



3 June 2015

Climate Change Contribution Consultation
Ministry for the Environment
via climate.contribution@mfe.govt.nz

To Whom It May Concern,

The New Zealand College of Public Health Medicine thanks the Ministry for the Environment for the opportunity to make a public submission on setting New Zealand's post-2020 climate change target under the United Nations Framework Convention on Climate Change (UNFCCC).

The New Zealand College of Public Health Medicine (NZCPHM) is the professional body representing the medical specialty of public health medicine in New Zealand. We have over 228 members, all of whom are medical doctors, including 197 fully qualified Specialists, 15 Associate Members, and 16 Registrars (doctors in the early stages of training in the speciality).

Public Health Medicine is the branch of medicine concerned with the assessment of population health and health care needs, the development of policy and strategy, health promotion, the control and prevention of disease, and the organisation of services. The NZCPHM strives to achieve health gain and equity for our population, reducing inequalities across socioeconomic and cultural groups, and promoting environments in which everyone can be healthy.

The NZCPHM considers that climate change is a serious, potentially catastrophic emerging risk to public health, sustainable development and equity. Projected climate change health impacts include malnutrition, deaths and injuries from extreme events, vector-borne disease such as dengue fever, cardio-respiratory effects from air pollution, and diarrhoeal disease. More diffuse effects include mental health problems, migrant health issues and the health issues resulting from civil tension and conflict. Health equity is one of the NZCPHM's core values, and so the College supports approaches that explicitly incorporate fairness. Our stance on the setting of greenhouse gas (GHG) emissions reduction targets is that New Zealand needs to rapidly reduce its GHG emissions – substantially more than its targets in international commitments to date.

This submission is in three parts:

- 1. Summary responses to the Ministry's consultation questions;**
- 2. Supporting information (appended);**
- 3. A key source NZCPHM publication (enclosed).**

In summary, the NZCPHM asks that the New Zealand Government:

1. Includes the health gains from climate action and health costs of climate inaction in the costings for NZ's Intended Nationally Determined Contribution (INDC)

2. Calls for a global zero carbon target by 2050 (with NZ meeting this target well before 2050)
3. Pledges at least 40% cuts by 2030 in our gross domestic greenhouse gas emissions compared with 1990, towards at least 95% by 2050
4. Places an immediate moratorium on new fossil fuel exploration, phasing out existing extraction in the next decade
5. Has credible cross-party plans in the INDC, legislating an independent Climate Commission to ensure NZ meets these targets and stays well within the global carbon budget

Finally, we are concerned at the lack of health sector input into the targets [work to date](#) – evidenced by Health not being in the listed Government agencies involved, and rejection of health impacts of inaction, in economic analyses. The NZCPHM was concerned to learn, from the Ministry’s public meetings, that neither the health gains (‘mitigation co-benefits’) from well-designed climate action, nor the health costs from climate changes, have been included in the economic analysis of the costs of New Zealand’s climate action. Any climate action strategy should include appropriate and well-designed actions that protect – and improve – New Zealanders’ health and well-being in the short and longer term. These actions will have an economic impact that should be included in any serious economic analysis of the costs of a climate action strategy.

While New Zealand’s emissions are a very small contribution to the global problem, the NZCPHM is concerned that if a country like New Zealand is unwilling to take significant action and is perceived to be doing as little as possible, it reduces the chances of a meaningful global agreement. If we want to avoid these health costs, we need to increase the likelihood of significant action by major emitters, which means committing to take significant action ourselves.

The health and equity impacts of climate change in New Zealand were described in the NZ Medical Journal last November ([Bennett et al](#)), and just last week the [lead editorial](#) in the NZ Medical Journal called for health and wellbeing to be part of the public discourse around climate targets and action, and the responsibility to push for strong, health-centred climate action. The NZCPHM agrees with that stance, and would be more than willing to help the Ministry in its further work.

Thank you for the opportunity for the NZCPHM to submit on this important issue for health in New Zealand. We hope our feedback is helpful, and would welcome the opportunity to assist the Ministry in any way.

Yours sincerely,



Dr Caroline McElnay
President, NZCPHM

New Zealand's Post-2020 Climate Change Target

Under the United Nations Framework Convention on Climate Change

Summary Responses

The NZCPHM's responses to the [Ministry for the Environment's consultation's questions](#) in brief, are:

Q1. Objectives for New Zealand's Intended Nationally Determined Contribution

The NZCPHM (the College) disagrees with the wording of the three key objectives, as explained below – and this is the order of importance to us:

Objective 3: It must guide NZ over the long term in the global transition to a low emissions economy

The College considers NZ's top priority is a just transition to a zero emissions economy. Regardless of what happens in Paris this December ([UNFCCC COP21](#)), the health and wellbeing of New Zealanders are best served by rapid movement to decarbonise our economy. This means the government securing cross-party agreement prior to Paris to take real steps, in this government term, to rapidly future-proof our country. This includes building on our clean energy strengths, diversifying our exports and creating a resilient, fair and health-promoting emissions-free economy.

Objective 1: A fair and ambitious contribution

New Zealand's contribution must be (as well as be seen to be) 'fair, ambitious, credible and sufficient', and most importantly as an international citizen, helping the world stay within the safe global carbon dioxide emissions budget. NZ's health and economy relies on world climate cooperation. We can, and must, also take steps to reduce our total greenhouse gas (GHG) emissions.

Health equity is one of the NZCPHM's core values, and so the College supports approaches that explicitly incorporate fairness in the face of biological, physical, social and economic impacts of climate change and resource limits. New Zealand's response to climate change must ensure that impacts of climate change do not worsen existing inequalities. We are particularly concerned about the impact that New Zealand's weak stand may have on small Pacific Island nations, given NZ's strategic position in the region and leadership responsibilities as a UN Security Council member.

The costs of mitigation and adaptation need to be predominately borne by those who have gained the most from cumulative emissions and are best able to pay. We support the approach taken by the Greenhouse Development Rights (GDR) framework's Responsibility and Capability Index, which combines countries' cumulative emissions (responsibility) with their capability to mitigate. The GDR framework expects New Zealand to reduce its emissions by 41% below 1990 levels by 2020.

Our stance is detailed further in the enclosed document, the College's supplementary [Background to the NZCPHM's stance on setting national GHG emissions targets](#) (2013), of which we encourage wide readership. In summary, the NZCPHM therefore holds that New Zealand's targets from beyond 2020 and for 2050 need to be strong, in order to fairly and equitably contribute to limiting global warming to 2°C by 2050.

