

STRICLTY EMBARGOED UNTIL 12.01am Monday 7 April 2008

World Health Day Public Lecture

7 April 2008

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Speaker Notes

Thank you for attending this evening which marks **the 60th World Health Day**. I'd like to thank the **McCaughey Centre** and Professor John Wiseman for hosting this evening and for their leadership in taking a broad approach to health which includes environmental factors. I'd also like to thank **Doctors for the Environment Australia** who have been actively promoting World Health Day. I'd also like to thank the **Australian Conservation Foundation** who have been hosting **Al Gores Climate Leadership project**- I was lucky enough to be one of the 250 Australian presenters who have presented to over one hundred thousand Australians interested in learning about climate change.

World Health Day is celebrated each year and this year the nominated theme is "**protecting health from climate change**". It is notable that of all the potential public health issues that the **World Health Organization could have chosen that climate change** has been selected. It makes sense when one considers that all the **basic determinants of health**; clean air, fresh water and safe food are dependent on a stable climate. In addition our most substantial **current global public health problems** such as diarrhea, malaria and malnutrition, which claim the lives of 3 million people per year, are in fact all climate sensitive illnesses.

In tonight's presentation I will be presenting **three areas- the basic science of climate change, the impacts of climate change and the implications for the health sector**. In particular I will be focusing on some **of the mental health implications of climate change** and discuss how health professional can help people who are distressed by climate change.

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As a **GP** I'm very comfortable with the idea that there will be those amongst you with specialized knowledge way beyond mine. **My main sources** are the World Health Organisation Toolkit for World Health Day, the IPCC Chapter 8 on health impacts of climate change, CSIRO summary reports on Australian predictions, and the photographs are sourced from the Al Gore climate project.

This iconic picture of the earth taken from space in 1968 is highlighted in Al Gore's Inconvenient Truth movie and reminds us that we really are living together on this blue ball called earth floating around space. One thing I learnt from the Al Gore training is the **power of visual images** to capture people's imagination and the old adage that "a picture's worth a thousand words" is very true. It's a bit like the highly effective campaign of putting lung cancer pictures on cigarette packets which seems to be a lot more effective than text. Looking at the earth this way, the idea that **humanity could overload the earth's limited natural systems** does seem possible, and indeed climate change is just one of a number of threats currently undermining the very life support systems on which we depend.

This picture shows the sun coming up behind the earth and demonstrates **the thinness of our atmosphere**. A metaphor proposed by famous physicist Carl Sagan is that if the earth was just a globe, the atmosphere's thickness would be equivalent to the thickness of the varnish of that globe.

In these next series of slides I will **overview the basic concept of global warming**. I will be oversimplifying deliberately, for example referring mainly to CO₂ when talking of greenhouse gases when in fact there are other important greenhouse gases such as methane and somewhat confusingly water. Essentially global warming can be thought of as the greenhouse gases trapping more of the reflected heat from the earth's surface and thus heating up the earth's atmosphere.

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Key scientists who studied this problem in the 1950s were Roger Revelle and Charles Keeling. They commenced measurements of CO₂ on an Island of Hawaii to avoid local pollution effects and using weather balloons carefully tracked the CO₂ levels in the atmosphere over time. You can see from this series of slides that CO₂ patterns fluctuate in a zig zag fashion on an annual basis and importantly that since beginning of measurements have continued to rise so that today CO₂ is higher than 380 ppm.

CO₂ levels and temperature can in fact be measured further back in time using **ice core samples**. Trapped bubbles of air in successively deeper layers indicate both estimates of past temperature and CO₂ levels. In this series of slides it can be seen that CO₂ and temperature tend to move closely together in what has been termed a coupled system.

Looking back in time even further at ice cores from the **Dome C glacier scientists** can make estimates from the last 650,000 years. As shown in these slides, the IPCC states, **“Atmospheric concentration of CO₂ (379ppm) and CH₄ (1774ppb) in 2005 exceed by far the natural range over the last 650,000 years”**

In recent times we are seeing rises in average global temperature. According to the IPCC **“The total temperature increase from 1850–1899 to 2001–2005 is 0.76°C”** and **“Eleven of the last 12 years (1995-2006) rank among the twelve warmest years in the instrumental record of global surface temperature since 1850”**

And it is clear that it is **humanity’s emissions of greenhouse gases** that are the likely culprit. **Again the IPCC says “Global GHG emissions due to human activities have grown since pre-industrial times with an increase of 70% between 1970 and 2004”** **“There is very high confidence that the net effect of human emissions since 1750 has been one of warming”** By very high confidence IPCC generally means a greater than 90% chance.

