sanitation, food and water supplies—has greatly benefited human health and wealth. Deaths from typhoid and tuberculosis declined dramatically during pre-antibiotic 20th century warming (1910–1945) (Gordon 1976). Mortality from all causes fell as temperatures rose (Bull et al. 1975). From a billion people in 1800, the global population doubled by 1927, doubled again to 4 billion in 1974 and again to 8 billion in 2022. Despite this fourfold increase over the last century, the number of deaths from extreme weather events declined by over 90% (Goklany et al. 2011).

Northern winters nevertheless remain more lethal than summers, 13% more so in 1952–67 in the U.S. and 16% more so in 1985–90, partly due to the increased availability and affordability of air-conditioning in summer (Fernandez-Raga et al. 2010, Moore 1998). Climate action in the U.K., however, was largely responsible for *fuel poverty* affecting almost a third of the elderly and high winter death toll in 2017–18, the worst in 42 years despite global warming (Poulter 2017, Coyle 2018).

Davis et al. (2003, 2004) found a 74.4% decline in heat-related mortality in 28 of the largest U.S. cities from 1964 to 1998 and estimated that another 1°C increase would further reduce the net mortality rate. Analyzing over 74 million deaths in 384 locations across 13 countries, Gasparrini et al. (2015) found that cold weather was over 17 times more lethal than hot weather: 7.3% of all deaths due to cold and 0.42% from heat. Masselot et al. (2023) found cold weather to be 10 times more lethal than hot weather across Europe and 40 times more so in northern Europe. Their visual display of this difference (Figure 1) was camouflaged by making the X-axis for heat-related deaths 5.6 times greater than the X-axis for cold-related deaths!

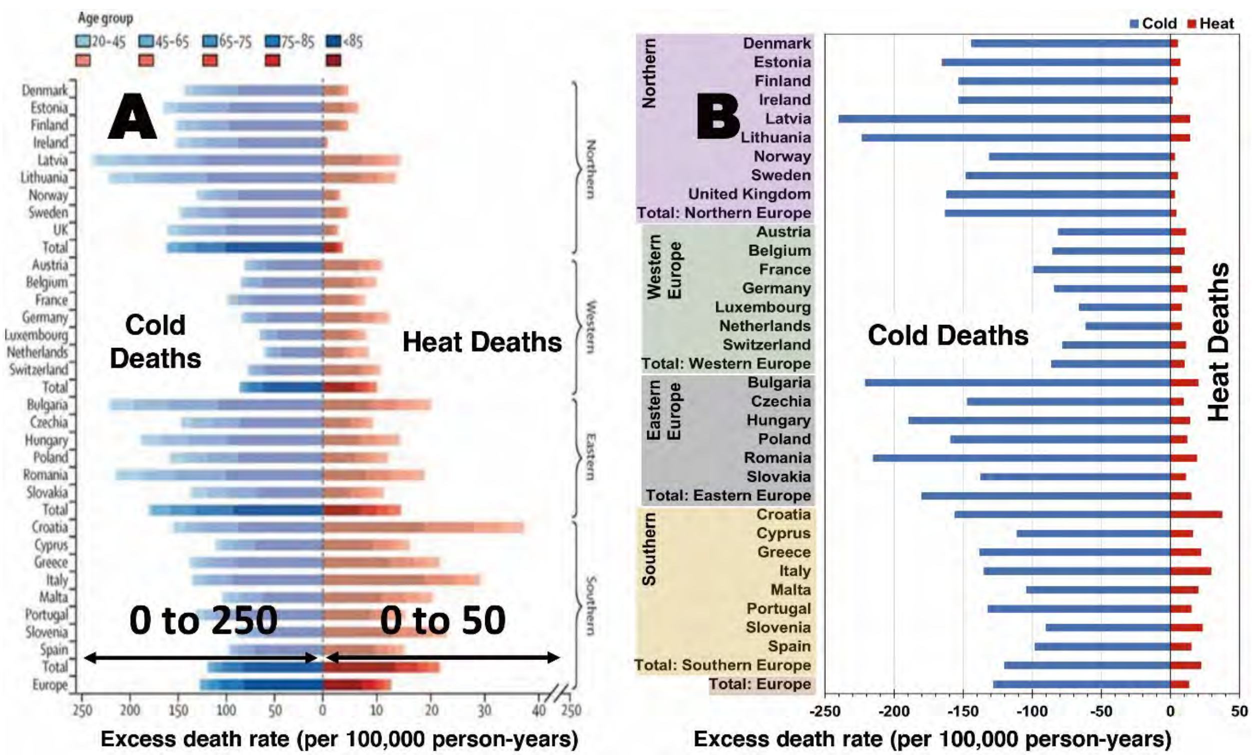

Figure 1: *Temperature-Related Mortality in European Cities from Masselot et al. 2023,*
(A) As Depicted in The Lancet,
(B) Identical X-axis for Heat and Cold, Corrected by the CO_2 Coalition.

Life expectancy is strongly associated with wealth, or GDP (gross domestic product) per capita (Figure 2) (Preston 2007). Both have been increasing in all regions of a warming world since the Industrial Revolution, the global average life expectancy at birth more than doubling from 32 to 71 years between 1900 and 2021 (Roser 2018).

By cheaply and reliably powering industry, plus mechanizing agriculture and transport, fossil fuels helped to end slavery and emancipate women and children. They propelled urbanization and development of sewerage, safe water supplies, electricity, heating and cooling. They also

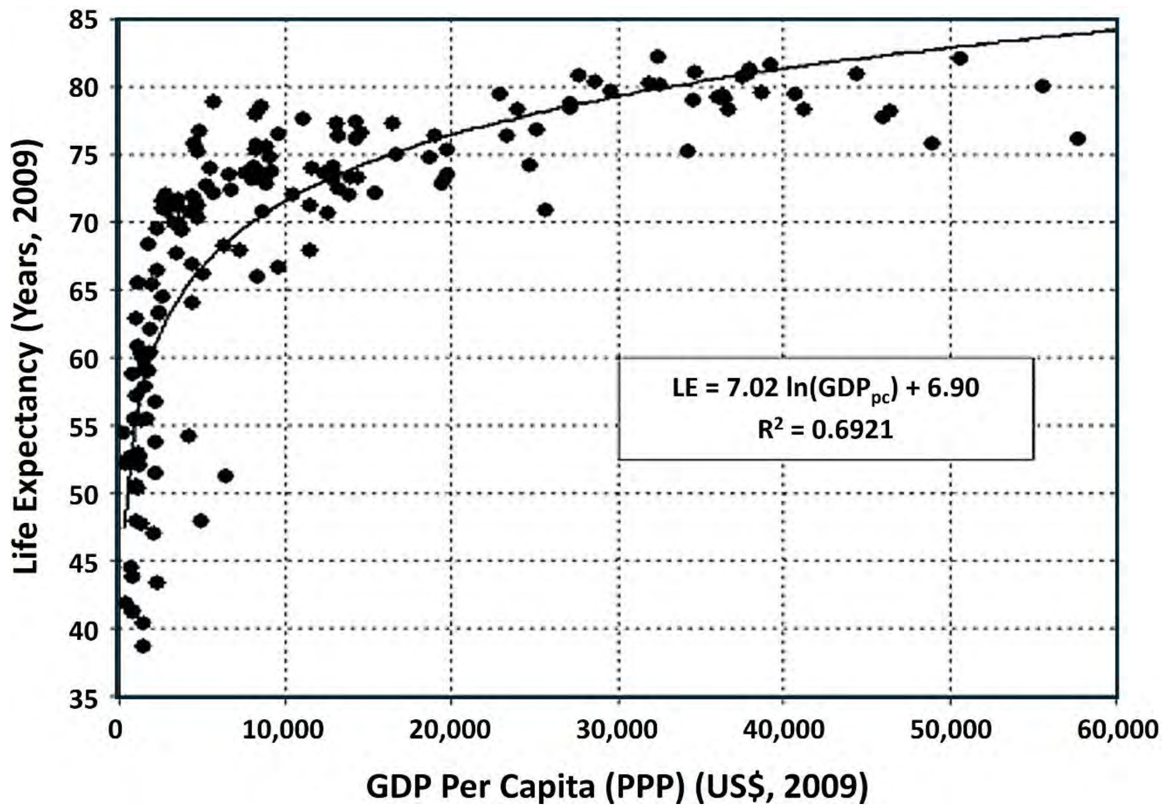

Figure 2: *The Preston Curve of Life Expectancy at Birth Increasing with GDP Per Capita. Source: https://en.wikipedia.org/wiki/Preston_curve*

facilitated improvements at hospitals and better overall health care. Their products and by-products (fertilizers, pesticides and carbon dioxide) also boosted food production and human nutrition.

By how much fossil fuels have contributed to global warming, no one can say precisely, but probably less than earlier estimates. Richard Tol (2010) analyzed 14 peer-reviewed papers examining likely impacts on GDP and human welfare of 21st century warming, which was variously estimated to be by 1°C (two studies), 2.5°C (10 studies) and 3°C (two studies). He found that that 1–2°C would probably increase global GDP (Figure 3). McKitrick (2025) analyzed 1,222 data sets on the impact on crop yields from warming due to increasing CO_2 and found it to be positive up to as much as 5°C of warming.

> *The Lancet* confidently predicted in 2009 that climate change would be "the biggest global health threat of the 21st century." But in 1909, who could have predicted two devastating world wars, the atomic bomb, the 1919 influenza pandemic, HIV/AIDS or the global obesity/diabetes epidemic? And who could have anticipated the marvels of modern medicine, antibiotics, antivirals, organ transplants, joint replacements, in vitro fertilization, genetic engineering or a doubling or more of the average lifespan? Prophesies are in the province of religion, not science.

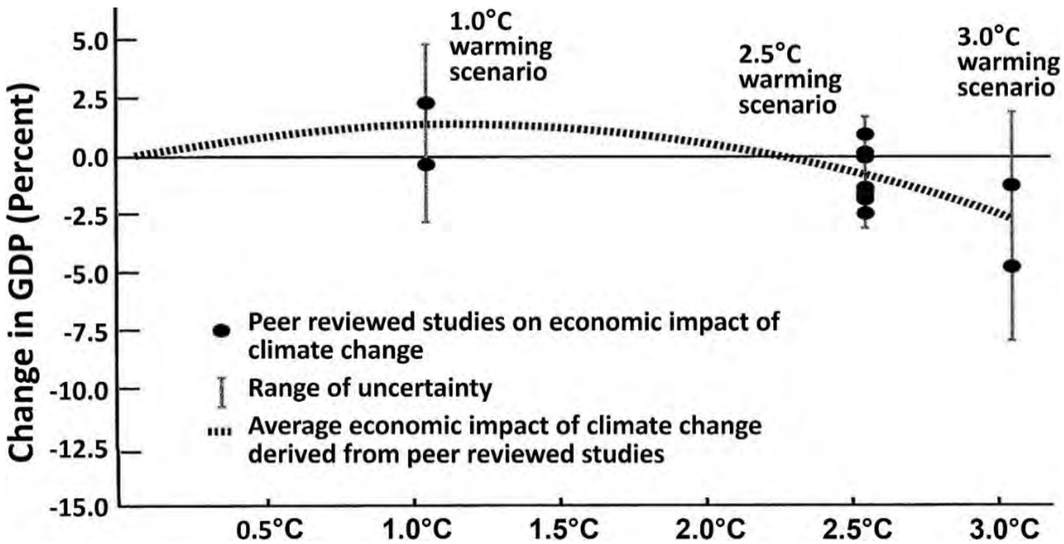

Figure 3: *Projected Economic Impact of Global Warming of 1°C, 2.5°C and 3°C Over the 21st Century (Tol 2010).*

TEMPERATURE, MORBIDITY AND MORTALITY

By absorbing some solar radiation by day and emitting it to Earth's surface by night, greenhouse gases reduce the diurnal temperature range (DTR), especially at high latitudes (Braganza 2004). Whereas solar warming increases daytime maximum temperatures, greenhouse gases primarily impact nocturnal minimums, nicely demonstrated in a study of nighttime temperatures across the U.S. (Knappenberger 2001). While warming during 1910–1939 was rather even across the year, warming during 1970–1997 impacted primarily the coldest nights (Figure 4).

High temperature variability is associated with increased cardiovascular and respiratory mortality in the U.S. (Braga et al. 2002). Cardiac mortality increased by 1.7% in Hong Kong and by ~3.2% in Shanghai for every 1°C increase in DTR (Tam 2009, Cao 2009). Emergency visits to the Huashan Hospital, Shanghai, with respiratory infections were 1% and 2% higher for every 1°C increase in the current-day and two-day moving average DTR, respectively (Ge et al. 2013). DTR is also a risk factor for death from chronic obstructive pulmonary disease (COPD) (Song et al. 2008).

Global declines in DTR, temperature variability and cold nights significantly reduce human morbidity and mortality short-term and over time (Easterling et al. 1997, Robeson 2002, Alexander et al. 2006). In a prospective ~5-year study in China, Tang et al. (2022) found that the risks for all-cause mortality, cardiovascular disease, and stroke increase by 13% (95% confidence index (CI): 8–18%), 12% (95% CI: 7–18%), and 9% (95% CI: 2–16%), respectively, per 1°C increment in DTR. Xu et al. (2013a) found that childhood asthma in Brisbane increased for up to nine days after a DTR above 10°C, with a 31% increase in emergency department admissions per 5°C increment in DTR. His team also found a 1°C increase in DTR to be associated with a 3%

increase in emergency department admissions for childhood diarrhea but wrongly concluded: “As climate change continues, DTRs are likely to become more variable. Therefore, the associated health impacts are also likely to increase (Xu et al. 2013b).” When researchers realized that their findings favored climate change, the research dried up!

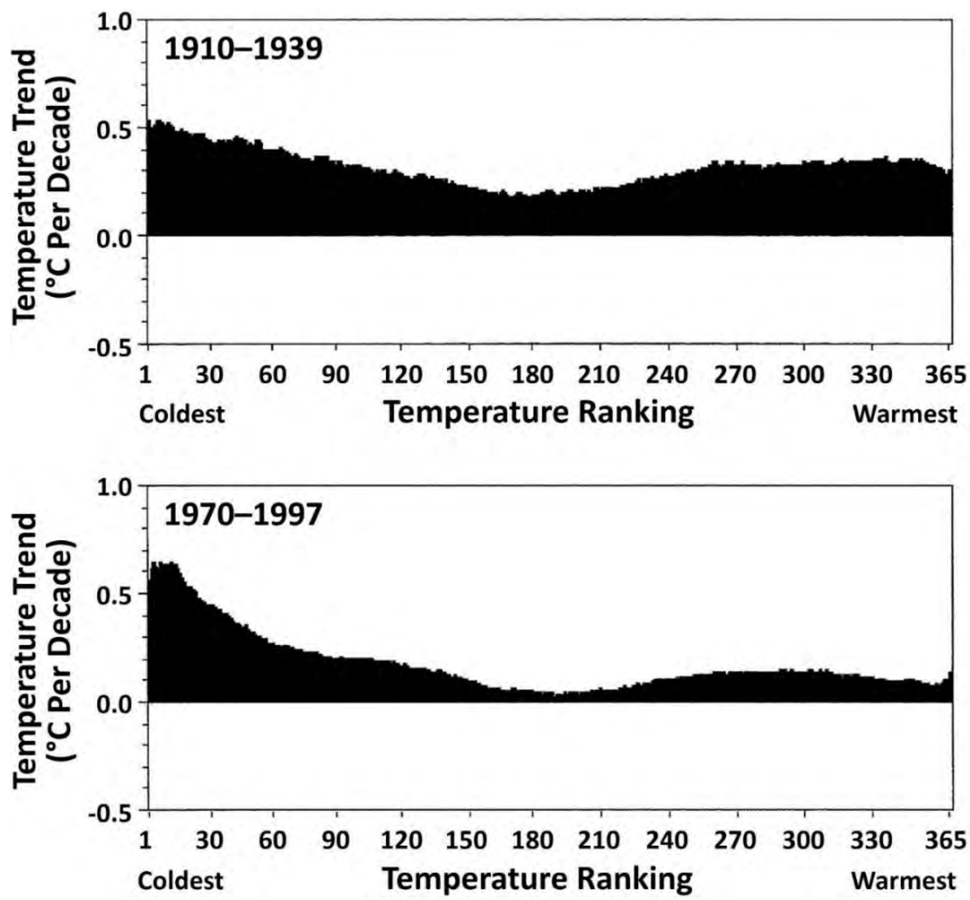

Figure 4: *Nocturnal Temperature Trends for 1910–39 (Top) and 1970–97 (Bottom): Trends Plotted for the Coldest Nights from the Left (No. 1) to the Warmest (No. 365) (Knappenberger et al. 2001).*

Cardiovascular disease (CVD) is the major cause of death worldwide. It presents more often in winter and is more often fatal on cold days (Hajat et al. 2002). A study in the Hunter Region of New South Wales, Australia, (1985–1990) found that “fatal coronary events and non-fatal definite myocardial infarction were 20–40% more common in winter and spring than at other times of year”; coronary deaths were up to 40% more likely to occur on cold days than at moderate temperatures (Enquselassie 1993). Cardiovascular mortality was 15% higher in the colder months of October–March than in the period April–September in Norway (1990–1995), 33% higher in Californian winters (1985–1996) and 50% higher in mid-winter than in mid-summer in both London (1994–1996) and Israel (1976–1985), despite summer temperatures often exceeding 30°C (Nafstad et al. 2001, Kloner et al. 1999, Kovats et al. 2004, Green et al. 1994).

Braga et al. (2002) compared cardiovascular mortality in hot cities in the southern United States with cold cities in northern states. They found neither hot nor cold weather had much impact in the hot cities but significantly increased the mortality in the cold cities, where the cold-day effect was five times as great as the hot-day effect and persisted for days. There was a deficit of deaths for a few days after the hot days, indicating that hot days had a “harvesting effect” on those who were about to die. Cagle and Hubbard (2005) examined the relationship between temperature and out-of-hospital cardiac deaths in people over 54 years of age in King County, Washington, over the period 1980–2000; mortality rose by 15% on days with maximum temperatures below 5°C and dropped by 3% on days with maximum temperatures over 30°C. In Japan (1970–1999), heart disease and stroke mortality rates were nearly twice as high in winter as in summer (Nakaji et al. 2004).

Stroke is more common in cold weather. Novosibirsk, Siberia, has one of the world’s highest rates of stroke, 87% being ischemic (due to blocked cerebral blood vessels) and 32% higher on days with low ambient temperature (Feigin et al. 2000). A similar association was found in Korea, where Hong et al. (2003) found a 24–48-hour lag between exposure to cold and the onset of stroke. A study of World Health Organization (WHO) data on women aged 15–49 from 17 countries in Africa, Asia, Europe, Latin America and the Caribbean found that a 5°C reduction in mean air temperature was associated with a 7% increase in hospitalization with stroke (Chang et al. 2004). Aneurismal subarachnoid hemorrhage is also strongly correlated with winter and cold weather (Gill et al. 2012).

Respiratory disease is strongly related to temperature. Coughs, colds and influenza are far more prevalent in winter. Consultations for respiratory disease in London (1992–1995) increased linearly by 10.5% per degree (below 5°C) (Hajat et al. 2002). Keatinge and Donaldson (2001) found a linear increase in mortality from respiratory disease in Londoners aged over 50 as the temperature fell below 15°C. The bronchiolitis season in central England was shortened by about three weeks for every 1°C of annual warming from 1981 to 2004 (Donaldson 2006). Carder et al. (2005) analyzed non-violent deaths in Scotland (1981–2001) and found that every 1°C drop in the daytime mean temperature below 11°C on any one day was associated with a 4.8% increased respiratory mortality over the following month. Respiratory-related deaths were 47% higher in winter than in summer in Oslo during the period 1990–1995 (Nafstad 2001). Even in Sao Paulo, Brazil, Gouveia et al. (2003) found the fewest respiratory deaths in all age groups occurred at 20°C; mortality increased twice as much per degree below 20°C as it did above 20°C.

Asthma increased in many countries by 50% per decade last century and the Centers for Disease Control (CDC) linked this to climate change (CDC 2014). Alternative explanations include increasing hygiene, antibiotic use and pasteurization of cow’s milk (Liu 2007, Kozyrskyj et al. 2007, Ewaschuk et al. 2011, Loss et al. 2011). Although rising CO_2 concentrations and temperatures may increase ragweed pollen numbers, they are highly variable both spatially and temporally (Wayne et al. 2002, Weber 2002). In Switzerland, ragweed pollen has been decreasing in Zurich since 1982, and the major allergenic pollens have been declining in Basel since the early 1990s, as has the incidence of allergic rhinitis (hay fever) (Frei et al. 2008). The Poaceae family of herbaceous grasses affects 80% of pollen-allergy sufferers in Europe (D'Amato et al. 2007). Jato et al. (2009) found that the Poaceae pollen count had declined in four Spanish cities since 1993, by ~75% in Lugo and by 80% in Santiago. They also found a delayed onset and shorter duration of the atmospheric pollen season.

Eczema prevalence in the U.S. is significantly lower when the temperature and relative humidity are highest (Silverberg et al. 2013). A study of atopic eczema in the mountainous area of Davos, Switzerland, in 1983–1989 found itch-intensity to be inversely correlated with temperature (Vocks et al. 2001). Thirty Norwegian children realized improvements in their eczema, quality of life, skin bacterial culture and medication usage after spending a month in the Canary Islands; the improvement, compared to a matched control group, was still apparent three months later (Byremo 2006).

Cholera, which afflicts 3–5 million people and kills about 100,000 annually, is now confined to developing countries in the tropics and subtropics (Figure 5) (Charles et al. 2011). When an epidemic broke out in London in 1848, Dr. John Snow performed the world's first epidemiological studies in linking it to contaminated water. Nearly a century and a half later, a

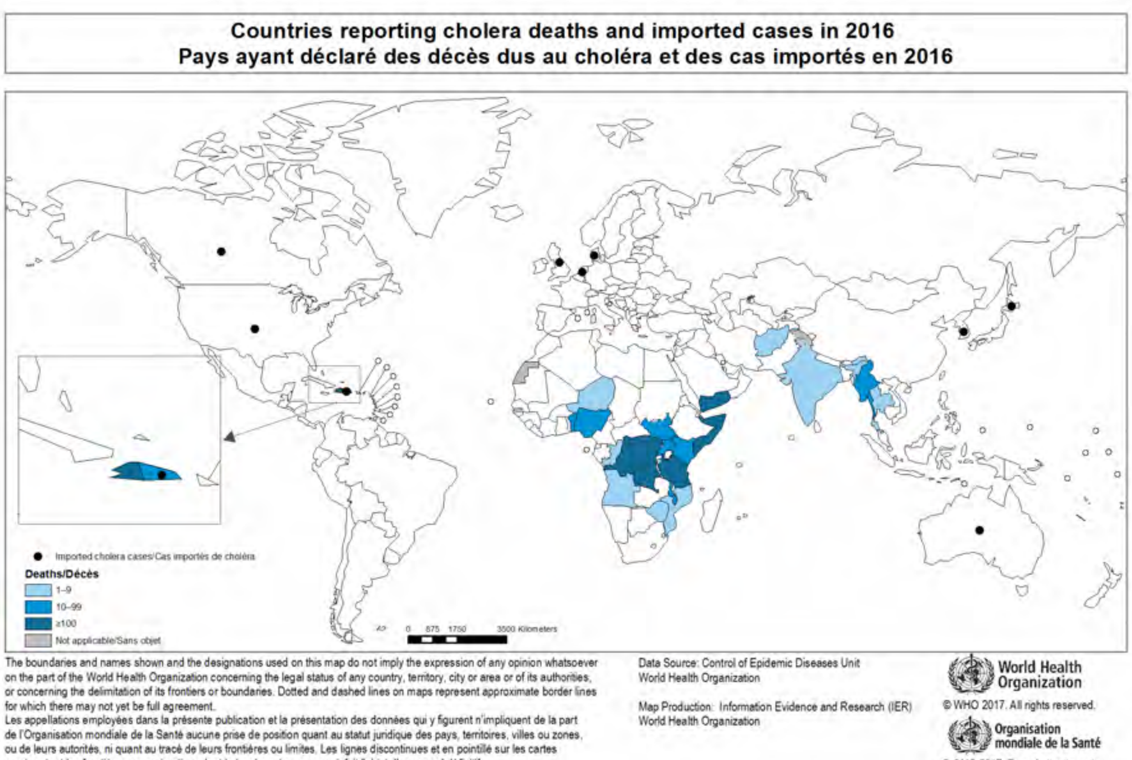

Figure 5: *Distribution of Cholera in 2016 as Reported to the World Health Organization. Source: http://gamapserver.who.int/mapLibrary/Files/Maps/Global_Cholera(WER)_2016.png*

paper in the prestigious journal *Science* linked a 1991 outbreak in South America to climate change (Colwell 1996). The real cause, however, was a failure of the Peruvian authorities to properly chlorinate water supplies (Anderson 1991). Climate change can be a convenient scapegoat for government failure!

Gastroenteritis, which kills around 444,000 children every year globally, is predicted to increase with climate change from enteroviruses released in glacial melt and more bacteria in warmer seas and flood water (WHO 2024a, Donnelly et al. 2023, Varghese et al. 2023, Trinanes et al. 2021). However, rotavirus and norovirus, the most common pathogens causing diarrhea in children and adults, respectively, exhibit lower survivability at warmer temperatures (Chua et al. 2022). Moreover, emergency department admissions for childhood diarrhea decline as DTR declines with climate change (Hajat et al. 2002). Infectious disease accounted for 74% of infant deaths in the U.K. before the motor vehicle saved cities from drowning in fly-breeding horse dung, the reason for the first international urban planning conference in 1898 (Pryce et al. 2012). Waste removal, fly control, clean-water systems, the heating and refrigeration of food reduced diarrheal disease dramatically in the developed world. The question is whether depriving developing countries of cheap, reliable energy, which support proven measures of preventing disease, in order to reduce global emissions will save more lives than it takes.

FUTURE WARMING

Predictions are notoriously difficult and uncertain. Modeled mortality risks based on modeled climate changes based on modeled emissions scenarios are prone to so many biases and errors that they should be regarded as mere guesstimates. Keatinge and Donaldson (2004) postulated that "the overall effect of global warming on health can be expected to be a beneficial one." Evaluating the future impact of unchecked global warming on human health, Bosello, Roson and Tol (2006) projected 1.4 million fewer deaths annually to 2050 and a lower mortality rate until at least 2200. More recently, Gasparrini et al. (2017) projected unmitigated heat-related mortality to soon overtake cold-related mortality in Southeast Asia regardless of emissions scenario used, but not in Australia or North America until the end of this century, and then only with the highest and most unlikely emissions scenario (RCP8.5 = 1,370ppm CO_2 equivalent) and warming (4.9°C) (Hausfather et al. 2020). Using the more realistic RCP4.5 scenario (650ppm CO_2 equivalent and 2.4°C of warming), cold remains more lethal than heat in all regions studied except Southeast Asia and South America (Figure 6). The best fit with the global climate trend of 0.16°C/decade in the satellite data since 1978 is the RPC2.6 scenario (Spencer et al. 2025).