Objective 2: Costs and impacts are managed appropriately

We disagree with the emphasis under this objective – of primarily considering costs of achieving the Contribution – without sufficiently considering the costs of an inadequate mitigation and adaptation response, and the benefits of adopting and implementing more ambitious emission targets.

New Zealand is already behind a large number of OECD countries in its climate change response. Economic assessments, for example by Stern in the UK, have generally recommended early action to avoid later long term serious economic impacts. Economic approaches need to include rates of discounting that are appropriate to assessing long term impacts and benefits (e.g. 1-2% annual discount rate, rather than 10-15% risk-adjusted – see Stern, 2007).

Healthy people depend on a healthy climate – we can't afford *not* to take real climate action. Ambitious climate action is the best investment in the health, wellbeing and resilience of our nation. The costs of climate change are much greater than the costs of responsible action (Stern, 2007), and climate change will affect our most vulnerable households the most. The important health gains ('mitigation co-benefits') from climate action must be included in the calculations. We need to share the costs and benefits of action fairly, both between countries and within New Zealand.

Q2. With NZ's distinct economy and emissions – what is fair?

A reduction target of at least 40% of 1990 levels by 2030 is realistic and achievable – the climate costs of inaction will have a much bigger impact, especially on low-income households. NZ's pledge must form part of its call for a global zero carbon target. Given the lack of transparency around the analysis in the discussion document and the likelihood that contributions to date will be insufficient to secure a 'safe' level of climate changes, NZ must be open to the possibility of a more ambitious target to play its part in global climate action. In any case, given the uneven trajectory of NZ's future emissions with forest harvesting, the overall priority is not expending our share of the global carbon budget over the next thirty-five years.

Current and future human wellbeing depends upon not exceeding our global carbon budget. We need to call for a global zero carbon target by 2050 – and New Zealand needs to take credible steps, right now, to reach this well before 2050. Furthermore, we need to keep up with other wealthy nations in pledging at least 40% cuts in our gross domestic GHG emissions compared with 1990 emissions, by 2030, and towards at least 95% by 2050.

Importantly, the world has five times the amount of fossil fuels in known reserve as we can afford to burn. We need to immediately commit to zero new fossil fuel exploration and phase out existing extraction in the next decade.

Our Intended Nationally Determined Contribution needs to also commit to the cross-party agreement and national policies needed to achieve these targets.

Q3. Reasonable costs?

The appropriate level of cost for climate action is, simply, whatever it takes. The costs of climate inaction far exceed the costs of taking action – we need to account for this in climate calculations. The sooner we act, the better.

Encouragingly, we can significantly improve health and equity in short- and medium-term ('mitigation co-benefits'), especially by shifting from cars to active and public transport; improving housing energy efficiency and shifting to climate-friendly home heating; more healthy eating, including increased plant and reduced red meat and animal fat consumption; and phasing out coal and lignite mining. NZ must include these co-benefits when calculating costs and benefits of action.

The transition must be fair, with policy design (e.g. recycling carbon penalty revenue) to support low income and other vulnerable households.

Q4. Important & likely opportunities?

Timely, well-designed climate actions that are put into place fairly will mean healthier New Zealanders living in a healthier environment and will reduce growing financial pressures on our health sector.

The Ministry's discussion document focuses heavily on agriculture, but half of our emissions are long-lived CO₂ from transport, housing and other energy use, which have to rapidly reduce to zero. We already have the technology and policies at hand to reduce these emissions – we now need the cross-party political will to put them in place. We will also need to reduce our economic reliance on ruminant livestock farming.

Q5. Managing future uncertainties around technologies and costs?

With the clear gains from early action and risks of further delay, we must act now on the best information we have. The future is not certain, including the precise impacts of the global warming already in the pipeline. We may need new emerging technology as a buffer against unexpected climate complications – and the best way to encourage technological development is setting a clear emissions-reducing direction for business certainty.

Government ambiguity around both GHG reduction targets and commitment to target achievement, adds considerably to uncertainty for businesses and communities, and may impede early adoption of low-carbon options. The health sector, for instance, is a high user of carbon-based energy and technologies globally. It will face important long-term procurement and infrastructure decisions that would benefit from clear policy and strategy for responding to requirements for reducing GHG emissions.

The precautionary principle compels us to act now. Risks of further delay are very high, while we have good certainty about potential short to medium term gains from well-designed emissions reductions policies. We need government to give clear, strong, consistent signals to spur both behaviour change and technological development.

Q6. Further information for our government to consider?

The Ministry's discussion document frames climate action as costly – ignoring the greater costs of climate inaction and the real gains to our health and economy by taking action now. It also ignores the health costs of inaction and health savings from mitigation, let alone the harms to human life and of suffering. It therefore needs a Health Impact Assessment. New Zealand's climate action needs health and wellbeing at its heart.

Furthermore, NZ's INDC has to be matched with credible plans that rapidly and fairly transition NZ to a zero carbon future, and make the most of opportunities for better health and a fairer society.

Thus, The NZCPHM also calls for:

- The INDC to have credible cross-party plans
- An independent NZ Climate Commission to monitor and ensure targets are met
- A Parliamentary climate change and health summit
- Health sector leadership on mitigation and adapting to locked-in climate impacts on health
- Involvement of public health expertise, and Health (including equity) Impact Assessment as routine to inform key climate-relevant policies
- Climate commitments that protect and promote health in the climate-vulnerable Pacific regions

Further detail, arguments in support of this submission, and source information is available on the following pages (Appendices) and in the Enclosure:

- **Appendix One** – NZCPHM’s stance on setting national GHG emissions targets
- **Appendix Two** – Response to the consultation process, including economic modelling and health input
- **Appendix Three** – Climate change and health
- **Appendix Four** – Source information
- **Enclosure** – Supplement one to the NZCPHM’s Climate Change Policy Statement, 2013: Background to the NZCPHM’s stance on setting national GHG emissions targets. Available at: <http://www.nzcphm.org.nz/policy-publications>

Appendix One

NZCPHM's stance on setting national GHG emissions targets

Health equity is one of NZCPHM's core values, and so the College supports approaches that explicitly incorporate fairness. Our stance on the setting of greenhouse gas (GHG) emissions reductions targets is that New Zealand needs to rapidly reduce its GHG emissions, substantially more than its targets in international commitments to date.

This stance is detailed in Supplement One to the College's [climate change policy](#). The Supplement, '[Background to the NZCPHM's stance on setting national GHG emissions targets](#)', is provided as an Enclosure.

The NZCPHM advocates action to reduce GHG emissions in line with what the best available science tells us is necessary. The most comprehensive assessment of climate change science to date was completed by the Intergovernmental Panel on Climate Change (IPCC) in 2013. This Fifth Assessment Report (AR5) drew the strongest conclusions yet on the high probability that human actions are causing climate change, on the catastrophic consequences for people and nature of run-away climate change and consequently on the need for action to mitigate, and adapt to, climate change.

