

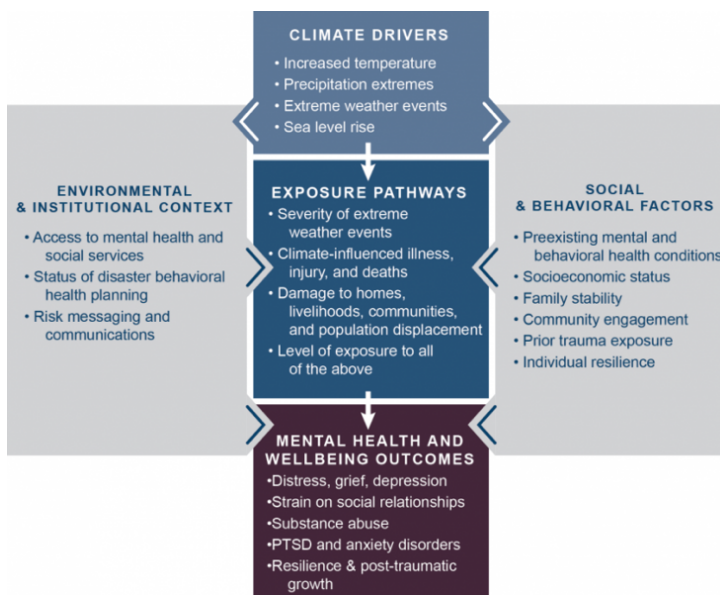


Figure 11: Climate Change and Mental Health and Wellness
Reproduced as part of public domain.

All of the influencing factors may also be affected by climate change (USGCRP: 2016).

Climate change may affect mental health directly by exposing people to trauma (Berry, Bowen & Kjellstrom, 2010). Adverse psychiatric outcomes are well-documented in the aftermath of natural disasters (Page & Howard, 2010), and can include both acute traumatic stress and more chronic stress-related conditions (such as post-traumatic stress disorder). Extreme heat events, which will become common as global temperatures rise, may be associated with a general increase in aggressive behavior, higher rates of criminal activity, increased suicide rates and child abuse. There will likely be an increase in the overall burden of mental health disorders worldwide as extreme weather conditions and natural disasters can lead to displacement, loss, and social disruption (Berry, Waite, Dear, Capon & Murray, 2018).

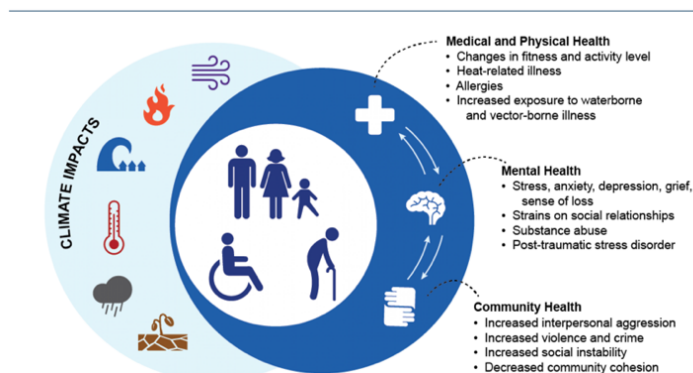


Figure 12

Those with mental illness are at special risk from the effects of climate change. Those with mental illness face increased risk of heat related illnesses for several reasons. These include the physical pathology associated with the specific mental illnesses like schizophrenia and accompanying dysfunction of thermoregulation. Psychiatric medications used to treat mental illness (e.g., antipsychotics and anticholinergic medications) have well documented association with heat intolerance (Riley & Kirk, 2017). Finally, the mental impairment accompanying some mental illness may impact an individual's ability to cope with and adapt to extreme weather events (Cusack, de Crespigny, & Athanasos, 2011).

A Public Service Announcement video is available to heighten awareness of heat, stress, and child abuse at: <https://www.youtube.com/watch?v=fLm6pdPtI0o#action=share>.

Figure 12 outlines mental health impacts from climate change.

FOOD SECURITY

Climate change is associated with seasonal change, with increasing temperatures, periods of drought and flooding resulting in the inability to grow traditional crops. These changes bring with them altered relationships among crops, pests, and pathogens. In addition, it also makes worse declining trends in pollinating insects, increasing ground-level ozone concentrations, and fishery declines especially in areas with limited capacity to adapt to these variations (Burke and Lobell, 2010; Muller et al., 2011; Myers et al., 2017).

It is anticipated that climate change will influence both the quality and the quantity of the food produced as well as its equitable distribution (Myers et al., 2017). Climate change is predicted to worsen malnutrition in the developing world. Extreme weather events and changes in temperature and precipitation patterns can directly damage or destroy crops and other food supplies. This may happen seasonally, but is anticipated to become a chronic problem under changing climate conditions. (Portier and Tart, 2010). It is predicted that by the end of the 21st century one half of the world's population could face severe food shortages due to the impact of rising temperatures on staple food crops. In subtropical and tropical regions, staple food crops could fall by 20-40 percent (Battisti and Naylor, 2009).

