

INDOOR SMOKE



ESTIMATES GLOBAL CARBON IMPACT



2010 EFFECT TODAY



DEATHS PER YEAR

3.1 MILLION

2030 EFFECT TOMORROW

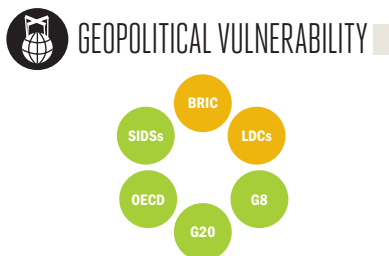
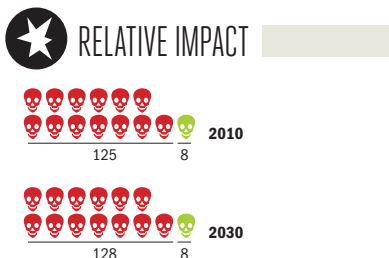
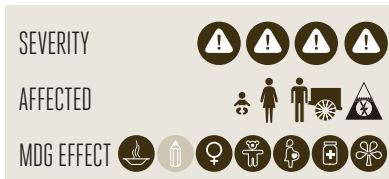
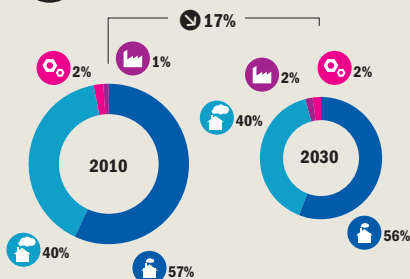


DEATHS PER YEAR

3.1 MILLION



MORTALITY IMPACT

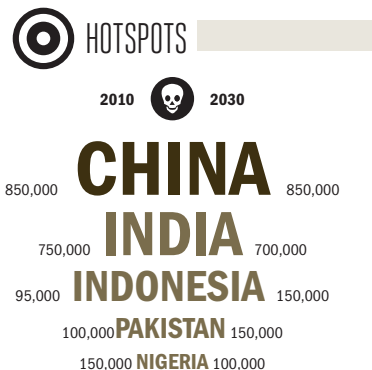


➤ The world is familiar with the fact that passive indoor tobacco smoke is a risk factor for lung cancer

➤ Indoor smoke from burning wood and coal for cooking and heating causes mortality on a much larger scale in developing countries

➤ Uneven sustainable development has locked out more than 1.3 billion people from access to electricity, so a large part of the world's population still cooks with indoor fires

➤ The practice means long-term exposure to toxic fumes, which can result in sickness ranging from chronic respiratory disease to lung cancer, tuberculosis and cardiovascular disease; it is a serious threat to human development



Deaths
 Developing Country Low Emitters
 Developed
 Developing Country High Emitters
 Other Industrialized

= Deaths per 100,000
 Change in relation to overall global population and/or GDP

Passive cigarette smoke indoors is well understood to be a risk factor for lung cancer among non-smokers, and governments around the world have taken significant regulatory action to combat indoor tobacco smoking for just this reason (Taylor et al., 2007; McNabola and Gill, 2009). Indoor smoke has long been identified as one of the most serious risk factors for mortality worldwide, especially among lower-income developing countries (WHO, 1997). But millions of people still die every year as a result of burning fuels like coal, wood and other biomass (crop waste, dung) in their homes for basic cooking and heating purposes (WHO, 2009). Lack of access to electricity or other forms of modern clean-burning fuels, such as kerosene or gas, force a reliance on locally available fuels like wood, which can also aggravate local deforestation (IEA, 2011; UNEP, 2005). Continued reliance on traditional burning stoves, however, is estimated to close the poverty trap tighter on more than 100 million of the world's poorest due to the comprehensive health effects. The impact is particularly severe on women, who are more likely to be

cooking on a regular basis, and for infants, who are more likely to be confined indoors when smoke exposure is highest (Amoli, 1997; Smith et al., 2000; Mishra et al., 2005).

