Awareness of the importance of climate change to public health has been growing. Calls for health professionals, including nurses, to take action to prepare for, and mitigate, climate change have been coming from a number of credible sources. This paper will assist nurses to recognise the health consequences of climate change, to generate and disseminate knowledge about these health consequences, to be active in mitigating emissions locally and within their organisations and to advocate and have input ...
Nursing and Climate Change: An emerging connection

William Adlong, BGenStud, MA (Social Ecology), (PhD Candidate) (a); Elaine Dietsch, RN, RM, DipSHC,MN(WH), PhD (b)

(a) - Research Institute for Professional Practice, Learning and Education (RIPPLE), Charles Sturt University, Wagga Wagga, New South Wales, Australia
(b) - School of Nursing, Midwifery and Indigenous Health, Charles Sturt University, Wagga Wagga, New South Wales, Australia

Abstract - Awareness of the importance of climate change to public health has been growing. Calls for health professionals, including nurses to take action to prepare for, and mitigate, climate change have been coming from a number of credible sources. This paper will assist nurses to recognise the health consequences of climate change, to generate and disseminate knowledge about these health consequences, to be active in mitigating emissions locally and within their organisations and to advocate and have input into policy processes. It is valuable for nurses to understand the health co-benefits of emission mitigation and the current health costs of fossil fuels. As advocates for evidence-based public health initiatives, nurses have a role to play in communicating to the public and to policy makers accurate information, including about the health costs of fossil fuel policies and the affordability of renewable energy technologies.

Keywords: nurse education, public health, sustainability, fossil fuels, renewable energy, advocacy
Climate change has major implications for health (Campbell, 2008). These health implications have been discussed in four series of articles in the Lancet (2007; 2009a; 2009b, 2010), a special issue in the American Journal of Preventive Medicine (2008) and in other medical, nursing and health journals (for example, Afzal, 2007; Barna, Goodman, & Mortimer, 2012; Haines & Patz, 2004; Mayner & Arbon, 2010; Mayner, Arbon, & Usher, 2010; Polivika, Chaudry & Mac Crawford, 2012; Sayre, Rhazi, Carpenter, & Hughes, 2010; St Louis & Hess, 2008; Voelker, 2009). The health impacts of climate change that these sources discuss include: increased transmission of disease; greater incidence of extreme weather events including droughts; sea level rise with inundation of infrastructure, living areas and food growing areas; reduced food production; shortages of food and clean water; mass migrations as populations seek to leave affected areas; strains on government finances and structures (due in part to decreased income and increased costs to repair infrastructure and take care of displaced people); and conflict over water and food (WHO/UNFCCC/CBD/UNCCD, 2011; Costello et al., 2009; McMichael, Woodruff, & Hales, 2006). The Australian Nursing Federation has called for nurses to engage in strategies to reduce the impact of climate change (Reale, 2007) and momentum is growing globally for nursing involvement (Barna et al., 2012). However, nurses often report feeling ill-equipped to address the issue and health impacts of climate change (Polivika et al., 2012). This situation has prompted a call for nurse educators to prepare future registered nurses for their role of addressing the impact of climate change as a public health issue (Barna et al., 2012; Goodman, 2011; Sayre et al., 2010). Some institutions have responded, for example Flinders University developed a program specifically addressing disaster nursing and associated research (Mayner & Arbon, 2010), but greater response is needed. The purpose of this paper is to provide nurses,
including nurse academics and nurse leaders, with background information to assist them to prepare for the increasing impact climate change will have on public health and to play a role in the mitigation of that impact.

The emissions trajectory of the world is such that the effects of climate change are likely to be worse than those anticipated by earlier reports of the Intergovernmental Panel on Climate Change (Costello et al., 2009; Richardson et al 2009). While limiting global temperature increases to 2°C Celsius above pre-industrial levels is often referred to as the ‘guardrail’ against dangerous climate change, a 2012 World Bank report (Potsdam Institute, 2012) states that current policy settings are driving the world toward a 4°C increase. The message of the World Bank report is that, since a 4°C rise would likely bring changes beyond that to which institutions (including health systems) could adapt, this level of warming must be avoided.