Seventy-six percent of the world's population derives most of their daily protein from plants (FAO, 2014). Beyond its influence on yields, rising CO₂ levels are also altering the nutritional composition of crops. Elevated atmospheric CO₂ may widen the disparity in protein

intake within countries, with plant-based diets being the most vulnerable (Medek, Schwartz, & Myers, 2017).

Food crops cultivated at elevated CO₂ levels, result in reduced protein content of potatoes, barley, rice, and wheat which are primary sources of dietary protein for many countries. (Myers et al., 2014).

It is predicted that more than 200 million people will fall below thresholds of recommended protein intake, and protein deficiency levels among those already below this threshold will worsen (Medek, Schwartz, & Myers, 2017).

With roughly 83 million people being added to the world's population every year, the upward trend in population size is expected to continue, even assuming that fertility levels will continue to decline (UN, 2017). This population growth combined with the impact of climate change may overwhelm global crop production. The capacity to ensure food security and nutritional adequacy in light of the rapidly changing biophysical conditions resulting from man-made climate change will be a major determinant of the next century's global burden of disease (Myers et al., 2017).

Figure 13 provides information on rising CO₂ levels and climate change on food safety and security <https://health2016.globalchange.gov/food-safety-nutrition-and-distribution>. Reproduced as part of public domain.

NATURAL DISASTERS, CLIMATE CHANGE, AND PREPAREDNESS

Extreme weather conditions result in disasters. It has become evident both nationally and globally, that climate change in the form of extreme weather events such as hurricanes, floods, heat waves, droughts, wildfires, and tornados require us to protect our communities through adaptation and preparedness measures to improve resiliency. Many municipalities and states within the U.S. have outlined preparedness and/or adaptation plans to address disasters from extreme weather events. Georgetown Climate Center offers an Adaptation Clearinghouse (<http://www.adaptationclearinghouse.org>) with policy and adaptation toolkits to assist communities in preparing for extreme weather events.

With the increase in the intensity and frequency of natural disasters there is the threat to public health from fallout of energy sources such as nuclear power. One recent example is the nuclear crisis in the Japan crisis post-tsunami in Fukushima (Eddy and Sase, 2015).

The promotion of sources of energy such as solar and wind would avoid environmental concerns that are

present with nuclear energy, as natural disasters increase in the number and severity with climate changes.

A recent study found that wind turbines can actually reduce winds from hurricanes, providing in essence, a protective effect.

Additional benefits of energy sources such as solar and wind are that these are renewable. This means that energy is generated from natural resources that are naturally replenished. Nurses must advocate for clean energy policies that support safe, renewable sources of energy such as wind, solar, geothermal, hydro, tidal, and wave. A comprehensive State Energy and Analysis Tool that can provide a state-level overview of the energy sector and clean energy options can be found at: <https://www.eia.gov/state/?sid=US>.

For more information about climate preparedness watch the TED Talk: “[Let's prepare for climate change](#)” by Vicki Arroyo.

The food system involves a network of interactions with our physical and biological environments as food moves from production to consumption, or from “farm to table.” Rising CO₂ and climate change will affect the quality and distribution of food, with subsequent effects on food safety and nutrition.

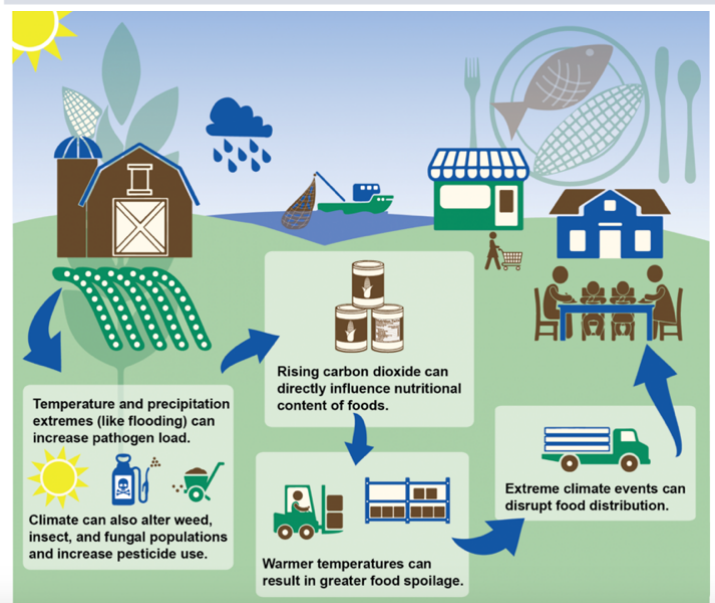


Figure 13

POPULATIONS AT GREATEST RISK

Populations considered most vulnerable to the adverse effects of climate change, lack the ability to adapt to the consequences of climate change. Research shows that up to 20 percent of people exposed to a traumatic event will develop long term psychological dysfunction. Those at greatest risk including the older adults, children, women and the poor who have limited options and