One effect of rising average global temperatures is retreat of glaciers. As the IPCC states **“Mountain glaciers and snow cover on average have declined in both hemispheres”**.

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In this series of before and after pictures of glaciers the overall pattern of retreat is evident. Of particular concern is the retreat of some glaciers in regions such as Nepal that are responsible for generating melt-water flows in to rivers used by millions in Asia as their source of fresh water.

The arctic ice is also exhibiting an overall reduction in size. According to the IPCC **“Satellite data since 1978 show that annual average arctic sea ice extent has shrunk by 2.7 % per decade with larger decreases in summer of 7.4% per decade”** Data from submarines travelling under the arctic has helped corroborate these findings. Notably more recent data since the IPCC indicates an even greater rate of decrease.

Melting of glaciers and melting of the arctic coupled with thermal expansion is leading to gradual sea level rises. According to the IPCC **“Global average sea level has risen since 1961 at an annual rate of 1.8 mm/year and since 1993 at 3.1 mm/year with contributions from thermal expansion, melting glaciers and ice caps, and the polar ice sheets”** On these estimates by 2100, sea level rises of between 18- 59cm are predicted.

IPCC says that **“Small islands, whether located in the tropics or higher latitudes, have characteristics which make them especially vulnerable to the effects of climate change, sea-level rise and extreme events.”** And **“Sea-level rise is expected to exacerbate inundation, storm surge, erosion and other coastal hazards”**

The possibility of more extreme sea level rises are less certain. IPCC says **“Contraction of the Greenland ice sheet is expected to continue to contribute to sea level rise after 2100.”** And **“Current models suggest virtually complete elimination of the Greenland ice sheet and resulting sea level rise of 7m if global average warming were sustained for millenia in excess of 1.9 degrees C to 4.6 degrees C relative to preindustrial values”** The picture indicates dramatically what a 7m sea level rise would look like in Beijing and the implications for populations, and subsequent environmental refugees would be catastrophic.

More powerful storms can compound sea level rise for example by inundating low level coast lines. The IPCC says **“Based on a range of models, it is *likely* that future tropical cyclones (typhoons and hurricanes) will become more intense, with larger peak wind speeds and more heavy precipitation associated with ongoing increases of tropical sea surface temperatures.”** In this series of slides of hurricane Katrina it can be seen dramatically how the intensity of the storm can gather momentum as it passes over warmer water. Although it’s not certain that this specific weather event was necessarily caused by climate change, there has been a pattern of stronger storms around the world. This picture shows Cyclone Monica over Australia represents one of the largest cyclones in the southern hemisphere.

Warmer atmospheric temperatures tend to alter patterns of precipitation around the world causing floods in some regions and overall drying in others. As the the IPCC predicts it is **“Very likely that precipitation increases in high latitudes and likely decreases in most subtropical land regions, continuing observed recent trends”**

Flooding is shown in these pictures in Europe, India and China and there has been a tendency to greater flooding events around the world. The IPCC predicts that **“Many millions more people are projected to be flooded every year due to sea-level rise by the 2080s. The number affected will be largest in the mega-deltas of Asia and Africa while small islands are especially vulnerable”**

From a health point of view floods increase risk of gastroenteritis in some regions of the world due to contamination of fresh water supplies **“Diarrheal disease primarily associated with floods and droughts are expected to rise in East, South and South-East Asia due to projected changes in the hydrological cycle associated with global warming”**

On the other side of the equation is drought. Australia is the driest inhabited continent, and has one of the most variable rainfall climates in the world. Though the precise contribution of climate change to our recent drought is uncertain, future predictions by the IPCC and the CSIRO indicate more frequent drought in Australia. IPCC states **“As a result of reduced precipitation and increased evaporation, water security problems are projected to intensify by 2030 in southern and eastern Australia”**

In a 2007 report CSIRO has stated, **“If a drought-month is defined as having very low soil moisture (within the driest 10% for the period 1974-2003), simulations from two models show up to 20% more drought-months over most of Australia by 2030, with up to 40% more drought-months by 2070 in eastern Australia, and up to 80% more in south-western Australia by 2070”** These two rainfall maps of Australia indicate the regions of reduced rainfall and lowest rainfall on record.