Rather than only producing effects that will occur sometime in the future, climate change has been having significant effects for some time now. The World Health Organization (2013) asserts that over 150,000 deaths per year can currently be attributed to climate change, through increased disease transmission, increased malnutrition and extreme weather events. Menne and Bertollini (2005) state that 35,000 additional deaths occurred due to the 2003 heat wave in Europe. However, the greatest health impacts of climate change are on the poorest and most vulnerable communities worldwide (Campbell, 2008; Homer et al., 2009).
Nurses, and hence nurse academics engaged in curriculum design and education, have an important role in anticipating and responding to the direct and indirect health effects of climate change (Haines et al., 2007; Horton, 2009; St Louis & Hess, 2008). As Sayre et al (2010, p. 334) argue, “Climate change needs to be reframed as a public health issue, and the importance of nurses to be educated and engaged cannot be overstated.” This assertion for nurses to be involved in what are often perceived as political issues when they impact health is not new. Almost thirty years ago, nurses were urged to become involved in what was then also a global health risk, the proliferation of nuclear weapons (Jameton & Jackson, 1984). Nurses have joined other health professionals with the aim of preparing for climate change effects and acting to mitigate these effects. For example, the Climate and Health Council (CHC, 2013) with 4,800 members (as of March, 2013) was established: “to enable health professionals around the world to take personal and collective action against the causes of climate change...” (Roberts & Stott, 2010, pp. 4-5).

The actions that nurses can take, with the support of pre-registration and continuing education, are of several types (for discussions of actions beyond the scope of this article, see Sayre et al. 2010 and the website of the Climate and Health Alliance, http://caha.org.au/). Because of their trusted place in the community (Afzal, 2007; Gill & Stott, 2009; Sayre et al., 2010), nurses can have an influential role through sharing information about the health effects of climate change. Nurses can also research the health effects of climate change to generate new knowledge about these effects and how they can be managed (McMichael et al., 2006). For example, nurse researchers can study how to manage increases in the transmission of diseases such as
salmonellosis, expected to increase with each degree temperature rise above 5°C (Menne & Bertollini, 2005), or how continuity of health services can be maintained in disasters such as that faced by New York with Superstorm Sandy (Redlener & Reilly, 2012). Nursing education can assist practitioners to develop a ‘local eco-medical literacy’, an ability to recognise the influence on health conditions of local ecological effects of climate change, as Bell (2010) describes with medical education. As the evaluation research of an innovative train the trainer health education program states: “There are multiple benefits – health, financial, reputational and environmental – for health professionals and health services to take a lead on sustainability” (Charlesworth, Madden, Capon, & Engelhard, 2011, p. 3) The greatest proportion of the health professional workforce are nurses (ANF, 2011; AACN, n.d.) and they can also act within their organisations and communities to bring about lower emissions from service provision and community ways of life, for example through ‘energy efficiency’ (Kats & Capital, 2003; Wilkinson, Smith, Beevers, Tonne, & Oreszczyn, 2007; Wilkinson et al., 2009).

Energy efficiency is “about avoiding energy waste and using less energy to achieve the same outcomes” (New South Wales Auditor General, 2013, p. 23). Energy efficiency includes initiatives such as increasing the insulation of buildings, using more efficient models of equipment, installing highly efficient lighting or planning transport trips in ways that lessen the number of trips and distance travelled. Energy efficiency is considered one of the most cost-effective forms of emission abatement, as savings from decreased energy use often pay off the cost of energy efficiency investments within a few years (McKensey & Co., 2009; Ürge-Vorsatz & Metz, 2009). Given that the energy use of the health sector can constitute over 20% of public
sector emissions and over 50% of the total building energy use of state government (Pencheon, Rissel, Hadfield & Madden 2010), energy efficiency in the health sector can be significant and lead the way for the business and wider community.