resources to adapt to the wide range of climate changes such as heat- and extreme weather events, as well as waterborne, vector-borne, and food-borne illnesses (La Greca et al., 2013; Pietrzak, Fried, Galea, & Norris, 2013). Determinants of vulnerability are outlined in Figure 14 from the [Climate and Health assessment](#).

Women and Children

Women and children are particularly vulnerable to extreme weather events. For example, women and children represented 90 percent of all victims in the 1991 cyclone in Bangladesh (Homer, Hanna & McMichael, 2009). Climate change will increase the risk of infant and maternal mortality, birth complications, and poorer reproductive health, especially in the tropical, developing countries (Rylander, Odland & Sandanger, 2013).

Pregnancy and Birth Outcomes

The developing fetus and child are more biologically and psychologically vulnerable to the many direct and indirect effects of global warming. Impacts include increased incidence of infectious disease, heat stress, respiratory disease, pre-term birth, and child abuse. Many of these impacts can affect the health and well-being of children over their lifetime.

While the study of the potential influences on pregnancy and prenatal complications related to climate change is an emerging area of research, there is strong evidence that extreme heat (which leads to poor air quality) can lead to pre-term birth and low birth weight (Zhang, Yu, & Wang, 2017). Other conditions that have been linked to extreme heat include congenital cataracts (Van Zutphen, Lin, Fletcher, & Hwang, 2012) and sudden infant death (Auger, Fraser Smargiassi, & Kosatsky, 2015).

Air pollution increases with extreme heat and may impair lung development indirectly by its association with low birth weight and prematurity. Exposure to air pollution during pregnancy has also been linked to asthma and decreased lung function in infancy and childhood (Korten, Ramsey, & Latzin, 2018).

Pregnant women are less able to regulate the temperature of their bodies. It is theorized that stress from a rising body temperature could also trigger an inflammatory response that constricts a pregnant woman's vasculature, making it harder for blood carrying oxygen to reach the placenta which can compromise the fetus. (Kuehn & McCormick, 2017). The dehydration that is associated with overheating may also be significant because it decreases the amount of amniotic fluid which is associated with fetal death. Temperature sensitive

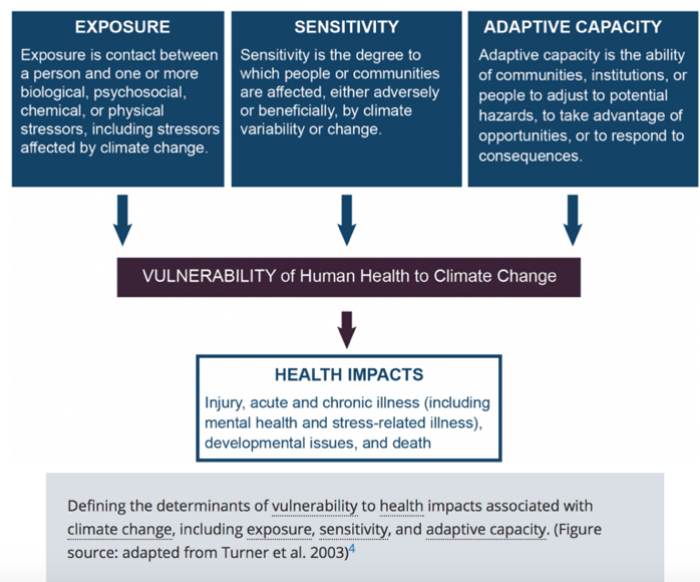


Figure 14: Reproduced as part of the public domain

proteins in the vessels of the umbilical cord may play a role through vasodilation in the placenta which in turn decreases blood pressure and therefore blood supply to the fetus.

In a study of approximately 60,000 births in California, increased temperatures were significantly associated with preterm birth for all mothers, regardless of maternal racial/ethnic group, maternal age, maternal education, or sex of the infant. An 8.6 percent increase in preterm delivery was associated with a 10°F increase in the weekly average temperature, with greater risks observed for younger mothers, Blacks, and Asians (Basu et al., 2010). Associations between extreme heat and preterm delivery have been supported in subsequent research studies (Carolan-Olah & Frankowska, 2014; Kloog et al., 2015; Schifano, et al., 2016) including a large study of 838,146 births in China (He et al., 2015).