Note that the '2 degree' warming level that has been deemed relatively safe by some governments still entails potentially catastrophic impacts including biodiversity loss, significant Arctic sea ice loss, a high risk of mass coral bleaching, a high likelihood of over 1m sea level rise in the long term, high risks from the increased incidence and severity of extreme weather events and a high risk for crop production.

The IPCC 5th Assessment Report usefully set out a carbon budget that humanity needs to stay within in order to have a reasonable chance of keeping below a 'relatively safe' level (i.e. 2 degrees) of average warming. Even if annual global emissions remain constant, rather than continuing to increase, this budget will be exceeded in 2035. The imperative to take significant action urgently is clear. In this context, New Zealand, as part of an international effort, must play its part in reducing emissions as much as possible.

AR5 states that to give a >66% chance of staying below 2°C, the maximum amount of CO₂ that can be emitted over the industrial period, i.e. the 'carbon budget', is 3.67 trillion tonnes (2.90 trillion tonnes CO₂ if also including the effects of non-CO₂ greenhouse gases). At 2011 the world had already used up two-thirds of that budget (1.89 trillion tonnes CO₂) (see Figure 1, below), and if current rates of emissions continue, the rest of the budget is likely to be exhausted before mid-century (Figure 2).

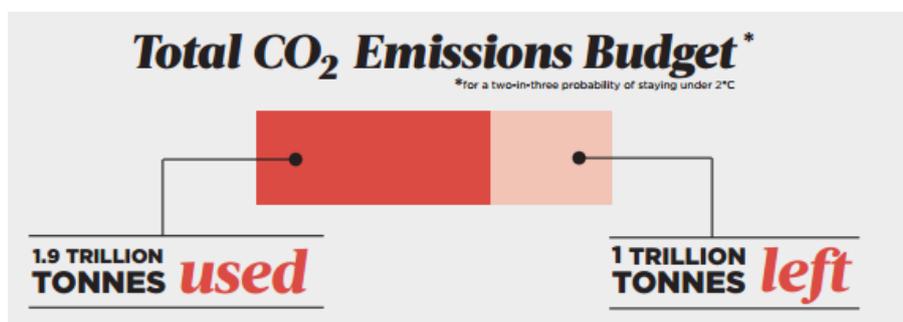


Figure 1. Source: http://www.generationzero.org/report_a_challenge_to_our_leaders

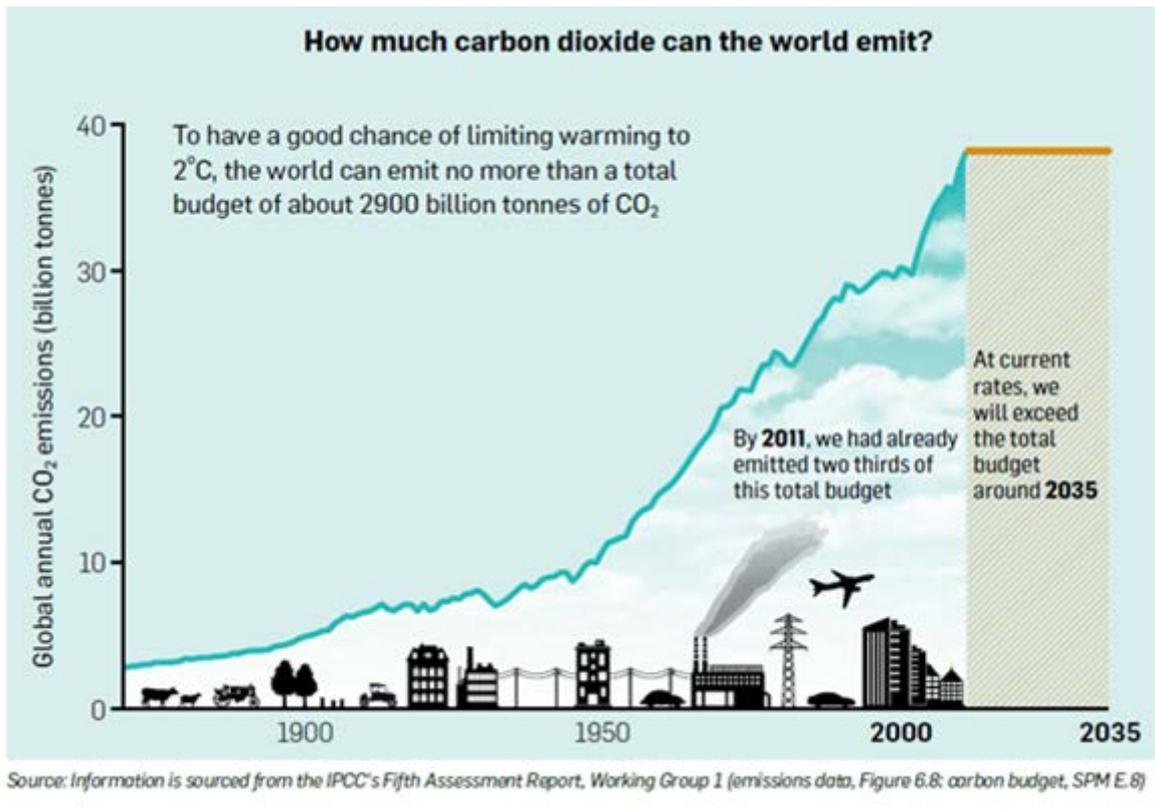


Figure 2. Source: [MfE 2015](#)

The longer the world delays getting started – New Zealand included – the steeper the emissions cuts will need to be, and the earlier the world will need to reach zero emissions in order to remain within the carbon budget. As the following graph shows, this becomes extremely challenging in short time.