Alaska, Africa, the Middle East, northern and central Asia, India, Indonesia and Russia were not included. Adaptation and demographic changes were also ignored. The authors warned: "The reported figures should therefore be interpreted as potential impacts under well-defined but hypothetical scenarios, and not as predictions of future excess mortality." When Christidis et al. (2010) factored adaptation into an analysis of the benefit of global warming on the mortality

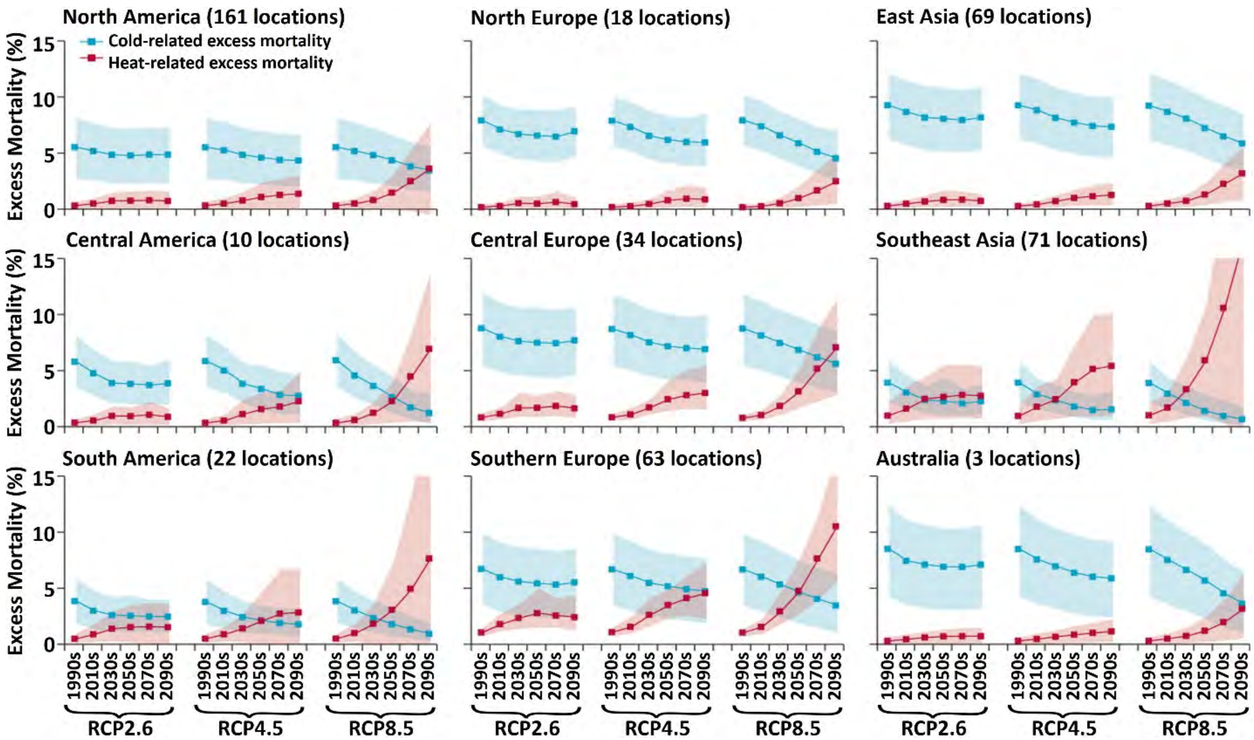

Figure 6: *Projected Changes in Cold-Related and Heat-Related Excess Mortality Over the 21st Century for Nine Regions and Three Emissions Scenarios: RCP2.6, RCP4.5 and RCP8.5.*

rate in England and Wales during the period 1976–2005, they found the ratio of lives saved to lives lost increased fourfold to 121.4. A projection that ignores adaptation can safely be ignored. Demographic changes also favor warmth. So many U.S. citizens move from the cold Northeast states to warm southern states that it is thought to have contributed 3–7% of the late 20th century gains in longevity and delayed about 4,600 deaths annually (Deschenes 2009). We don't see Singaporeans, Malaysians or Indonesians fleeing the heat. Overpopulation, poverty, religious/tribal conflicts, political instability and corruption dwarf climate change in driving migration (Owain et al. 2018). Another confounding factor is fertility rates that tend to fall as countries become wealthier and per capita carbon emissions increase.

TEMPERATURE EXTREMES

Deadly heatwaves such as the European one in 2003 are often attributed to climate change (Schar et al. 2004). Temperatures elsewhere across the globe at the time, however, were normal or below normal (Figure 7) (Chase et al. 2006).

Australia's deadliest heatwave, with temperatures of 102°F (38.9°C) or above for 24 days straight, 120°F (49.9°C) in the shade at Bourke and 109°F (42.8°C) at midnight at Brewarrina, was in January 1896 (Sydney Morning Herald 1896, Barrier Miner 1896). Seven months later, the eastern United States had a 10-day heatwave that killed nearly 1,500 people (NPR, 2010). Another very prolonged U.S. heatwave in 1901 killed 9,500 people, making it easily the most destructive heatwave in U.S. history (Becker et al. 1980). The 1936 North American heatwave during the Dust Bowl decade set record temperatures across 14 states, reaching 49°C in Steele, North Dakota, and killed at least 5,000 people. The 1954 summer-long heatwave across the Midwest, reaching 117°F (47.2°C) in East St. Louis, ranks as the hottest in 11 states (Figure 8) based on an analysis of Midwest temperature records from 1845 to 2009 (Westcott 2011). Nancy Westcott (2011) also found a *reducing* trend of heatwaves over the 20th century.

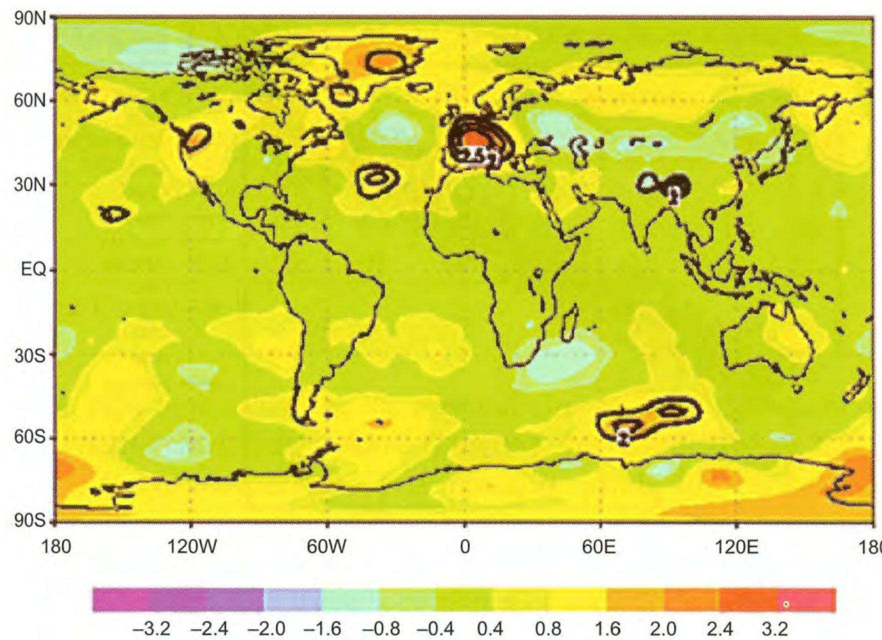

Figure 7: *Global Tropospheric Temperature Anomalies, June–August 2003 (Chase et al. 2006).*

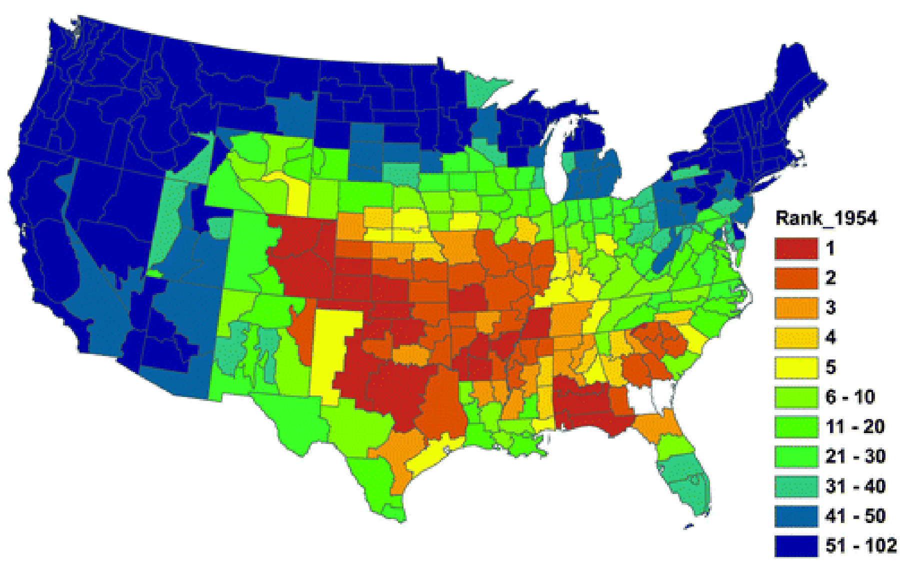

Figure 8: *Rank of the June–September 1954 Heat Wave Based on National Climatic Data Center (NCDC) Climate Division Temperature Data for the Years 1895–2009 (Westcott 2011).*

The fourth National Climate Assessment (NCA4) states: "Heat waves (6-day periods with a maximum temperature above the 90th percentile) increased in frequency until the mid-1930s, became considerably less common through the mid-1960s, and increased in frequency again thereafter. As with warm daily temperatures, heat wave magnitude reached a maximum in the 1930s" (Figure 9) (Wuebbles et al. 2017). A 1915–2025 analysis of U.S. heat waves by region reveals that those in the first half of the 20th century were primarily in the eastern two-thirds of the country and primarily in the West since 1990 (Christy et al. 2025c). The frequency and severity of both extreme heat and extreme cold in the U.S. have declined since 1898 (Christy et al. 2025b).

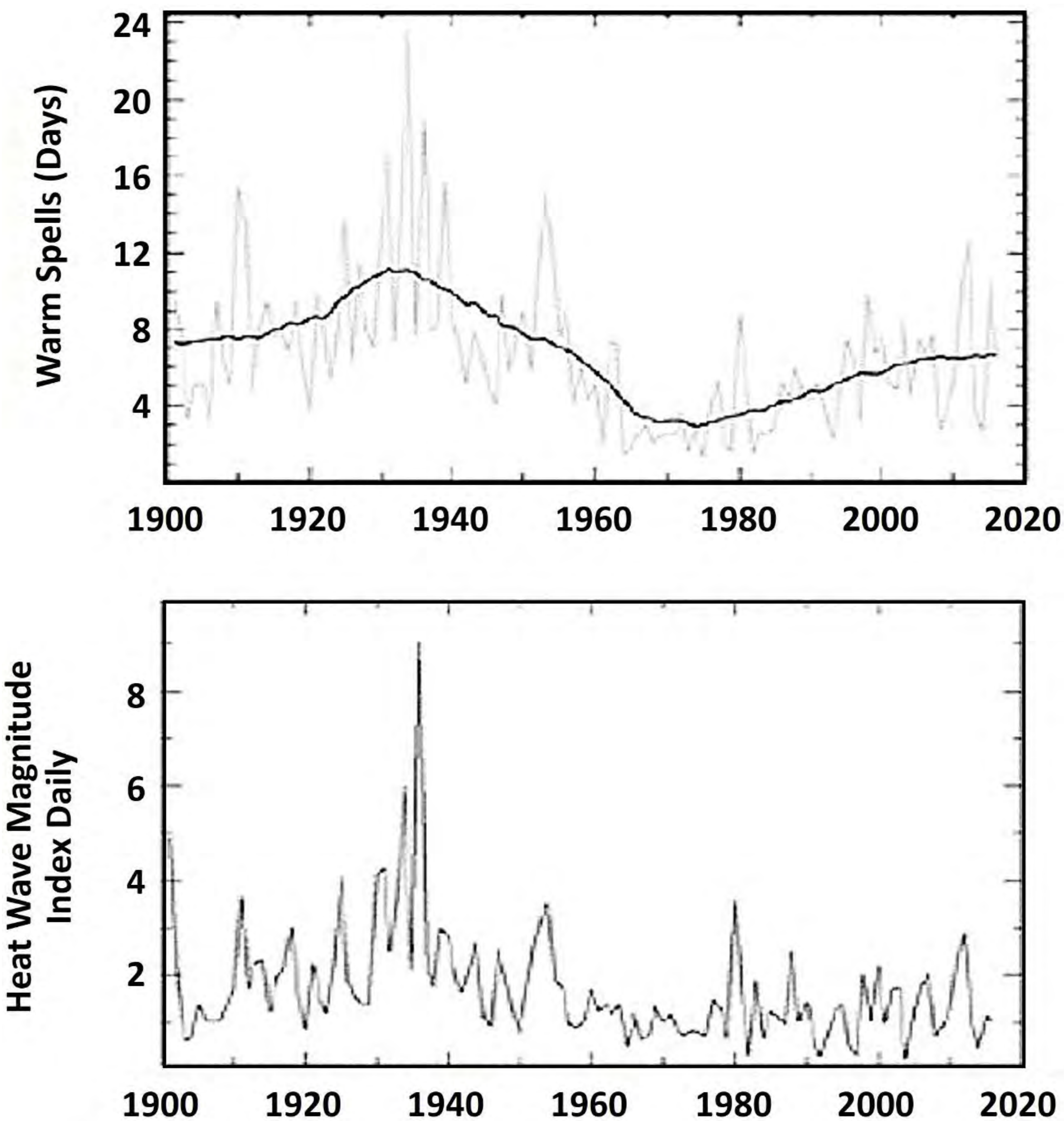

Figure 9: *U.S. Heatwaves Since 1900.*
Source: NCA4 Figure 6.4

Urban heat intensifies heat waves and heat wave mortality much more than does global warming (Wong et al. 2013). Cities can be over 11°C hotter than the surrounding countryside, the larger the city the greater the difference (Hung et al. 2006). The percentage of the global population classed as urban increased from 30% in 1950 to 50% in 2008 and is expected to reach 70% by 2050 (Yale University Seto Lab 2018). The U.S. population is now nearly 90% urban. Unlike global warming, urban heat can be effectively and efficiently mitigated, creating cool city refuges using greenery and water features, requiring careful urban planning and adequate water resources (Rosenfeld et al. 1998, Watts et al. 2014).

Air pollution also exacerbates heat wave mortality. Of the estimated excess deaths attributed to unusually high temperatures during the 2003 European summer, elevated atmospheric concentrations of ozone and particulate matter less than 10µm diameter (PM_{10}) accounted for 21–38% in the U.K. and 33–50% in the Netherlands (Robine et al. 2008, Stedman 2004, Fischer 2004). Mortality was also higher than expected from temperature alone in France (Fouillet et al. 2008). The EU's decision in 2001 to promote diesel to reduce CO_2 emissions probably increased heat wave mortality!

Obesity, now an epidemic, exacerbates heat wave mortality by reducing heat tolerance while aerobic fitness increases it (Koliaki et al. 2023, Bedno et al. 2010, Lisman et al. 2014). Acclimatization reduces mortality from heat waves but not cold spells (Diaz et al. 2005). Whereas mortality from the latter remains higher for weeks, it drops rapidly and dramatically after heat waves, indicating that most of those who die are close to death anyway (Rooney et al. 1998). This *harvesting effect* found in the U.S. and Europe results in "virtually no lasting impact of heat waves on mortality (Laschewski et al. 2002, Deschenes, 2009)."

Affordable energy reduces heat wave mortality. The 1954 Midwest heat wave was worse than the 1936 heat wave in intensity, extent and duration, but killed fewer than a fifth as many people, largely because air conditioners, electric fans, refrigerators, ice and cold drinks had become more available and affordable (Posey 1981).

Heat wave planning. Following the 2003 European heat wave, which caused 15,000 excess deaths during France's August vacation with its relative lack of care for the isolated and vulnerable, the French Directorate General for Health set up a National Heat Wave Plan. This included a system for real-time surveillance, prevention and treatment of heat-related diseases, air-conditioning equipment for hospitals and retirement homes, city-scale censuses of the isolated and vulnerable, visits to them during the alert periods, a warning system and media broadcasting of preventive messages. When France experienced another severe heat wave in July 2006, there were nearly 4,400 fewer deaths than expected. Modern forecast and warning systems have also been shown to be very effective in preventing heat-related deaths (Harlan et al. 2011). Lazy governments blame climate change instead of implementing measures to mitigate the effects of heat.

TEMPERATURE AND DISEASE VECTORS

Vector-borne infection is regarded by the IPCC as a major threat to human health from climate change (IPCC 2013). The World Health Organization (WHO) states that vector-borne diseases account for over 17% of all infectious diseases and cause more than 700,000 deaths annually (WHO 2024c). It is postulated that global warming will spread the following disease vectors to areas that have hitherto been too cool for them (Rogers et al. 2000).

Vector	Species	Diseases
Mosquitoes	*Anopheles*	Malaria – *P. falciparum, P. vivax, P. ovale and P. malariae*
	Aedes	Chikangunya, Dengue, Yellow Fever, Ziga
	Culex	West Nile Virus
Ticks	*Ixodes*	Lyme disease
Sandflies		Leishmaniasis

Malaria was endemic for millennia in Europe and England, where 17th century burial records reveal a mortality rate comparable to that in sub-Saharan Africa today (Reiter 2000, Dobson 1989). Apart from epidemics during the unusually hot summers of 1848 and 1859, there was a near-linear decline in endemic malaria in the U.K. from 1840 to 1910. It disappeared in 1953, and reestablishment is considered highly unlikely regardless of warming (Kuhn et al. 2003). Endemic malaria in Finland likewise faded out over two centuries of warming with limited or no countermeasures or medication leading Hulden and Hulden (2009) to conclude that, "malaria in Finland basically was a sociological disease and that malaria trends were strongly linked to changes in the human household size and housing standard (Hulden et al. 2009)." Helsinki had its last malaria epidemic in 1902. Devastating epidemics occurred in parts of northern Europe, even in the Arctic Circle, until the middle of the 20th century (Bruce-Chwatt et al. 1980).

In the U.S., a malaria epidemic affected 30% of the population of the Tennessee River Valley in 1933 (WWARN 2011). Despite rapid warming from 1916 to 1937, there was a fourfold decline in deaths from malaria in Mississippi; the only significant correlation was with family income: the higher the income the fewer the deaths (Brierly 1945). Malaria remained endemic in 36 states until the Centers for Disease Control and Prevention (CDC) was created to tackle it after World War II. Swamps were drained, agricultural practices were changed, cases were isolated from mosquitoes and treated, mosquito nets and DDT were widely used, and millions of homes were sprayed. The U.S. was considered malaria-free in 1951 (CDC 1999). Despite global warming, the 20th century saw a dramatic decline globally in both endemicity and per capita mortality rate (down 95.4%) (Gething et al. 2010, WHO 2013).

Studies extending over 10–32 years found no correlation between temperature or rainfall and the incidence of malaria in western Africa, at four highland sites in east Africa or in western Kenya (Jackson et al. 2010, Hay et al. 2002, Shanks et al. 2000). A comprehensive study across

Africa over an 85-year period (1911–1995) found a correlation with precipitation in Southern Mozambique but none with temperature anywhere (Small et al. 2003). In a review paper, Rogers and Randolph (2006) attribute the observed increase in malaria in many parts of Africa to "land-cover and land-use changes and, most importantly, drug resistance rather than any effect of climate." They noted that "the recrudescence of malaria in the tea estates near Kericho, Kenya, in East Africa, where temperature has not changed significantly, shows all the signs of a disease that has escaped drug control following the evolution of chloroquine resistance by the malarial parasite (Rogers 2006)."

Haque et al. (2010) analyzed monthly case data for the malaria endemic district of Chittagong Hill Tracts in Bangladesh from January 1989 to December 2008. They found no correlation with temperature, rainfall or humidity but a strong negative association with the normalized difference vegetation index (NDVI), a satellite-derived measure of surface-vegetation greenness. They state: "Each 0.1 increase in monthly NDVI was associated with a 30.4% decrease in malaria cases," probably due to increasing insectivorous bird populations. By stimulating plant growth, CO_2 may be reducing malaria risk.

It is thought that global warming will allow malaria to climb to higher altitudes (Transer et al. 2003). Before the introduction of DDT and other public health measures, however, malaria transmission occurred much higher than now, at up to 2,600 meters in Kenya, 2,450 meters in Ethiopia, 2,500 in the Himalayas, 2,180 in Argentina and 2,773 (near thermal springs) in Bolivia (Reiter 1998). After considering forest clearance, agriculture, urbanization, health infrastructure, drug and insecticide resistance, civil strife and other influences on endemic malaria in the Highlands of Kenya and New Guinea, Paul Reiter of the Insects and Infectious Disease Unit of the Institut Pasteur in Paris, France, concluded that "simplistic reasoning on the future prevalence of malaria is ill-founded; malaria is not limited by climate in most temperate regions, nor in the tropics, and in nearly all cases, 'new' malaria at high altitudes is well below the maximum altitudinal limits for transmission."

The impact of climate change on future global malaria distribution proved to be much weaker when per capita GDP was included in the models (Béguin et al. 2011). One model using five variables and a high-emissions scenario produced a 0.92% decrease (Spencer et al. 2025).[89] Indur Goklany (2004) calculated that the malaria death toll could be halved through a combination of proven measures at a tiny fraction of emissions-mitigation costs.

Chikungunya virus (CHIKV) was first isolated in Tanzania during an outbreak of incapacitating arthralgia in 1953 (Robinson 1955). The African primary hosts are non-human primates and small mammals, and *Aedes aegypti* is its primary vector. CHIKV has been spreading rapidly in recent decades but not due to climate change. *A. aegypti* had escaped Africa centuries ago with the slave trade and established itself widely across tropical and subtropical regions (Figure 10), even in southern Europe before disappearing there in the mid-1990s (Reiter 2010).

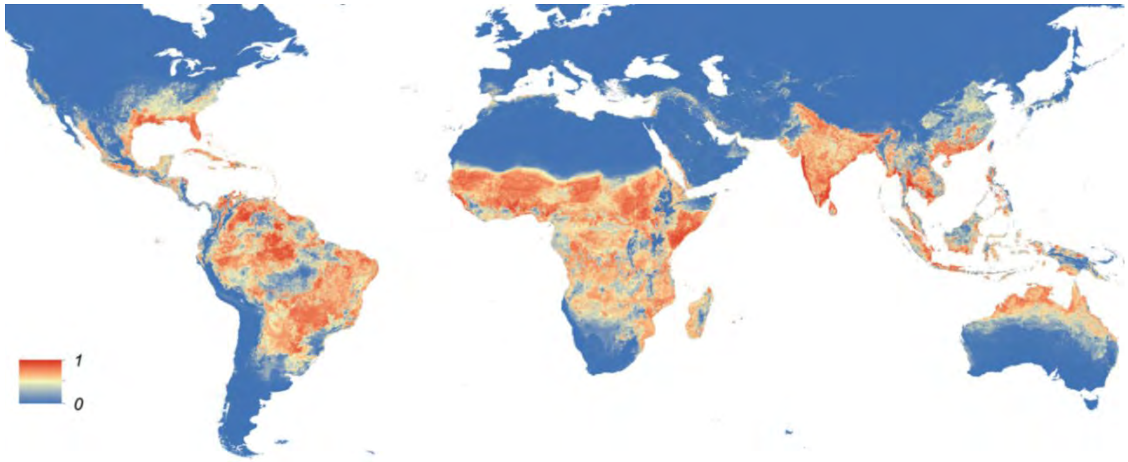

Figure 10: *Global Distribution of Aedes aegypti: Probability From 0 Blue to 1 Red (Kraemer et al. 2015).*

CHIKV broke out on Reunion Island and neighboring Indian Ocean islands in 2005 and in India in 2006. It then spread to Southeast Asia, simultaneously undergoing a genomic micro-evolution which enabled it to be transmitted by *Aedes albopictus*, the tiger mosquito of Southeast Asia (Burt et al. 2012. Scholte et al. 2007). *A. albopictus*, which is intolerant to extreme heat, has been adapting to cold climates in temperate regions such as Japan. It can hibernate over winter and produce eggs that are more cold tolerant (Hii et al. 2009, Hanson et al. 1995). Adult mosquitoes can even survive freezing winters in suitable microhabitats (Romi et al. 2006). It spread to Albania in 1979 and to Genoa, Italy, in imported used tires in 1990 (Adhami et al. 1998, Sabatini et al. 1990). By 2007, it had spread extensively across southern Europe (Figure 11). Ravenna in northern Italy experienced Europe's first CHIKV epidemic after the virus was introduced from India (Rezza et al. 2007). *A. albopictus* has recently spread westward in the continental United States, where locally acquired cases occurred in 2014; only travel-associated cases have been reported since 2015 (Staples et al. 2014, CDC 2018a).

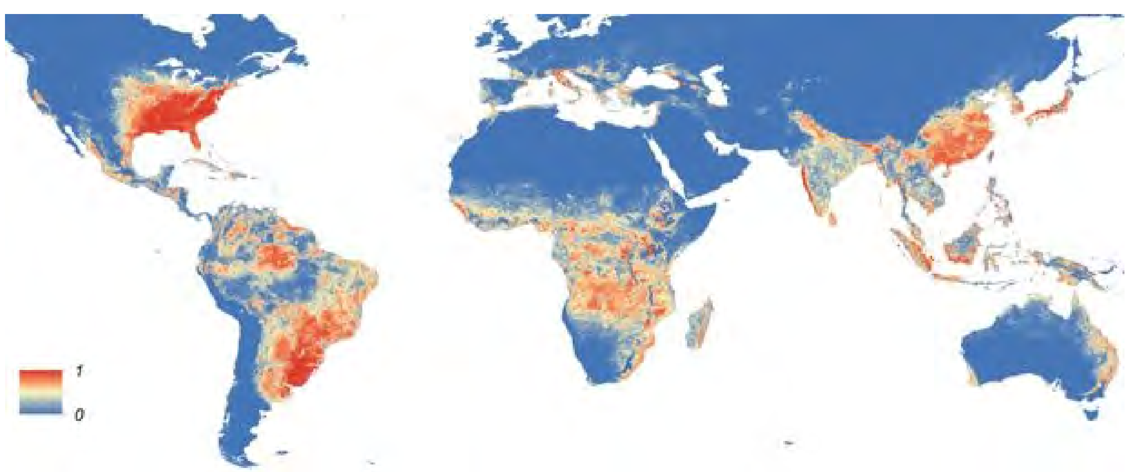

Figure 11: *Global Distribution of Aedes albopictus: Probability of Occurrence From 0 Blue to 1 Red (Kraemer et al. 2015).*

Modeling by Fischer et al. (2013) projected an increased risk "for Western Europe (e.g. France and Benelux-States) in the first half of the 21st century and from mid-century onwards for central parts of Europe (e.g. Germany). Interestingly, the southernmost parts of Europe do not generally provide suitable conditions in these projections." In other words, their emissions scenarios will make it too warm for *A. albopictus* to remain established in southern Europe.

The reality, of course, is that no one knows what might happen this century. Warming may be less than thought, vaccines and public health measures may control or even eradicate the virus from the developed world, it may mutate again, or more CO_2 may even reduce the incidence. Tuchman *et al*. (2003) grew the quaking aspen (*Populus tremuloides*) (Michaux) trees at atmospheric CO_2 concentrations of either 360 ppm or 720 ppm for an entire growing season and fed the incubated leaf litter to four species of mosquito larvae to assess the effect on development. They found the larvae of *Aedes albopictus* had a mortality rate 2.2 times higher when fed the high-CO_2 litter, which delayed the development of all larvae by 9–20 days.

Dengue fever is arguably the most important vector-borne viral disease globally, infecting over 200 million people, 1% of them severely with over 20,000 deaths annually (Kyle et al. 2008, Wiler-Smith et al. 2008, Beatty et al. 2008). A review of 16 studies, carefully selected from 75 papers with methodologies of varying quality, found dengue transmission to be highly sensitive to climatic conditions, especially temperature, rainfall and relative humidity (Naish et al. 2014). Climate change is implicated by the following: incidence increasing 30-fold over the past 5–6 decades; endemicity increasing to involve 119 countries; expanding transmission zone to include half the world's population; lengthening mosquito lifespan and shortening virus incubation period with warming, resulting in more infected mosquitoes over longer periods (Kyle et al. 2008). This must be weighed against other historical facts, scientific evidence, research and developments:

- Dengue and yellow fever were major public health problems in the U.S. during the cold 17^{th} century but disappeared during the warm 20^{th} century (Nabi et al. 2009). The CDC states: "As recently as the 1940s, large dengue outbreaks were documented in the United States reaching places as far north as Boston. Today, the situation has changed significantly. Reasonable climate, competent mosquito vectors, and susceptible human hosts are all still present in the continental United States, and dengue viruses are frequently reintroduced by infected travelers (CDC 2012). Transmission in the U.S. is rare, however, because there is insufficient contact between infected humans, vector mosquito species, and susceptible humans to sustain transmission."
- Alternative explanations for the observed global increase in incidence include rapid urbanization, international travel and disruption of vector control programs (Wilder-Smith et al. 2008). The authors conclude: "Population dynamics and viral evolution offer the most parsimonious explanation for the observed epidemic cycles of the disease, far more than climatic factors." In 1995, dengue afflicted over 4,000 Mexicans in Tamaulipas

while Texas had only a handful of non-imported cases. The essential difference was not climate but living standards and sound public health policies (Moore 1998). Laredo, Texas, (population 200,000) and Nuevo Laredo, Tamaulipas, (population 290,000) are connected by bridges across the Rio Grande. After an outbreak in 1999, Reiter et al. (2003) found "the incidence of recent cases, indicated by immunoglobulin M antibody serosurvey, was (12.3 times] higher in Nuevo Laredo, although the vector, *Aedes aegypti*, was more abundant in Laredo." Reiter et al. determined that "the proportion of dengue infections attributable to lack of air-conditioning in Nuevo Laredo was 55% ... (and] if the current warming trend in world climates continues, air-conditioning may become even more prevalent in the United States, in which case, the probability of dengue transmission will likely decrease." The CDC (2012) endorsed this: "Studies on the U.S.-Mexico border, for example, suggest that the restriction of transmission there is due to the limitation of contact between human hosts and mosquito vectors that comes with low housing density and the use of air conditioning and screens."

- Future solutions to dengue could include the development of effective dengue vaccines, genetic modification of *A. aegypti*, the sterile insect technique (shown to reduce the target mosquito population by more than 90%) and the *Wolbachia* bacterium, which allows mosquitoes to be resistant to arboviruses such as dengue and Zika.

West Nile Virus (WNV) was first identified in a West Nile district of Uganda in 1937. It is asymptomatic in 80% of infected people but can cause severe encephalitis or meningitis in about one in 150 infected persons, especially the elderly or immunocompromised. It is transmitted by a *Culex* species of mosquito that has bitten an infected bird. Appearing in New York in 1999 and spreading across the states taking hundreds of lives, it was soon linked to climate change (Epstein 2001, Walsh 2014). But its rapid spread from northeast to the south and west (Figure 12) and its decline despite warming (Figures 13 and 14) indicate that the vector was already there and climate change had nothing to do with incidence of West Nile.