As temperatures continue to increase in many regions of the world, consideration of its impact on birth outcomes is critical (Anderko, Chalupka, & Anderko, 2012; Anderko, Schenk, Hufling, & Chalupka, 2016).

Children

Children are particularly vulnerable to detrimental health impacts from climate change. Children spend more time than adults outdoors, breathe more rapidly than adults, and are still developing their respiratory systems. As temperatures increase, air quality decreases with increased pollution and pollen, increasing asthma attacks and allergies in children. Extreme heat waves increase rates of heat stress and exhaustion, heat stroke and

death, especially in infants and children. Children are less able to deal with heat and are more susceptible to dehydration. They are therefore, more vulnerable to heat-related disease and death and will suffer disproportionately as the Earth warms.

As temperatures increase, insects that carry disease such as ticks and mosquitoes expand their range, increasing the risk for diseases such as Lyme Disease, West Nile, and more recently, Zika. As temperatures increase, water security (or the reliable availability of water) for drinking diminishes. Droughts resulting from climate changes can dramatically impact water quality and have also resulted in widespread wildfires across the U.S., adversely impacting air quality from dense smoke that can lead to respiratory and cardiovascular illness in children. Wildfires and other extreme events such as hurricanes have led to depression and post-traumatic stress disorders. Child abuse has been found to increase as much as six-fold during these stressful events when resources are limited to young families (Sheffield & Landrigan, 2011).

Older Adults

The older adult population of the United States is projected to grow substantially in the coming decades. The number of older adults aged 65 and older is projected to nearly double between 2015 to 2050 from approximately 48 million to 88 million. Nineteen million of the 88 million will be 85 years of age and older. The older adult population is highly varied with respect to their climate-related vulnerabilities due to the diversity of overall physical and mental health, disability status, educational attainment, socioeconomic status, and social support networks (USGCRP, 2016).

Older persons are among the most at risk population facing increased challenges in adapting to climate change, with potentially far-reaching implications for the health of individuals as well as for societal strategies to cope at both the population and policy levels (Pillemer and Filliberto, 2017). Advanced age is one of the most significant risk factors for heat-related death in the U.S. because older adults are less able to regulate extremes in temperatures. Exposure to extreme heat can result in multiple adverse effects in older adults. Extreme heat events are projected to become more frequent, of longer duration, and more intense in the future, particularly in large metropolitan areas and in higher latitudes. (USGCRP, 2016). Older adults, aged 65 and older, represent the majority of deaths associated with extreme weather events (Thacker, M., Lee, R., Sabogal, R., Henderson, A., 2008). For example, in New Orleans, people aged 60 and older comprised 15 percent of the

Table 1: Summary of information related to health effects and populations most affected by extreme weather events.

Weather	Health Effects	Populations Most Affected
Heat waves	Heat Stress	Extremes of age, athletes, people with respiratory disease
Extreme weather events (rain, hurricane, tornado, flooding)	Injuries, drowning	Coastal, low-lying land dwellers, low socio-economic status (SES)
Droughts, floods, increased mean temperature	Vector, food, and water borne diseases	Multiple populations at risk
Sea-level rise	Injuries, drowning, water and soil salinization, ecosystem and economic disruption	Coastal, low SES
Drought, ecosystem migration	Food and water shortages, malnutrition	Low SES, older adults, children
Extreme weather events, drought	Mass population involvement, international conflict	General population
Increases in ground-level ozone, airborne allergens, and other pollutants	Respiratory disease exacerbations (COPD, asthma, allergic rhinitis, bronchitis)	Older adults, children, those with respiratory disease
Climate change generally; extreme events	Mental health	Young, displaced, agricultural sector, low SES

Source: <https://www.cdc.gov/climateandhealth/effects/default.htm>

population prior to Hurricane Katrina. However, more than 70 percent of those who died as a result of the hurricane were older adults (Beneson, 2009). Superstorm Sandy also hit older adults particularly hard with approximately half of those who died aged 65 or older (New York Times, 2012).

Extreme high temperatures are associated with an increase in hospital admissions for cardiovascular and respiratory disorders, with older adults among the most impacted. Long-term increases in temperature variability can increase the risk of mortality in susceptible older people (Zanobetti, O' Neil, Gronhand, & Schwartz, 2012). Future climate-related increases in summertime temperatures may increase the risk of death in older people with chronic conditions, particularly those suffering from congestive heart failure and diabetes. (Anderko, Chalupka, & Afzal, 2012; Anderko, Chalupka, Gray, & Kesten 2013; USGCRP, 2016).