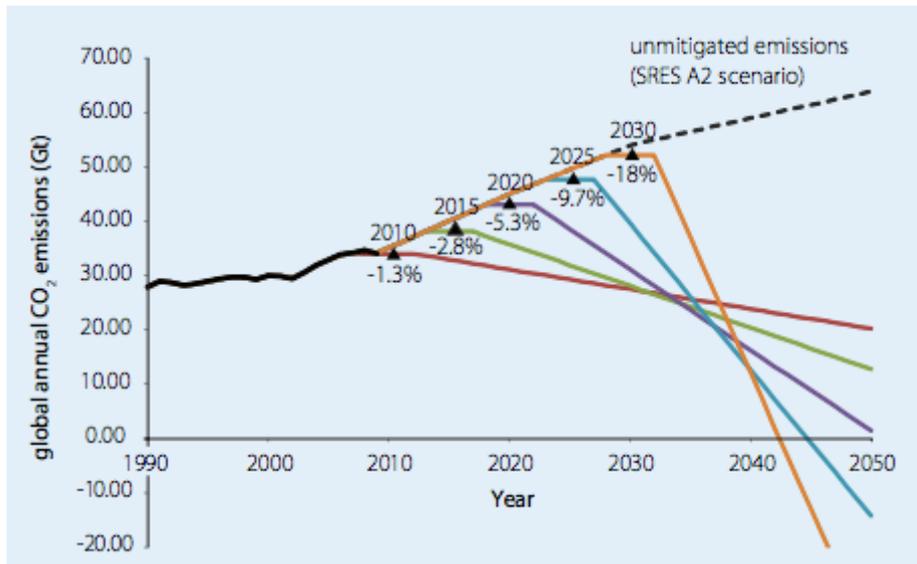


Figure 3. Source: New Zealand Climate Change Centre 2011, [The Challenge of Limiting Warming to Two Degrees](#).

Alternative scenarios for global CO₂ emissions to 2050: The percentage figures indicate the amount (relative to 1990) by which global emissions would need to be reduced, per year, every year, after their peak to remain within the same cumulative emissions budget. In this particular modelling, all scenarios meet the same cumulative emissions budget of 1445 Gt CO₂ between 2000 and 2050, which gives a roughly 50/50 chance of limiting long-term temperature increase to 2°C.

There are a number of different ways for countries to set targets for GHG emissions reductions, in order to keep within global emissions budgets. Several frameworks, in the context of fixed limits, incorporate historical responsibility, science and fairness in calculating emission reduction allocations. For example, the Greenhouse Development Rights (GDR) framework's Responsibility and Capability Index combines countries' cumulative emissions (responsibility) with their capability to mitigate (using wealth as a proxy, from per capita GDP adjusted for distribution of thresholds of individuals' incomes).

Within overall limits for established economies, approaches that consider per capita emissions (which can include historical cumulative emissions) and affordability calculate markedly higher targets than what New Zealand has committed to. The Greenhouse Development Rights (GDR) framework (GDRf) would expect New Zealand to reduce its emissions by 41% by 2020 on 1990 levels.

The NZCPHM's core values include equity, and this supports approaches that account for fairness in the face of fixed limits. Established economies, like New Zealand, historically have had high greenhouse gas emissions and have benefited from activities that cause high emissions. By contrast, least developed and developing nations are disproportionately affected by climate change, which they have not caused and yet have least capacity to adapt.

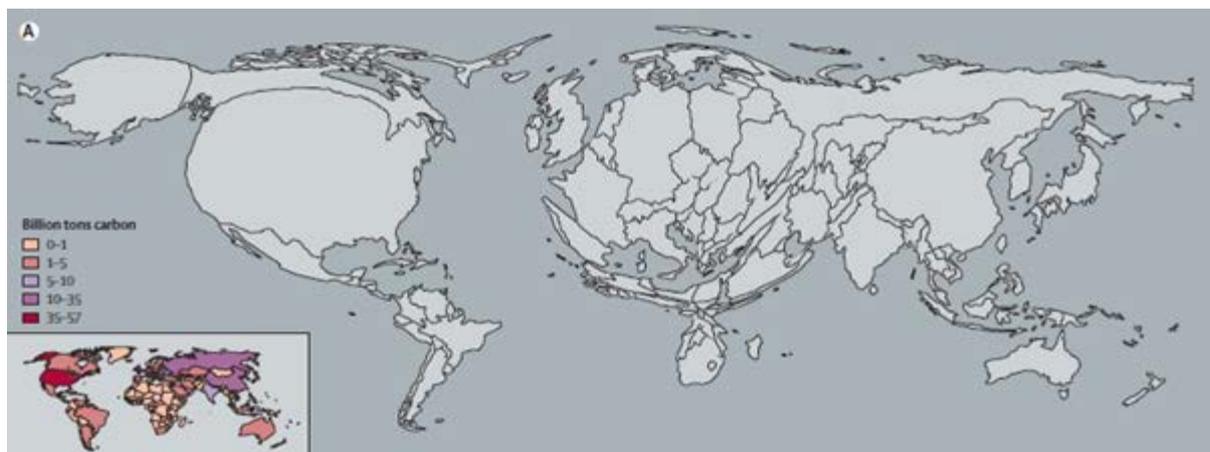


Figure 4a. The climate gap: those who have caused climate change

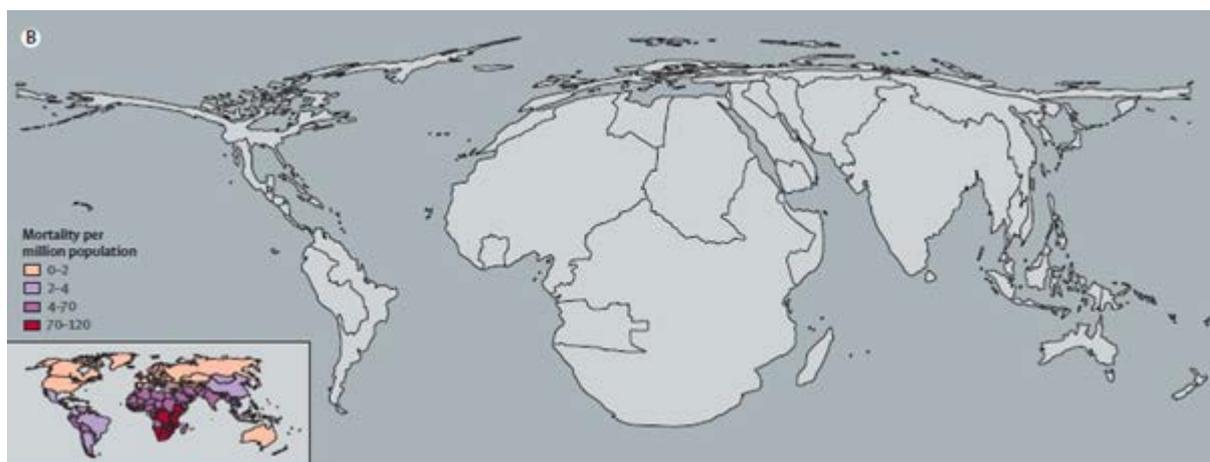


Figure 4b. The climate gap: those who will suffer most from climate change

Density-equalising cartogram. Comparison of (a) undepleted cumulative CO₂ emissions by country for 1950–2000 vs. (b) the regional distribution of four climate-sensitive health consequences (malaria, malnutrition, diarrhoea, and inland flood-related fatalities) estimated for 2000-2030.