Yellow fever spread from Africa to the Americas and Caribbean via the slave trade. The first recorded outbreak was in 1647 on the island of Barbados (McNeill 2004). It reached New York City in 1668 and Philadelphia a year later; a 1793 epidemic in Philadelphia wiped out nearly 10% of its population (Campbell 2008). Major outbreaks hit New Orleans in 1833 and 1853, and Memphis in 1878 (Marr et al. 2013). It spread to Europe early in the 19th century and took the

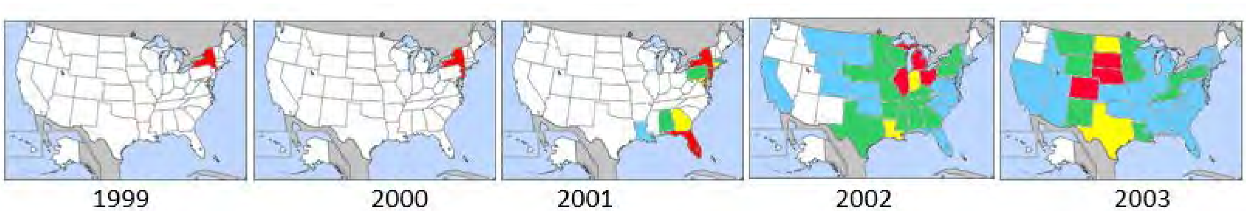

Figure 12: *Progress of WNV in the U.S. 1999–2003. White 0, Blue <1%, Green1–5%, Yellow 5–10%, Red >10% (CDC 2016).*

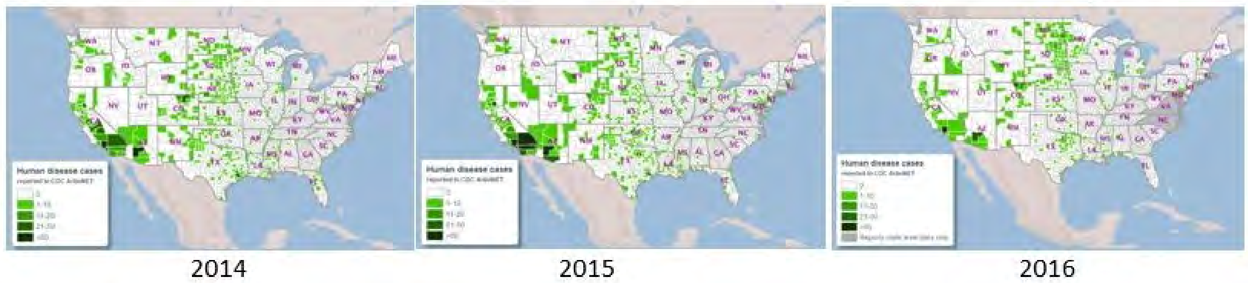

Figure 13: *WNV Cases Reported to the CDC 2014–2016. White 0, Green Light 1–10, Dark 21–50, Black >50 (CDC 2016).*

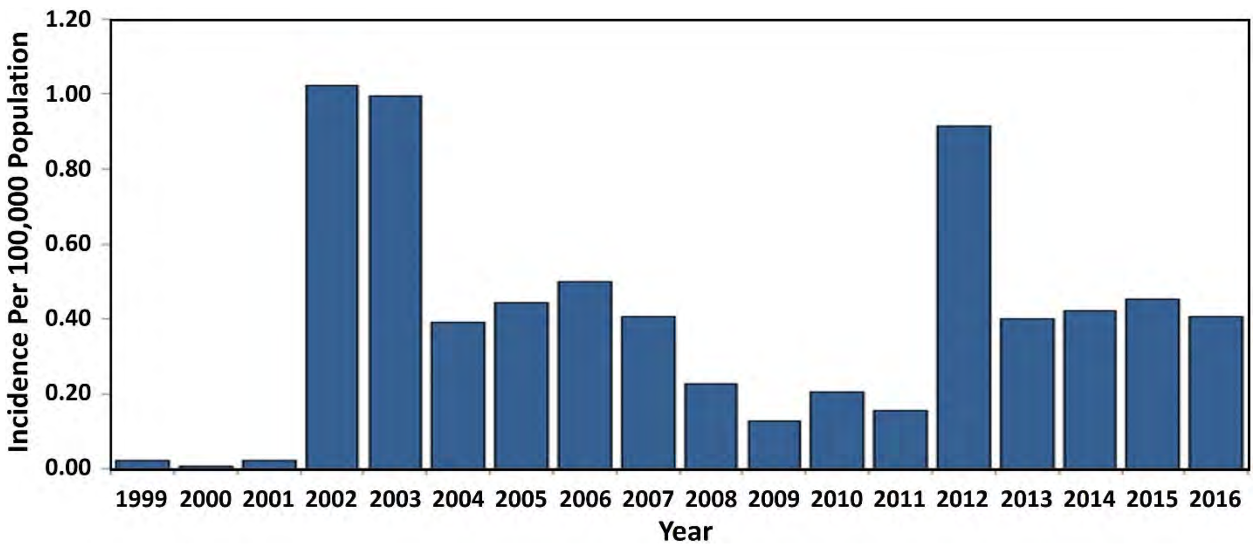

Figure 14: *West Nile Virus Neuro-Invasive Disease Incidence Reported to the CDC by Year, 1999–2016 (CDC 2016).*

lives of thousands in Gibraltar and Barcelona (Sawchuck et al. 1998, Canela et al. 2008). There were even small outbreaks in France and Wales (Coleman 1983, Meers 1986). Thanks to an effective vaccine and stringent travel regulations, it is now confined to central Africa and South America (Barrett et al. 2009). The story of yellow fever illustrates that the answer to vector-born disease is not climate action but sound science and public health policies.

Zika virus was first identified in the 1960s in Southeast Asia, where it produced nothing more than a mild illness: fever, rash and aching joints. In 2013, a Zika strain suddenly appeared in French Polynesia, then in the Caribbean and Brazil, where it exploded and resulted in over 4,000 cases of microcephaly between late 2015 and early 2016. By September 2017, there were thought to have been 3 million to 4 million cases of Zika across 84 countries due to international air travel. A Singaporean outbreak that began in August 2016 resulted in 455 cases over three months. When Singapore's Ministry of Health and National Environment Agency quickly identified and managed infected people, eradicated mosquitoes and removed breeding sites, new cases were reduced by 48% within a month (Lane et al. 2017). Public health measures can control such outbreaks before climate mitigation gets its boots on! Climate action, which impedes proven preventive measures, is counterproductive.

Lyme disease was first diagnosed in 1975 in Old Lyme, Connecticut, whence it derived its name (Williams 2007). It is the most common tick-borne human disease, with an estimated annual incidence of 300,000 in the United States and at least 85,000 in Europe (Shapiro 2014, Lindgren et al. 2006). It is caused by the spirochete bacteria *Borrelia burgdorferi* and sometimes by *Borrelia mayonii* (Pritt et al. 2016). It is transmitted in the eastern United States and parts of Canada by the tick *Ixodes scapularis* and on the Pacific Coast by *I. pacificus* (Clark 2004). As these ticks like habitats with at least 85% humidity and need temperatures over 7 °C (45 °F) during host questing in spring, the northeast United States is especially suitable (Figure 15) (Süss 2008).

The impact of climate change on Lyme disease appears to be complex. Subak (2003) found a correlation between warmer winters and the incidence of Lyme disease the next summer, perhaps because mild winters enhance survival of the ticks' primary host, the white-footed mouse. Warm dry summers, on the other hand, are associated with a reduced incidence, perhaps because of reduced survival of both mouse and *Ixodes* nymph (Jones et al. 2000). The number of reported cases of Lyme disease appears to have peaked in 2009, despite further warming (Figure 16).

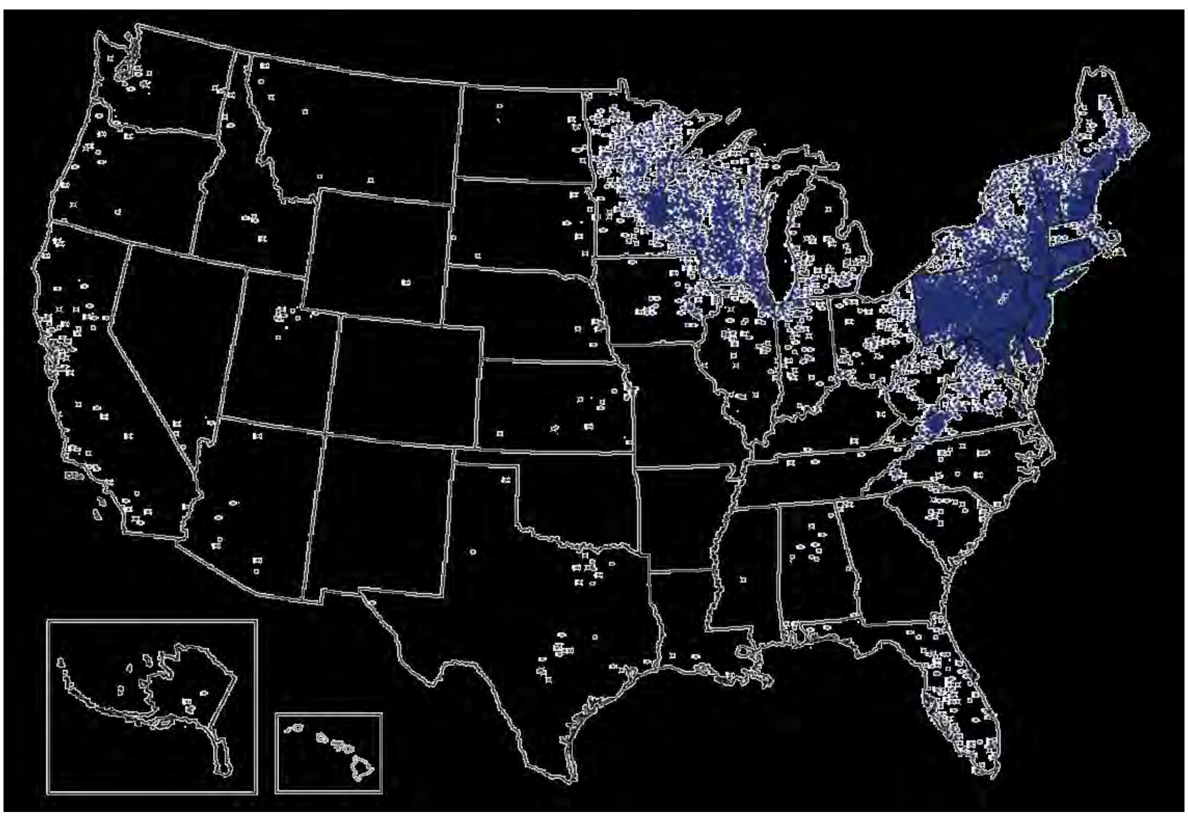

Figure 15: *Reported Cases of Lyme Disease in the U.S. in 2016* (CDC 2018b).

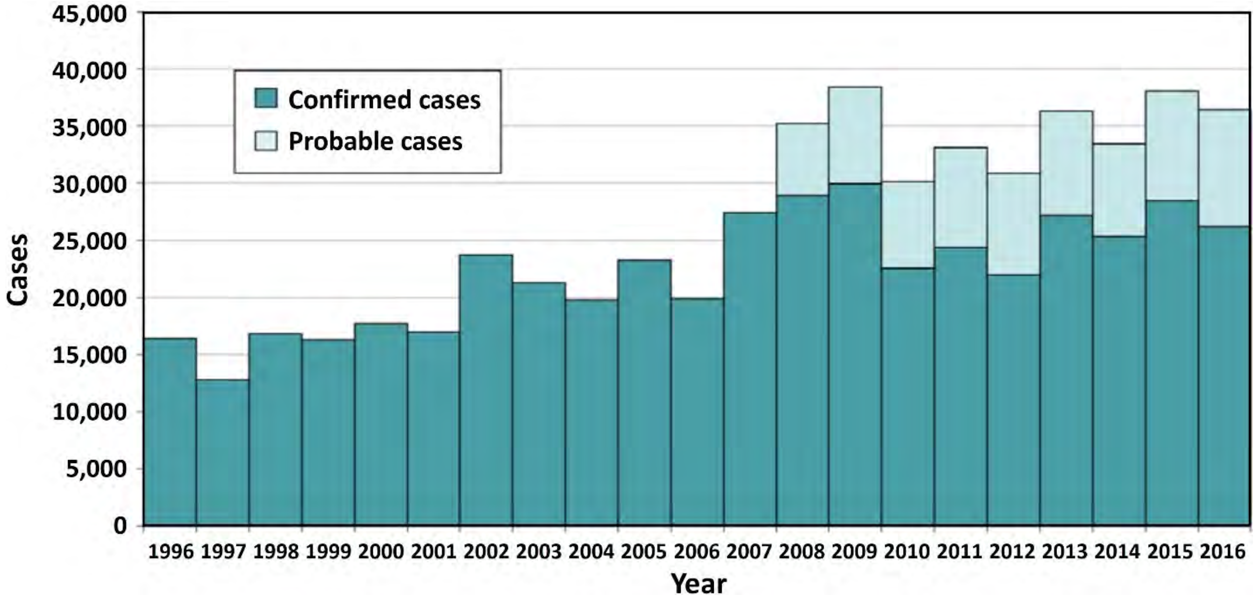

Figure 16: *Reported Cases of Lyme Disease in the U.S., 1996–2016 (CDC 2018b).*

Modeling by Brownstein et al. (2005) "generated the current pattern of *I. scapularis* across North America with an accuracy of 89% ($P < 0.0001$). Extrapolation of the model revealed a significant expansion of *I. scapularis* north into Canada with an increase in suitable habitat of 213% by the 2080s. Climate change will also result in a retraction of the vector from the southern U.S. and movement into the central U.S." As their modeled transmission zone migrates northwards into Canada over the next 70 years, it retreats from Florida and Texas, and the population exposed to Lyme *diminishes* by 28% in the 2020s, by 12.7% in the 2050s and by 1.9% in the 2080s. The connection between suitable *I.scapularis* and deciduous forest is so strong that the authors state: "Recent emergence of Lyme disease throughout the northeastern and mid-Atlantic states has been linked to reforestation." The motor car may thus have contributed to the emergence of Lyme disease by converting numerous horse-paddocks into woodlands and by fertilizing them with carbon dioxide. *The focus should be on educating the public, early diagnosis and treatment rather than on climate mitigation.*

Leishmaniasis, from over 20 *Leishmania* species of protozoa parasite, is transmitted by an infected female sandfly, with over 50 species of the genus *Phlebotomus* in the Old World and genus *Lutzomyia* in the New World. The main animal reservoirs include rodents, dogs, wild cats, jackals, foxes, sloths, hyraxes and other carnivores. It is endemic in 88 countries across Africa, Asia, Europe, and North and South America, infecting up to a million people and killing up to 30,000 annually, mainly among the poorest people on Earth (WHO 2018). It is associated with malnutrition, population displacement, poor housing, a weak immune system and lack of financial resources. It is also linked to environmental changes such as deforestation, building of dams, irrigation schemes and urbanization. Manifesting as visceral, cutaneous, or mucocutaneous forms, the most common is cutaneous leishmaniasis, which occurs in the

Americas, the Mediterranean basin, central Asia and the Middle East (Desjeux 2001, Postigo 2010). In North America, leishmaniasis is endemic in Mexico and Texas and has begun to expand its range northward (Figure 17).

Modeling that extends the risk of human exposure northwards, even into southern Canada, with climate change assumes that the United States will be no more effective than African nations in preventing the spread of this disease and its vectors (Gonzalez et al. 2010).

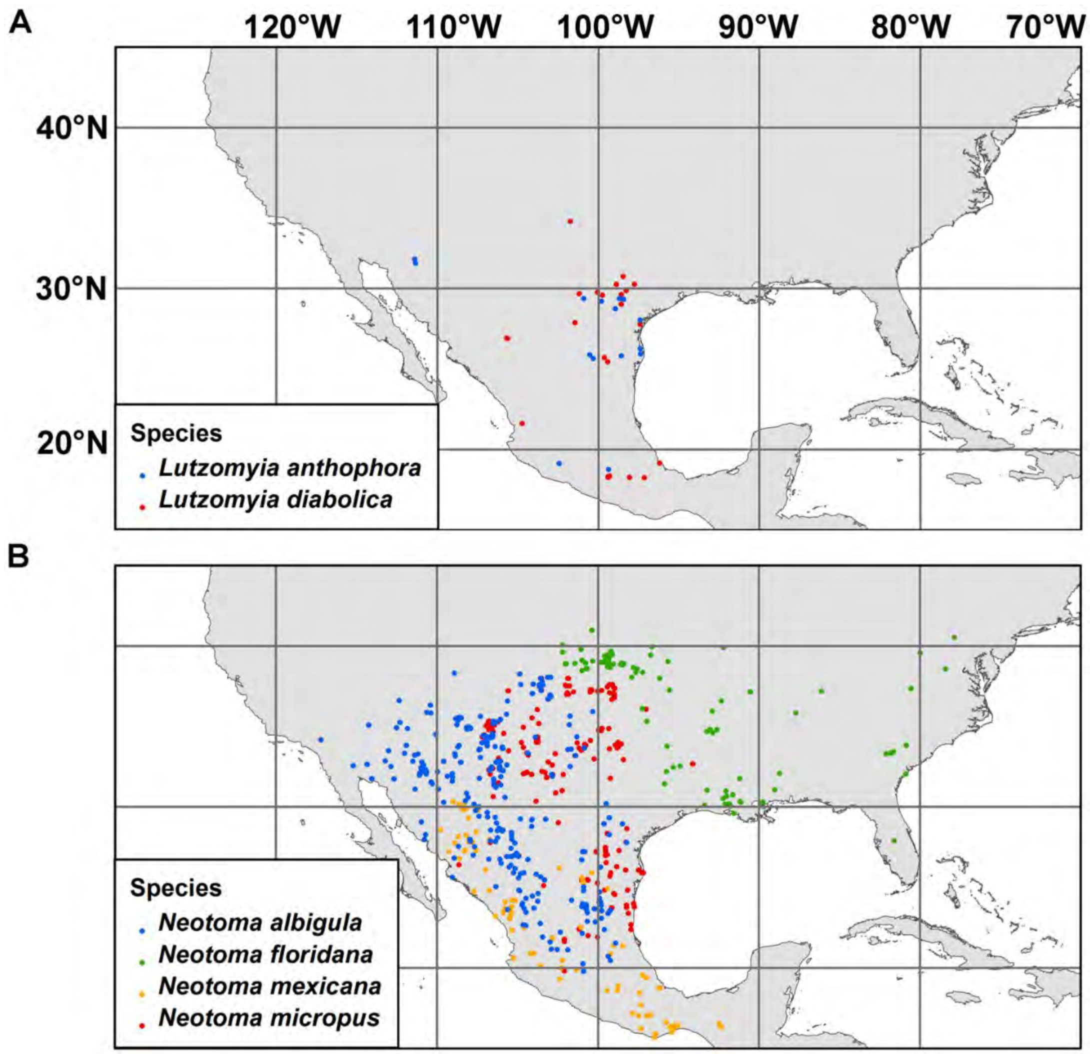

Figure 17: *Vector and Reservoir Data Points in North America (2009 data).*
A: Both Vector Species. B: All Four Reservoir Species (Gonzalez et al. Figure1 2010).

Leptospirosis is a zoonotic disease acquired from infected animals, soil or water, especially flood water contaminated with rat urine. Globally, there are about a million severe cases and 60,000 deaths reported annually. Recent unprecedented outbreaks have been blamed on climate change, but the main reason is population growth plus poverty resulting in urban slums in developing countries (Bharti et al. 2003).

EXTREME WEATHER EVENTS

It is now widely believed that tropical cyclones, wild storms, tornadoes, floods, droughts, heat waves and wildfires are increasing in frequency and/or severity due to climate change, thus posing an existential threat to humanity.

Tropical cyclones, termed **hurricanes** in the North Atlantic and **typhoons** in the Northwest Pacific, rank among the deadliest of natural disasters due to wind, storm surge and flooding rain. Winds can range from 120 to over 300 kilometers per hour (km/h). A tropical cyclone killed an estimated 300,000 people in what is now Bangladesh in 1970 (Weather.com 2014). The deadliest Atlantic hurricane was probably the Great Hurricane of 1780, which took about 22,000 lives. Major hurricanes hit New York City in 1815 and 1821, and another in 1893. Atlantic hurricane activity declined from around 1800 and became unusually quiet from 1970 to 1995 (Figure 18).

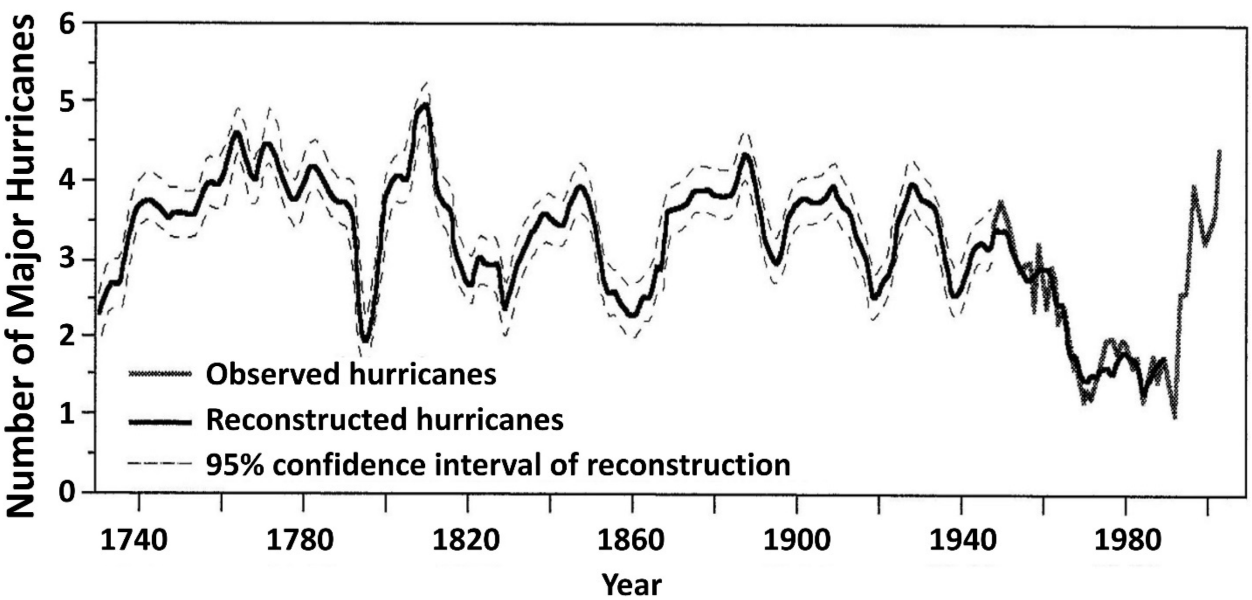

Figure 18: *Annual Number of Major Atlantic Basin Hurricanes, 1730–2005: Reconstructed from Coral and Plankton Sediments in the Caribbean Sea and Matched Observations (Nyberg et al. (2005).*

Klotzbach et al. (2018) conducted a comprehensive evaluation of landfalling-hurricane data for the continental U.S. from 1900, updated through 2024, in Figure. 21. While the largest numbers of landfalling hurricanes occurred in 2004–05, with four major hurricane landfalls in 2005, there is no statistically significant trend. No major hurricanes hit the U.S during the 2006–2016 decade, the longest such period since 1920 (Christy et al. 2025a).

Typhoons account for nearly a third of the world's tropical cyclones. The deadliest, Typhoon Nina, took 230,000 lives in 1975, nearly half being caused by 12 Chinese reservoirs failing

(Anderson-Berry et al. 2002). The second deadliest, Typhoon Haiyan, had wind speeds up to 315 km/h and took 6,352 lives in 2013 (Samenow et al. 2013). The most intense was Typhoon Tip in 1979 with wind speeds over 350km/h before making landfall in the central Philippines (Dunnavan et al. 1980). The Joint Typhoon Warning Center began identifying super typhoons with wind speeds of more than 150 miles per hour (240 km/h) in 1947. It lists 10 fewer during the last 2015–24 decade than during the 1952–61 decade.

Water vapor reaching high altitudes and precipitating as cyclonic rain contains a higher proportion of the oxygen-16 isotope than the heavier oxygen-18 isotope than it does at lower altitudes. Nott et al. (2007) used this to analyze cyclonic activity over 800 years from stalagmites in a Chillagoe cave in North Queensland and confirmed a close correlation with the 20th century historical record. They were surprised to find the most intense cyclones occurred during the Little Ice Age (Figure 19). From "a new tropical cyclone activity index spanning the last 1,500 years", Haig and Nott (2016) found that "solar forcing largely drives decadal, interdecadal, and centennial cycles within the tropical cyclone record." The frequency and intensity of tropical cyclones in North Queensland continue to decline (Figure 20).

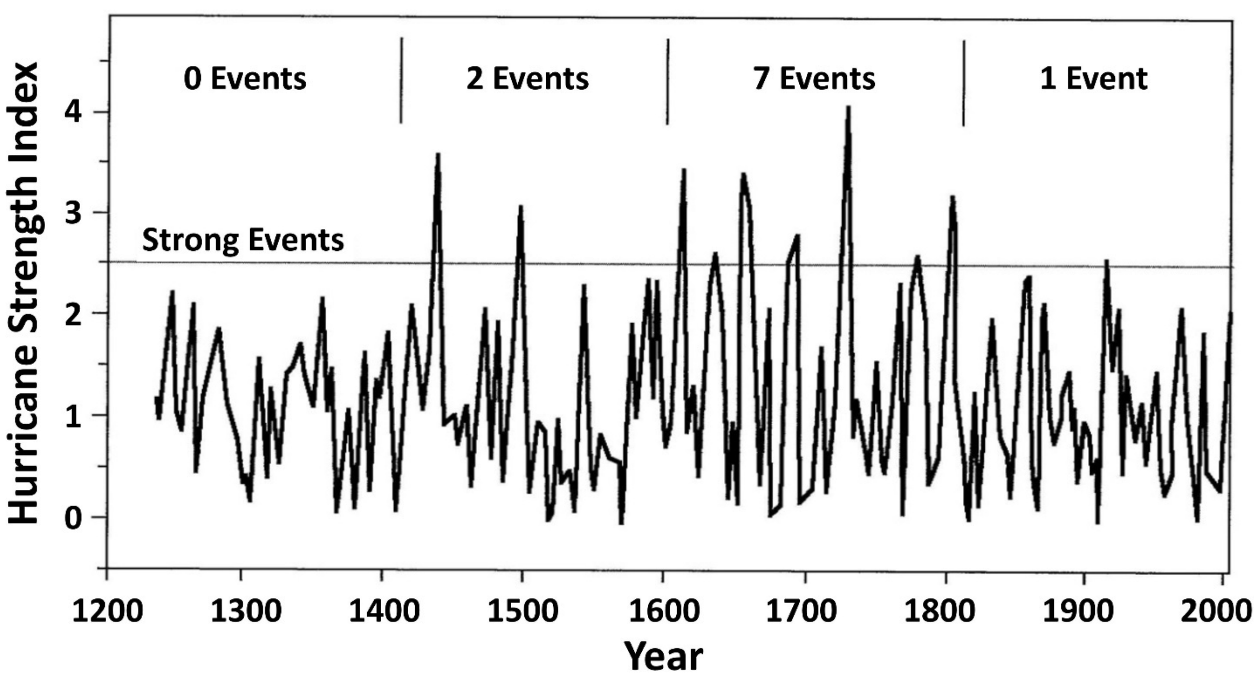

Figure 19: *Strength Index of Tropical Cyclone Events in North Qld., 1226–2003 (Nott et al. 2007).*

Cyclones have caused over 2,100 deaths in Australia since 1839, the deadliest being category 5 Cyclone Mahina, killing over 300 people in 1899 (Australian Bureau of Statistics 2008, ABC News 2014). Thanks to better forecast and warning systems and to improved building codes in cyclone-prone regions, the loss of life from cyclonic activity is now rare. Category 5 Cyclone Yasi did not cause a single death in 2011 (Euronews 2011). While deaths declined dramatically, damages increased, but not due to climate change. The World Meteorological Organization states: “The recent increase in societal impact from tropical cyclones has largely been caused by rising concentrations of population and infrastructure in coastal regions (WMO 2006).” After normalizing mainland U.S. hurricane damage from 1900 to 2005 at 2005 values, Pielke et al. (2008) found no trend in damages. The greatest normalized damage ($157 billion) was from the 1926 Miami hurricane (Pielke et al. 2008).