Finally, where one lives can be an important determinant of the impact of climate change on the health of older adults. For example, about 20 percent of older adults live in an area in which a hurricane or tropical storm made landfall within the last 10 years. The increasing severity of tropical storms may pose risks for older adults living in coastal areas. For older adults residing in cities, factors such as the urban heat island effect, urban sprawl, and neighborhood safety may also present risks (USEPA, 2016).

Older adults are also more likely to live alone, with limited social contacts and support. Disabilities in one or more areas related to communication (seeing, hearing, or speaking), mental functioning (such as Alzheimer's disease or dementia), and physical functioning (limited or no ability to walk, climb stairs place older adults at risk (Haq, 2017).

Interruptions in medical care and the difficulties associated with transporting patients with their necessary medication, medical records, and any equipment, such as oxygen, can be catastrophic. Extreme events can also cause power outages that can affect electrically-powered medical equipment and elevators, leaving some older adults without treatment or the ability to evacuate. The loss of electricity during a storm can make it difficult to get food, medicine, and other needed services to older adults and those with limited mobility living in multi-story buildings with elevators. As evidenced by the impact of Hurricane Maria, those with disabilities, chronic medical conditions, or living in nursing homes or assisted-living facilities are particularly at risk (Amengual et al., 2014; Anderko, Chalupka, Afzal, 2012; Anderko, Chalupka, Gray & Kesten, 2013; EPA, 2016).

Table 2: Health Benefits of the Clean Air Act

The 1990 Clean Air Act Amendments prevents (in cases):		
	2010	2020
Asthma Exacerbation	1,700,000	2,400,000
School Loss Days	3,200,000	5,400,000
Lost Work Days	13,000,000	17,000,000
Chronic Bronchitis	54,000	75,000
Emergency Room Visits	86,000	120,000
Heart Disease - Acute Myocardial Infarction	130,000	200,000
Adult Mortality- Particles	160,000	230,000

USEPA: <https://www.epa.gov/clean-air-act-overview/benefits-and-costs-clean-air-act-1990-2020-second-prospective-study>

Reproduced as part of public domain.

Finally, older adults are at even greater risk of exposure because they are more likely to reside in risk prone locations such as cities (urban heat islands), coastal or flood-prone areas, isolated rural areas, or areas with increased levels of air pollution or aging and poorly maintained infrastructure (Miranda, Hastings, Aldy, & Schlesinger, 2011).

Poor

Those living in poverty are also extremely vulnerable to many of the health effects of climate change. Existing illnesses and challenges in daily life are further complicated by disruptions in access to public services, displacement from homes and the need to migrate with limited transportation options, and increased stress as a result of extreme climate events (Anderko, Chalupka & Afzal, 2012; Anderko, Schenk, Huffling, & Chalupka, 2016).

One study found that as temperatures rise, the economic yield is reduced (Fritze, Blashki, Burke, & Wiseman, 2008). Changes to existing ecosystems can impact livelihoods, such as those who rely on natural resources for their

economic well-being (e.g., farmers). Indigenous groups that rely on subsistence living are particularly sensitive to these impacts (Cunsolo Willox et al., 2013; Kjellstrom and McMichael, 2013).

People living in poverty have less capacity to adapt to the challenges brought by climate change. Frequently unable to evacuate in a natural disaster, they are left more exposed to its effects. They also have higher exposure to the dangerous conditions created by poor air quality and extreme heat events.

Those with lower incomes are disproportionately impacted by the extreme weather and natural disasters. They frequently have reduced mobility and access to healthcare although they typically have a greater burden of chronic disease which can be exacerbated by climate. Additionally, financial limitations can hamper their ability to access to buy goods and services that might help them to cope more effectively with the effects of disasters (Bourque and Cunsolo Willox, 2014; USGCRP, 2016).

In addition, many low-income people in the United States are employed in sectors of the economy that are very climate-dependent (e.g., fishing or farming).

Changes to existing ecosystems can impact livelihoods, such as those who rely on natural resources for their economic well-being (e.g., farmers). Indigenous groups that rely on subsistence living are particularly sensitive to these impacts (Cunsolo Willox et al., 2013; Kjellstrom and McMichael, 2013). One study found that as temperatures rise, the economic yield is reduced (Fritze, Blashki, Burke, & Wiseman, 2008).

ADVOCACY: THE CLEAN AIR ACT AND CLIMATE

Clean air, with reductions in carbon pollution, is essential for a healthier climate and public. The health, environmental, and economic impacts of air pollution are significant. Each day, air pollution causes lost days at work and school, as well as reduces agricultural crop and commercial forest yields by billions of dollars each year.

The original Clean Air Act of 1963 was passed and established funding for the study of and cleanup of air pollution. However, there was no comprehensive federal response until Congress passed a much stronger Clean Air Act of 1970. That same year Congress created the Environmental Protection Agency (EPA) and gave it the primary role in carrying out the law.