HAZARD MECHANISM

When wood, coal or other forms of solid fuels are burned, almost all stoves commonly used in developing countries do not burn the fuel completely. This means fine particles are released into the enclosed air space and are inhaled, with damaging consequences for human lungs (Kleeman et al., 1999; Pope et al., 2002). Many houses lack ventilation or have poor ventilation, and the typical smoke released when stoves are used contains a potent and hazardous cocktail of toxins, including carbon monoxide, nitrogen and sulphur oxides, benzene, formaldehyde, butadiene and benzo(a)pyrene. Inhaling this smoke repeatedly over a number of years seriously predisposes those affected to illness and death tied to a wide range of health concerns, in particular chronic respiratory diseases (e.g. chronic obstructive pulmonary disease), lower respiratory illnesses, lung cancer and cardiovascular disease (WHO, 2004; Fullerton et al., 2008).

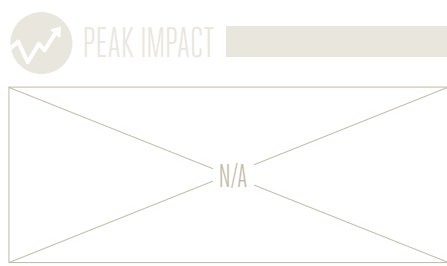
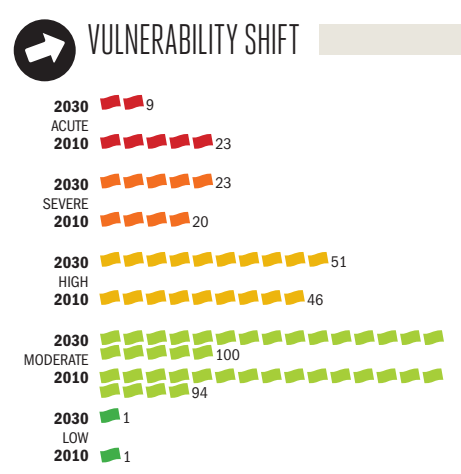
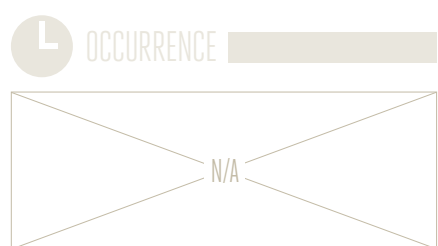
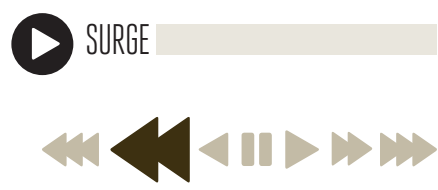
Smoke inhalation is thought to impede the body's ability to resist tuberculosis, since exposure to indoor smoke has additionally been shown to substantially increase the risk of contracting that disease (Mishra et al., 1999a). Indoor smoke exposure can also lead to partial or complete visual impairment (acquired blindness), while people suffering from complete visual impairment are more than seven times more likely to die as a result of an unintentional injury than those with non-impaired vision (Mishra et al., 1999b; Lee et al., 2003b). Other health concerns have been identified but are not covered here, such as the much higher risks of sudden antenatal death (stillbirth) shown to occur when mothers are exposed to indoor smoke (Mishra et al., 2005).

challenge to human development, with low-income developing countries in particular from Africa and Asia severely affected. Most sub-Saharan African countries are assessed as acutely or severely affected. China and India have by far the largest share of mortality, with an estimated 800,000 deaths each for the year 2010 and more than 30 million people affected by illness as a result of indoor smoke in each country. Other countries with large-scale impacts include Nigeria, Ethiopia, Pakistan, Indonesia, Bangladesh, Afghanistan and DR Congo.

While the majority of developing countries are experiencing serious effects, not a single developed country has vulnerability above Moderate, with only fractional numbers of annual deaths attributed to indoor smoke.

IMPACTS

The annual global impact of indoor smoke was estimated to be 3.1 million deaths for the year 2010. That figure of 3.1 million annual deaths is expected to remain stable but decline as a share of overall global population through 2030. Over 150 million people are estimated to be affected by illnesses stemming from indoor smoke every single year. The impact presents a comprehensive



= 5 countries (rounded)



THE INDICATOR

The indicator measures the human health impact of smoke inhalation from the incomplete combustion of wood, coal and other biomass fuels burned for cooking or heating within buildings, above all in developing countries. The indicator estimates the direct effect this practice has on chronic respiratory disease (chronic obstructive pulmonary disease), lower respiratory illnesses, lung cancer, cardiovascular disease and tuberculosis (WHO, 2004; Fullerton et al., 2008; Mishra et al., 1999a). It also measures the indirect effect of increased mortality due to injuries from partial or complete visual impairment (blindness) resulting from extended smoke exposure (Mishra et al., 1999b; Lee et al., 2003). The indicator relies on the World Health Organization's latest update of the global disease burden database (WHO BDD, 2011) and relies on the Organization for Economic Co-operation and Development's analysis to estimate how indoor smoking mortality is likely to evolve through to 2030 (OECD, 2012).