Source: Costello A, Abbas M, Allen A, Ball S, Bell S, et al. Managing the health effects of climate change: Lancet and University College London Institute for Global Health Commission. *Lancet* 2009;373:1693-1733. figure 4: sourced from Patz et al: Patz JA, Gibbs HK, Foley JA, Rogers JV, Smith KR. Climate change and global health: quantifying a growing ethical crisis. *EcoHealth* 2007;4:397-405. figure 1.

Consequently, the College considers established economies, like New Zealand, are in a position, and have a responsibility, to alleviate past actions and contribute rapidly and proportionately more reductions than nations with historically lower emissions.

Targets calculated using the GDR framework are based on fair and equitable approaches to the allocation of emissions reduction amongst countries. New Zealand's 5% target for 2020 and its 50% target for 2050 are much lower than needed under the GDR and similar frameworks.

The College therefore holds that New Zealand's targets for 2020 and 2050 need to be higher in order to fairly and equitably contribute to limiting global warming to 2°C by 2050.

Appendix Two

Response to the Consultation process, including economic modelling and Health input

Consultation Process

Considering the importance of the issue, the College considers the consultation process has been unnecessarily brief (18 working days) and poorly resourced. The requirement to submit New Zealand's contribution (preferably by March 2015) has been known by the New Zealand government since November 2013, yet public consultation was announced via email on 7 May 2015. For such an important yet complex issue, meaningful consultation should have started several months ago.

The College also considers that there is some bias in the discussion document. It reads that emissions reduction in New Zealand is too expensive, too difficult, and more costly compared with other parts of the world, but does not provide credible evidence in support. It implies that New Zealand should therefore take on a minimal emissions reduction target.

There is no mention in the discussion document of what NZ has committed to already – not only 5% below the 1990 baseline level by 2020, but also 50% by 2050, both targets officially gazetted.

Furthermore, release of economic modelling information by the Ministry, and the modelling itself, so late into consultation, reduces the credibility and transparency of the consultation itself.

Flaws in the Economic Modelling

The economic modelling uses an incorrect baseline. As noted above, New Zealand has already committed to reducing emissions 5% below 1990 levels by 2020, and the current Bonn/Paris negotiations implicitly expect no 'backsliding' from existing commitments. This 5% target effectively sets a new baseline for New Zealand to take further action. By contrast, the modelling assumes a baseline where New Zealand has no reduction commitment and takes no action, which is misleading. The 'real world baseline' is in fact a 5% reduction commitment by 2020.

A late posting on the [MfE website](#) describes the economic analyses commissioned and why those have excluded health, as follows:

“Modelling the economic costs of New Zealand's intended nationally determined contribution

Why doesn't the modelling include the costs of inaction or co-benefits of action?

The costs of inaction are difficult to quantify as they depend on the actions that the whole world takes to reduce emissions, not just New Zealand. The costs of inaction will be large but are hard to predict accurately and hard to express in monetary terms. This is also the case for modelling co-benefits of action such as air quality and health benefits. Current research and model development is beginning to address these complexities.”

The NZCPHM acknowledges the complexity of the costs of modelling the costs of inaction and the co-benefits of action. However, in response to the MfE webpage, we consider the following four issues relevant:

1. Some costs have already been modelled, reporting cost-benefit ratios or monetary savings, especially for the health co-benefits of action (references in Appendix 4);
2. Health costs in a warming NZ could be substantial. The lack of any Health input into modelling work is of concern.
3. Including uncertain health cost of inaction and health savings from action is no less valid than the aspects modelled that have been included;
4. Scenario analyses with logical consequences can be modelled, which could include applying the inflated \$50 social cost of carbon (already used by Government) to excess CO₂ emissions BAU beyond targets cumulative to 2030.

The reason given for not including the health costs from climate inaction was that New Zealand is dependent on the rest of the world to take adequate climate action. But this applies to any country – no nation is large enough to solve climate change on its own, and it is nonsensical to expect other nations to not weigh the costs and benefits of climate action.

The inclusion of only climate action costs is invalid; the modelling done already is full of assumption, and including uncertain (but substantial) health cost of inaction and health savings from action is no less valid than the aspects modelled that have been included. Consistent with [Treasury CBA guidance](#), it is better to manage uncertainty – with loss of precision – than discard major factors, wrecking construct validity.

Variable levels of information do not excuse presenting only the costs of action, without attempting to outline the benefits. The discussion document could have easily undertaken scenario analyses rudimentary in any public policy setting, examining a matrix of four scenarios: (i) neither the world nor NZ takes adequate climate action, (ii) the world doesn't act/NZ does, (iii) the world acts/NZ acts, and (iv) the world acts/ NZ doesn't.

The costs of inaction (scenarios (i) and (iv)) could be broadly estimated by applying the Government's (viz. NZTA's) implied \$50/tonne CO₂ social cost of carbon ([EEM Appendix A9.6,A9.7](#) \$40/tonne, inflation-adjusted) to excess emissions beyond NZ's [620 Mt CO₂ per-capita share of the remaining global carbon budget](#) as 'business as usual' beyond targets cumulative to 2030.

In summary, the modelling asked by MfE fails to address:

- the likely costs to society and the economy of a changing climate;
- any non-market tools for achieving emissions reductions by regulation;
- NZ's international exposure to climate risk (i.e. action by consumers or governments in other countries might take against New Zealand if it was perceived that New Zealand was not doing enough to reduce emissions);
- likely trends in global carbon prices;
- anything that agriculture can do to reduce emissions, and assumes that the rest of the economy will subsidise farming;
- anything that our forestry industry can do to plant trees and remove carbon from the atmosphere;
- furthermore, it assumes NZ can only meet our emissions obligations by buying overseas emissions units.

Despite such flaws, the model quoted in the discussion paper still finds that New Zealand could achieve a 40% emissions reduction target while raising average household incomes from \$73,000 today to \$83,200 by 2027 (based on a \$50 per tonne carbon price). With a 40% target, the increase in average annual household income is only \$530 lower than it would be with the 'real world baseline' – a 5% target (\$83,730) (p.14 [MfE discussion document](#)). So, according to the Government's own modelling, the average household will forego just \$10.20 per week in additional income to achieve a 40% target compared with the 'real world baseline'.

Lack of Health Consideration

The discussion document presents no analysis of the costs to New Zealand of climate change, health and otherwise. In the absence of concerted action to reduce emissions globally, the cost to the economy of the increased frequency of extreme weather events is likely to be billions of dollars, astride the cost to peoples' lives and health (both physical injury and mental/social disruption); e.g. [the 2008 drought cost the economy an estimated \\$2.8 billion](#) – likewise with adapting to sea level rise.