In 1990, Congress revised and expanded the Clean Air Act, providing EPA broader authority to implement and enforce regulations reducing pollutant emissions.

By reducing air pollution, the Clean Air Act has led to significant improvements in human health and the environment in the United States.

Since 1970,

- The six most commonly found air pollutants have decreased by more than 50 percent,
- Air toxics from large industrial sources, such as chemical plants, petroleum refineries, and paper mills have been reduced by nearly 70 percent,
- Production of most ozone-depleting chemicals have ceased.

At the same time,

- The U.S. gross domestic product (GDP) has tripled
- Energy consumption has increased by 50 percent
- Vehicle use has increased by almost 200 percent (Johnson, 2011, USEPA, 2011b).

The US EPA (2011b) reports that by 2020, the Clean Air Act Amendments will prevent over 230,000 early deaths.

Table 2 presents some additional data related to health benefits of the Clean Air Act.

In 2014, President Obama unveiled the Clean Power Plan (CPP) issued under section III(d) of the Clean Air Act, which established a federal framework to reduce carbon emissions from existing fossil fuel-fired power plants. This was a key component of the Obama's administration strategy for meeting U.S. commitments under the Paris Accord (<https://archive.epa.gov/epa/sites/production/files/2015-08/documents/fs-cpp-overview.pdf>).

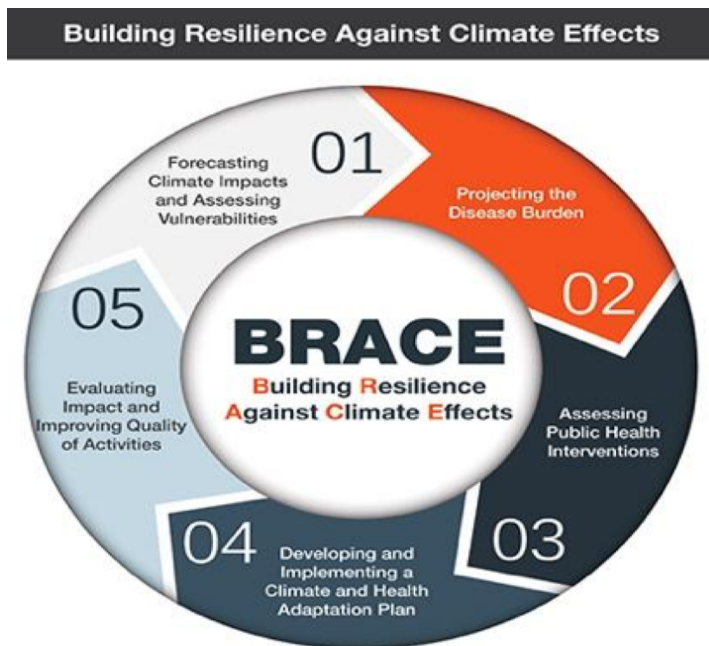
NURSES: OPPORTUNITIES FOR ACTION

Climate change will continue to cause enormous health challenges, which will require a significant response from nurses. According to Dr. Margaret Chan, Director General of the World Health Organization (2007), "We have compelling reasons for doing so. Climate change will affect, in profoundly adverse ways, some of the most fundamental determinants of health: food, air, water."

Nurses have a significant role and professional responsibility to act (Pollitt, P., Sattler, B., Butterfield, P., Anderko, L., Brody, C., Mood, L., ... & Cook, K., 2020). The American Nurses Association has taken a stand on climate and the role of nurses through resolutions introduced in 2008. In 2018, the American Academy of Nursing released its own policy statement on climate change and outlined nurse's professional obligations to

address health issues emanating from climate changes (Leffers & Butterfield, 2018).

Figure 15



<https://www.cdc.gov/climateandhealth/BRACE.htm>

Reproduced as part of public domain.

To be successful, nurses must first become informed about the health implications of climate change in order to educate clients, communities and healthcare systems (Sherman, J., Thiel, C., MacNeill, A., Eckelman, R, et al., 2020). to advocate effectively for healthy public policy (Anderko, Schenk, Huffling, & Chalupka, 2016). A list of key resources can be found on the Health Care Without Harm website (with a focus on health care institutions): www.noharm.org and the Alliance of Nurses for Healthy Environments (ANHE) website www.envirn.org which also offers a free online media module series on Health, The Clean Air Act and Health at: <https://envirn.org/advancing-clean-air-climate-health-opportunities-for-nurses/>.

Nurses have been in the forefront of facing the challenges of climate change and advocating for actions that will reduce health impacts at the individual and societal levels. There are several examples of nurses leading the way.