Droughts in Australia have already caused enormous financial and community stress for rural communities. *Beyondblue* Australia’s national depression initiative set up a drought support telephone line which was inundated with calls for assistance . A recent report by the **Victorian Council of Social Services** highlights the distress that drought causes in communities and recommends that mental health services in drought and climate change affected areas be adequately funded.

River flows will also be affected in different ways by climate change. The IPCC says “By mid-century, annual average river runoff and water availability are projected to increase by 10-40% at high latitudesand decrease by 10-30%over some dry regions at mid-latitudes.” Of concern to Australians are predicted reduced flows in Australia’s Murray Darling river systems as shown in these recent photos, which will exacerbate existing water management challenges for this system.

Whilst a rich country like Australia has substantial ability to adapt to these changes in rainfall, poor regions of Africa are less able to do so. The IPCC states **“(In Africa) By 2020, between 75 million and 250 million people are projected to be exposed to**

increased water stress due to climate change.” The picture shows Lake Chad which has drastically reduced since the 1960s reducing opportunities for irrigation and fishing.

Food security and malnutrition will also be worsened in Africa by climate change, **“Agricultural production, including access to food, in many African countries and regions is projected to be severely compromised by climate variability and change This would further adversely affect food security and exacerbate malnutrition in the continent.”** according to the IPCC.

Heatwaves are another threat to health. Europe’s 2003 heat wave shown in the pictures contributed to over 35000 deaths especially amongst the most vulnerable populations such as the elderly. In Australia a study commissioned by the Australian Medical Association and Australian Conservation Foundation indicates that **“If we don’t adapt, temperature-related deaths could more than double by 2020 to 2,500 deaths per year.”** We have been witnessing some the hottest days on record in Australia.

Higher temperatures increase the threat of bushfires in Australia. According to CSIRO, **“Simulations from two models show the number of days with very high and extreme fire danger ratings increases 4-25% by 2020 and 15-70% by 2050.”** The health risks from fire for communities and fire services are of course substantial including injury, smoke inhalation and deaths.

Another health risk for Australia is the potential spread of some vector borne diseases such as **Dengue Fever** though it is highly likely that even with expanded regions of potential spread Australia’s strong public health capacity would limit the spread of the disease. Changes in the transmission zones of mosquito’s bearing **Malaria** are thought to be likely with warmer temperatures, although the overall impact on disease rates in specific areas still uncertain.

Climate change is also thought to worsen air pollution in particular the concentrations of **ozone at ground level**. This has been associated with high rates of cardio respiratory disease including asthma.

So to **summarise**, there are numerous health effects of climate change and they vary markedly according to location, the vulnerability of the population and the capacity to adapt. There are some instances where climate change will likely to reduce illness such as reducing cold related deaths in some regions but overall the pattern is a worsening of the familiar illnesses. Examples include;

- heat wave related deaths,
- injuries and post traumatic stress disorders from extreme weather events such as storms or floods,
- worsening cardio respiratory diseases from high levels of ground level ozone,
- water and food borne diseases such as gastroenteritis,
- vector borne illnesses such as altered transition zones of mosquito borne diseases,
- food and water shortages which are particularly problematic in Africa and
- the impacts of population displacement from sea level rise or agricultural failure.

Quantifying the overall risk of climate change on health is difficult because of the many uncertainties. One approach that has been adopted by the World Health Organisation is called a **comparative risk assessment**- essentially this is an epidemiological and statistical process whereby the burden of various diseases is attributed to a range of risk factors. Focusing on climate sensitive diseases between the 1970s and 2000, the WHO estimates that climate change has contributed to over 150,000 additional deaths per year. The highest rates, 80- 120 climate change related deaths per million per year are indicated in brown on the slide are concentrated in the poorest regions of the world.

Another way to present this is a **density equaling cartogram** by Patz and colleagues which shows visually where the greatest mortality exists that can be attributed to climate change again between the 1970s and 2000. In the map, the bulging of Africa and South

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East Asia indicate their high vulnerability to climate change. It contrasts with this density equaling cartogram by Patz demonstrating the cumulative emissions in billions tones of carbon equivalent in 2002.