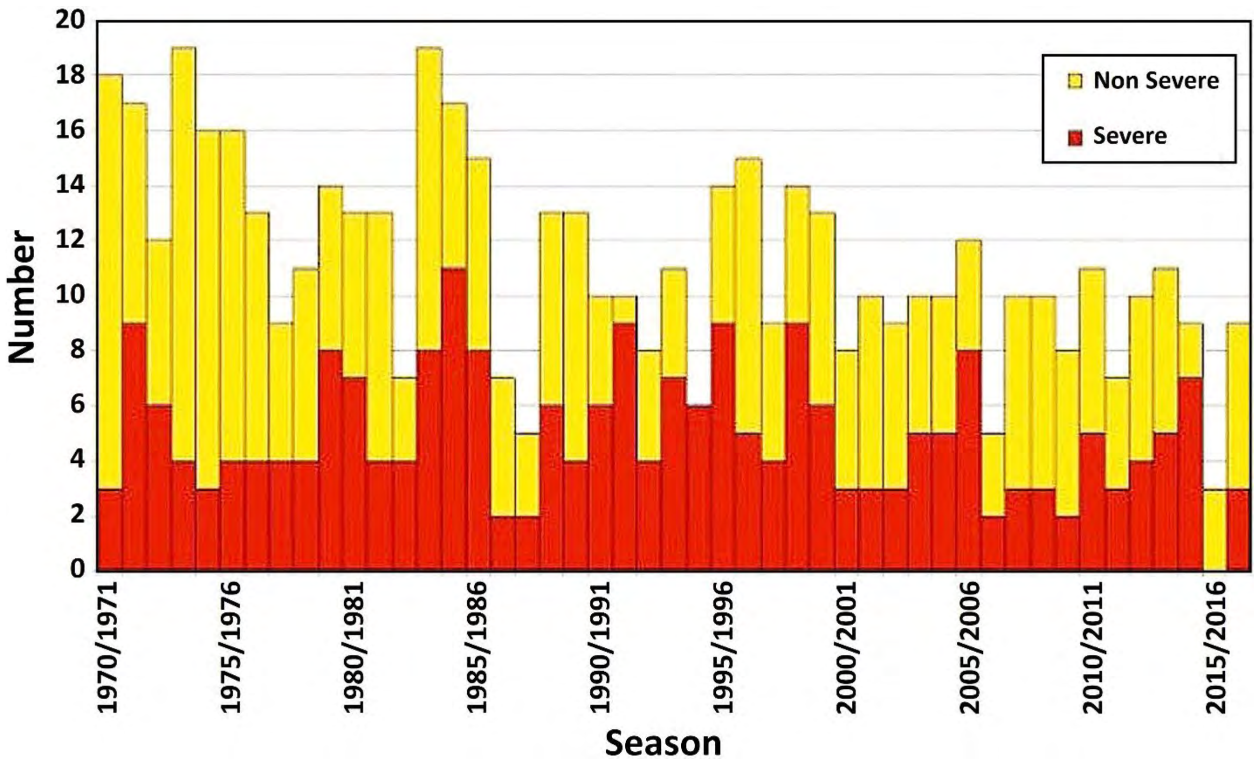

Figure 20: *Number of Severe and Non-Severe Tropical cyclones in Australia, 1970–2017. Severe Tropical cyclones are Those with a Minimum Central Pressure Less Than 970 hPa. Source: Bureau of Meteorology*

Hailstorms. The deadliest storm killed 1,300 people in the Manikganj District of Bangladesh in April 1989 (Independent UK). Hail the size of cricket balls killed 246 people near Moradabad, India, in April 1888 (Johnston 2017). A similar hailstorm hit Sydney on April 14, 1999, inflicting enormous damages but killing no one, the essential difference being wealth and warning systems (The Conversation 2017).

A hailpad is a simple foam-and-foil tool that helps scientists track hail size and distribution by capturing the dents left behind during a storm. An analysis of hailpads in France from 1990 to 2010 by Hermida et al. (2013) showed an upward trend in 154 (significant in 10%) and a downward trend in 177 (significant in 17%). Changnon and Changnon (2000) assessed hail-day trends from carefully screened records of 66 stations across the United States over a 100-year period, 1896–1995, and found five types of 20-year fluctuations:

One present in the Midwest had a peak in hail activity in 1916–35 followed by a general decline to 1976–95. Another distribution had a mid-century peak and was found at stations in three areas: the central high plains, northern Rockies, and East Coast. The third distribution peaked during 1956–75 and was found at stations in the northern and south-central high plains. The fourth temporal distribution showed a steady increase during the 100-year period, peaking in 1976–95, and was found in an area from the Pacific Northwest to the central Rockies and southern plains. The fifth distribution found at stations in the eastern Gulf Coast had a maximum at the beginning of the century and declined thereafter. The 100-year linear trends defined four regions across the United States with significant uptrends in the high plains, central Rockies, and southeast, but with decreasing trends elsewhere in the nation. The national average based on all-station hail values formed a bell-shaped 100-year distribution with hail occurrences peaking in mid-century.

Tornadoes in the U.S. may have increased in number but have decreased in severity since recording began in 1950 (Figure 21). NOAA explains: "The increase in tornado reports over the last 54 years is almost entirely due to secular trends such as population increase, increased tornado awareness, and more robust and advanced reporting networks (NOAA ongoing,c)." Tornado activity increases with La Niña events, when the eastern Pacific Ocean is cool, and decreases during El Niño events (Lepore et al. 2017). The 2011 tornado season, for example, was particularly active (1,676 tornadoes), deadly (553 deaths) and costly (>$28 billion) while 2016 was unusually quiet (18 deaths) (NOAA 2018,c). Over three times as many deaths occurred during the warming-hiatus decade as during the recent rapidly warming decade (1,084 from 2005 to 2014 and 350 from 2015 to 2024) (NOAA ongoing,b).

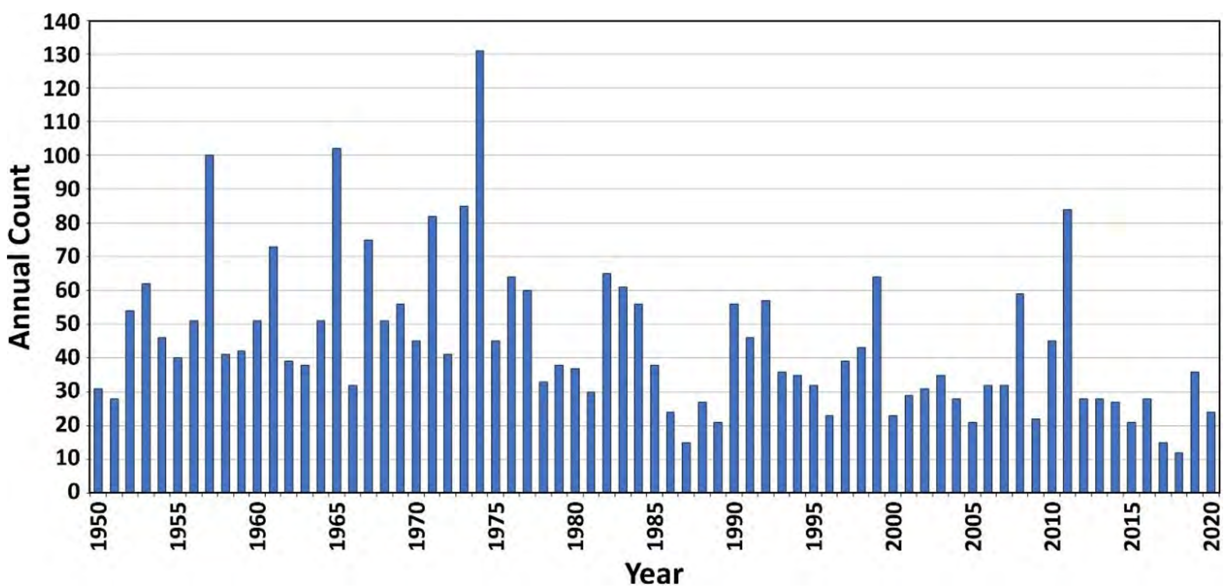

Figure 21: *Annual Number of Strong Tornadoes (EF3+) Across the United States, 1950–2020 (NCDC/NOAA ongoing,a).*

Floods take many lives and impact the health of survivors, often long after the event. The world's deadliest flood occurred when China's Huang He (Yellow) River killed 7 million people in 1332. The next most deadly occurred when the same river killed between 1 million and 4 million people in 1887 and 1931 (White 2012). Approximately 100,000 flood fatalities occurred in England and the Netherlands in 1099, another 80,000 in the Netherlands when the Great Storm broke a dike in 1287, and another 10,000 from a similar incident in 1421. Late-thaw ice jams blocked swollen rivers and burst dikes in the Netherlands during the cold 18th century (Demaree 2006). The highest flood risk in Germany's River Werra was in the 1700s (Mudelsee et al. 2006). California's worst recorded flood occurred during 1861–1862 when nearly 10 feet of rain submerged the entire Central Valley for weeks (Null et al. 2007). Flooding of the river Vltava in the Czech Republic decreased over the last century (Yiou et al. 2006). Australia's Mary River had its worst recorded flood in 1893, with Aboriginal legends of even worse floods (Gympie Regional Memories 2023). Brisbane had more frequent and severe recorded floods during the 19th century than the subsequent 125 years, the highest being in 1841 and the next highest in 1893 (Figure 22). A global analysis of nearly 200 rivers revealed that flows over the last century were unchanged in the majority, increasing in 27 and decreasing in 31 (Kundzewicz et al. 2005). This is also true for those rivers with observations stretching back much further in time (Svensson et al. 2005).

The IPCC's AR5 (2015) agrees: "There continues to be a lack of evidence and thus low confidence regarding the sign of trend in the magnitude and/or frequency of floods on a global scale." Christy et al. (2025) computed the 26 highest five-day precipitation totals every five years over 130 years at 29 recording stations on the Pacific coast and found no trends (Figure 23). Deluges associated with the massive 1997–98 El Niño event are apparent. They likewise found no trends in the humid Southeast nor the Northeast of the U.S. (The Conversation 2017).

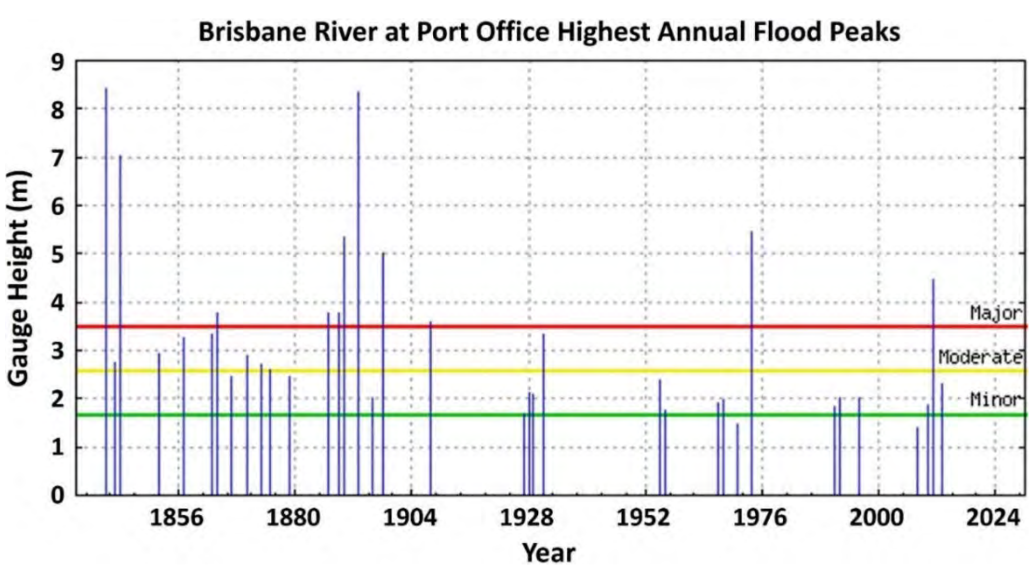

Figure 22: *Brisbane River Heights in Meters, 1840–2016. (Australian Bureau of Meteorology 2016)*

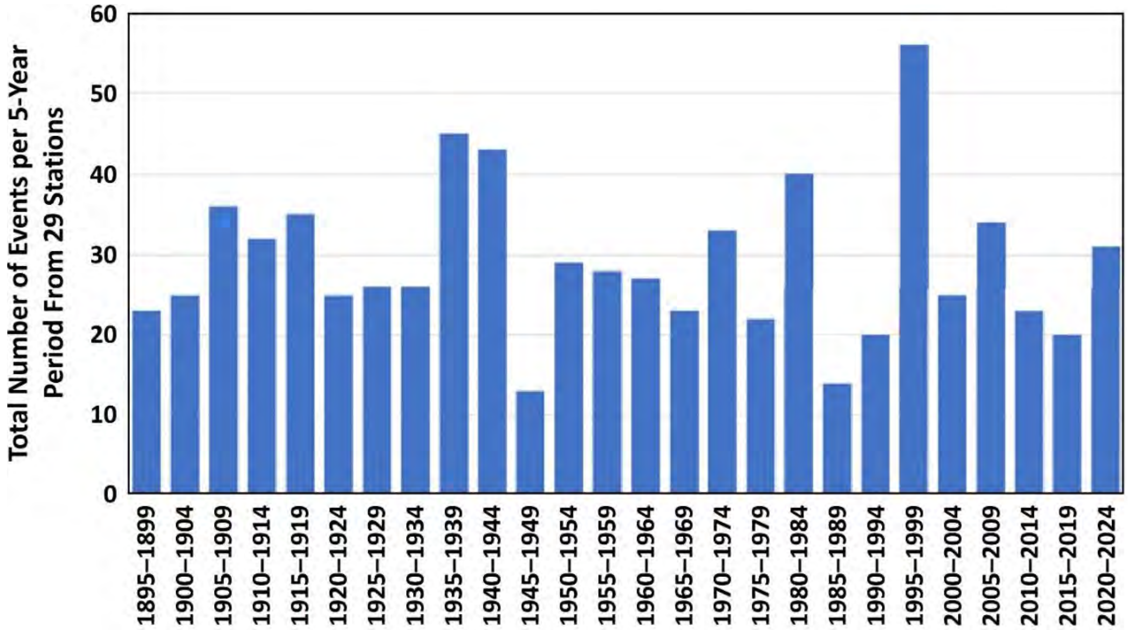

Figure 23: *Time Distribution by Five-Year Periods of the 26 Heaviest (One-in-Five Year) Occurrences for 29 Stations on the Pacific Coast (Christy et al. 2025 Figure 6.4.2).*

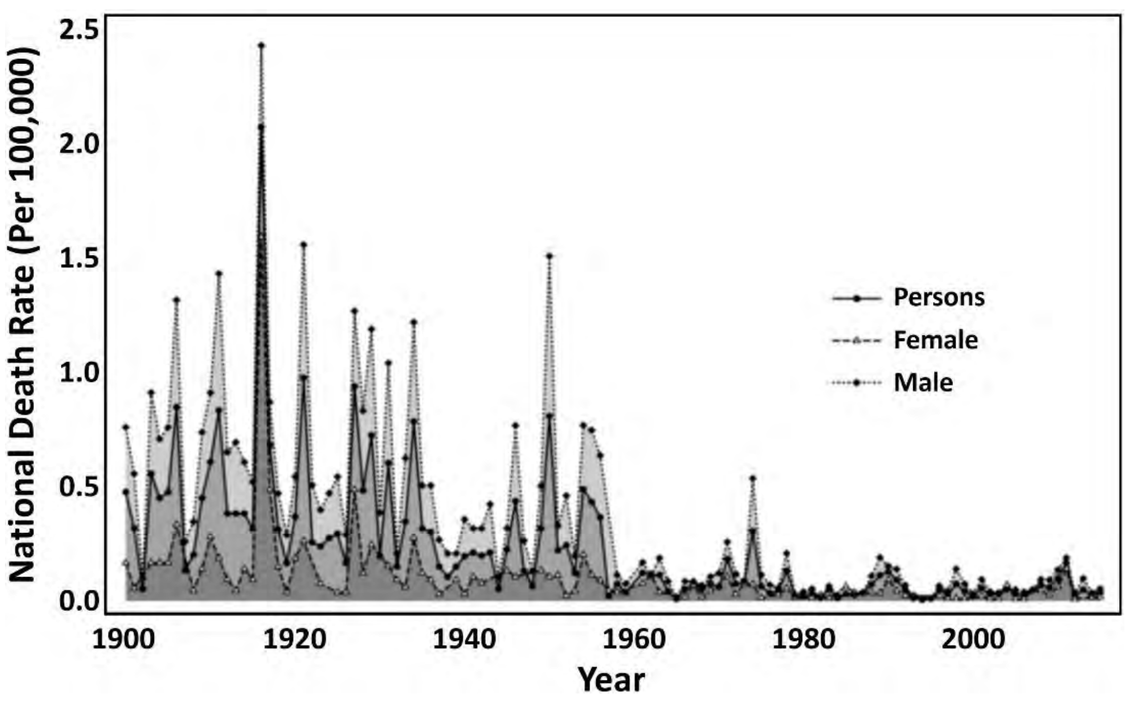

Figure 24: *Australian Flood Fatality Rate from 1900 to 2015 (Haynes et al. 2016).*

Most flood fatalities occurring worldwide between 2005 and 2014 were in Asia and among women (Chowdhury et al. 1993). Haynes et al. (2016) analyzed 1,859 Australian flood fatalities from 1900 to 2015 and found a dramatic decline through that time (Figure 24). Ashley and Ashley (2008) found no statistically significant trend in fatalities over the period 1959–2005 in the United States (Figure 25).

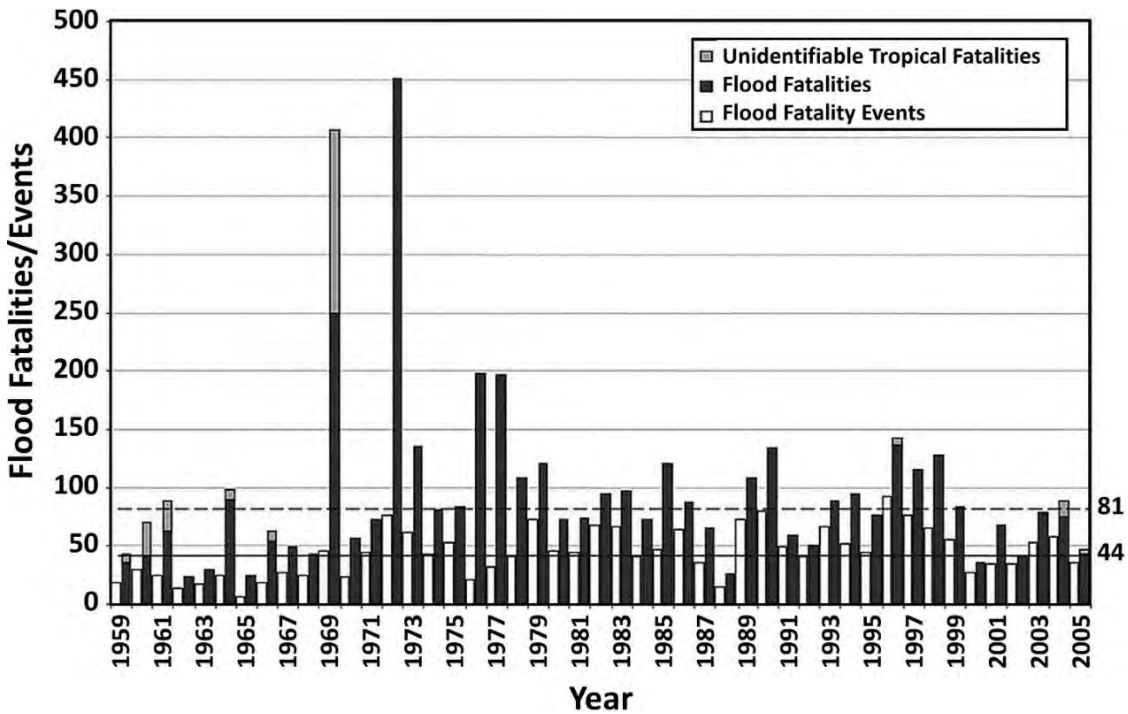

Figure 25: *Flood Fatalities in the continental United States, 1959–2005. Black Bars Represent Deaths Due Strictly to Flooding for All Event Types in the Study. Gray Bars Represent Deaths Due to Tropical Systems but Not to Flooding Alone. Light Grey Bars Represent Deadly Events. The Dashed Horizontal Line Represents Yearly Fatality Median, and the Non-Dashed Horizontal Line Represents Yearly Fatality Event Median. The Asterisk Indicates That 2005 Data are Preliminary and Do Not Include Hurricane Katrina Fatalities from Louisiana (Ashley and Ashley 2008).*

The Australian evidence indicates that the solution to flooding is not climate mitigation but better infrastructure, warning systems, evacuation centers, rescue services, etc. While flood casualties have been declining, health problems associated with dislocation and economic losses have been increasing due to population growth, especially along waterways. Altered land use and loss of flood plains and wetlands impacts flooding far more than does climate change. Bjorn Lomborg put it simply and starkly: "A dollar spent on flood management will reduce flooding 1,300 times better than a dollar spent on Kyoto (Lomborg 2007)."

Drought in the American west is often attributed to climate change, but accurate records of precipitation going back to 1895 indicate no significant trend in either the Southwest or Northwest Regions (NCDC 2025). After demonstrating a robust relationship between tree-rings and observed Colorado River flows over the 20th century, Meko et al. (2007) examined these proxies back to 762 CE and found many more severe droughts, the worst occupying almost the entire 12th century (Figure 26).

Models project wet regions becoming wetter and dry regions drier (Lau et al. 2013), but Sun et al. (2012) found that wet areas got drier and dry areas got wetter from 1940 to 2005, and Greve et al. (2014) found no difference.

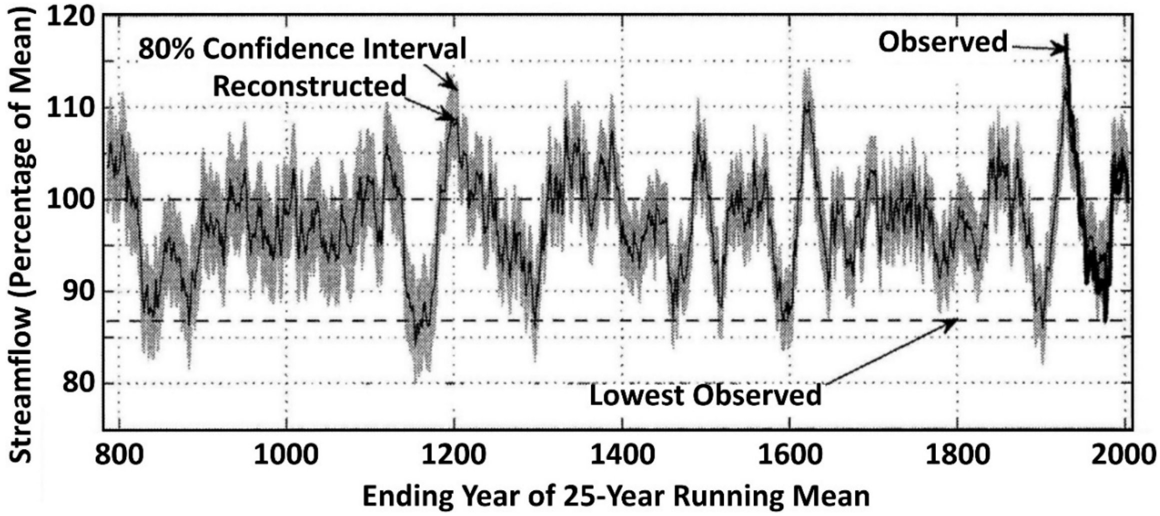

Figure 26: *Colorado River Stream Flow, Observed: 1905–2005 and Reconstructed from Tree Rings: 762–2005 (Adapted from Meko et al. 2007).*

Leaf stomata density and water loss decrease as atmospheric CO_2 increases; thus, increasing drought tolerance (Royer 2001). From 1982 to 2012, CO_2 increased by 15% and vegetation cover increased by 11% in *arid* areas (Donohue et al. 2013). Scientists once worried about increasing desertification due to climate change but now worry about a greening planet and shrinking deserts (Park et al. 2018, Cesscati et al. 2018, Pearce 2024)!

Konzmann et al. (2013) estimated that global irrigation demand will decline by about 17% by the 2080s due to a combination of increasing carbon dioxide, shorter growing periods and precipitation increases. Wiltshire et al. (2013) estimate that population growth will increase the number at risk of water stress from 2.6 billion to 4.1 billion in 2000 but to only 2.9 billion under the IPCC's A1FI scenario with the benefits of CO_2 factored in; the higher the CO_2, the greater the risk reduction.

Wildfires can cause not only immediate death and destruction but also protracted mental health consequences for firefighters and survivors—especially those losing loved ones, livelihoods and/or property—over many months or even years (McFarlane 1988, McFarlane et al. 1984). Toxic and potentially carcinogenic smoke can also impact health, even hundreds of kilometers away (Bernstein et al. 2013). Particulate matter smaller than 2.5 microns ($PM_{2.5}$) from wildfires is more toxic to the respiratory system than equivalent concentrations of $PM_{2.5}$ from background urban sources (Johnston 2017). Johnston et al. (2012) estimated that the smoke from wildfires kills over 300,000 people globally, mostly in Africa and Asia, and especially among the elderly and those with chronic heart and lung conditions (Morgan et al. 2010, Martin et al. 2013). The annual $PM_{2.5}$ emissions from wildfires have significantly declined this century except in Canada (Samborska et al. 2024). Wildfires in catchment areas can also reduce runoff by as much as 50%, as trees regenerate over subsequent years or decades. (Kuczera 1985, Smith et al. 2011).

The burning question, of course, is whether wildfires are caused by climate change. The burned area in the U.S. and globally declined last century, by 27% this century and on every continent,[267] but the intensity of wildfires may be increasing in some areas (Giglio et al. 2013, Samborska et al. 2024, Cunningham et al. 2024). Increased forest fire frequency, intensity and/or duration of fire season has been observed in Africa, South Africa, Australia, Alaska, Canada, western U.S., Russia and Spain, but this does not necessarily incriminate climate change (Hemp 2005, Kraaij et al. 2013, Bradstock et al. 2013, Kasischke et al. 2010, Gillett et al. 2004, Westerling et al. 2006, Williams et al. 2011, Pausas et al. 2012). Whereas the 2019–20 Australian summer bushfires (attributed to climate change) burned 7% of New South Wales, back in 1851, a quarter of Victoria burned after white settlement had disrupted thousands of years of traditional "cool burning" of a fire-prone region with wet winters and hot dry summers (Jones et al. 2022, Strutt 2023). The highest profile forest fire in the U.S. West, the 1910 Big Blowup fire which destroyed over 3 million acres and entire towns, led the U.S. Forest Service to focus on fire suppression of all forest fires. Eventually, the U.S. Forest Service recognized that more frequent smaller prescribed burns, fuel elimination, and controlled wildfires are more appropriate and result in healthier forests, water ecosystems and biodiversity (Sommer 2016, Stephens et al. 2021).

Wildfires require a fuel load (dry, flammable vegetation), suitable weather (hot dry winds), and an ignition source (natural or human). Some suggest that increasing carbon dioxide can increase all three: fuel loads via CO_2-fertilisation, warmer and wetter growth conditions, combustibility via increased temperatures, and ignition via lightning strikes (Hovenden et al. 2010, Flannigan et al. 2013, Villarini et al. 2013).

It is not that simple, however. Increased atmospheric CO_2 benefits some trees more than some grasses, which dry out and burn faster, and survive fires. Deforestation in the tropics is a major fire factor (Kuczera 1985). Ecosystem models tend to overestimate precipitation and the growth response to it. They don't include plant diversity, evapotranspiration and ground water, mineral composition of the soil, forest management, grazing, changes in cultivation practices and varieties, irrigation, storms, insect attacks and other disturbances which together contribute more to fuel load variations (Piao et al. 2017). Greenhouse gases impact winter minimum much more than summer maximum temperatures. Lightning strikes, thought to increase by 5-6% per degree C of warming, account for very few ignitions (Price et al. 1994). Balch et al. (2017) evaluated over 1.5 million government records of wildfires in the U.S. spanning the period from 1992 to 2012, He found that humans accounted for 84% of the fires and that the human-caused fire season was three times longer than the lightning-caused fire season. Whereas human ignition accounted for 5.1 million square kilometers, lightning accounted for only 0.7 million square kilometers, primarily in sparsely populated mountainous areas of the western United States. Many wildfires, such as California's Wine Country fires in 2017, are started by downed power lines in high winds (Steele 2017).

The human impact on wildfires also involves controlled burning, firebreaks, clearing around dwellings, fire protection, warning systems, fire-fighting capabilities and demographics. Most buildings affected by major bushfires in Australia are within 100 meters of bushland, and many back right onto it (Chen et al. 2010). Altered ecosystems can also have a profound impact. The introduction of African gamba grass to northern Australia has greatly intensified wildfires there (Queensland Government 2016). Curran, Perry and Wyse (2017) point out that: “Plantations of highly flammable exotic species, such as pines and eucalypts, probably helped to fuel the recent catastrophic fires in Portugal and in Chile. In arid regions, such as parts of the U.S. southwest, the introduction of exotic grasses has transformed shrublands, as fires increase in severity.“ Focusing on CO_2 to prevent wildfires may be as misguided as the former focus on eggs to prevent heart attacks and diverts attention from proven preventive measures:

- Adequate and properly maintained firebreaks, including green firebreaks
- Preventing or limiting the spread of highly flammable exotics
- Maintaining safe electrical networks, placing them underground in high-risk areas
- Regular planned/controlled burning at appropriate times/weather conditions
- Timely, effective communication to the public of fire risk, planned burns and smoke pollution
- Making dwellings as fire-resistant and smoke-proof (sealed) as possible
- Using effective air cleaners to reduce indoor smoke pollution, especially for asthmatics

Denying the use of fossil fuels for such preventive measures and for firefighting could cost countless lives.