In 2013, the White House Champion of Change award for Climate Change and Public Health was awarded to two exceptional nurses for their work:

Laura Anderko PhD RN

<https://obamawhitehouse.archives.gov/champions/public-health-and-climate/laura-anderko>

and Therese Smith, RN BSN MPA

<https://obamawhitehouse.archives.gov/champions/public-health-and-climate/therese-smith>.

Charlotte Wallace, RN, MS was invited to join President Obama as he outlined climate changes and public health impacts, discussing the role of health professionals in supporting healthy public policy: <https://blog.aahs.org/uncategorized/nursing-blog/charlotte-wallace-rn-represents-nursing-at-round-table-with-president-obama>

Patricia Butterfield, PhD RN participated on a panel at a White House Summit on Climate Change and Health, discussing the role of climate change in curriculum and best practices in the field. <https://news.wsu.edu/2015/04/14/wsuh-part-of-white-house-public-health-climate-change-discussion/>

Katie Huffling, MS, RN CNM orchestrated the first White House event dedicated to nurses responding to climate change and health impacts. The summit brought together nurse leaders from national organizations to learn about health impacts and craft a response from the nursing profession on how best to address these needs. <https://envirn.org/anhe-white-house-climate-and-health-roundtable/>

ADAPTATION

There are a number of strategies to adapt to climate changes and ultimately, build community resiliency and preparedness.

At the Places Where We Practice

- Plan for health risks: asthma, allergies, infectious disease, cardiac and respiratory, heat related events
- Develop disaster preparedness plans: floods, fires and storms
- Incorporate resilience into design, operations, and energy options. The Climate Resilience Toolkit provides a step by step guide and case studies of successful projects within healthcare settings. Available at: <https://toolkit.climate.gov>. Another resource is Climate Smart Healthcare, a guide for healthcare systems across the world (World Bank, 2017).

At Home

- Prepare for change in temperatures and precipitation
- Cooler buildings, more shade structures

- Adequate water run-off: more permeable surfaces, effective guttering
- Plant trees, manage invasive species
- Garden for food production
- Develop connections and friendships in neighborhoods
- Address depression and anxiety

In our Communities

- Identify at-risk populations and help ensure safety
- Build supportive networks
- Institute early warning systems
- Support sustainable businesses, programs, and organizations
- Work toward Zero Waste
- Address disaster preparedness

In the Policy Arena

- Influence urban planning, city growth plans
- Communicate with elected officials regularly
- Get involved with nursing organizations

Building Resilience Against Climate Effects: B.R.A.C.E.

A broader view of “what to do” for health professionals includes the BRACE framework offered by CDC that evaluates population health impacts.

The Climate and Health Program at the Centers for Disease Control and Prevention (CDC) developed the Building Resilience against Climate Effects (BRACE) framework to help communities, health departments, and other health facilities prepare and respond to these changes. The BRACE framework incorporates an assessment of climate change impacts, a vulnerability assessment, the modeling of projected health impacts, an evidence-based evaluation of intervention options, a strategy for implementing interventions, and systematic evaluation of all activities in an iterative framework (see Figure 15).

The vulnerability assessment is critical in various stages as an agency works through the BRACE framework – (i) in Step One, it guides health agencies to assess specific communities and places that are vulnerable to projected climate impacts; (ii) Step Two considers the disease burden of climate change; (iii) Step Three provides

knowledge on which specific public health interventions to implement in order to reduce the health burden; (iv) Step Four provides community characteristics (e.g., socioeconomic, environmental, infrastructural) in the development and implementation of a climate and health adaptation plan; and (v) Step Five evaluates the impact and makes improvement.

Implementing steps to reduce greenhouse gas (GHG) emissions is only part of the challenge of addressing climate change. Scientific evidence indicates that even if GHG emissions were to be stabilized at current levels, the earth is already committed to significant warming by the end of the century (Watts et al., 2017; WHO, 2017). Climate change preparedness projects must begin immediately, as we advocate for regulations to reduce GHG emissions. Nurses can play a vital role in local and regional climate adaptation strategies by preparing their communities to be resilient and best cope with the anticipated health impacts of climate change (Anderko, Schenk, Huffling, & Chalupka, 2016; Gould, 2011). Georgetown Climate Center has an [Adaptation Clearinghouse](#) with information for local communities and a listing of adaptation plans for each state in the US. Another resource includes a report entitled Adaptation in Action that can be found at: <https://bit.ly/2VCpla4>.

Effective advocates influence public policy, laws, and budgets by using facts, their relationships, the media, and messaging to educate government officials and the public on the changes they want to bring for a healthier environment. The ANHE website offers reports and information on communicating risks related to climate change along with webinars, podcasts and more at: <https://envirn.org/climate-change/>.