ESTIMATES COUNTRY-LEVEL IMPACT

COUNTRY	☠		♿	
	2010	2030	2010	2030
ACUTE				
Afghanistan	80,000	100,000	4,500,000	6,000,000
Angola	35,000	35,000	3,000,000	3,000,000
Burundi	15,000	10,000	700,000	550,000
Cambodia	15,000	15,000	450,000	500,000
Mali	25,000	20,000	1,000,000	1,000,000
Niger	30,000	30,000	2,000,000	2,000,000
Rwanda	15,000	15,000	850,000	700,000
Sierra Leone	15,000	15,000	750,000	650,000
Somalia	15,000	15,000	750,000	750,000
SEVERE				
Bangladesh	90,000	95,000	3,000,000	3,500,000
Burkina Faso	20,000	20,000	1,000,000	1,000,000
Central African Republic	4,000	3,000	200,000	150,000
Chad	15,000	15,000	650,000	600,000
China	850,000	850,000	50,000,000	50,000,000
Cote d'Ivoire	20,000	15,000	750,000	550,000
DR Congo	75,000	75,000	5,000,000	4,500,000
Ethiopia	100,000	85,000	5,000,000	4,000,000
Guinea	8,750	7,250	350,000	300,000
Guinea-Bissau	1,750	1,500	100,000	85,000
Haiti	6,000	6,250	250,000	250,000
India	750,000	700,000	35,000,000	35,000,000
Kyrgyzstan	3,250	3,750	150,000	150,000
Laos	3,750	4,000	150,000	200,000
Liberia	5,250	5,250	300,000	300,000
Madagascar	20,000	15,000	900,000	750,000
Malawi	15,000	10,000	850,000	700,000
Myanmar	35,000	35,000	1,000,000	1,000,000
Nigeria	150,000	100,000	6,500,000	5,000,000
Pakistan	100,000	150,000	4,000,000	5,000,000
Senegal	10,000	8,750	400,000	350,000