FOOD, FAMINE, CLIMATE AND CO_2

In his 1968 book *The Population Bomb*, Paul Ehrlich predicted widespread famine with hundreds of millions starving to death in the 1970s, but the death toll declined as the population grew (Figure 27).

While pessimists panicked, Norman Borlaug, a Minnesota agronomist, quietly launched a green revolution in Mexico, which became a net wheat exporter in 1963, in the Philippines, which became a rice exporter in 1968, and India and Pakistan, which more than doubled their wheat production. Borlaug became “the man who saved a billion lives” and was awarded the Nobel Peace Prize in 1970. Thanks to his disease-resistant, high-yield hybrids and fertilizers, global food production increased from 1961 to 2005 by 2.3% per annum (35% faster than the population rate of 1.7% per annum). Food consumption increased from 2,280 kcal/d to 2,800 kcal/d per person as agricultural production grew along with GDP (Wik et al. 2008). In *Nature Climate Change*, Asseng et al. (2015) warned: “Warming is already slowing yield gains at a majority of wheat-growing locations. Global wheat production is estimated to fall by 6% for each °C of further temperature increase.” Despite subsequent warming, Mohan in *The Times of*

India (17 August 2017) reported a record food-grain production, up 4% from the previous record, a fivefold increase since 1951 and a fourfold increase in yield per hectare. Global wheat production also reached record levels due to increases in India, Russia and the U.S. (Figure 28). New durum varieties can withstand 40°C temperatures (Hillsdon 2018).

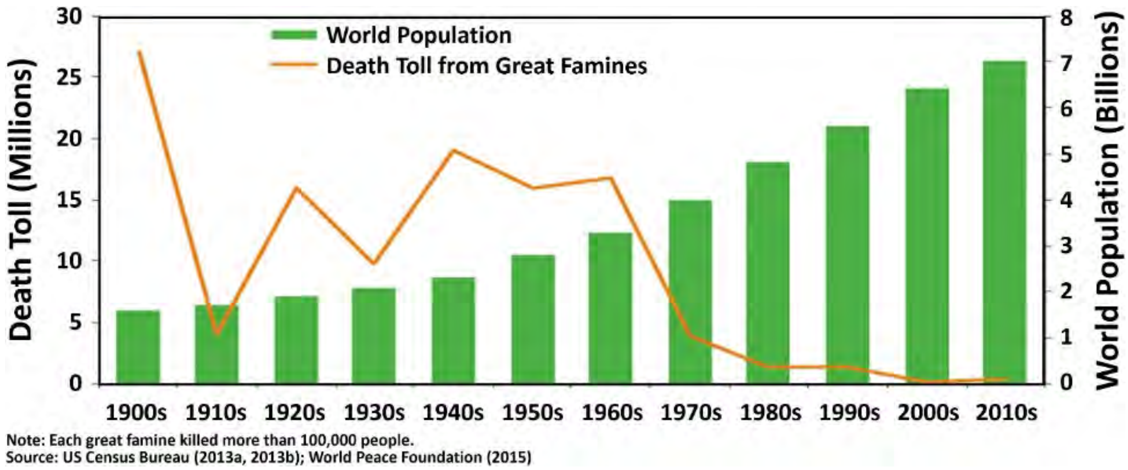

Figure 27: *Global Population (billions) and Mortality from Great Famines (Millions) from 1900 through 2015.*

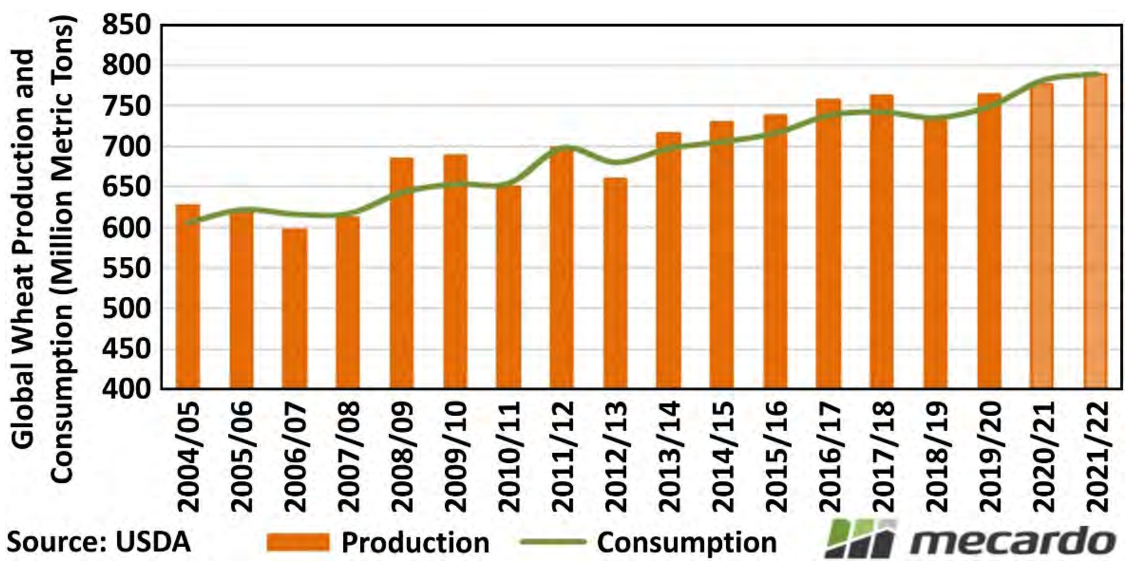

Figure 28: *Global Wheat Production and Consumption 2004–2022.*

Global warming has extended the arable area, growth rate and growing season for food crops (Frich et al. 2002). From 1980 to 2003, global food production increased by 62.8% as atmospheric CO_2 increased by 11.2%, fertilizer use by 27.5% and land use barely at all (Curtin 2009). Numerous studies of CO_2 enrichment have demonstrated dramatically improved crop yields (Jablonski et al. 2002, Kimball et al. 2002). It also reduces water requirements and mitigates drought (Fleisher et al. 2008). Horticulturalists increase CO_2 two and a half times the present atmospheric level in greenhouses**.** Ainsworth-Long (2005) performed a meta-analysis of

124 papers on 40 species tested at 12 sites, seven in the USA, three in Europe, two in New Zealand and Japan, using free-air CO_2 enrichment (FACE) to around 550 ppm. The actual increases achieved (above the ambient CO_2 level at the time of the study) varied from 30.5% to 68% with an average of 49.2%. They found that trees benefited the most, more than anticipated from chamber studies, while crop yields increased by 17% on average, less than expected from chamber studies. Sorghum yields increased by as much as 28% under dry conditions due to reduced water loss from fewer transpiration stomata. Light-saturated CO_2 uptake was increased by 19% at temperatures under 25°C and by 30% at higher temperatures, indicating better heat-tolerance under elevated CO_2 (Gutiérrez del Pozo et al. 2009). Two FACE facilities using CO_2 at up to 200 ppm above ambient levels produced a 5–7% increase in rice yield and 8% increase in wheat yield, which would result in an extra 59 million metric tons a year globally, enough to feed an extra 550 million mouths at the average per capita consumption. Reducing it to preindustrial levels would put billions of lives at risk of starvation and constitute a crime against humanity.

The U.S. National Bureau of Economic Research matched satellite-based observations of outdoor CO_2 levels across the U.S. with county-level agricultural output data and other economic variables. They concluded that CO_2 emissions had boosted U.S. crop production since 1940 by 50% to 80%—much larger than previous estimations using FACE experiments—and found that every 1 ppm of increase in CO_2 boosts corn yields by 0.5%, soybeans by 0.6%, and wheat by 0.8 % (Figure 29) (Taylor et al. 2023).

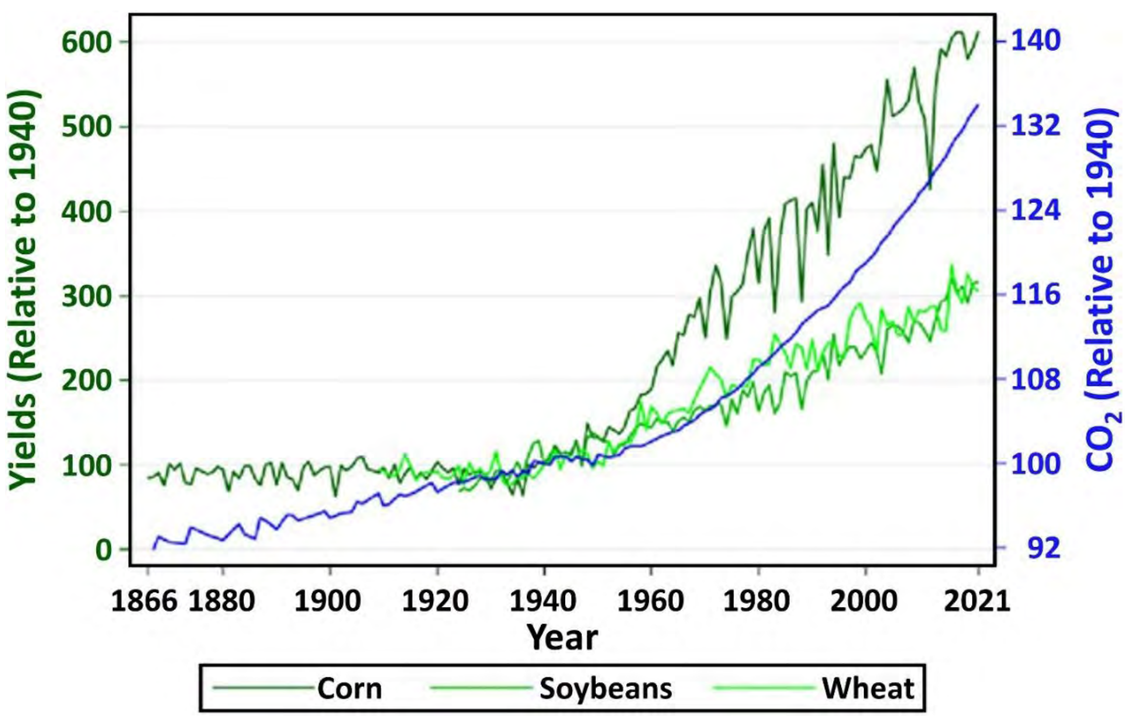

Figure 29: *U.S. Average CO_2 Levels and Yields of Corn, Soy and Wheat all Normalized so 1940=100 (Taylor and Schlenker 2023).*

Climate activists focus on the fact that CO_2 enrichment lowers the protein and mineral content of some foods, but genotype selection and nitrogen/mineral fertilization can maintain protein/mineral content (De Costa et al. 2007, Sultana et al. 2017). CO_2 enhancement significantly increases the flavonoid/antioxidant content of wheat and strawberries: by 55% and 112%, ascorbic acid (vitamin C) by 10% and 13% and glutathione by 3% and 171% at 300 ppm and 600 ppm, respectively (Levine et al. 2008, Wang et al. 2003). Tomatoes grown in enriched CO_2 are higher in vitamins A and C (Kimball et al. 1981, Madsen 1975). Idso et al. (2002) found that CO_2-enriched oranges were 4% heavier, 74% more in number and 5% higher in vitamin C. Soy beans grown from seedlings in CO_2 at 700 ppm (compared to 400 ppm) had an isoflavone content 8% higher when grown at the usual mean temperature of 18°C, 104% higher when grown at 23°C and 101% higher at 28°C (Caldwell et al. 2005). When drought was added to heat stress, the isoflavone content was 38%–186% higher in plants exposed to 700 ppm. Broccoli grown in 65%-enriched CO_2 produced heads 7% heavier and containing 37% more glucosinolates (Schonhof et al. 2007). These not only enhance flavor but also help to prevent cancer (Mikkelsen et al. 2002). Similar results were found with Chinese kale (La et al. 2009). Growing spinach at 800 ppm increased the fresh weight by 67%, the soluble protein concentration by about 52% and vitamin C by 21% (Jin et al. 2009). Gwynn-Jones et al. (2012) found that quercetin glycosides and various other antioxidants were significantly higher in several types of berries consumed by humans and other animals at northern latitudes when grown at 600 ppm. It is very likely that CO_2 has been quietly improving food quantity and quality.

Global food security depends not only on production but also on distribution and transport, which invariably involves the use of fossil fuels. Misguided climate action can threaten food security. The diversion of good food into biofuel may have pushed 130–155 million people into absolute poverty, hunger and starvation in 2008 and caused 190,000 premature deaths in 2010 (Goklany 2011). In 2007, Australia's CSIRO warned: "If all of the ethanol capacity that is currently proposed was to be fulfilled by existing crops (principally wheat and sugar), or if a national E10 target were to be met (e.g. by ... wheat as the feedstock), it could force the import of wheat in drought years." Despite a severe U.S. drought in 2012, 40% of its corn crop went into ethanol (Carter et al. 2012). Researchers noted the real irony as follows: "Once estimates from the literature for process emissions and displacement effects including land-use change are considered, the conclusion is that U.S. biofuel use to date is associated with a net increase rather than a net decrease in CO_2 emissions (DeCicco et al. 2016)." What folly!

Seafood supplies about 10% of the world's human calorie intake and is an important source of omega-3 fatty acids (ω-3 FAs), which may reduce cardiovascular morbidity and mortality and benefit some metabolic, inflammatory, neurological, neuropsychiatric and eye disorders (Fleming et al. 2014, Yashodhara et al. 2009). It is thought that increasing CO_2 will impact seafood via higher sea-surface temperatures, ocean "acidification" (reduced alkalinity), altered precipitation and sea-level rise. Cheung et al. (2009) rely on unlikely emissions scenarios and temperature projections to "show that climate change may lead to large-scale redistribution of global catch potential, with an average of 30%–70% increase in high-latitude regions and a drop of up to 40% in the tropics." Crustaceans (crabs, lobsters, shrimps and krill) appear to benefit from more dissolved CO_2 even at many times today's atmospheric level (Ries et al. 2009). Samaila et al. (2011) put climate change into perspective: "Global marine fisheries are underperforming economically because of overfishing, pollution and habitat degradation." Protecting and promoting sea grass will increase seafood supplies and mitigate climate change more effectively than focusing on emissions (Broom 2023).

MENTAL HEALTH

We are now seeing a global epidemic of climate-related anxiety (fear, guilt, hopelessness, depression, anger, grief, shame, hopelessness, etc.) among children and young people, affecting 84% of the latter and negatively affecting the daily life and function of nearly half (Crandon et al. 2022, Hickman et al. 2021). Many are so convinced that climate change is an existential threat that they elect not to propagate the race! A study of 5,500 Australian adults found that 25% met the screening criteria for clinical anxiety or trauma related to climate change, and 20% of those aged 18–34 were functionally impaired by it (Patrick et al. 2022). Why are children and young people so anxious about climate change? One reason is that the media now link climate change to almost every extreme weather and wildfire event, labeling many of them "unprecedented." Older people with long memories have a better perspective.

A more sinister reason is the deliberate indoctrination of the young. A 2007 survey of 600 Australian children aged 10–14 who had recently been shown Al Gore's docudrama, *An Inconvenient Truth***,** emotively depicting drowning polar bears, oceans rising 20 feet, dreadful epidemics and more happening very soon unless we "save the planet," found that 44% were nervous about the future impact of climate change and 25% believed the world would end before they got much older (Tucci et al. 2007). Another survey of 200 schoolchildren in New South Wales likewise found that fears over climate change were producing feelings of powerlessness and despair: "Many children thought they would not survive to adulthood (Kiernan 2008)." Teachers are now encouraged to use "sustainable" educational material, some of it presenting apocalyptic predictions and frightening propaganda bordering on child abuse (Minecraft Education 2025).

Dire predictions are often based on flawed models, exaggerations, wild imaginations and a failure to factor in human ingenuity (Goklany 2014). Predictions made in the 1970s of an impending ice age, falling crop yields, increasing global famine, advancing deserts, a pesticide-induced cancer epidemic, rapid depletion of oil, gas and other resources, were not only wrong but opposite of what happened. More recent predictions of malaria spreading across the globe, Arctic ice disappearing by 2013, increasing droughts and tropical cyclones have all failed to materialize. Indeed, the world has never been safer than now (Figure 30).

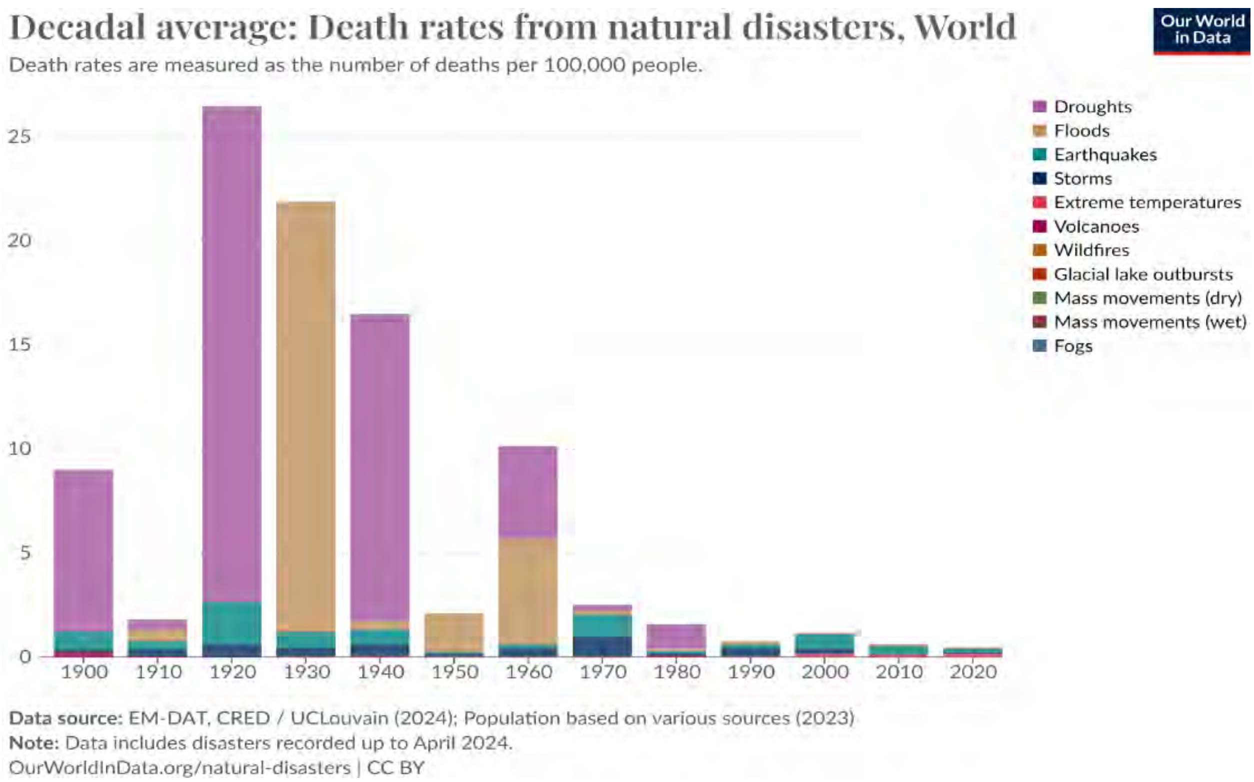

Figure 30: *Global Mortality from Natural Disasters from 1900 to 2024.*

Child psychologist Clare Rowe has seen many cases of eco-anxiety including an eight-year-old girl with “a deep and persistent fear about her family’s car usage. She would cry and refuse to get in the vehicle, believing that each trip was directly killing the planet (Rowe 2025).” Childhood anxiety is normally treated by offering realistic perspectives and reassuring safety but “when it comes to climate change, we abandon this approach entirely and instead of reassurance, we validate their fears. We even encourage them to remain anxious as a form of moral engagement.” Australian doctors are also advised “to avoid invalidating when challenging thoughts and feelings about climate change” and to “not dispute the accuracy or otherwise of thoughts” but rather “identify action which is meaningful and sustainable for them (e.g., eating less meat or joining a local environmental group) (Seth et al. 2023).” When this was challenged, and their assertion that climate change was a “significant existential threat that most Australians are rationally worried about,” the authors dismissed dozens of cited scientific papers as “outlier opinion and research” in favor of an authoritative “consensus of the global scientific community (Allen 2023)”.

The academic left first quarreled with science before capturing, corrupting and politicizing it (Gross et al. 1986, Agrawala 1997, Fuller et al. 2010, Paltridge 2009). They then ignored quantitative uncertainties to contrive a catastrophic climate-change consensus, calling skeptics *deniers* and inventing a climate crisis and “global boiling” to foster fear, funding and a rush to renewables (Strengers et al. 2015, Cook et al. 2013, Solomon 2008, Clifford 2023).

Anthropocentric purists prohibit alternative diagnoses, prognoses, priorities or remedies and suspect fossil-fuel funding behind anyone challenging "the science." Climate change does impact the poorest the most but, as we shall see in the next section, a lucrative climate industry makes them even poorer and more vulnerable.

ENERGY SOURCES AND HEALTH

Humanity has climbed an energy ladder from burning biomass (wood, charcoal, crop waste and dung) to wind and hydropower (windmills and watermills) to fossil fuels (coal, oil and natural gas) and biofuels (ethanol and biodiesel), to nuclear power, solar (photovoltaic and thermal) and then back to wind power (turbines).

Biomass accounts for about 10% of global energy consumption and around 90% in South Asia and sub-Saharan Africa (except South Africa) (World Energy Council, 2017, International Energy Agency 2014). It is unquestionably the most air-polluting and lethal of all energy sources. According to the WHO (2024b), over 2 billion people (around a third of the world's population) still cook and heat their homes using biomass, estimated in 2020 to cause 3.2 million deaths a year: 32% from heart disease, 23% from stroke, 21% from pneumonia, 19% from chronic obstructive pulmonary disease (COPD), and 6% from lung cancer. Lelieveld et al. (2015) attributed 90% of the ambient air pollution in South Asian megacities to the burning of biomass in homes. This led Mikko Paunio (2018), an epidemiologist at the University of Helsinki, to state: "Perhaps around six million deaths globally are attributable to domestic combustion of solid (bio)fuels. However, despite these appalling statistics, the development community has focused its efforts on mitigating global warming instead. Some ... have even encouraged the burning of crop residues in homes. The effect of this headlong rush to 'save the climate' has horrifying implications for human health." Paunio also points out that burning wood pellets in Europe is not only more polluting than coal but also destroying forests and increasing CO_2 emissions (Sterman et al. 2018).

A large prospective study from 2000 to 2009 across the United States indicated that fine particulate matter (≤2.5 microns or $PM_{2.5}$) levels over 10µg/m3 increased total mortality by 3%, CVD mortality by 10% and respiratory mortality in never smokers by 27% (Thurston et al. 2016). The most air-polluted region of the planet, with an annual mean ambient $PM_{2.5}$ of greater than 26µg/m3, stretches band-like from northwest Africa across Arabia and northern India to eastern China; countries with the highest CO_2 emissions per capita—Australia, Canada and United States—have among the lowest actual air pollution (i.e. $PM_{2.5}$ ≤10µg/m3); only Siberia, Scandinavia, Scotland and Ireland have less, and the only areas in Australia with a $PM_{2.5}$ greater than 10µg/m3 are in the wildfire-affected north and the dry undeveloped center (WHO 2018). The answer to life-threatening air pollution is development, and that requires the intelligent use of fossil fuels.

Coal fueled the Industrial Revolution, allowing machines to replace muscles, thus liberating animals, serfs and slaves and permitting train travel and the rise of a prosperous middle class. Downsides included hazards associated with the mining, transport and burning of coal. Wikipedia lists 50 mining disasters since 1885, mostly underground cave-ins and explosions. The worst year on record was 1907 when over 3,000 U.S. miners died (ABC News 2006). Those risks are now greatly reduced by open-cut mining and by automation (CSIRO 2025).

Coal worker pneumoconiosis (CWP), commonly known as 'black lung', took about 25,000 lives globally in 2013, but was almost eliminated in Queensland in the 1970s and in New South Wales a little later (Figure 31) (GBD 2015). The U.S. has been less successful in preventing CWP, probably due to the higher quartz content in mine dust (Joy et al. 2011). Spraying a bio-degradable binding polymer onto the surface has been shown to reduce coal dust lost to the environment by 75% and is included in good management controls (Queensland Government 2018).

By replacing biomass for cooking and heating, and supplying over a third of the world's electricity, coal prevents millions of deaths every year, and many more by helping to lift people out of poverty. High-efficiency, low-emission (HELE) power plants use scrubbers and precipitators to remove 99% of fly ash, 97% of sulfur dioxide and up to 90% of nitrogen oxides generated from burning coal (World Nuclear Association 2017). New ultra-clean coal (UCC) technologies can remove 99.75% of particulates and almost all the sulfur. Coal power in the U.S. is 17 times safer than in India and China (Table 1). India has huge coal reserves but mostly of low-quality and high-ash content (World Energy Council 2018).

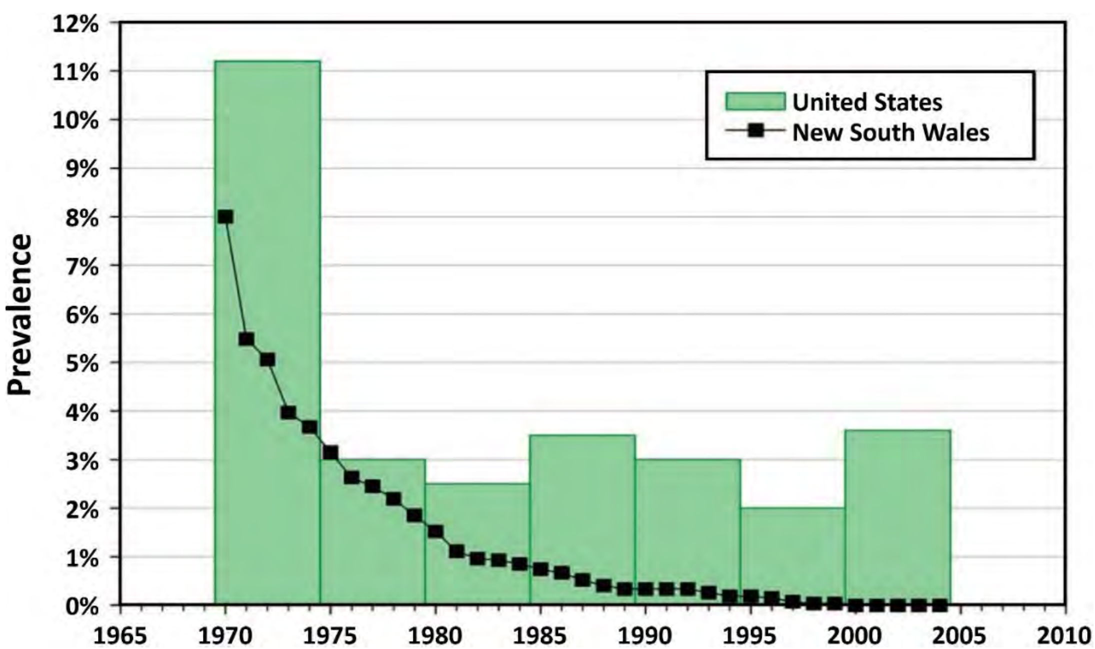

Figure 31: *Prevalence of Pneumoconiosis Among U.S. Underground Coal Miners and NSW Coal Workers (Joy et al.2011).*

Oil and its distillates (petroleum, kerosene and diesel) revolutionized 20th century transport even more than did coal in the 19th century. It solved the horse-dung problem and allowed cities and trees to grow on former denuded horse paddocks. Downsides included lead (added to gasoline as anti-knock) and other particulates contaminating the air in big cities and soil along busy roadways until unleaded gasoline and catalytic converters were mandated in developed countries in the 1980s (Wikipedia 2018k). When the EU promoted diesel in 2001 to reduce CO_2 emissions, by 2016 most European cars were diesel, spewing out nitrogen oxides and particulates (soot) (The Times 2017). In 2007, the U.S. mandated diesel particulate filters, which tend to clog up during short trips around town and require periodic long CO_2-emitting trips to remove the accumulated carbon. Even “Euro 6 Standard” vehicles miss their pollution targets by a whopping 400% (Jenkins et al. 2017). A misguided attempt to reduce a non-pollutant, CO_2, increased real pollution! After successive Indian governments subsidized diesel to assist farmers, the number of diesel cars increased tenfold and New Delhi became the city with the world’s most polluted air, killing up to 50,000 people per year (The Economist 2016). Biodiesel is no less polluting. EVs recharged overnight with coal-generated electricity may reduce air pollution in cities but are really coal-powered cars. “Just Stop Oil” campaigners depend on oil for food, clothing, accessories, medicine, prosthetics, furniture, phones, electricity (insulation), transport and even the paint they throw on precious artwork!