While New Zealand's emissions are a very small contribution to the global problem, if a country like New Zealand is unwilling to take significant action and is perceived to be doing as little as possible, it reduces the chances of a meaningful global agreement. If we want to avoid these costs, we need to increase the likelihood of significant action by major emitters, which means committing to take significant action ourselves.

The discussion document makes no attempt to assess the co-benefits of taking action to reduce emissions, such as improved health arising from increased walking and cycling or reduced water pollution from more riparian tree planting. Studies already exist on the estimated costs of air pollution in New Zealand, the economic costs of congestion, the costs to the economy of physical inactivity, the potential economic benefits of more active transport modes, likewise home insulation, better eating, and the potential economic benefits of riparian planting (references in Appendix 4). The failure of the Ministry for the Environment to incorporate this kind of analysis into its discussion of New Zealand's emissions reduction target is disappointing.

We are concerned at the clear lack of Health input into the targets work to date – evidenced by Health not being in the listed Government agencies involved, and rejection of health impacts of inaction, in economic analyses. The NZCPHM was concerned to learn, from the Ministry's public meetings, that neither the health gains ('mitigation co-benefits') from well-designed climate action, nor the health costs from climate changes, have been included in the economic analysis of the costs of New Zealand's climate action. Any climate action strategy should include appropriate and well-designed actions that protect – and improve – New Zealanders' health and well-being in the short and longer term. These actions will have an economic impact that should be included in any serious economic analysis of the costs of a climate action strategy.

We are further concerned the above defects may be symptomatic of more fundamental under-appreciation of the health impacts of climate change by the Ministry, on our reading of the [MfE's website](#). This ignores extensive literature on health impacts, health equity implications and potential climate action co-benefits in New Zealand, where effects on health and health equity will be large and far-reaching. We outline these in Appendix 3.

Appendix Three

Climate Change and Health

The New Zealand College of Public Health Medicine (NZCPHM) holds climate change as a serious, potentially catastrophic emerging risk to public health, development and equity.

- Climate change is almost certainly already contributing to the global burden of disease and premature death, with larger health impacts expected over coming decades. These potentially catastrophic health impacts disproportionately affect developing countries, and the most disadvantaged and vulnerable within all countries. New Zealanders will not be immune from the consequences.
- In New Zealand, Māori, Pacific, vulnerable, and lower socioeconomic populations are at risk of disproportionate health impacts from climate change. Therefore climate change also has serious implications for health equity in New Zealand.
- New Zealand's location in the Pacific and its reliance on the global economy mean that beyond direct climate-health impacts, adverse impacts on the determinants of health are likely, along with new health and social pressures from migrant populations arriving in New Zealand.

The NZCPHM has a responsibility to ensure the public health and equity consequences of climate change are understood, to lead in preventing and preparing for those consequences, and to promote the substantial population health gains that can be achieved from appropriate climate change action.

Our key messages are:

- Human-caused climate change is a serious and urgent threat to health and health equity globally and in New Zealand.
- Globally, leading health threats include water and food insecurity with malnutrition, extreme weather events, and changing patterns of infectious disease.
- Climate change means New Zealand will face many adverse impacts on health, with disproportionate health impacts for Māori. New health and social pressures will arise from climate migrant and refugee populations arriving in New Zealand and flow-on from disruption to the global economy.
- Without rapid and sustained global action to reduce GHG emissions (particularly from fossil fuels), the world will breach its carbon budget and may experience high levels of warming (4-6°C by 2100) that render many populated areas of the world unable to support human health and wellbeing.
- Well-planned action to reduce GHG emissions can bring about substantial health benefits and will help New Zealand address its burden of chronic disease. Public health medicine professionals call for strong and urgent action on climate change that improves population health, accords with Te Tiriti O Waitangi (The Treaty of Waitangi), and creates more equitable, just and resilient societies in New Zealand and worldwide.

Climate change and its environmental and social manifestations result in diverse risks to human health, both direct and indirect, that are recognised by world health authorities and leading medical journals alike, with statements that the consequences to public health are potentially catastrophic. Direct and indirect effects on health are evident in the following diagram.