Advocacy is another important, perhaps crucial, health strategy that nurses can use to work towards significantly affecting health outcomes (Barna et al., 2012; Coote, 2006; Frumkin, 2011; Haines et al., 2007; St Louis & Hess, 2008). In an Australian report, Gruszin, Hetzel and Glover (2012) describe how the success of major health reforms of the 20th century that challenged existing players was dependent in large part on advocacy; for example, banning smoking in public places; banning products containing asbestos; making the use of seat belts compulsory; and setting and monitoring blood alcohol limits for drivers. The mobilisation of groups in the community, including nurses, helped achieve these health advances.

Nurses can take a role in policy development (Costello et al., 2009; Frumkin, 2011; St Louis & Hess 2009). By communicating information and reasons for courses of action to government policy makers and in the media generally, nurses can sway the formation of policy and the discourses that set the context for policy formation. Nursing can achieve this in part through swaying the public’s understanding, actions and influence upon government. Nursing advocacy can focus not only on the negative health impacts of climate change but the other existing and often overlooked health costs of the conventional fossil fuel energy system.
Such costs of fossil fuel generation have been detailed by a group of researchers at the Harvard Medical School (Epstein, 2011) who have produced a report that seeks to quantify the health cost per unit of electricity generated with coal. The team catalogued the health costs of the ‘life cycle’ of coal generation from mining/extraction, through processing and transport to combustion of the fuel. The public health burden of communities near mines is one important component of the life-cycle costs of coal. Other components are the injuries and deaths in mines, deaths in accidents in the transport of coal and respiratory and other effects from the mercury, particulate matter, nitrous oxide, sulfur dioxide, mercury and lead released through the combustion and processing of the coal. The team calculated the health costs of coal, in addition to its greenhouse gas effect, to be in the range of $US.08 to $.14 per kilowatt-hour, which is more than the premium that has been associated with ‘green’ electricity (that is, more than the additional cost of generating electricity through renewable energy technologies). The Harvard team estimated that the health costs of the life-cycle of coal in the US (and by implication, nations such as Australia) are extremely significant. These figures are evidence that, when the health costs of coal generation are taken into account, the health benefits of moving to renewable energy offset at least a significant part of the investment costs required. Other sources also quantify the health costs of fossil fuel generation (European Commission, 2005; European Commission, 2006; Jacobson, Colella, & Golden, 2005; Millman, Tang, & Perera, 2008; National Research Council, 2011; World-Bank, 2007). The IPCC (2011) provides figures showing deaths from fossil fuel electricity generation to be many times higher than those for renewable generation.
In part because of these health costs of fossil fuels, many actions that mitigate climate change have direct and indirect health co-benefits (Lancet, 2009b; European Commission, 2011; Haines et al., 2007; St Louis & Hess, 2008;). For example, efforts to limit emissions from cars can result in less smog and respiratory problems (European Commission, 2011). Walking and riding to reduce emissions and fossil fuel use has the direct co-benefit of promoting the health of the walkers and riders involved (Barna et al., 2012). In Mexico City, where a Metrobus public transport service began in 2005 and carries 687,000 passengers per day, consequent reductions in traffic are estimated to avoid approximately 23 fatalities per year (UNEP, 2012, p. 45).

Through energy efficiency initiatives, funds that were previously used to pay for energy use can be freed up to serve health purposes more directly. Energy efficiency in communities and households can free funds that stimulate the local economy and decrease the health disadvantages faced by people in low income households. Similarly, more efficient cars reduce expenditure on commuting, putting more money in the hands of the public. By identifying co-benefits, nurses can make proposals for policies to mitigate climate change more compelling and “leverage political support” (UNEP, 2012, p. 45).