Natural gas (methane) produces almost no pollutants and less CO_2 per unit of energy than coal, which it is fast replacing in the United States. Being far more flammable than other fossil fuels, its storage and distribution require stringent safety standards. Fatal explosions are not uncommon, but, as shown in Table 1, there are far fewer deaths per unit of energy produced than with coal or oil (Malbran 2010). As the primary source of fertilizer, natural gas saves numerous lives. It has also been shown that hydraulic fracturing (fracking) for shale gas has a good safety record (McGraw 2016, Harrabin 2015).

Table 1: *Comparison of Energy Sources in Relation to Greenhouse Gas (GHG) Emissions, Energy Return on Energy Invested (EROI), Required Land and Resources, and Human Mortality Rate per Unit of Energy Produced.*

Metric/Source	Coal (No CCS)	Biomass[1]	Gas (No CCS)	Nuclear	Hydro (Med-Large)	Wind[2]	Solar Silicon PV[3]
GHG Emissions (g CO_2e/kWh)[4]	903	900	449	12	24	12	48
EROEI (buffered)	30.00	3.50	28.00	75.00	35.00	3.90	1.60
Land Use (CCUS) (m^2/MWh)	21.0	760.0	1.3	0.3	14.0	99.0	19.0
Critical Mineral Usage (kg/TWh)	7	7	8	12	6	165	124
Bulk Material Usage (CCUS) (t/TWh)	606	606	713	1,192	15,658	5,931	2,441
Mortality (Deaths/TWh)	64.4	14.3	3.4	0.04	0.71	0.10	0.23
Dispatchable/Intermittent (R/I)	D	D	D	D	D	I	I

1. Biomass gross CO2 emissions per Drax annual report; EROEI for corn biomass; Land Use from Freeing Energy; Mineral usage assumed same as coal
2. Wind land usage taken as median of Our World in Data analysis
3. Solar PV land use assumed ground-based silicon
4. GHG Emissions (except biomass) taken as median from UNECE report p83 https://unece.org/sites/default/files/2021-10/LCA-2.pdf

Solar power includes photovoltaic (PV) power generation and thermal solar plants that can store heat for use after dark. There are hazards associated with PV in its manufacturing, rooftop installation, cleaning, servicing and removal/replacement (Tsoutsos et al. 2005). Potentially toxic materials used in PV manufacture include silicon, gallium arsenide and cadmium (Etnier et al. 1981). The PV solar industry has become a leading emitter of hexafluoroethane, nitrogen trifluoride and sulfur hexafluoride, which are all potent and potentially toxic greenhouse gases (PR Newswire 2012, Tsai 2008). Falls from ladders and roofs are the leading cause of fatalities in the U.S. construction industry. Brian Wang (2008) estimated 100–150 fatal falls from solar panel roof installations annually. Per unit of energy produced, the lifecycle CO_2 emissions are four times greater for PV solar than for nuclear power and the quantity of toxic waste (lead, chromium, cadmium, etc.) is 300 times greater than that for nuclear waste, posing a future solar-waste crisis (Desai et al. 2017).

Wind power impacts human health in numerous ways. Yet, many farms are now growing turbines instead of turnips! Injuries and fatalities—over 1,500 times U.S. nuclear fatalities per unit of energy produced (Table 1)—occur during the transportation, installation and maintenance of turbines. Sunlight flickering through massive rotating blades can be annoying and even trigger epileptic seizures in susceptible subjects (Harding et al. 2008). Studies and reports on wind-turbine noise are many (Hartman 2017). A comprehensive review by Schmidt and Klokker (2014) found evidence of a dose-response relationship between wind-turbine noise and annoyance, sleep disturbance and possibly psychological distress, but no statistically significant association with tinnitus, hearing loss, vertigo or headache. Infrasound in the 5–8 Hz range can cause a rattling of doors and windows, which can be annoying to those living close to wind turbines (Jung et al. 2008). Tang et al. (2017) found that wind turbines in northern China affected the soil temperature and moisture of nearby farms, thereby reducing gross summer production by 8.9% and annual net production by 4%. Mining and refining of rare earth elements for turbines and EVs pollute Inner Mongolian lakes with large quantities of toxic and radioactive waste (Dominish et al. 2019, Fisher et al. 2013).

The major problem with wind and solar as producers of electricity their inability to operate when the wind doesn't blow and the sun doesn't shine, necessitating very costly storage and and back-up infrastructure. This increases the price of dispatchable electricity (Figure 32) and hence fuel poverty and temperature-related mortality.

Hydropower is the most reliable renewable energy—provided the rain comes. Pumped hydro allows surplus wind and solar energy to be stored but is expensive. It is vital that dams and reservoirs are well designed and built only on suitable sites. When the Banqiao dam on the Ru River in China burst in 1975, more than 170,000 people perished. A 1972 dam failure in Buffalo Creek, West Virginia, took 125 lives, injured over 1,100 and left nearly 5,000 people homeless. In 1972, a dam near Rapid City, South Dakota failed and flooded the entire downtown during the night. This event killed 237 and injured 2,932 people (Campbell 2008).

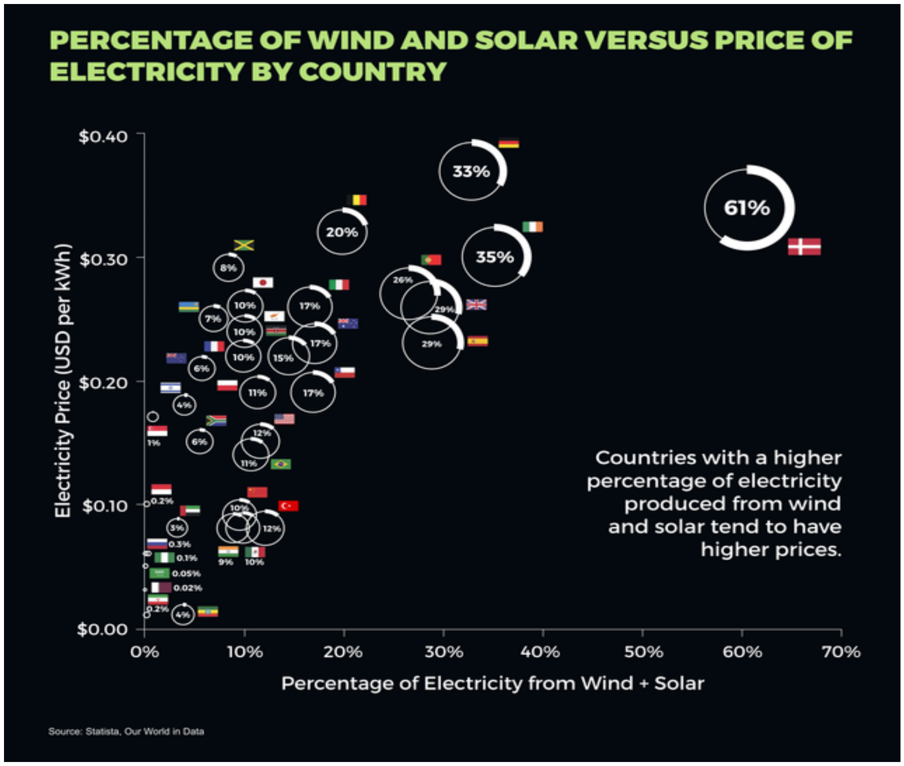

Figure 32: *Relationship Between Electricity Prices and Percentage of Intermittent Energy by Country in 2021.*

Nuclear power became unpopular after a tsunami hit Fukushima on March 11, 2011, even though no one died from radiation (Wang 2008). Nuclear has by far the lowest fatality footprint (Table 1). Even Chernobyl was responsible for fewer than 50 confirmed deaths. Laser enrichment of radioactive waste and fusion breeding might soon revolutionize the nuclear industry, making it more efficient and safer than ever (NRC 2017, Mannheimer 2014).

For optimal health, every country should be free to choose the most affordable and reliable energy sources. Those using coal should be encouraged and perhaps assisted to make it as clean as possible. Most will probably transition to gas and eventually to nuclear energy. Biomass should be phased out, as should all subsidies, and intermittent renewables must remain minor players. The underlying principle should be the conservation and best use of resources.

CONCLUSION

Warmth is good for human health and prosperity. Fossil fuels have played a vital role in providing the wealth essential for health and environmental protection. They have also boosted atmospheric CO_2 and added a little warmth, both being hitherto beneficial overall for plants and people. The ingenuity of *Homo sapiens* at adapting to climate has permitted people to populate almost the entire globe from the freezing Arctic to the steamy tropics. If we stick to doing what we do best—adaptation—we will continue to thrive. We must be prepared not only for global warming, but also for global cooling, which will surely occur as our present warm Holocene draws to its inevitable end.

Human health and that of the planet depends on balancing productivity and development with conservation and environmental protection. Only developed countries with people lifted out of poverty can afford to produce clean energy, protect the environment, put power lines underground, construct buildings with 5-star energy ratings, use efficient lighting/appliances to minimize energy and water use, and provide adequate safe water supplies and effective public health measures to control communicable diseases. It is vital that governments focus on real pollutants, not imagined ones, and avoid using climate change as a scapegoat for failure to implement sound public health policies and proven preventive measures. Misguided climate action can be worse than unmitigated climate change.

Urban design can be improved to reduce urban heat and to encourage health-promoting walking and cycling. Smoggy cities could also encourage a switch to electric vehicles, but not with generous taxpayer-funded subsidies. Energy costs need to be kept as low as possible, especially in cold climates, so that poor people can afford to keep warm in winter. Fossil fuels, including coal, will continue to have an important role to play in advancing civilization and human health over the 21st century. Our focus should be on conservation and health-promoting activities rather than on CO_2 and climate change. Unmitigated warming this century is likely to be more beneficial than harmful for humanity and the planet.

The 2014 IPCC Summary for Policymakers nicely summed it up: "The most effective vulnerability reduction measures for health in the near term are programs that implement and improve basic public health measures such as provision of clean water and sanitation, secure essential health care including vaccination and child health services, increase capacity for disaster preparedness and response, and alleviate poverty (*very high confidence*)."

ACKNOWLEDGMENTS

About the Authors

Dr. D. Weston Allen, MBBS, FRACGP
Dr. Allen obtained his medical degree at the University of Queensland in 1969 and entered the Fellowship of the Royal Australian College of General Practitioners (FRACGP) in 1975. He is a full-time family physician at Kingscliff on the southern Gold Coast.

Dr. Jan Breslow, M.D.
Dr. Breslow is the Fredrick Henry Leonhardt Professor at Rockefeller University and Head of the Laboratory of Biochemical Genetics and Metabolism; Senior Physician Rockefeller Hospital. He is also the former President of the American Heart Association and a member of the National Academy of Sciences, the National Academy of Medicine, and the German National Academy of Sciences Leopoldina.

Dr. Daniel Nebert, M.D.
Dr. Nebert is Professor Emeritus at the University of Cincinnati Medical Center where he was a professor of environmental health. HE also held the title of Adjunct Professor at the Human Genetics Division, Department of Pediatrics and Molecular & Developmental Biology at Cincinnati Children's Hospital Medical Center.

All are members of the CO_2 Coalition, a non-profit scientific organization based in Fairfax, Virginia and the document was created and is submitted under the auspices of the CO_2 Coalition.

Editor's Note

This document was originally submitted to EPA Administrator Lee Zeldin on September 19, 2025, and was titled *CO_2 Coalition Comment on Reconsideration of 2009 Endangerment Finding and Greenhouse Gas Vehicle Standards*. It was created and sent as a comment on the EPA's Proposed Rule 90FR 36288 of August 1, 2025: *Reconsideration of 2009 Endangerment Finding and Greenhouse Gas Vehicle Standards* and identified with the requested Docket ID Number EPA-HQ-OAR-2025-0194.

This response focused primarily on the EPAs Section VII, Requests for Comment, Number 2. in the rule: The scientific underpinnings of the Endangerment Finding are weaker than previously believed and contradicted by empirical data, peer-reviewed studies, and scientific developments since 2009 (C-2).

About the CO_2 Coalition

The CO_2 Coalition was established in 2015 as a non-partisan educational foundation operating under Section 501(c)(3) of the IRS code for the purpose of educating thought leaders, policy makers and the public about the important contribution made by carbon dioxide (CO_2) to our lives and economy. The organization seeks to engage in an informed and dispassionate discussion of climate change, humans' role in the climate system, the limitations of climate models and the consequences of mandated reductions in CO_2 emissions.

The CO_2 Coalition is comprised of more than 180 experts in various fields of science, engineering, physics and more who promote the many benefits of modest warming and increasing carbon dioxide.

REFERENCES

ABC News 2006: *Coal Mining Steeped in History*. https://abcnews.go.com/Primetime/Mine/story?id=1475697

ABC News 2014: T*ropical Cyclone Mahina: Bid to have deadly March 1899 weather event upgraded in record books*. http://www.abc.net.au/news/2014-12-26/cyclone-mahina/5964342

Adhami, J, and Reiter, P, 1998: *Introduction and establishment of* Aedes *(*Stegomyia*)* albopictus *Skuse (Diptera: Culicidae) in Albania*. Journal of the American Mosquito Control Association 14, 340–343.

Agrawala, S, 1997: *Explaining the Evolution of the IPCC Structure and Process*. Belfer Center for Science & International Affairs, Harvard University.

Ainsworth, EA, and Long, SP 2005: *What have we learned from fifteen years of free-air CO_2 enrichment FACE? A meta-analytic review of the responses of photosynthesis, canopy properties and plant production to rising CO_2*. New Phytologist 165, 351–372.

Alexander, LV, et al. 2006: *Global observed changes in daily climate extremes of temperature and precipitation*. Journal of Geophysical Research 111.

Allen, DW, 2023: *Regarding psychological distress due to climate change*. Australian Journal of General Practice 52, 824–6. https://www1.racgp.org.au/ajgp/2023/december/december-2023-correspondence

Anderson, C, 1991: *Cholera Epidemic Traced to Risk Miscalculation*. Nature 354 (4), 255.

Anderson-Berry, LJ, and Weyman JC, 2002: *Fifth International Workshop on Tropical Cyclones: Topic 5.1: Societal Impacts of Tropical Cyclones.* World Meteorological Organization. National Oceanic and Atmospheric Administration.

Ashley, ST, and Ashley, WS, 2008: *Flood fatalities in the United States*. Journal of Applied Meteorology and Climatology 47, 805–818. http://commons.lib.niu.edu/bitstream/handle/10843/13369/Ashley,%20S.%20-%20Flood%20Fatalities%20in%20United%20States.pdf;sequence=1

Asseng, S, et al. 2015: *Rising temperatures reduce global wheat production*. Nature Climate Change 5, 143–147. https://doi.org/10.1038/nclimate2470

Austin Alchon, S, 2003: *A pest in the new land: new epidemics in a global perspective.* University of New Mexico Press. p. 21. https://books.google.com/books?id=YiHHnV08ebkC&pg=PA21&dq#v=onepage&q&f=false

Australian Bureau of Statistics 2008: *Feature Article 3: Understanding Natural Hazard Impacts on Australia*. 1301.0 - Yearbook Complete. http://www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/1301.0Feature%20Article42008

Balch, JK, et al. 2017: *Human-started wildfires expand the fire niche across the United States*. PNAS 114 (11) 2946–2951. http://www.pnas.org/content/pnas/114/11/2946.full.pdf

Barrett, AD, Teuwen, DE, 2009: *Yellow fever vaccine – how does it work and why do rare cases of serious adverse events take place?* Current Opinion in Immunology 21 (3), 308–13. doi:10.1016/j.coi.2009.05.018

Barrier Miner 1896: *Thunderstorms and High Temperatures*. January 23. https://trove.nla.gov.au/newspaper/article/44159099?zoomLevel=5

Beasley, R, Crane, J, Lai, CK, Pearce, N, 2000: *Prevalence and etiology of asthma*. Journal of Allergy and Clinical Immunology 105, 466–472.

Beatty, ME, Letson, GW, and Margolis, HS, 2008: *Estimating the global burden of dengue*. Proceedings of the 2nd International Conference on Dengue and Dengue Haemorrhagic Fever. Phuket, Thailand.

Becker, R,J and Wood, RA, 1980: *'Heat Wave'.* Weatherwise 39 (4), 32–36.

Bedno, SA, et al. 2010: *Exertional Heat Illness Among Overweight U.S. Army Recruits In Basic Training*. Aviation, Space, and Environmental Medicine 81 (2), 107–111. https://doi.org/10.3357/ASEM.2623.2010

Béguin, A, Hales, S, Rocklöv, J, Åström, C, et al. 2011: *The opposing effects of climate change and socio-economic development on the global distribution of malaria*. Global Environmental Change 21, 1209–1214.

Bernstein, AS, and Rice, MB, 2013: *Lungs in a warming world: climate change and respiratory health*. CHEST Journal 143, 1455–1459.

Bharti, AR, Nally, JE, Ricaldi, JN, et al. 2003: *Leptospirosis: a zoonotic disease of global importance*. The Lancet Infectious Diseases 3 (12), 757–771.

Bosello, F, Roson, R, and Tol, RSJ, 2006: *Economy-wide Estimates of the Implications of Climate Change: Human Health*. Ecological Economics 58 (3), 579–91.

Bradstock, RA, Penman, T, Boer, M, Price, O, Clarke, H, 2013: *Divergent responses of fire to recent warming and drying across south-eastern Australia*. Global Change Biology 20 (5), 1412–1428. https://doi.org/10.1111/gcb.12449

Braga, ALF, Zanobetti, A, and Schwartz, J, 2002: *The effect of weather on respiratory and cardiovascular deaths in 12 U.S. cities*. Environmental Health Perspectives 110, 859–863.

Braganza, K, Karoly, DJ, and Arblaster, JM, 2004: *Diurnal temperature range as an index of global climate change during the twentieth century*. Geophysical Research Letters 31 (13). doi.org/10.1029/2004GL019998

Brierly, WB, 1945: *Malaria and socio-economic conditions in Mississippi*. Social Forces 23 (4), 451–59. https://www.jstor.org/stable/2571839

Briner, JP, et al. 2006: *A multi-proxy lacustrine record of Holocene climate change on northeastern Baffin Island*. Quaternary Research 65 (3), 431–442. https://doi.org/10.1016/j.yqres.2005.10.005

Broom, D, 2023: *Seagrass regeneration projects in the UK are helping to combat the climate crisis. Here's how*. WEF Nature and Biodiversity. https://www.weforum.org/stories/2023/07/seagrass-restoration-carbon-climate-change/

Brownstein, JS, Holford, TR, and Fish, D, 2005: *Effect of Climate Change on Lyme Disease Risk in North America*. Ecohealth 2 (1), 38–46. https://doi.org/10.1007/s10393-004-0139-x

Bruce-Chwatt, L, and de Zulueta, J, 1980: *The rise and fall of malaria in Europe, a historico-epidemiological study*. Oxford University.

Bull, GM, and Morton, J, 1975: *Relationships of temperature with death rates from all causes and from certain respiratory and arteriosclerotic diseases in different age groups*. Age and Ageing 4, 232–246.

Bureau of Meteorology, Government of Australia 2017: *Known Floods in the Brisbane & Bremer River Basin*. http://www.bom.gov.au/qld/flood/fld_history/brisbane_history.shtml

Bureau of Meteorology, Government of Australia 2018: *Tropical Cyclone Trends*. http://www.bom.gov.au/cyclone/climatology/trends.shtml

Burt, FJ, Rolpf, MS, Rulli, NE, et al. 2012: *Chikungunya: a re-emerging virus*. The Lancet. 379, 662–671.

Byremo, G, Rod, G, and Carlsen, KH, 2006: *Effect of climatic change in children with atopic eczema*. Allergy 61, 1403–1410.

Cagle, A, and Hubbard, R, 2005: *Cold-related cardiac mortality in King County, Washington, USA 1980–2001*. Annals of Human Biology 32 525–537.

Caldwell, CR, Britz, SJ, and Mirecki, RM, 2005: *Effect of temperature, elevated carbon dioxide, and drought during seed development on the isoflavone content of dwarf soybean [Glycine max (L.) Merrill] grown in controlled environments*. Journal of Agricultural and Food Chemistry 53, 1125–1129.

Callaway, E, 2017: *Oldest Homo sapiens fossil claim rewrites our species' history*. Nature. https://doi.org/10.1038/nature.2017.22114

Campbell, BC, ed. 2008: *American Disasters: 201 Calamities That Shook the Nation*. 49–50.

Candy, I, Coope, GR, Lee, JR, et al. 2010: *Pronounced warmth during early Middle Pleistocene interglacials: Investigating the Mid-Brunhes Event in the British terrestrial sequence*. Earth-Science Reviews 103 (3–4), 183–196. https://doi.org/10.1016/j.earscirev.2010.09.007

Canela SJ, Pallarés Fusté MR et al. 2008: *A mortality study of the last outbreak of yellow fever in Barcelona City (Spain) in 1870.* Gaceta sanitaria / S.E.S.P.A.S. 23 (4), 295–299. doi:10.1016/j.gaceta.2008.09.008

Cao, J, Cheng, Y, Zhao, N, Song, W, Jiang, C, Chen, R, and Kan, H, 2009: *Diurnal temperature range is a risk factor for coronary heart disease death*. Journal of Epidemiology 19, 328–332.

Carder, M, McNamee, R, Beverland, I, Elton, R, Cohen, GR, Boyd, J, and Agius, RM, 2005: *The lagged effect of cold temperature and wind chill on cardiorespiratory mortality in Scotland*. Occupational and Environmental Medicine 62: 702–710.

Carter, CA, and Miller, HL, 2012: *Corn for Food, Not Fuel*. New York Times, July 30. https://www.nytimes.com/2012/07/31/opinion/corn-for-food-not-fuel.html

CDC (Centers for Disease Control and Prevention) 1999: *Control of infectious diseases 1900–1999*. JAMA 282 (11), 1029–32. www.http://doi.org/10.1001/jama.282.11.1029

CDC 2012: *Dengue and Climate*. https://www.cdc.gov/dengue/entomologyecology/climate.html

CDC 2024: *Allergens*. https://www.cdc.gov/climate-health/php/effects/allergens-and-pollen.html?CDC_AAref_Val=https://www.cdc.gov/climateandhealth/effects/allergen.htm

CDC (2016): *West Nile virus disease cases and deaths reported to CDC by year and clinical presentation, 1999–2016*. https://www.cdc.gov/westnile/statsmaps/cumMapsData.html#three (accessed July 15, 2016)

CDC 2018a: *Chikungunya virus in the United States*. https://www.cdc.gov/chikungunya/geo/united-states.html January 25 (Accessed June 12, 2018)

CDC 2018b: *Lyme Disease: What You Need to Know*. https://www.cdc.gov/lyme/resources/brochure/lymediseasebrochure.pdf (Accessed June 12, 2018)

Cesscati, A, Alkama, R, Miralles, DG, Forzieri, G, 2018: *Biophysical impacts of global greening*. Geophysical Research Abstracts 20, EGU2018-15043-1. https//meetingorganizer.copernicus.org/EGU2018/EGU2018-15043-1.pdf

Chang, CL, et al. 2004: *Lower ambient temperature was associated with an increased risk of hospitalization for stroke and acute myocardial infarction in young women*. Journal of Clinical Epidemiology 57, 749–757.

Changnon, SA, and Changnon, D, 2000: *Long-Term Fluctuations in Hail Incidences in the United States*. Journal of Climate 13 (3), 658–664. https://doi.org/10.1175/1520-0442(2000)013<0658:LTFIHI>2.0.CO;2

Charles, RC, and Ryan, ET, 2011: *Cholera in the 21st century.* Current Opinion in Infectious Diseases 24 (5), 472–477. https//doi.org/10.1097/QCO.0b013e32834a88af

Chase, TN, Wolter, K, Pielke, RA, Sr. and Rasool, I, 2006: *Was the 2003 European summer heat wave unusual in a global context?* Geophysical Research Letters 33 (23). https://doi.org/10.1029/2006GL027470

Chen, K, and McAneney, J, 2010: *Bushfire Penetration into Urban Areas in Australia: A Spatial Analysis*. Report for the Bushfire CRC. http://www.bushfirecrc.com/sites/default/files/managed/resource/bushfire-penetration-urban-areas.pdf

Cheung, WWL, Lam, VWY, et al. 2009: *Large-scale redistribution of maximum fisheries catch potential in the global ocean under climate change*. Global Change Biology 16 (1), 24–25. https://doi.org/10.1111/j.1365-2486.2009.01995.x

Chowdhury, AMR, Bhuyia, AU, Choudhury, AY, and Sen, R, 1993: *The Bangladesh cyclone of 1991: why so many people died*. Disasters 17, 291–304.

Christidis, N, Donaldson, GC, and Stott, PA, 2010: *Causes for the recent changes in cold- and heat-related mortality in England and Wales*. Climatic Change 102, 539–553.

Christy, J, Curry, J, Koonin, S, McKitrick, R, Spencer, R, 2025a: *A Critical Review of Impacts of Greenhouse Gas Emissions on the U.S. Climate*. Report to U.S. Energy Secretary Christopher Wright, DOE. p51.

Christy, J, Curry, J, Koonin, S, McKitrick, R, Spencer, R, 2025b: *A Critical Review of Impacts of Greenhouse Gas Emissions on the U.S. Climate*. Report to U.S. Energy Secretary Christopher Wright, DOE. p55.

Christy, J, Curry, J, Koonin, S, McKitrick, R, Spencer, R, 2025c: *A Critical Review of Impacts of Greenhouse Gas Emissions on the U.S. Climate*. Report to U.S. Energy Secretary Christopher Wright, DOE. p58.

Chua, PLC, Ng, CFS, Tobias, A, et al. 2022: *Associations between ambient temperature and enteric infections by pathogen: a systematic review and meta-analysis*. The Lancet Planetary Health 6 (3), E202–E218. https://doi.org/10.1016/S2542-5196(22)00003-1

Clark, K, 2004: Borrelia Species in Host-Seeking Ticks and Small Mammals in Northern Florida. Journal of Clinical Microbiology 42 (11), 5076–5086. https://doi.org/10.1128/JCM.42.11.5076-5086.2004

Clifford, C, 2023: *'The era of global boiling has arrived,' says UN boss, as White House announces provisions to protect workers from extreme heat*. CNBC. https://www.cnbc.com/2023/07/27/the-era-of-global-boiling-has-arrived-says-un-boss-antonio-guterres.html?msockid=0872c8fdf536693e295ddea7f43368e6

Coleman, W, 1983: *Epidemiological method in the 1860s: yellow fever at Saint-Nazaire*. Bulletin of the history of medicine 58 (2), 145–163. https://www.ncbi.nlm.nih.gov/pubmed/6375767

Colwell, R, 1996: *Global Climate and Infectious Disease: The Cholera Paradigm*. Science 274, 2025–2031.

Cook, J, et al. 2013: *Quantifying the consensus on anthropogenic global warming in the scientific literature*. Environmental Research Lettershttp://iopscience.iop.org/article/10.1088/1748-9326/8/2/024024

Coyle, H, 2018: *48,000 Brits dead after worst winter in 42 years*. The Daily Star 2018. https://www.dailystar.co.uk/news/latest-news/694368/flu-winter-death-cold-fatalities?utm_source=CCNet+Newsletter&utm_campaign=1b394a49be-EMAIL_CAMPAIGN_2018_04_09&utm_medium=email&utm_term=0_fe4b2f45ef-1b394a49be-20143845

Crandon, TJ, Scott, JG, Charlson, FJ, et al. 2022: *A social-ecological perspective on climate anxiety in Children and adolescents*. Nature Climate Change 12, 123–131. https://doi.org/10.1038/s41558-021-01251-y.

CSIRO 2021: *Mining safety and automation*. https://www.csiro.au/en/work-with-us/industries/mining-resources/Mining/Mining-safety-and-automation

Cuffey, KM, and Marshall, SJ, 2000: *Substantial contribution to sea level rise during the last interglacial from the Greenland ice sheet*. Nature 404, 591–594.

Cunningham, CX, Williamson, GJ, and Bowman, D, 2024: *Increasing frequency and intensity of the most extreme wildfires on Earth*. Nature Ecology and Evolution 8, 1420–1425. https://doi.org/10.1038/s41559-024-02452-2

Curtin, T, 2009: *Climate change and food production*. Energy and Environment 20 (7), 1099–1116.

D'Amato, G, Cecchi, L, Bonini, S, Nunes, C, et al. 2007: *Allergenic pollen and pollen allergy in Europe*. Allergy 62, 976–990.

Dansgaard, W, White, JWC, and Johnsen, SJ, 1989: *The abrupt termination of the Younger Dryas climate event*. Nature 339, 532–533.

Davis, RE, Knappenberger, PC, Michaels, PJ, and Novicoff, WM, 2003: *Changing heat-related mortality in the United States*. Environmental Health Perspectives 111, 1712–1718.

Davis, RE, Knappenberger, PC, Michaels, PJ, and Novicoff, WM, 2004: *Seasonality of climate-human mortality relationships in U.S. cities and impacts of climate change*. Climate Research 26, 61–76.