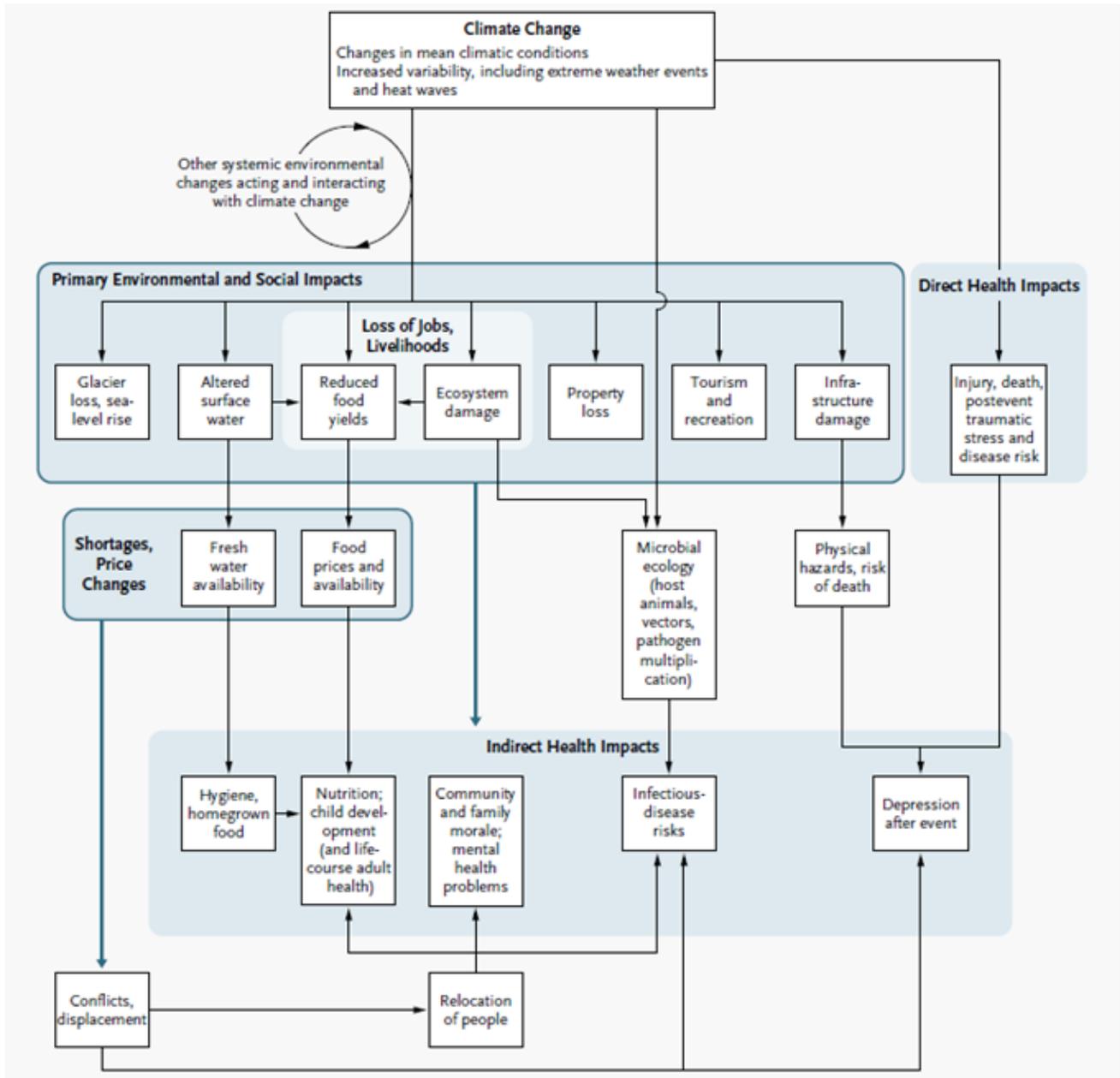


Figure 5. Pathways by which climate change influences human health.

Source: McMichael AJ. Globalization, climate change, and human health. *N Engl J Med.* 2013; 368(14): 1335-43.

Global Health Impacts

Evidence presented in the Fourth Assessment Report of the IPCC in 2007 (AR4) strongly suggested that climate change was already contributing to the global burden of disease and premature deaths. It was anticipated that the burden of disease would increase over coming decades, with larger increases from mid-century.

Projected climate change health impacts included malnutrition, deaths/injuries from extreme events, vector-borne disease such as dengue fever, cardio-respiratory effects from air pollution, and diarrhoeal disease.

The AR4 noted that population vulnerability to climate change health effects would vary by geographic location, demographics, background burden of climate-sensitive diseases, strength of the health system, and socio-economic capacity to adapt.

Emerging information since AR4 has included robust links between very hot days and increased mortality; floods continue to be the most common weather disaster, with immediate health impacts (trauma and deaths); emerging evidence for indirect health impacts (e.g. from pre-existing medical conditions, mental health, conflict) persisting beyond extreme weather events; heat stress and occupational health concerns for workers (particularly outdoor workers).

Analysis by DARA and The Climate Vulnerable Forum suggests that climate change already causes 400,000 excess deaths per year (through malnutrition, heat illnesses, diarrhoeal infections, vector borne disease, meningitis and environmental disasters) and that this number will increase to more than 650,000 deaths per year by 2030 if current emission patterns continue. Lower estimates (250,000 excess deaths per year 2030-50) were [published by the WHO in 2014](#). Most climate-health risk assessments to date are confined to lower-range warming scenarios (around 2°C) and consider relatively near-future timeframes (e.g. 2030 or 2050).

New Zealand and Māori health impacts

New Zealand will not be insulated from the consequences of climate change. Climate trends may already be affecting the health of New Zealanders, and the impacts over coming decades are likely to be multifaceted. Health impacts will depend on the extent and rate of warming in New Zealand, the adaptive capacity of individuals and society, and the policies and programmes New Zealand chooses to use to mitigate and adapt to climate change.

New Zealand already has a relatively high burden of several climate-sensitive diseases (e.g. enteric infections, allergic disease, and skin cancer) and this will influence future climate-health burden.

There will be different impacts for different parts of the population depending on age, ethnicity, health status and socio-economic vulnerability. Māori are at risk of disproportionate impacts compared with non-Māori, not only because of differences in health and socio-economic status, but also because of indigenous relationships with the environment, customary practices such as collection of kaimoana (seafood) with exposure to food-borne disease risk, and differential access to and quality of health and social services.

The New Zealand economy and the Māori economy (which is heavily invested in climate-sensitive primary industries) will be influenced by global climate and socioeconomic changes and responses to climate change. Reduced export and tourism income, for example, could impact across the socio-economic determinants of health with increased unemployment, decreased household capacity to secure the basics for good health, and a reduced tax-base for health sector spending. New Zealand, as a nation, has a responsibility to its region – the Pacific – and the likely increase in demand for aid will also place pressure on the economy. These indirect impacts on the determinants of health may equal or even outweigh the direct health impacts of climate change in New Zealand.

Table 1. Health impacts of climate change in New Zealand, and implications for Māori Health.

Expected Health Impacts in New Zealand	Implications for Māori Health
<p>Food security and nutrition</p> <p>Increased global food prices may exacerbate food insecurity and therefore compromise nutrition for some groups.</p>	<p>The Māori population experiences a higher burden of food insecurity compared with non-Māori and therefore is more at risk of the food security and nutrition impacts of climate change.</p>
<p>Mental health and suicide</p> <ul style="list-style-type: none"> • Increased stress and mental health issues, including suicide, related to loss of livelihood (e.g. farmers with drought). • Mental health concerns for people affected by extreme weather events and forced migration. • Psychological impacts on young people who may suffer anxieties about potential catastrophic climate change, not unlike those experienced by children growing up with the fear of nuclear war. 	<p>The Māori population has higher rates of mental illness and suicidal behaviour than non-Māori.</p> <p>Sources of increased stress will likely affect Māori at least as much as total population with additional impacts relating to loss of coastal land, urupa (cemetery), marae (meeting house), and other sites of significance.</p>
<p>Migrant health issues</p> <p>It is likely that migrants and refugees will arrive in New Zealand from climate-change affected Pacific Islands. This may impact on household overcrowding and incidence of some infectious diseases (e.g. tuberculosis).</p>	<p>Increased pressure on housing stock from an influx of migrants may have a greater impact on Māori, because Māori are disproportionately affected by poorer housing, household overcrowding and crowding-related infectious disease compared with non-Māori.</p>
<p>Injury and illness from extreme weather events (e.g. flooding, landslides, storm surges, drought)</p> <ul style="list-style-type: none"> • Immediate trauma from extreme weather events. • Indirect health impacts in weeks to months after extreme event (from e.g. pre-existing medical conditions, mental health, conflict). 	<p>Many Māori communities are situated in coastal areas that are vulnerable to sea level rise, storms and storm surges, erosion, and landslides.</p> <p>The Māori population has a higher burden of chronic disease as well as differential access to, and quality of health services, therefore greater risk of indirect health impacts after extreme events.</p>
<p>Heat-related deaths and illness</p> <ul style="list-style-type: none"> • Increases in heat-related deaths and illness, particularly for those with chronic disease, and those aged >65 years. • Winter-related deaths may decline, but there is uncertainty about the role of seasonal factors (such as infectious diseases) versus temperature in winter-related deaths. Heat-related deaths likely to outnumber any fewer winter deaths by 2050. • Heat stress and occupational health concerns for outdoor workers. 	<p>Māori have a higher burden of chronic disease, thus at greater risk of heat-related deaths and illness.</p> <p>Māori are overrepresented in semi-skilled and unskilled workforces, and may be more likely to be employed in heavy outdoor labour and therefore exposed to workplace heat stress.</p>