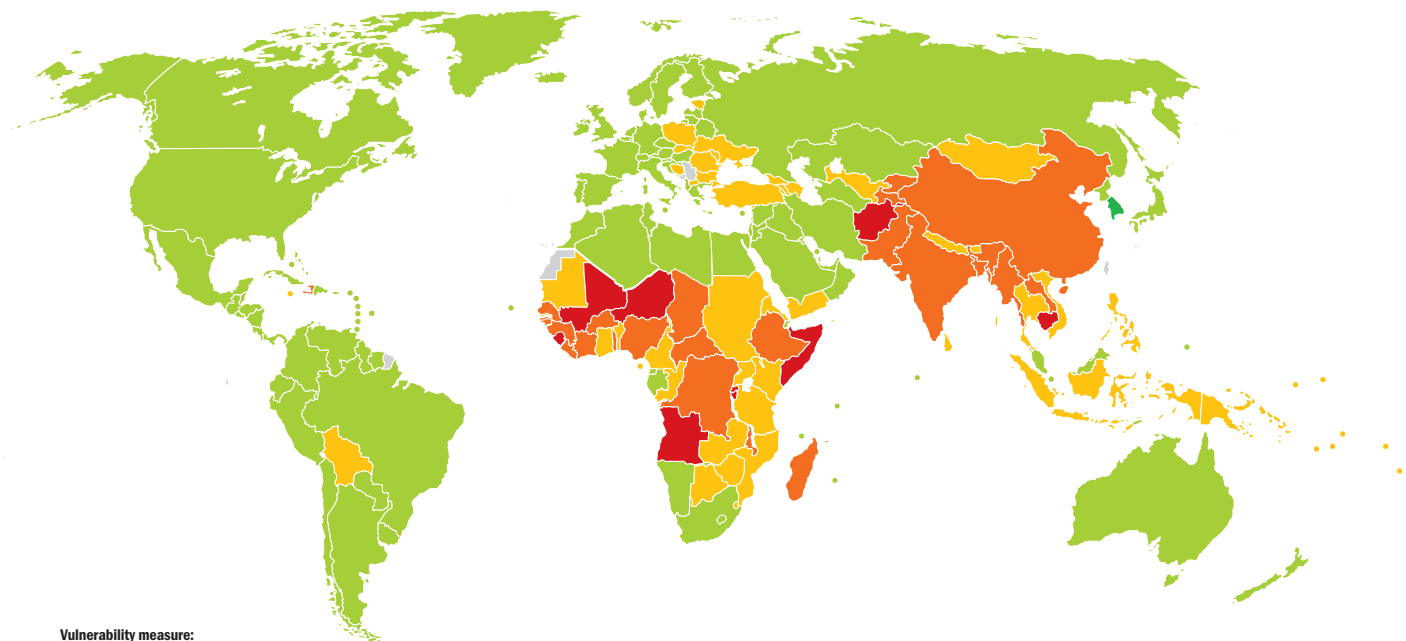
COUNTRY	☠		♿	
	2010	2030	2010	2030
Tajikistan	5,500	6,250	250,000	250,000
Togo	6,250	5,250	200,000	150,000
HIGH				
Armenia	1,000	950	40,000	35,000
Azerbaijan	2,750	2,750	100,000	100,000
Benin	6,750	5,750	350,000	300,000
Bhutan	300	400	15,000	20,000
Bolivia	2,000	2,500	100,000	150,000
Bosnia and Herzegovina	750	650	6,250	5,250
Botswana	800	500	50,000	30,000
Bulgaria	2,250	1,750	15,000	10,000
Cameroon	15,000	10,000	750,000	550,000
Congo	1,750	1,500	75,000	70,000
Eritrea	2,500	2,000	150,000	100,000
Estonia	200	200	2,500	2,750
Fiji	150	150	4,250	3,750
Gambia	1,000	800	45,000	30,000
Georgia	1,250	950	20,000	15,000
Ghana	10,000	8,250	450,000	350,000
Indonesia	95,000	150,000	5,000,000	6,500,000
Jamaica	750	750	50,000	50,000
Kenya	20,000	15,000	950,000	650,000
Macedonia	400	350	3,250	3,000
Marshall Islands	25	30	750	900
Mauritania	2,500	2,250	85,000	75,000
Micronesia	30	30	1,250	1,500
Moldova	800	700	20,000	15,000
Mongolia	650	650	20,000	20,000
Mozambique	15,000	10,000	750,000	550,000
Nepal	15,000	15,000	650,000	750,000
Papua New Guinea	2,750	3,250	100,000	150,000
Philippines	20,000	20,000	700,000	750,000

COUNTRY	☠		♿	
	2010	2030	2010	2030
Poland	5,500	7,250	35,000	45,000
Romania	5,000	4,000	55,000	45,000
Samoa	60	60	3,000	3,250
Sao Tome and Principe	85	75	4,250	3,750
Slovakia	850	1,000	5,500	7,000
Solomon Islands	150	200	6,250	8,750
Sri Lanka	7,250	6,500	400,000	350,000
Sudan/South Sudan	20,000	15,000	900,000	750,000
Swaziland	400	250	25,000	15,000
Tanzania	20,000	20,000	1,500,000	1,000,000
Thailand	20,000	20,000	1,000,000	950,000
Tonga	30	35	1,500	1,750
Turkey	9,500	15,000	400,000	650,000
Tuvalu	5	5	150	150
Uganda	25,000	25,000	1,500,000	1,500,000
Ukraine	10,000	8,000	80,000	60,000
Uzbekistan	10,000	10,000	450,000	500,000
Vanuatu	55	65	2,500	3,000
Vietnam	45,000	40,000	1,500,000	1,500,000
Yemen	10,000	20,000	500,000	900,000
Zambia	10,000	9,000	550,000	500,000
Zimbabwe	5,500	4,000	250,000	150,000
MODERATE				
Albania	550	550	7,500	7,500
Algeria	1,250	1,500	35,000	40,000
Antigua and Barbuda	10	10	200	200
Argentina	3,250	3,250	20,000	20,000
Australia	1,500	2,250	15,000	25,000
Austria	300	400	3,500	4,500
Bahamas	20	20	200	200
Bahrain	20	25	250	250
Barbados	20	15	100	100



CARBON VULNERABILITY

● Acute ● Severe ● High ● Moderate ● Low



Vulnerability measure:
comparative mortality
as a share of population
(national)