DeCicco, JM, Liu, DY, Heo, J, et al. 2016: *Carbon balance effects of U.S. biofuel production and use*. Climatic Change 138, 667–680. http://doi.org/10.1007/s10584-016-1764-4

De Costa, J, Weerakoon, WMW, Chinthaka, KGR, et al. 2007: *Genotypic variation in the response of rice (Oryza sativa) to increased atmospheric carbon dioxide and its physiological basis*. Journal of Agronomy and Crop Science 193 (2),117–130. https://doi.org/10.1111/j.1439-037X.2007.00255.x

Demaree, GR, 2006: *The catastrophic floods of February 1784 in and around Belgium – A Little Ice Age event of frost, snow, river ice and floods*. Hydrological Sciences Journal 51 (5), 878–898.

Desai, J, and Nelson, M, 2017: *Are we headed for a solar waste crisis?* Environmental Progress. http://environmentalprogress.org/big-news/2017/6/21/are-we-headed-for-a-solar-waste-crisis

Deschenes, O, and Moretti, E, 2009: *Extreme weather events, mortality, and migration*. The Review of Economics and Statistics 91, 659–681.

Desjeux, P, 2001: *Worldwide increasing risk factors for leishmaniasis*. Medical Microbiology and Immunology 190, 77–79.

Diaz, J, Garcia, R, Lopez, C, Linares, C, Tobias, A, and Prieto, L, 2005: *Mortality impact of extreme winter temperatures*. International Journal of Biometeorology 49, 179–183.

Dobson, M, 1989: *History of malaria in England*. Journal of the Royal Society of Medicine 82, 3–7.

Dominish, E, Teske, S, Florin, N, 2019: *Responsible minerals sourcing for renewable energy*. Report prepared for Earthworks by Institute for Sustainable Futures, UTS. https://www.uts.edu.au/globalassets/sites/default/files/2019-04/isfearthworks_responsible-minerals-sourcing-for-renewable-energy_report.pdf

Donaldson, GC, 2006: *Climate change and the end of the respiratory syncytial virus season*. Clinical Infectious Diseases 42, 677–679.

Donnelly, MC, Talley, NJ, 2023: *Effects of climate change on digestive health and preventative measures*. BMJ Gut 72 (12). https://doi.org/10.1136/gutjnl-2023-331187

Donohue, RJ, Roderick, ML, McVicar, TR, and Farquhar, GD, 2013: *Carbon dioxide fertilization has increased maximum foliage cover across the globe's warm, arid environments*. Geophysical Research Letters. https://doi.org/10.1002/grl.50563

Dunnavan, GM, and Diercks, JW, 1980: *An Analysis of Super Typhoon Tip (October 1979)*. Monthly Weather Review. American Meteorological Society 108 (11), 1915–1923. https://doi.org/10.1175/1520-0493(1980)108<1915:AAOSTT>2.0.CO;2

Easterling, DR, Horton, B, Jones, PD, Peterson, TC, Karl, TR, et al. 1997: *Maximum and minimum temperature trends for the globe*. Science 277, 364–367.

Enquselassie, F, Dobson, AJ, Alexander, HM, and Steele, PL, 1993: *Seasons, temperature and coronary disease*. International Journal of Epidemiology 22, 632–636.

Epstein, PR, 2001: *West Nile virus and the climate*. National Center for Biotechnology Information, National Library of Medicine. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3456354/

Etnier, EL, and Watson, AP, 1981: *Health and safety implications of alternative energy technologies. II. Solar*. Environmental Management 5 (5), 409–425.

Euronews 2011: *No loss of life as Cyclone Yasi hits Australia*. February 3.

Ewaschuk, JB, et al. 2011: *Effect of pasteurization on immune components of milk: implications for feeding preterm infants*. Applied Physiology, Nutrition and Metabolism 36 (2), 175–182. https://doi.org/10.1139/h11-008

Feigin, VL, Nikitin, YP, et al. 2000: *A population-based study of the associations of stroke occurrence with weather parameters in Siberia, Russia (1982–92)*. European Journal of Neurology 7, 171–178.

Fernandez-Raga, M, Tomas, C, and Fraile, R, 2010: *Human mortality seasonality in Castile-Leon, Spain, between 1980 and 1998: the influence of temperature, pressure and humidity*. International Journal of Biometeorology 54, 379–392.

Fischer, D, Thomas, SM, Suk, JE, Sudre, B, Hess, A, Tjaden, NB, Beierkuhnlein, N, and Semenza, JC, 2013: *Climate change effects on Chikungunya transmission in Europe: geospatial analysis of vector's climatic suitability and virus' temperature requirements*. International Journal of Health Geographics 12, 51. https://doi.org/10.1186/1476-072X-12-51

Fischer, PH, Brunekreef, B, and Lebret, E, 2004: *Air pollution related deaths during the 2003 heat wave in the Netherlands*. Atmospheric Environment 38,1083–1085

Fisher, T, and Fitzsimmons, A, 2013: *Big Wind's Dirty Little Secret: Toxic Lakes and Radioactive Waste*. Institute for Energy Research. https://www.instituteforenergyresearch.org/renewable/wind/big-winds-dirty-little-secret-rare-earth-minerals/

Flannigan, M, Cantin, AS, de Groot, WJ, et al. 2013: *Global wildland fire season severity in the 21st century*. Forest Ecology and Management 294, 54–61.

Fleisher, DH, Timlin, DJ, Reddy, VR, 2008: *Elevated carbon dioxide and water stress effects on potato canopy gas exchange, water use and productivity*. Agricultural and Forest Meteorology 148 (6–7) 1109–1122. https://doi.org/10.1016/j.agrformet.2008.02.007

Fleming, A, Hobday, AJ, Farmery, A, van Putten, EI, et al. 2014: *Climate change risks and adaptation options across Australian seafood supply chains – A preliminary assessment*. Climate

Risk Management 1, 39–50. https://www.sciencedirect.com/science/article/pii/S2212096313000065#b0020

Fouillet, A ,et al. 2008: *Has the impact of heat waves on mortality changed in France since the European heat wave of summer 2003? A study of the 2006 heat wave*. International Journal of Epidemiology 37, 309-317.

Frei, T, and Gassner, E, 2008: *Trends in prevalence of allergic rhinitis and correlation with pollen counts in Switzerland*. International Journal of Biometeorology 52, 841–847.

Frich, P, Alexander, LV, Della-Marta, P, et al. 2002: *Observed coherent changes in climatic extremes during the second half of the twentieth century*. Climate Research 19, 193–212.

Fuller, TW, and Mosher, S, 2010: *Climategate: the Crutape Letters*. Createspace Independent Publishing Platform.

Gasparrini, A, Guo, Y, Hashizume, M, et al. 2015: *Mortality risk attributable to high and low ambient temperature: a multicountry observational study*. The Lancet 386, 369–375. 10.1016/S0140-6736(14)62114-0

Gasparrini, A, et al. 2017: *Projections of temperature-related excess mortality under climate change scenarios*. The Lancet Planetary Health 1, E360–E367. http://dx.doi.org/10.1016/S2542-5196(17)30156-0

GBD (Global Burden of Disease Study) 2015: *GBD Mortality and Causes of Death, Collaborators. Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013.* The Lancet 385, 117–171. https://doi.org/10.1016/S0140-6736(14)61682-2

Ge, WZ, Xu, F, Zhao, ZH, Zhao, JZ, and Kan, HD, 2013: *Association between diurnal temperature range and respiratory tract infections*. Biomedical and Environmental Sciences 26, 222–225.

Gething, PW, Smith, DL, Patil, AP, Tatem, AJ, Snow, RW, Hay, SI, 2010: *Climate change and the global malaria recession*. Nature 465, 342–345. https://doi.org/10.1038/nature09098

Giglio, L. et al. 2013: *Analysis of daily, monthly, and annual burned area using the fourth-generation global fire emissions database (GFED4)*. Journal of Geophysical Research-Biogeosciences 118 (1), 317–328.

Gill, RS, Hambridge, HL, et al. *Falling temperature and colder weather are associated with an increased risk of Aneurysmal Subarachnoid Hemorrhage*. World Neurosurgery 79, 136–142.

Gillett, NP, Weaver, AJ, Zwiers, FW, Flannigan, MD, 2004: *Detecting the effect of climate change on Canadian forest fires*. Geophysical Research Letters 31, L18211.

Goklany, I, 2004: *Climate Change and Malaria*. Science 306 (5693), 55–57. https://doi.org/10.1126/science.306.5693.55

Goklany, IM, 2011: C*ould biofuel policies increase death and disease in developing countries?* Journal of American Physicians and Surgeons 16 (1), 9–13.

Goklany, I, 2014: *Unhealthy Exaggeration*. The Global Warming Policy Foundation. http://www.thegwpf.org/indur-goklany-unhealthy-exaggeration/

Goklany, IM, Morris, J, 2011: *Wealth and Safety: The Amazing Decline in Deaths from Extreme Weather in an Era of Global Warming, 1900–2010*. Reason 393, 1–24 https://reason.org/wp-content/uploads/files/deaths_from_extreme_weather_1900_2010.pdf

Gonzalez, C, Wang, O, Strutz, SE, et al. 2010: *Climate change and risk of leishmaniasis in North America: predictions from ecological niche models of vector and reservoir species*. PLOS Neglected Tropical Diseases 4 (1), e585. https://doi.org/10.1371/journal.pntd.0000585

Gordon, D, 1976: *Health, Sickness and Society*. University of Queensland Press, p.185.

Gouveia, N, Hajat, S, and Armstrong, B, 2003: *Socioeconomic differentials in the temperature-mortality relationship in Sao Paulo, Brazil*. International Journal of Epidemiology 32, 390–397.

Green, MS, Harari, G, and Kristal-Boneh, E, 1994: *Excess winter mortality from ischaemic heart disease and stroke during colder and warmer years in Israel*. European Journal of Public Health 4, 3–11.

Greve, P, Orlowsky, B, Mueller, B, et al. 2014: *Global assessment of trends in wetting and drying over land, Nature Geoscience*. https://doi.org/10.1038/ngeo2247

Gross, PR, and Levitt, N, 1986: *Higher superstition: the academic left and its quarrels with science*. JHU Press (Revised in 1997).

Gutiérrez del Pozo, D, Gutierrez, E, Pérez, P, et al. 2009: *Acclimation to future atmospheric CO_2 levels increases photochemical efficiency and mitigates photochemistry inhibition by warm temperatures in wheat under field conditions*. Physiologia Plantarum 137 (1), 86–100. https://doi.org/10.1111/j.1399-3054.2009.01256.x

Gwynn-Jones, D, Jones, AG, Waterhouse, A, et al. 2012: *Enhanced UV-B and elevated CO_2 impacts sub-Arctic shrub berry abundance, quality and seed germination*. Ambio 41 (3), 256–268.

Gympie Regional Memories 2023: *Floods of Gympie*. https://gympieregionalmemories.com/2021/02/04/floods-of-gympie/

Haig, J, and Nott, J, 2016: *Solar forcing over the last 1500 years and Australian tropical cyclone activity*. Geophysical Research Letters 43 (6),: 2843–2850. https://doi.org/10.1002/2016GL068012

Hajat, S, and Haine, A, 2002: *Associations of cold temperatures with GP consultations for respiratory and cardiovascular disease amongst the elderly in London*. International Journal of Epidemiology 31, 825–830.

Hanson, SM, and Craig, GB, 1995: *Aedes albopictus (Diptera: Culcidae) Eggs: Field Survivorship During Northern Indiana Winters*. Journal of Medical Entomology 32 (5), 599–604. https://doi.org/10.1093%2Fjmedent%2F32.5.599

Haque, U, Hashizume, M, Glass, GE, et al. 2010: *The role of climate variability in the spread of malaria in Bangladeshi highlands*. PLoS ONE 5 (12), e14341. https://doi.org/10.1371/journal.pone.0014341.

Harding, G, Harding, P, Wilkins, A, 2008: *Wind turbines, flicker, and photosensitive epilepsy: Characterizing the flashing that may precipitate seizures and optimizing guidelines to prevent them*. Epilepsia 49, 1095–1098.

Harlan, SL, and Ruddell, DM, 2011: *Climate change and health in cities: impacts of heat and air pollution and potential co-benefits from mitigation and adaptation*. Current Opinion in Environmental Sustainability 3 (3), 126–134. https://doi.org/10.1016/j.cosust.2011.01.001

Harrabin, R, 2015: *Fracking: Think again, campaigner urges environmentalists*. September 10. https://www.bbc.com/news/science-environment-34191713

Hartman, RS, 2017: *Savoy wind turbine study is junk science*. The Berkshire Eagle. September 8. http://www.berkshireeagle.com/stories/letter-savoy-wind-turbinestudy-is-junk-science,518890

Hausfather, Z, Peters, GP, 2020: *Emissions – the 'business as usual' story is misleading*. Nature 577, 618–620. https://doi.org/10.1038/d41586-020-00177-3

Hay, SI, Cox, J, Rogers, DJ., Randolph, SE, Stern, DI, Shanks, GD, Myers, MF, and Snow, RW, 2002: *Climate change and the resurgence of malaria in the East African highlands*. Nature 415, 905–909.

Haynes, K, Coates, L, de Oliveira, FD, et al. 2016: *An analysis of human fatalities from floods in Australia 1900–2015*. Risk Frontiers, Macquarie University. https://www.riskfrontiers.com/pdf/flood_fatality_report_final.pdf

Hemp, A, 2005: *Climate change-driven forest fires marginalize the impact of ice cap wasting on Kilimanjaro*. Global Change Biology 11, 1013–1023.

Hermida, L, Sánchez, JL, López, L, Berthet, C, et al. 2013: *Climatic Trends in Hail Precipitation in France: Spatial, Altitudinal, and Temporal Variability*. The Scientific World Journal. http://dx.doi.org/10.1155/2013/494971

Hickman, C, Marks, E, Pihkala, P, et al. 2021: *Climate anxiety in children and young people and their beliefs about government responses to climate change: A global survey*. The Lancet Planet Health 5 (12), e863–873. https://doi.org/10.1016/S2542-5196(21)00278-3

Hii, YL, Rocklöv, J, Ng, N, Tang, CS, Pang, FY, Sauerborn, R, 2009: *Climate variability and increase in intensity and magnitude of dengue incidence in Singapore*. Global Health Action 2 (1). https://doi.org/10.3402/gha.v2i0.2036

Hillsdon, M, 2018: Wheat in heat: the 'crazy idea' that could combat food insecurity. The Guardian, March 23. https://www.theguardian.com/global-development/2018/mar/23/heat-tolerant-durum-wheat-crazy-idea-food-insecurity?utm_source=CCNet+Newsletter&utm_campaign=e4674d7290-EMAIL_CAMPAIGN_2018_04_10&utm_medium=email&utm_term=0_fe4b2f45ef-e4674d7290-20143845

Hovenden, MJ, and Williams, AL, 2010: The impacts of rising CO_2 concentrations on Australian terrestrial species and ecosystems. Austral Ecology 35, 665–684.

Hulden,, L and Hulden, L, 2009: The decline of malaria in Finland—the impact of the vector and social variables. Malaria Journal 8. https://doi.org/10.1186/1475-2875-8-94

Hung, T, et al. 2006: Assessment with satellite data of the urban heat island effects in Asian mega cities. International Journal of Applied Earth Observation and Geoinformation 8 (11), 34–48.

Idso, SB, Kimball, BA, Shaw, PE, Widmer, W, Vanderslice, JT, et al. 2002: *The effect of elevated atmospheric CO_2 on the vitamin C concentration of (sour) orange juice*. Agriculture, Ecosystems and Environment 90, 1–7.

Independent UK 2017: *World's deadliest storms from tornadoes to cyclones, lightning and hail*. May 18. https://www.independent.co.uk/environment/world-deadliest-storms-tornadoes-cyclones-hail-lightning-bangladesh-india-egypt-zimbabwe-a7741261.html

IPCC (Intergovernmental Panel on Climate Change) 2013: *Chapter 11, Human Health*. Working Group II, IPCC Fifth Assessment Report p. 3.

IPCC Summary for policymakers. 2014: In: *Climate Change Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press. https://ipcc.ch/pdf/assessment-report/ar5/wg2/ar5_wgII_spm_en.pdf

International Energy Agency World Energy Outlook 2014: *2014 Fact sheet: Energy in sub-Saharan Africa today*. https://www.iea.org/media/news/2014/press/141013_WEO_Africa_Energy_OutlookFactsheet1.pdf

Jablonski, LM, et al. 2002: *Plant reproduction under elevated CO_2 conditions: a meta-analysis of reports of 79 crop and wild species*. New Phytologist 156, 9–26.

Jackson, MC, Johansen, L, Furlong, C, Colson, A, and Sellers, KF, 2010: *Modelling the effect of climate change on prevalence of malaria in western Africa*. Statistica Neerlandica 64, 388–400.

Jato, V, Rodriguez-Rajo, FJ, Seijo, MC, and Aira, MJ, 2009: *Poaceae pollen in Galicia (N.W. Spain): characterization and recent trends in atmospheric pollen season*. International Journal of Biometeorology 53, 333–344.

Jenkins, HW, Jr., 2017: *Dieselgate Is a Political Disaster*. Wall Street Journal, February 14. https://www.wsj.com/articles/dieselgate-is-a-political-disaster-1487116586

Jin, CW, Du, ST, Zhang, YS, Tang, C and Lin, XY, 2009: *Atmospheric nitric oxide stimulates plant growth and improves the quality of spinach (Spinacia oleracea)*. Annals of Applied Biology 155, 113–120.

Johnston, F, 2017: *Bushfires and Planned Burns – Tips for your patients in managing smoke*. Respiratory Medicine Today 2 (2), 34–36.

Johnston, FH, et al. 2012: *Estimated global mortality attributable to smoke from landscape fires*. Environmental Health Perspectives 120, 695–701.

Johnston, I, 2017: *World's deadliest storms from tornadoes to cyclones, lightning and hail*. Independent. May 18. https://www.independent.co.uk/environment/world-deadliest-storms-tornadoes-cyclones-hail-lightning-bangladesh-india-egypt-zimbabwe-a7741261.html

Jones, CJ, and Kitron, UD, 2000: *Populations of Ixodes scapularis (Acari: Ixodidae) Are Modulated by Drought at a Lyme Disease Focus in Illinois*. Journal of Medical Entomology 37 (3), 408–415.

Jones, MW, Abatzoglou, JT, et al. 2022: *Global and Regional Trends and Drivers of Fire Under Climate Change*. AGU Reviews of Geophysics 60 (3), 1–76. https://doi.org/10.1029/2020RG000726

Joy. GJ, Colinet, JF, and Landen, DD, 2011: *Coal workers' pneumoconiosis prevalence disparity between Australia and the United States*. Centers for Disease Control and Prevention. https://www.cdc.gov/niosh/mining/UserFiles/Works/pdfs/cwppd.pdf

Jung, SS, Cheung, WS, Cheong, C, Shin, SH, 2008: *Experimental Identification of Acoustic Emission Characteristics of Large Wind Turbines with Emphasis on Infrasound and Low-Frequency Noise*. Journal of the Korean Physical Society 53, 1897–1905.

Kasischke, ES, Verbyla, DL, Rupp, TS, McGuire, AD, Murphy, KA, Jandt, R, et al. 2010: *Alaska's changing fire regime: implications for the vulnerability of boreal forests*. Canadian Journal of Forest Research 40, 1360–1370.

Keatinge, WR, and Donaldson, GC, 2001: *Mortality related to cold and air pollution in London after allowance for effects of associated weather patterns*. Environmental Research 86, 209–216.

Keatinge, WR, and Donaldson, GC, 2004: *The impact of global warming on health and mortality*. Southern Medical Journal 97, 1093–1099.

Kiernan, R, 2008: Medical Observer 10.

Kimball, BA, and Mitchell, ST, 1981: *Effects of CO_2 enrichment, ventilation, and nutrient concentration on the flavor and vitamin C content of tomato fruit*. Horticultural Science 16, 665–666.

Kimball, BA, Kobayashi, K, and Bindi, M, 2002: *Responses of agricultural crops to free-air CO_2 enrichment*. Advances in Agronomy 77, 293–368.

Kloner, RA, Poole, WK, and Perritt, RL, 1999: *When throughout the year is coronary death most likely to occur? A 12-year population-based analysis of more than 220,000 cases*. Circulation 100, 1630–1634.

Klotzbach, P, et al. 2018: *Continental U.S. Hurricane Landfall Frequency and Associated Damage: Observations and Future Risks*. Bulletin of the American Meteorological Society 99 (7), 1359–1376. https://doi.org/10.1175/BAMS-D-17-0184.1

Knappenberger, PC., Michaels, PE, and Davis, RE, 2001: *The nature of observed climate changes across the United States during the 20th century*. Climate Research 17, 45–53.

Koliaki, C, Dalamaga, M, Liatis, S, 2023: *Update on the Obesity Epidemic: After the Sudden Rise, Is the Upward Trajectory Beginning to Flatten?* Current Obesity Reports 12 (4), 514–527. https://doi.org/10.1007/s13679-023-00527-y

Konzmann, M, Gerten, D, and Heinke, J, 2013: *Climate impacts on global irrigation requirements under 19 GCMs, simulated with a vegetation and hydrology model*. Hydrological Sciences Journal 58 (1), 88–105.

Kovats, RS, Hajat, S, and Wilkinson, P, 2004: *Contrasting patterns of mortality and hospital admissions during hot weather and heat waves in Greater London, UK*. Occupational and Environmental Medicine 61, 893–898.

Kozyrskyj, AL, et al. 2007: *Increased Risk of Childhood Asthma From Antibiotic Use in Early Life*. Chest Journal 131 (6), 1753–1759.

Kraaij, T, Baard, JA, Cowling, RM, van Wilgen, BW, 2013: *Historical fire regimes in a poorly understood, fire-prone ecosystem: eastern coastal fynbos*. International Journal of Wildland Fire 3, 277–287.

Kraemer, MUG, Sinka, ME, Duda, KA, et al. 2015: *The global distribution of the arbovirus vectors Aedes aegypti and Ae. Albopictus.* Ecology, Epidemiology and Global Health. https://doi.org/10.7554/eLife.08347

Kuczera, GA, 1985: *Prediction of water yield reduction following a bushfire in Ash-mixed species eucalypt forest*. Water Supply Catchment Hydrology Research Report MMBW-W-0014, Melbourne and Metropolitan Board of Works.

Kuhn, KG, Campbell-Lendrum, DH, Armstrong, B, and Davies, CR, 2003: *Malaria in Britain: Past, present, and future*. Proceedings of the National Academy of Science, USA 100, 9997–10001.

Kundzewicz, ZW, et al. 2005: *Trend detection in river flow series: 1. Annual maximum flow*. Hydrological Sciences Journal 50 (5), 797–810.

Kyle, JL, and Harris, E, 2008: *Global spread and persistence of dengue*. Annual Review of Microbiology 62, 71–92.

La, GX, Fang, P, Teng, YB, et al. 2009: *Effect of CO_2 enrichment on the glucosinolate contents under different nitrogen levels in bolting stem of Chinese kale (Brassica alboglabra L.)*. Journal of Zhejiang University Science B 10, 454–464.

Lamb, HH, 1965: *The early Medieval Warm Epoch and its sequel*. Palaeogeology, Palaeoclimatology, Palaeoecology 1, 13–37.

Lamb, HH, 1988: *Weather, Climate and Human Affairs: A Book of Essays and Other Papers*. Routledge.

Lane, D, et al. 2017: *How Zika upped the ante.* A*Star Research 8, 12–15. www.research.a-star.edu.sg/feature-and-innovation/7740/how-ziga-upped-the-ante

Laschewski, G, and Jendritzky, G, 2002: *Effects of the thermal environment on human health: an investigation of 30 years of daily mortality data from SW Germany*. Climate Research 21, 91–103.

Lau, WKM, Wu, HT, and Kim, KM, 2013: *A canonical response of precipitation characteristics to global warming from CMIP5 models*. Geophysical. Research Letters 40, 3163–3169. http://doi.org/10.1002/grl.50420

Lelieveld, J, et al. 2015: *The contribution of outdoor air pollution sources to premature mortality on a global scale*. Nature 525, 367–371.

Lepore, C, Tippett, MK, and Allen, JT, 2017: *ENSO-based probabilistic forecasts of March–May U.S. tornado and hail activity*. Geophysical Research Letters 44 (17), 9093–9101. https://doi.org/10.1002/2017GL074781

Levine, LH, Kasahara, H, Kopka, J, Erban, A, Fehrl, I, Kaplan, F, et al. 2008: *Physiologic and metabolic responses of wheat seedlings to elevated and super-elevated carbon dioxide*. Advances in Space Research 42, 1917–1928.

Lewis, N, and Curry, J, 2018: *The impact of recent forcing and ocean heat uptake data on estimates of climate sensitivity*. AMS Journal of Climate 6051–6071. https://doi.org/10.1175/JCLI-D-17-0667.1

Lindgren, E, and Jaensen, T, 2006: *Lyme borreliosis in Europe: influences of climate and climate change, epidemiology, ecology and adaptation measures*. World Health Organization. http://www.euro.who.int/__data/assets/pdf_file/0006/96819/E89522.pdf

Lisman, P, et al. 2014: *Heat Tolerance Testing: Association Between Heat Intolerance and Anthropometric and Fitness Measurements*. AMSUS Military Medicine 179 (11), 1339–1346. https://doi.org/10.7205/MILMED-D-14-00169.

Liu, AH, 2007: *Hygiene theory and allergy and asthma prevention*. Paediatric and Neonatal Epidemiology 21 (3), 2–7.

Lomborg, B, 2007: *Cool It*. Knopf, Borozoi Books 83.

Loss, G, et al. 2011: *The protective effect of farm milk consumption on childhood asthma and atopy: The GABRIELA study*. The Journal of Allergy and Clinical Immunology 128 (4), 766–773. https://doi.org/10.1016/j.jaci.2011.07.048

Lozhkin, AV, Anderson, PM, 1995: *The last interglaciation in Northeast Siberia*. Quaternary Research 43, 47–158.

Madsen, E, 1975: *Effect of CO_2 environment on growth, development, fruit production and fruit quality of tomato from a physiological viewpoint*. In: Chouard, P. and de Bilderling, N. (Eds.) Phytotronics in Agricultural and Horticultural Research, 318–330.

Malbran, Pia, 2010: *Gas Explosions Not Uncommon*. CBS Evening News, September 10. https://www.cbsnews.com/news/gas-explosions-not-uncommon/

Manheimer, WJ, 2014: *Fusion Breeding for Mid-Century Sustainable Power*. Journal of Fusion Energy 33, 199–234. https://doi.org/10.1007/s10894-014-9690-9

Marr, JS, and Cathey, JT, 2013: *The 1802 Saint-Domingue yellow fever epidemic and the Louisiana Purchase*. Journal of Public Health Management and Practice 19, 1.

Martin, KL, et al. 2013: *Air pollution from bushfires and their association with hospital admissions in Sydney, Newcastle and Wollongong, Australia 1994–2007*. Australian and New Zealand Journal of Public Health 37, 238–243.

Masselot, P, Mistry, M, Vanoli, J, Schneider, R, et al. 2023: *Excess mortality attributed to heat and cold: a health impact assessment study in 854 cities in Europe*. The Lancet Planetary Health 7 (4), e271–e281. https://doi.org/10.1016/S2542-5196(23)00023-2

McBean, G, et al. 2005: *Arctic Climate: Past and Present*. UAF EDU. Chapter 2, p. 51.

McFarlane, AC, 1988: *The longitudinal course of posttraumatic morbidity: the range of outcomes and their predictors*. Journal of Nervous and Mental Diseases 176, 30–9.

McFarlane, AC, and Raphael, B, 1984: *Ash Wednesday: the effect of a fire*. Australian and New Zealand Journal of Psychiatry 18, 341–51.

McGraw, S, 2016: *Is Fracking Safe? The 10 Most Controversial Claims About Natural Gas Drilling*. Popular Mechanics. https://www.popularmechanics.com/science/energy/g161/top-10-myths-about-natural-gas-drilling-6386593/

McKitrick, R, 2025: *Extended crop yield meta-analysis data do not support upward SCC revision*. Scientific Reports 15 (5575). https://doi.org/10.1038/s41598-025-90254-2

McNeill, JR, 2004: *Yellow Jack and Geopolitics: Environment, Epidemics, and the Struggles for Empire in the American Tropics, 1650–1825*. OAH Magazine of History 18 (3), 9–13. https://doi.org/10.1093%2Fmaghis%2F18.3.9

Meers, PD, 1986: *Yellow fever in Swansea, 1865.* The Journal of hygiene 97 (1), 185–91. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2082871/

Meko, D, et al. 2007: *Medieval drought in the upper Colorado River basin*. Geophysical Research Letters 34 (10) L10705. https://doi.org/10.1029/2007GL029988

Mikkelsen, MD, Petersen, B, Olsen, C, and Halkier, BA, 2002: *Biosynthesis and metabolic engineering of glucosinolates*. Amino Acids 22, 279–295.