To mitigate climate change and its health impacts, and to realise the more immediate health co-benefits of switching from fossil fuel generation, requires actions and policies that challenge existing players. Many fossil fuel electricity generators, for example, regard subsidies for renewable generation as a threat to their business, as pointed by the columnist Parkinson (2012). Because renewable energy is generated with very low marginal costs, it tends to reduce wholesale electricity prices, as well as reduce peak demand, significantly lessening the income
of existing fossil fuel generators (Parkinson, 2013; Sensfuß, Ragwitz, & Genoese, 2008; VCEC, 2012, pp. 61-62). Similarly, car manufacturers may regard fuel economy policies as a threat to their profits. The International Consortium of Investigative Journalists reported that there are 2,000-3,000 lobbyists in North America seeking to persuade members of Congress to lessen action on climate change (that is four or five lobbyists per member of Congress)(Lavell & Pell, 2009). The strong influence that lobbyists can have on government policy writers has been discussed by Pearse (2007) (in relation to Australia) and Kaiser (2009) (in relation to the US). As the lobby organisations frequently provide jobs to policy writers later, the policy writers can feel obliged to favour the lobbyists’ interests (Pearse, 2007; Kaiser, 2009). Robottom and Hart (1993, p. 25) state, “Sustained critical investigations of environmental issues almost inevitably encounter the political base of such issues – the opposing vested interests whose struggle constitutes the environmental issue itself.”

To have influence in the wider policy sphere, the action of nurses who are advocating needs to be well planned, strategic and designed to use available leverage. The actions need to be informed not only about the science of climate change and related health effects, but also by a developing critical analysis of the interests, ‘partnerships’ and strategies of incumbent players that oppose climate action (Goodman, 2011). There are similarities between the movement for climate action and other public health reforms that many nurses have participated in, such as to decrease smoking (Hudmon, Addleton, Vitale, Christiansen, & Mejicano, 2011). Action to realise the health ‘dividends’ of mitigation of climate change (Armstrong, 2012; Horton, 2009) needs to be based in an understanding of the existing ‘policy paradigm’ (Hall, 1993), that is the
sets of beliefs and assumptions that underlie existing policy (Goodman, 2011). The policy paradigm provides, for the policy maker, “a framework of ideas and standards that specifies not only the goals of policy and the kind of instruments that can be used to attain them, but also the very nature of the problems they are meant to be addressing” (Hall, 1993, p. 279). The policy paradigm is largely tacit and tends to be reinforced by the social relations and situation of the policy maker, including their contacts with industry representatives such as the lobbyists mentioned earlier.

Given the tacit nature of a policy paradigm, to alert policy makers to the need for a transformational change of processes and infrastructure (in order to achieve the emission reductions called for by scientists to have a fair chance of avoiding dangerous climate change (Ürge-Vorsatz & Metz, 2009)) requires more than good and credible argument. Habermas (1996) argues that in order for the communicative flows coming from the civic sphere (advocating for a change) to have influence on government, they must not only be carefully conceived, articulated and furnished with solutions, they must also be ‘amplified’ and ‘dramatised’ so they actually register in the parliamentary processes. Wilson (2000) writes of the importance of gaining high levels of media engagement, mobilising large numbers of supporters and exploiting ‘trigger events’ in order to secure a shift to a new policy paradigm. Given the strength of the vested interests involved with carbon policy and the fact that policy paradigms can be international in nature (Babb, 2012), it is fortunate that there is a large global climate action network of groups and individuals with whom nurses can partner with the aim of implementing good climate policies.
Nurses need to be aware of assumptions that are foundational to the persistence of the fossil fuel paradigm. One assumption is that renewables are unaffordable. Recent reports, however, indicate that renewables are less expensive than new fossil fuel generation in a number of parts of the world (including Australia) and are becoming increasingly cost competitive (Adlong, 2012; Bloomberg New Energy Finance, 2013; IEA, 2011; UNEP, 2011). As we have seen, when the air pollution and other health costs of fossil fuel use are considered (even without a price on carbon), the health savings from investment in renewables can offset their cost very significantly. As renewables do not have ongoing fuel costs, the costs of developing national (or international) systems with high levels of renewable generation can actually be less than or similar to the costs of existing policy settings (even without considering health savings) (European Commission, 2011; IPCC, 2011; Mathiesen, Lund, & Karlsson, 2011; Rocky Mountain Institute, 2011). Additionally, the cost of solar photovoltaics has fallen so much in Australia that electricity can be generated substantially cheaper than the retail rates paid by most consumers.