<p>Vector-borne and zoonotic disease</p> <ul style="list-style-type: none"> • Increased likelihood that mosquito vectors could establish in New Zealand, which could lead to local transmission of mosquito-borne diseases (e.g. dengue fever, Ross River virus, Chikungunya, West Nile virus). • Possible impacts on other vector-borne diseases (e.g. tick-borne) and nonvector-borne zoonotic diseases. 	<p>The Māori population is concentrated in North Island, with many communities situated near the coast. These areas (e.g. Northland, Bay of Plenty) are at higher risk for the establishment of mosquito vectors of public health concern.</p>
<p>Food and water-borne disease</p> <ul style="list-style-type: none"> • Heavy rainfall events can transport faecal contaminants into waterways. People can subsequently be exposed to pathogens through drinking water and recreation (e.g. swimming, contaminated shellfish). • Studies correlate temperature increases with food-borne disease (e.g. salmonellosis). • More frequent dry conditions may affect continuity of household water supplies, impacting diseases influenced by hygiene (e.g. enteric infection). • Climate change may be creating a marine environment that promotes toxic algal blooms, which are associated with toxic shellfish poisoning in humans. • Possible increase in incidence of leptospirosis through contact with flood contaminated surface water. • Increased temperature, and both high and low rainfall, may have impacts on parasitic diseases (e.g. cryptosporidiosis, giardiasis) particularly in the context of agricultural intensification in NZ. 	<p>A higher burden for Māori is expected, given higher rates of gastrointestinal infections for Māori compared with non-Māori, the comparatively high proportion of Māori with vulnerable, untreated water supplies, and in many locations the role of kaimoana as a regular part of Māori diet.</p>
<p>Ultraviolet radiation</p> <ul style="list-style-type: none"> • Climate change may delay recovery of stratospheric ozone. • Warmer temperatures may promote increased outdoor time in regions with traditionally cooler climate, but the reverse may occur in hotter regions. Increased or decreased outdoor time may affect exposure to solar ultraviolet radiation (UVR) – with possible impacts on rates of skin cancer and eye disease, and vitamin D levels. 	<p>The Māori population has a lower burden of melanoma skin cancer and non-melanoma skin cancer than non-Māori, but a higher burden of eye disease. Any impact on vitamin D levels would likely impact on the burden of chronic disease for Māori.</p>
<p>Physical activity</p> <p>Warmer temperatures and either increases or decreases in outdoor time, depending on region-specific changes in</p>	<p>Any changes in physical activity levels would likely impact on the burden of chronic disease for Māori.</p>

climate, may impact on levels of physical activity, with consequent health impacts.	
<p>Cardio-respiratory disease from air pollution</p> <ul style="list-style-type: none"> High temperatures may exacerbate photochemical air pollution with impacts on respiratory disease – particularly in urban areas with high transport emissions (e.g. Auckland). Potential for bush/forest fire air pollution to impact on people with cardiorespiratory disease. 	Given that Māori have a higher respiratory and cardiovascular disease burden than non-Maori, the impact of increased pollution would be likely to fall more heavily on Māori.
<p>Allergic diseases, including asthma</p> <ul style="list-style-type: none"> Possible impacts on allergic conditions with changes in aeroallergenic plant distribution, flowering, and pollen production. 	Greater impact on the Māori population, who have a higher burden of asthma and allergic disease than non-Māori.
<p>Indoor environment</p> <ul style="list-style-type: none"> Climate change may affect the healthiness of indoor environments through overheating of buildings, changed concentration of indoor air pollutants, flood damage and indoor moisture. 	Greater health impacts on Māori are expected, given that the Māori population is overrepresented in vulnerable housing.

Global and Local Health Equity Impacts

The negative impacts of climate change disproportionately affect developing countries, and the most disadvantaged and vulnerable within all countries, including the elderly, people with chronic medical conditions, indigenous peoples, children, and socioeconomically deprived and other marginalised groups. Climate change also affects intergenerational equity by threatening the health and wellbeing of younger and future generations.

Along with the disproportionate impact of climate change on the Māori population, Pacific island nations in our region already face the negative effects of climate change, with low-lying, small islands such as Tuvalu, Kiribati and Tokelau being especially vulnerable to disease, displacement and economic impacts.

Pacific peoples in New Zealand have a tradition of supporting both family back in the Pacific and new arrivals from the Pacific to New Zealand. Thus climate change has implications for the financial, housing and health challenges faced by Pacific people in New Zealand, as well as Pacific Island-based peoples dependent on financial support from New Zealand-based family members.

Poorly planned responses to climate change also have the potential to impact on social and health inequities. Mitigation policies that raise costs for fuel and energy (and therefore increase costs of goods and services) could place extra financial burden on families – particularly for Māori, Pacific and lower socioeconomic groups. Increases in the cost of living tend to impact more heavily on those with the lowest disposable incomes.

Appendix Four

Source Information

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Earth Statement (<http://earthstatement.org/>) – 4/8 statements:

- Governments must put into practice their commitment to limit global warming to below 2°C.
- The remaining global carbon budget – the limit of what we can still emit in the future – must be well below 1000 Gt CO₂ to have a reasonable chance to hold the 2°C line.
- We need to fundamentally transform the economy and adopt a global goal to phase out greenhouse gases completely by mid-century. Deep decarbonization, starting immediately and leading to a zero-carbon society by 2050 or shortly thereafter, is key to future prosperity.

- Equity is critical for a successful global agreement in Paris. Every country must formulate an emissions pathway consistent with deep decarbonization. For the sake of fairness, rich countries and progressive industries can and should take the lead and decarbonize well before mid-century. Developing countries should formulate plans far beyond what they can be expected to pursue on their own, reaping benefits from leapfrogging into a sustainable economy, well supported by international climate finance and technology access. Safeguarding the right to development of the Least Developed Countries (LDCs) is fundamental.

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