Minecraft Education 2025: *Climate Futures* https://education.minecraft.net/en-us/resources/climate-science/climate-futures

Mohan, V, 2017: *Govt revises foodgrain output to record 275.68 million tonnes*. The Times of India. August 17. https://timesofindia.indiatimes.com/india/govt-revises-foodgrain-output-to-record-275-68-million-tonnes/articleshow/60090001.cms

Moore, TG, 1998: *Climate of Fear*. Cato Institute, p.83.

Morgan, G, Sheppeard, V, Khalaj, B, et al. 2010: *The effects of bushfire smoke on daily mortality and hospital admissions in Sydney, Australia, 1994 to 2002*. Epidemiology 21, 47–55.

Mudelsee, M, et al. 2006: *Trends in flood risk of the river Wierra (Germany) over the last 500 years*. Hydrological Sciences Journal 51 (5), 818–33.

Nabi, SA, and Qader, SS, 2009: *Is global warming likely to cause an increased incidence of malaria?* Libyan Journal of Medicine 4, 18–22.

Nafstad, P, Skrondal, A, and Bjertness, E, 2001: *Mortality and temperature in Oslo, Norway, 1990–1995*. European Journal of Epidemiology 17, 621–627.

Naish, S, Dale, P, Mackenzie, JS, et al. 2014: *Climate change and dengue: a critical and systematic review of quantitative modelling approaches.* BMC Infectious Diseases 2014 14 (167). https://doi.org/10.1186/1471-2334-14-167

Nakaji, S, Parodi, S, Fontana, V, et al. 2004: *Seasonal changes in mortality rates from main causes of death in Japan (1970–1999)*. European Journal of Epidemiology 19, 905–913.

NCDC (National Climatic Data Center) website: https://www7.ncdc.noaa.gov/CDO/CDODivisionalSelect.jsp

National Public Radio 2010: *The Heat Wave Of 1896 And The Rise Of Roosevelt*. August 11. https://www.npr.org/templates/story/story.php?storyId=129127924&ft=1&f=1022

NOAA National Centers for Environmental Information (ongoing,a): *U.S. Tornadoes. Historical records and patterns*. https://www.ncei.noaa.gov/access/monitoring/tornadoes/patterns (Accessed 21 August 2025)

NOAA National Centers for Environmental Information (ongoing,b): *U.S. Tornadoes. Time Series.* https://www.ncei.noaa.gov/access/monitoring/tornadoes/time-series/ytd/11?mean=true (Accessed 21 August 2025)

NOAA National Weather Service Storm Prediction Center (ongoing,c): Inflation Adjusted Annual Tornado Running Total. http://www.spc.noaa.gov/wcm/adj.html (Accessed June 12, 2018)

Nott, J, Haig, J, Neil, H, and Gillieson, D, 2007: *Greater frequency variability of landfalling tropical cyclones at centennial compared to seasonal and decadal scales*. Earth and Planetary Science Letters 255 367–72. https://doi.org/10.1016/j.epsl.2006.12.023

Null, J, and Hulbert, J, 2007: *California Washed Away: The Great Flood of 1862*. Weatherwise 60 (1), 26–30. https://doi.org/10.3200/wewi.60.1.26-30

Nyberg, J, Winter, A, Malmgren, BA, 2005: *Reconstruction of Major Hurricane Activity*. American Geophysical Union Fall Meeting Abstracts.

Oppenheimer, S, 2009: *The great arc of dispersal of modern humans: Africa to Australia*. Quaternary International 202, 2–13 https://doi.org/10.1016/j.quaint.2008.05.015

Owain, EL, and Maslin, MA, 2018: *Assessing the relative contribution of economic, political and environmental factors on past conflict and the displacement of people in East Africa.* Palgrave Communications 4 (47). https://doi.org/10.1057/s41599-018-0096-6

Paltridge, GW, 2009: *The Climate Caper*. Connor Court Publishing Pty Ltd. 81–104.

Park, CE, Jeong, SJ, Joshi, M, et al. 2018: *Keeping global warming within 1.5 °C constrains emergence of aridification*. Nature Climate Change 8, 70–74. https://doi.org/10.1038/s41558-017-0034-4

Patrick, R, Snell, T, Gunasiri, H, Gaard, R, Meadows, G, Enticott, J, 2022: *Prevalence and determinants of mental health related to climate change in Australia*. Australian and New Zealand Journal of Psychiatry 57 (5). https://doi.org/10.1177/00048674221107872

Patterson, WP, Dietricha, KA, Holmdena, C, and Andrews, JT, 2010: *Two millennia of North Atlantic seasonality and implications for Norse colonies*. Proceedings of the National Academy of Science 107 (12), 5306–5310. www.pnas.org/cgi/doi/10.1073/pnas.0902522107

Paunio, M, 2018: *Kicking Away the Energy Ladder*. The Global Warming Policy Foundation. https://www.thegwpf.org/content/uploads/2018/05/Paunio-EnergyLadder.pdf

Pausas, JG, and Fernandez-Munoz, S, *Fire regime changes in the Western Mediterranean Basin: from fuel-limited to drought-driven fire regime*. Climatic Change 110: 215–216.

Pearce, F, 2004: *Desertification was supposed to be the 'greatest environmental challenge of our time.' Why are experts now worried about greening?* Bulletin of the Atomic Scientists.

https://thebulletin.org/2024/08/desertification-was-supposed-to-be-the-greatest-environmental-challenge-of-our-time-why-are-experts-now-worried-about-greening/

Piao, SL, et al. 2013: *Evaluation of terrestrial carbon cycle models for their response to climate variability and to CO_2 trends*. Global Change Biology 19, 2117–2132.

Pielke, R, Jr. 2015: *Coverage of Extreme Events in the IPCC AR5*. October 3. http://rogerpielkejr.blogspot.com/2013/10/coverage-of-extreme-events-in-ipcc-ar5.html?utm_source=CCNet+Newsletter&utm_campaign=e4674d7290-EMAIL_CAMPAIGN_2018_04_10&utm_medium=email&utm_term=0_fe4b2f45ef-e4674d7290-20143845

Pielke, RA, Jr. et al. 2008: *Normalized Hurricane Damage in the United States: 1900–2005 (PDF).* Natural Hazards Review 9 (1), 29–42. https://doi.org/10.1061/(ASCE)1527-6988(2008)9:1(29)

Posey, C, 1981: *1980 Heat wave*. Weatherwise 33, 112–116.

Poulter, S, 2017: *Campaigners demand urgent cuts to power bill after number of winter deaths among the elderly rise by 40%*. The Daily Mail, November 22. http://www.dailymail.co.uk/news/article-5109511/Calls-cut-power-bills-winter-deaths-rise-40.html#ixzz4zHs6iwle

Postigo, JA, 2010: *Leishmaniasis in the World Health Organization Eastern Mediterranean Region*. International Journal of Antimicrobial Agents 36 (Supplement 1).

PR Newswire 2012: *Solar Cells Linked to Greenhouse Gases Over 23,000 Times Worse than Carbon Dioxide According to New Book, Green Illusions*. June 4. http://www.digitaljournal.com/pr/738098

Preston, SH, 2007: *The changing relation between mortality and level of economic development*. International Journal of Epidemiology 36 (3), 484–490. https://doi.org/10.1093%2Fije%2Fdym075

Price, C. and Rind, D. 1994: *Possible implications of global climate change on global lightning distributions and frequencies*. Journal of Geophysical Research 99 (D5), 10,823–10,831.

Pritt, BS, Mead, PS, Johnson, DK, et al. 2016: *Identification of a novel pathogenic Borrelia species causing Lyme borreliosis with unusually high spirochaetaemia: a descriptive study*. The Lancet Infectious Diseases 16 (5), 556–564. https://doi.org/10.1016/S1473-3099(15)00464-8

Pryce, JW, Weber, MA, Ashworth, MT, Roberts, SEA, Malone, M, Sebire, NJ, 2012: *Changing patterns of infant death over the last 100 years: autopsy experience from a specialist children's hospital*. Journal of the Royal Society of Medicine 105 (3), 123–130. https://doi.org/10.1258/jrsm.2011.110075

Queensland Government 2016: *Gamba Grass*. https://www.daf.qld.gov.au/__data/assets/pdf_file/0011/67466/IPA-Gamba-Grass-PP147.pdf

Queensland Government 2018: *Coal dust management*. https://www.qld.gov.au/environment/pollution/monitoring/coal-dust/management

Reiter, P, 1998: *Global-warming and vector-borne disease in temperate regions and at high altitude*. The Lancet 351, 839–40.

Reiter, P, 2000: *From Shakespeare to Defoe: malaria in England in the Little Ice Age*. Emerging Infectious Diseases 6 (1), 1–11.

Reiter, P, 2010: *Yellow fever and dengue: a threat for Europe*. Eurosurveillance 15 (10),195–09. https://www.eurosurveillance.org/content/10.2807/ese.15.10.19509-en

Reiter, P, Lathrop, S, Bunning, M, et al. 2003: *Texas lifestyle limits transmission of Dengue virus*. Emerging Infectious Diseases 2003 9, 86–89.

Rezza, G, Nicoletti, L, Angelini, R, Romi, R, Finarelli, AC, Panning, M, 2007: *Infection with Chikungunya virus in Italy: an outbreak in a temperate region*. The Lancet 370, 1840–1846.

Ries, JB, Cohen, AL, and McCorkle, DC, 2009: *Marine calcifiers exhibit mixed responses to CO_2-induced ocean acidification*. Geology. 37, 1131–1134.

Robeson, SM, 2002: *Relationships between mean and standard deviation of air temperature: implications for global warming*. Climate Research 22, 205–213.

Robine, JM, et al. 2008: *Death toll exceeded 70,000 in Europe during the summer of 2003*. Comptes Rendus Biologies 331 (2), 171–178. https://doi.org/10.1016%2Fj.crvi.2007.12.001

Robinson, MC, 1955: *An epidemic of virus disease in Southern Province, Tanganyika Territory, in 1952–53. I. Clinical features*. Transactions of the Royal Society of Tropical Medicine and Hygiene 49, 28–32. https://doi.org/10.1016/0035-9203(55)90080-8

Rogers, DJ, and Randolph, SE, 2000: *The global spread of malaria in a future, warmer world*. Science 289, 1763–66.

Rogers, DJ, and Randolph, SE. 2006: *Climate change and vector-borne diseases*. Advances in Parasitology 62, 345–381.

Romi, R, Severini, F, Toma, L, 2006: *Cold acclimation and overwintering of female Aedes albopictus in Roma*. Journal of the American Mosquito Control Association 22 (1), 149–51. https://doi.org/10.2987/8756-971X(2006)22[149:CAAOOF]2.0.CO;2

Rooney, C, McMichael, AJ, Kovats, RS, and Coleman, MP, 1998: *Excess mortality in England and Wales, and in Greater London, during the 1995 heat wave*. Journal of Epidemiology and Community Health 52, 482–486.

Rosen, W, 2007: *Justinian's Flea: Plague, Empire, and the Birth of Europe*. Viking Adult, p 3, ISBN 978-0-670-03855-8.

Rosenfeld, AH, Akbari, H, Romm, JJ, Pomerantz, M, 1998: *Cool communities: strategies for heat island mitigation and smog reduction*. Energy and Buildings 28 (1), 51–62.

Roser, M, 2018: *Life Expectancy*. OurWorldInData.org. https://ourworldindata.org/life-expectancy

Rowe, C, 2025: *Suffer little children*. IPA Review 77 (2), 16–21.

Royer, DL, 2001: *Stomatal density and stomatal index as indicators of paleoatmospheric carbon dioxide concentration*. Review of Palaeobotany and Palynology 114 (1), 1–28.

Sabatini, A, Raineri, V, Trovato, VG, Coluzzi, M, 1990: Aedes albopictus *in Italia e possibile diffusione della specie nell' area Mediterranea*. Parassitologia 32, 301–304.

Samaila, UR, Cheung, WWL, Lam, VWY, Pauly, D, and Herrick, D, 2011: *Climate change impacts on the biophysics and economics of world fisheries*. Nature Climate Change 1, 449–456. https://doi.org/10.1038/nclimate1301

Samborska, V, and Ritchie, H, 2024: *Wildfires*. Our World in Data. https://ourworldindata.org/wildfires

Samenow, J, and McNoldy, B, 2013: *Super typhoon Haiyan strikes Philippines, among strongest storms ever*. Washington Post, November 7. https://www.washingtonpost.com/news/capital-weather-gang/wp/2013/11/07/super-typhoon-haiyan-closes-in-on-philippines-among-strongest-storms-ever/?noredirect=on&utm_term=.03eeb22dda79

Sawchuck, LA, and Burke, SDA, 1998: *Gibraltar's 1804 Yellow Fever Scourge: The Search for Scapegoats*. Journal of the History of Medicine and Allied Sciences 53 (1), 3–42. https://academic.oup.com/jhmas/article-abstract/53/1/3/742694

Schar, C, et al. 2004: *The role of increasing temperature variability in European summer heatwaves*. Nature 427, 332–336. http://doi.org/10.1038/nature02300 http://www.met.reading.ac.uk/~vidale/papers/SchaerEtAl2004.pdf

Schmidt, JH, and Klokker, M, 2014: *Health Effects Related to Wind Turbine Noise Exposure: A Systematic Review*. PLOS One. https://doi.org/10.1371/journal.pone.0114183

Scholte, EJ, and Schaffner, F, 2007: *Waiting for the tiger: establishment and spread of the* Aedes albopictus *mosquito in Europe*. Emerging pests and vector-borne diseases in Europe. Takken W, Knols, BGJ, eds. Wageningen Academic Publishers, 241–260.

Schonhof, I, Klaring, HP, Krumbein, A, and Schreiner, M, 2007: *Interaction between atmospheric CO_2 and glucosinolates in broccoli*. Journal of Chemical Ecology 2007 33, 105–114.

Seth, A, Maxwell, J, Day, C, Le Feuvre, C, Patrick, R, 2023: *Understanding and managing psychological distress due to climate change*. Australian Journal of General Practice 52 (5), 263–268.

Shanks, GD, Biomndo, K, Hay, SI, and Snow, RW, 2000: *Changing patterns of clinical malaria since 1965 among a tea estate population located in the Kenyan highlands*. Transactions of the Royal Society of Tropical Medicine and Hygiene 94, 253–255.

Shapiro, ED, 2014: *Clinical Practice. Lyme Disease.* New England Journal of Medicine 370 (18), 1724–31. https://web.archive.org/web/20161019142422/http:/portal.mah.harvard.edu/templatesnew/departments/MTA/Lyme/uploaded_documents/NEJMcp1314325.pdf

Silverberg, JI, Hanifin, J, Simpson, EL, 2013: *Climatic factors are associated with childhood eczema prevalence in the United States*. Journal of Investigative Dermatology 133 (7), 1752–1759.

Small, J, Goetz, SJ, and Hay, SI, 2003: *Climatic suitability for malaria transmission in Africa, 1911–1995*. Proceedings of the National Academy of Sciences 100 (26) 15,341–15,345. https://doi.org/10.1073/pnas.2236969100

Smith, HG, Sheridan, GJ, Lane, PNJ, Nyman, P, Haydon, S, 2011: *Wildfire effects on water quality in forest catchments: A review with implications for water supply*. Journal of Hydrology (396) 170–192.

Sommer, L, 2016: *Let it burn: The Forest Service wants to stop putting out some fires*. KQED. https://www.kqed.org/science/1134217/let-it-burn-the-forest-service-wants-to-stop-putting out-some-fires

Song, G, Chen, G, Jiang, L, Zhang, Y, Zhao, N, Chen, B, and Kan, H, 2008: *Diurnal temperature range as a novel risk factor for COPD death*. Respirology 13, 1066–1069.

Spencer, R, and Christy, J, 2025: *Global Temperature Report: July 2025 with Version 6.1*. https://www.nsstc.uah.edu/climate/2025/July2025/GTR_202507JULY_v1.pdf

Staples, JE, Fischer, M, 2014: *Chikungunya Virus in the Americas — What a Vectorborne Pathogen Can Do.* New England Journal of Medicine 371 (10), 887–889. https://doi.org/10.1056%2FNEJMp1407698

Stedman, JR, 2004: *The predicted number of air pollution related deaths in the UK during the August 2003 heatwave*. Atmospheric Environment 38, 1087–1090.

Steele, J, 2017: *Deconstructing the Climate Demagoguery of the Wine Country Wildfire Tragedies*. Landscapes and Cycles, October 25. http://landscapesandcycles.net/wine-country-fires-and-climate-demogoguery.html

Stephens, S, Thompson, S, et al. 2021: *Fire, Water, and Biodiversity in the Sierra Nevada: A Possible Triple Win*. Environmental Research Communications 3 (8), 81–104. https://doi.org/10.1088/2515-7620/ac17e2

Sterman, JD, Siegel, L, and Rooney-Varga, JN, 2018: *Does replacing coal with wood lower CO_2 emissions? Dynamic life cycle analysis of wood bioenergy*. Environmental Research Letters 13 (1), 1–10. https://iopscience.iop.org/article/10.1088/1748-9326/aaa512/pdf

Strengers, B, Verheggen, B, and Vringer, K, 2015: *Climate Science Survey. Questions and Responses*. PBL Netherlands Environmental Assessment Agency, April 25. http://www.pbl.nl/sites/default/files/cms/publicaties/pbl-2015-climate-science-survey-questions-and-responses_01731.pdf

Strutt, W, 2022: *Black Thursday Bushfires*. National Museum Australia. https://www.nma.gov.au/defining-moments/resources/black-thursday-bushfires

Subak, S, 2003: *Effects of Climate on Variability in Lyme Disease Incidence in the Northeastern United States*. American Journal of Epidemiology 105 (6), 531–538.

Sultana, H, Armstrong, R, Suter, H, et al. 2017: *A short-term study of wheat grain protein response to post-anthesis foliar nitrogen application under elevated CO_2 and supplementary irrigation*. Journal of Cereal Science 75, 135–137.

Sun, F, Roderick, ML, and Farquhar, GD, 2012: *Changes in the variability of global land precipitation*. Geophysical Research Letters 39 (19), L19402. https://doi.org/10.1029/2012GL053369

Süss, J, Klaus, C, Gerstengarbe, FW, Werner, PC, 2008: *What Makes Ticks Tick? Climate Change, Ticks, and Tick-Borne Diseases.* Journal of Travel Medicine 15 (1), 39–45. https://doi.org/10.1111/j.1708-8305.2007.00176.x

Svensson, C, Kundzewicz, ZW, and Maurer, T, 2005: *Trend detection in river flow series: 1. Annual maximum flow*. Hydrological Sciences Journal 50 (5), 811–24. http://doi.org/10.1623/hysj.2005.50.5.811

Sydney Morning Herald, 1896: *Extraordinary Heat at Willcannia*. January 18. https://trove.nla.gov.au/newspaper/article/14033576?zoomLevel=5

Tam, WWS, Wong, TW, Chair, SY, and Wong, AHS, 2009: *Diurnal temperature range and daily cardiovascular mortalities among the elderly in Hong Kong*. Archives of Environmental and Occupational Health 64, 202–206.

Tang, B, Wu, D, Zhao, X, Zhou, T, Zhao, W, and Wei, H, 2017: *The observed impacts of wind farms on local vegetation growth in northern China*. Remote Sensing 9 (4), 332. https://doi.org/10.3390/rs9040332

Tang, H, Wang, X, et al. 2022: *Long-Term Impacts of Diurnal Temperature Range on Mortality and Cardiovascular Disease: A Nationwide Prospective Cohort Study*. Metabolites 12 (12), 1287; https://doi.org/10.3390/metabo12121287

Taylor, C, and Schlenker, W, 2023: *Environmental drivers of agricultural productivity growth: CO_2 fertilization of US field crops*. National Bureau of Economic Research Working Paper 29320. https://www.nber.org/papers/w29320

The Conversation 2016: *To understand how storms batter Australia, we need a fresh deluge of data*. November 13. https://theconversation.com/to-understand-how-storms-batter-australia-we-need-a-fresh-deluge-of-data-68487

The Conversation 2017: *How invasive weeds can make wildfires hotter and more frequent*. December 20. https://theconversation.com/how-invasive-weeds-can-make-wildfires-hotter-and-more-frequent-89281?utm_medium=email&utm_campaign=Latest%20from%20The%20Conversation%20for%20December%2021%202017%20-%2090897694&utm_content=Latest%20from%20The%20Conversation%20f

The Economist 2016: *The city with the most polluted air*. (Video), January 15. https://www.youtube.com/watch?v=rEbNsn91XV0

The Times 2017: *Scientific advice promoting diesel 'was wrong'*. April 5. https://www.thetimes.co.uk/article/scientific-advice-was-wrong-6zdch9sqq

Thurston, GD, et al. 2016: *Ambient particulate matter air pollution exposure and mortality in the NIH-AARP Diet and Health cohort*. Environmental Health Perspectives 124 (4), 484–490. https://doi.org/10.1289/ehp.1509676

Tol, R, 2010: *The impact of climate change and its policy implications*. In Moran and Roskam: Climate Change: The Facts. IPA, 68–77.

Tsoutsos, T, et al. 2005: *Environmental impacts from the solar energy technologies*. Energy Policy 33 (3), 289–296. https://doi.org/10.1016/S0301-4215(03)00241-6

Transer, FC, Sharp, B, and Sueur, D, 2003: *Potential Effect of Climate Change on Malaria Transmission in Africa*. Royal Society of Tropical Medicine and Hygiene 97, 129–132.

Trinanes, J, Martinez-Urtaza, J, 2021: *Future scenarios of risk of Vibrio infections in a warming planet: A global mapping study*. The Lancet Planet Health (5), e426–e435. http://dx.doi.org/10.1016/S2542-5196(21)00169-8

Tsai, WT, 2008: *Environmental and health risk analysis of nitrogen trifluoride (NF_3), a toxic and potent greenhouse gas*. Journal of Hazardous Materials 159 (2–3), 257–263. https://doi.org/10.1016/j.jhazmat.2008.02.023

Tucci, J, Mitchell, J, and Goddard, D, 2007: *Children's fears, hopes and heroes: Modern Childhood in Australia*. Australian Childhood Foundation, Ringwood, Vic, National Research Centre for the Prevention of Child Abuse, Monash University. June 11.

Tuchman, NC, Wahtera, KA, Wetzel, RG, et al. 2003: *Nutritional quality of leaf detritus altered by elevated atmospheric CO_2: effects on development of mosquito larvae*. Freshwater Biology 48, 1432–1439.

US Nuclear Regulatory Commission 2017: *Global Laser Enrichment Facility Licensing*. August 2. https://www.nrc.gov/materials/fuel-cycle-fac/laser.html

Varghese, R , Patel, P , Kuma,r D , et al. 2023: *Climate change and glacier melting: Risks for unusual outbreaks?* Journal of Travel Medicine 30 (4). https://doi.org/10.1093/jtm/taad015

Villarini, G, and Smith, JA, 2013: *Spatial and temporal variability of cloud-to-ground lightning over the continental U.S. during the period 1995–2010*. Atmospheric Research 124, 137–148.

Vocks, E, Busch, R, Fröhlich, C, Borelli, S, Mayer, H, and Ring, J, 2001: *Influence of weather and climate on subjective symptom intensity in atopic eczema*. International Journal of Biometeorology 45, 27–33.

Walsh, B, 2014: *Thanks to Climate Change, West Nile Virus Could Be Your New Neighbor*. Time, February 28. http://time.com/11683/west-nile-virus-climate-change/

Wang, B, 2008: *Deaths per TWh for all energy sources: Rooftop solar power is actually more dangerous than Chernobyl*. Next Big Future, March 14. https://www.nextbigfuture.com/2008/03/deaths-per-twh-for-all-energy-sources.html

Wang, SY, Bunce, JA, and Maas, JL, 2003: *Elevated carbon dioxide increases contents of antioxidant compounds in field-grown strawberries*. Journal of Agricultural and Food Chemistry 51, 4315–4320.

Watts, W, and Barrins, J, 2014: *Smart urban design could save lives in future heatwaves*. The Conversation, October 22. https://theconversation.com/smart-urban-design-could-save-lives-in-future-heatwaves-33246

Wayne, P, Foster, S, Connolly, J, et al. 2022: *Production of allergenic pollen by ragweed (Ambrosia artemisiifolia L.) is increased in CO_2-enriched atmospheres*. Annals of Allergy, Asthma, and Immunology 88, 279–282.

Weather.com 2014: *The Storm that Killed 300,000*. April 25. https://weather.com/storms/hurricane/news/deadliest-cyclone-history-bangladesh-20130605#/1

Weber, RW, 2002: *Mother Nature strikes back: global warming, homeostasis, and implications for allergy*. Annals of Allergy, Asthma and Immunology 88, 251–252.

Westcott, N, 2011: *The Prolonged 1954 Midwestern U.S. Heat Wave: Impacts and Responses*. American Meteorological Society 3 (3), 165–176. https://doi.org/10.1175/WCAS-D-10-05002.1;

Westerling, AL, Hidalgo, HG, Cayan, DR, Swetnam, TW, 2006: *Warming and earlier spring increase Western U.S. forest wildfire activity*. Science 313, 940–943.

White, M, 2012: *The Great Big Book of Horrible Things: The Definitive Chronicle of History's 100 Worst Atrocities.* WW Norton, 47.

WHO (World Health Organization) 2013: *World Malaria Report 2013, Annex 6B*. http://www.who.int/malaria/publications/world_malaria_report_2013/en/ Accessed June 12, 2018.

WHO 2018: *Leishmaniasis*. March 14. http://www.who.int/en/news-room/fact-sheets/detail/leishmaniasis

WHO (date unknown): *Air Pollution*. http://www.who.int/airpollution/en/ (Accessed June 12, 2018).

WHO 2024a: *Diarrhoeal disease*. March 7. https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease

WHO 2024b: *Household air pollution*. October 16. https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health

WHO 2024c: *Vector-borne Diseases*. September 26. https://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases

Wik, M, Pingali, P, and Broca, S, 2008: *Global Agricultural Performance: Past Trends and Future Prospects*. World Bank. (PDF) Global Agricultural Performance: Past Trends and Future Prospects

Wilder-Smith, A, and Gubler, DJ, 2008: *Geographic expansion of Dengue: The impact of international travel*. Medical Clinics of North America 92, 1377–1390.

Williams, C, 2007: *Infectious Disease Epidemiology: Theory and Practice (2nd ed.)*. Jones and Bartlett, 447.

Williams, J, et al. 2011: *Findings and implications from a coarse-scale global assessment of recent selected megafires*. Paper presented to 5th International Wildland Fire Conference, Sun City, South Africa. May 9–13. http://foris.fao.org/static/pdf/fm/5thIWFConference2011.pdf

Wiltshire, A, et al. 2013: *The importance of population, climate change and carbon dioxide plant physiological forcing in determining future global water stress*. Global Environmental Change 23 (5), 1083–1097.

WMO Tropical Meteorology Research Program 2006: *Summary Statement on Tropical Cyclones and Climate Change*. https://web.archive.org/web/20090325193707/http://www.wmo.int/pages/prog/arep/press_releases/2006/pdf/iwtc_summary.pdf 2006.

Wong, KV, Paddon, A, Jiminez, A, 2013: *Review of World Urban Heat Islands: Many Linked to Increased Mortality*. Journal of Energy Resource Technology 135 (2), 1217–1228. https://doi.org/10.1115/1.4023176

World Energy Council 2016: *World Energy Resources-Bioenergy*. https://www.worldenergy.org/wp-content/uploads/2017/03/WEResources_Bioenergy_2016.pdf

World Energy Council 2018: *Coal in India*. https://www.worldenergy.org/data/resources/country/india/coal/

World Nuclear Association 2017: *'Clean Coal' Technologies, Carbon Capture & Sequestration*. http://www.world-nuclear.org/information-library/energy-and-the-environment/clean-coal-technologies.aspx

Wuebbles, DJ, Fahey, DW, and Hibbard, KA, Eds. 2017: *Climate science special report: Fourth National Climate Assessment.* U.S. Global Change Research Program I 190–191. https://doi.org/10.7930/J0J964J6

WWARN 2011: *The History of Malaria*. http://www.malaria.com/overview/malaria-history

Xu, Z, Huang, C, Su, H, Turner, LR, Qiao, Z, Tong, S, 2013a: *Diurnal temperature range and childhood asthma: a time-series study*. Environmental Health 12 (12). https://doi.org/10.1186/1476-069X-12-12.

Xu, Z, Huang, C, Turner, LR, Su, H, Qiao, Z, and Tong, S, 2013b: *Is diurnal temperature range a risk factor for childhood diarrhea?* PLoS One 8 (5), e64713. https://doi.org/10.1371/journal.pone.0064713

Yale University Seto Lab 2018: *Forecasting Urban Growth*. https://urban.yale.edu/research/theme-3

Yashodhara, BM, Umakanth, S, et al. 2009: *Omega-3 fatty acids: a comprehensive review of their role in health and disease*. Postgraduate Medical Journal 85, 84–90. http://dx.doi.org/10.1136/pgmj.2008.073338

Yiou, R, et al. 2006: *Statistical analysis of floods in Bohemia (Czech Republic) since 1825*. Hydrological Sciences Journal 51 (5), 930-945.

Zhu, Z, Piao, S, Myneni, R, et al. 2016: *Greening of the Earth and its drivers*. Nature Climate Change 6 791–795. https://doi.org/10.1038/nclimate3004