World Health Day is about raising the problems **but also generating solutions**. How can the health sector respond to climate change. In the remaining time we will discuss how the health sector can *1 adapt to impacts of climate change 2 advocate for strong and effective mitigation 3 Help educate the community about the issue*

The inertia in the climate system means that some warming in coming decades is inevitable so **adaptation will be a necessity**. As the IPCC states “**Past emissions are estimated to involve some *unavoidable warming* (about a further 0.6 degrees by the end of the century relative to 1980- 1999) even if atmospheric greenhouse gas emissions remain at 2000 levels**” Since the IPCC report more recent data suggests that emissions are tracking along the higher emission scenarios, that sea level is rising faster than the models suggested, and that the oceans capacity to absorb CO₂ is slowing faster than expected.

So **adaptation** will be important and the health sector and the health sector will have role. **This figure** overviews the health impacts of climate change and how the health sector can intervene to reduce the impacts. **Potential adaptive roles for health sector** include disaster preparedness for heat waves and other extreme weather events, monitoring of infectious diseases and providing psychosocial support to communities affected by long term drought are some of the roles primary health care play.

A second role for health professionals is to **advocate for strong and effective mitigation**. As outlined in Professor Garnauts interim report, time is running out for the world to come up with *a post Kyoto framework* that leads to real stabilization of CO₂.

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One way to think about this is to consider the impacts of a range of average global temperature increases and **then work backwards** to establish what levels of CO₂ (equivalent) stabilization we should be aiming for and what would be required to do so. As shown in the figure whether we aim to stabilize at 450, 550 or higher CO₂ ppm equivalent can have a dramatic effect on average global temperature rise and the environmental and human costs.

To have **any chance of achieving even modest targets** we need a strong commitment to urgent action to reduce emissions in Australia, strong firm commitments to targets, active engagement of the growing developing countries especially China, engagement of the US, broad international agreement on how CO₂ is to be valued, and a system that is equitable and acceptable to countries across the world. This is indeed a tall order, **but business as usual** is also not an option especially for a country like Australia that is the arguably the most vulnerable developed country to climate change.

Doctors also have a role in **public education** about climate change and if governments are going to make the hard decisions required, they will be looking to public opinion for support. For example **Doctors for the Environment Australia have developed posters** and pamphlets for waiting rooms to prompt discussion about climate change with patients. In particular the environmental and health co-benefits of active transport and healthy eating can be emphasized.

Another role for the health sector is **managing the distress and worry of the community** about climate change. While there has been much discussion about the effects of climate change on physical health, caused by events such as heat waves and the spread of infectious diseases – little thought has so far been given to the impact of climate change on mental health. Research into the mental health impacts of climate change is an emerging field.

While it is clear that the wellbeing of many in farming communities will be directly affected by more frequent droughts – the mental health impacts of climate change are also an issue for the broader community. Anecdotally, GPs are already finding that more patients are presenting with worries about climate change. Organisations such as the **Australian Psychological Society** are now providing tips to help psychologists advise patients who are anxious about climate change.

The high prevalence of stress, anxiety and depression in the Australian community mean that many are susceptible to excessive worry about climate change. People with depression and anxiety have a low threshold to taking on the negative information about climate change that is presented to them in the media, which feeds into a hopelessness about the future. This excessive pessimism can often immobilize people and prevent them from taking action, to the detriment of their own health and that of the planet.

Action can be a great stress reliever, and by encouraging their patients to take action **doctors can have a positive impact** on their patients' physical and mental health.

Strategies doctors can use include,

- Encouraging patients to walk, cycle or use public transport – thereby reducing greenhouse gas emissions, improving their fitness and preventing obesity;
- Encouraging patients to consume fresh, healthy, locally-produced food – reducing the amount of energy used in producing their food, cutting down on unnecessary packaging and reducing the amount of processed, fatty food in their diet.
- Encouraging patients to think about the steps they can take to live a more sustainable lifestyle – whether it be recycling, switching to green power or reducing their water use.
- Providing hope that we can solve the climate crisis if we act now and support our policy makers to make the tough decisions that are required

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World health day highlights the health impacts of climate change. **For Australia**, as one of the driest continents in the world we have strong vested interest in seeing urgent workable solutions achieved. An optimistic motivated approach gives us the best chance of success.