Another assumption underlying the fossil fuel paradigm is that renewables cannot provide dependable, dispatchable power. While there is variability to solar and wind resources, the variability of power generation can be overcome in a number of ways. Generation from a system of widely dispersed wind farms is less variable than a single wind farm, as low wind speeds at one location tend to be made up at another location (IEA, 2009; Jacobson & Delucchi, 2010; Mills & Wiser, 2010). Generation from solar thermal power stations has been enhanced through the storage of heat (for example in tanks of molten salt) which allows generation long
after the sun has set. One solar thermal plant with molten salt storage (Torresol Energy’s ‘Gemasolar’ plant) in Spain began round-the-clock electricity generation in May 2011 (Dunn, Hearps, & Wright, 2012). The Gemasolar solar thermal plant generates enough electricity to supply approximately 25,000 households. ‘Pumped hydro’ - which involves pumping water up to an elevated reservoir to be gravity fed through a generator when needed - is another form of storage that is in commercial use (Wright & Hearps, 2010).

Wilson (2000) notes that one of the ways that a new policy regime comes to replace the old is through challenging the rationality of the old regime’s arguments and assertions. Promoting awareness of the outdated nature of the notions that renewable energy is prohibitively expensive and unable to provide dispatchable power may assist in the transition to a paradigm that is attuned to both the urgency of the need for climate action and to the solutions that are being demonstrated and explored around the world.

Conclusion

There are calls for nurses, to take a role in relation to climate change. On current trajectories, climate change is likely to have major impacts on health through more extreme weather events, increased transmission of disease, destruction of infrastructure, food and water shortages and other effects. Nurse academics play a role in continuing to research and educate nurses about these changes, how to adapt to their impact and how to advocate for mitigation of emissions in order to avoid climate change impacts beyond that to which health systems could successfully adapt.
Fortunately, mitigation options often have strong economic arguments and can be shown to have other significant health benefits that strengthen the argument for their use (as in the case of a number of renewable energy technologies when compared with coal, for example).

Nursing advocacy to mitigate climate change and its health impacts, however, like other major health reforms that challenged the status quo, are likely to meet with opposition from vested interests and to meet a policy paradigm that has not yet attuned to the possibilities and imperatives of a carbon constrained world. Nurses can share strategies and knowledge with others in the global climate network to promote widespread understanding and adequate response to the need for emission abatement and preparation of health services. Nurse educators, in academia and clinical settings can lead learning on the development of strategies for local mitigation (such as energy efficiency in the health service or community) and for local and broader advocacy. Nurses can also advance arguments for the increasing affordability of renewable energy and the growing ability to store renewable energy for dispatch when needed.

This paper has demonstrated that climate change is already and will become an increasing major health issue which nurses needed to consider. Both pre-registration and continuing nurse education can bring a focus onto knowledge of the health impacts of climate change, responses that can be made and ways of mitigating emissions. Development of policies to limit climate change and its public health impacts may depend, in part, on the advocacy of nurses who must be prepared to meet the challenge.
References
Charlesworth, K., Madden, L., Capon, A., & Engelhard, S. (2011). Climate Change, Sustainability and Health Workshops for Medical Professionals Evaluation Report: Royal Australasian College of Physicians with financial support from the Australian Department of Health and Ageing through the Public Health Education and Research Program; adaptation of program by National Health Service Sustainable Development Unit, UK.


IPCC. (2011). IPCC special report on renewable energy sources and climate change mitigation Cambridge, United Kingdom.


Lancet Series, (2010), Climate change, 376(9755)