COUNTRY	2010		2030		COUNTRY	2010		2030		COUNTRY	2010		2030	
	☠	👤	☠	👤		☠	👤	☠	👤		☠	👤	☠	👤
Belarus	1,750	1,500	15,000	15,000	Hungary	1,250	1,500	8,000	9,750	Panama	350	350	20,000	20,000
Belgium	350	450	3,750	5,000	Iceland	5	10	80	100	Paraguay	600	700	30,000	35,000
Belize	30	30	1,750	1,750	Iran	6,000	6,750	25,000	30,000	Peru	2,000	2,000	100,000	100,000
Brazil	25,000	30,000	1,000,000	1,500,000	Iraq	2,750	3,500	65,000	80,000	Portugal	350	450	4,250	5,250
Brunei	15	15	150	150	Ireland	100	150	1,000	1,750	Qatar	15	15	150	150
Canada	1,500	2,250	15,000	25,000	Israel	100	150	1,250	1,750	Russia	30,000	2,750	200,000	15,000
Cape Verde	60	45	3,250	2,250	Italy	2,250	2,750	25,000	30,000	Saint Lucia	20	20	1,000	950
Chile	850	1,250	5,500	8,000	Japan	10,000	15,000	150,000	150,000	Saint Vincent	10	10	150	150
Colombia	4,500	4,750	250,000	250,000	Jordan	350	450	1,500	1,750	Saudi Arabia	1,250	1,750	15,000	20,000
Comoros	200	150	9,250	7,750	Kazakhstan	2,000	2,000	20,000	20,000	Seychelles	5	5	30	25
Costa Rica	400	450	20,000	25,000	Kiribati	15	15	60	70	Singapore	250	250	2,750	2,750
Croatia	300	250	5,750	4,750	Kuwait	70	85	800	950	Slovenia	70	90	800	1,000
Cuba	1,250	1,000	50,000	45,000	Latvia	350	300	2,250	2,000	South Africa	5,500	4,000	300,000	250,000
Cyprus	75	70	850	800	Lebanon	350	350	2,250	2,250	Spain	1,750	2,250	40,000	45,000
Czech Republic	500	650	3,250	4,250	Lesotho	300	150	15,000	7,250	Suriname	40	30	150	150
Denmark	150	250	2,000	2,500	Libya	450	500	8,250	9,250	Sweden	400	500	4,250	5,500
Djibouti	150	100	4,750	3,000	Lithuania	450	400	3,000	2,500	Switzerland	250	300	2,750	3,250
Dominica	5	5	95	90	Luxembourg	15	25	150	250	Syria	1,750	2,250	75,000	90,000
Dominican Republic	1,000	1,000	30,000	30,000	Malaysia	3,250	3,500	20,000	20,000	Timor-Leste	200	200	850	900
Ecuador	600	650	15,000	15,000	Maldives	35	45	2,250	3,000	Trinidad and Tobago	100	100	1,750	1,750
Egypt	8,000	8,750	100,000	100,000	Malta	15	10	150	150	Tunisia	700	750	10,000	10,000
El Salvador	700	700	35,000	35,000	Mauritius	70	45	450	300	Turkmenistan	900	1,000	4,250	4,750
Equatorial Guinea	40	35	250	200	Mexico	9,500	15,000	500,000	750,000	United Arab Emirates	80	80	900	900
Finland	200	250	2,250	2,750	Morocco	3,500	3,750	65,000	70,000	United Kingdom	2,000	2,750	20,000	30,000
France	1,500	2,000	15,000	25,000	Namibia	200	150	10,000	8,500	United States	15,000	25,000	200,000	300,000
Gabon	250	200	10,000	9,500	Netherlands	400	550	4,500	6,000	Uruguay	350	350	2,250	2,250
Germany	3,750	4,750	40,000	50,000	New Zealand	300	450	3,500	5,000	Venezuela	1,500	1,500	35,000	35,000
Greece	450	600	5,250	6,500	Nicaragua	950	1,000	50,000	55,000	LOW				
Grenada	10	10	250	200	North Korea	650	600	2,750	2,250	South Korea				
Guatemala	2,000	2,500	150,000	200,000	Norway	150	200	1,750	2,250					
Guyana	100	90	4,250	3,000	Oman	150	200	850	1,250					
Honduras	1,500	1,500	80,000	90,000	Palau	1	5	15	20					

👤 Additional persons affected - yearly average