Tips for advocating effectively include:

- **Know the facts:** To gain and maintain credibility, it is critical that you have the all of the facts on both sides of any issue. Having this information will help you in conversations with government officials, the media, other advocates, and the general public.
- **Use the facts:** Any position you take should be grounded in the facts. It is often helpful to put your facts into one-pagers that you can distribute. Many organizations such as the American Lung Association provide talking points or letters that can guide you.
- **Have a clear and concise message:** Government officials, the press and the general public do not have time for long-winded conversations or documents— you need to get to your point quickly and concisely. And remember to

watch out for the jargon and acronyms used in different fields — you want everyone to understand the issues you are raising.

- **Nurture relationships and work collaboratively:** Advocacy is a joint venture- you need to find your allies and work with them. Your chances of success are much greater when there are large numbers of organizations and people on your side. Whenever possible, be sure you and your allies have consistent data and the same messages.
- **Engage the public:** Use the media, social media, petitions, letters, e-mails and other grassroots strategies to engage as many people as you can. Remember numbers speak loudly to elected officials!
- **Make your voice heard!** Advocacy is not the place for being shy. Make sure you spread the word—through meetings with government officials, press conferences, letters, petitions, rallies, and phone calls.
- **Share:** And don't forget to talk about what you are advocating for at dinner parties and social events--you never know who can become a useful ally.
- **Say thank you:** Remember that everyone is busy and their time is valuable. Keep your meetings short and always say thank you afterwards. When your advocacy is a success, always thank everyone who helped you achieve your victory!

CONCLUSION

Nurses are trusted by society worldwide. They must advise and advocate for a cleaner environment that mitigates climate change through strong clean air and energy policies.

APPENDIX A - CLIMATE CHANGE RESOURCES

- Visit the [National Park Services'](#) website to learn more about the difference between global warming and climate change and for further description of the greenhouse gas effect.
- [The National Institute of Environmental Health Sciences'](#) website lists the health impacts of climate change, along with strategies to reduce health impacts, and identifies areas for further research.
- [The Centers for Disease Control and Prevention's](#) website lists the effects of climate on health and provides fact sheets to use for further education.
- [The Intergovernmental Panel on Climate Change](#) works to advance understanding of climate change and impacts by reviewing and assessing current scientific,

technical and socio-economic information. View their latest assessment report [here](#).

- [The National Climate Assessment](#), a report developed by over 300 experts and a Federal Advisory Committee, details the impacts of climate change across the differing regions of the United States.
- [The U.S. Environmental Protection Agency's](#) website has resources for learning about climate change and the action the EPA is taking to reduce impacts on human health and the environment.
- [The World Health Organization's](#) website identifies what is being done on a global level to address the threat of climate change and offers actions to take to advance climate solutions.
- Learn how to apply health promotion interventions in caring for the planet and the systems in which human existence depends at [Planetary Health Now!](#)

REFERENCES

Amengual, A., Homar, V., Romero, R., Brooks, H.E., Ramis, C., Gordaliza, M. & Alonzo, S. (2014). Projections of heat waves with high impact on human health in Europe, Global and Planetary Change, 1(19): 71-84. (<http://dx.doi.org/10.1016/j.gloplacha.2014.05.006>)

American Lung Association. (2018). State of the Air 2018: Author. Available at: <http://www.lung.org/assets/documents/healthy-air/state-of-the-air/sota-2018-full.pdf>

Anderko, L., Chalupka, S., Du, M., & Hauptman, M. (2019). Climate changes reproductive and children's health: a review of risks, exposures, and impacts, Pediatric Research.

Anderko, L., Schenk, E., Huffling, K., & Chalupka, S. (2016) Climate Change, Health and Nursing: A Call to Action. Alliance of Nurses for Healthy Environments. Available at: <https://envirn.org/climate-change-health-and-nursing/>.

Anderko, L., Chalupka, S., Gray, W. & Kesten, K. (2013). Greening the 'Proclamation for Change': Healing through sustainable health care environments American Journal of Nursing 113(4):52-59.

Anderko, L. Chalupka, S. M., Afzal, B.M. (2012). Climate change and health: Is there a role for the healthcare sector? Catholic Health Association of the United States. Available at: <http://www.chausa.org/docs/default-source/general-files/9c161534f9e94b3bb2f34a3cc191e97f1-pdf.pdf?sfvrsn=0>

Anderko, L., Schenk, E., Huffling, K., & Chalupka, S. (2016). Climate Change, Health and Nursing: A Call to Action. Alliance of Nurses for Healthy Environments. Available at: <https://envirn.org/climate-change-health-and-nursing/>.

Asad, H. & Carpenter, D. (2018). Effects of climate change on the spread of Zika virus: a public health threat. *Reviews on Environmental Health*, 33(1), pp. 31-42. Retrieved 3 Jun. 2018, from doi:10.1515/reveh-2017-0042

Auger, N., Fraser, W. D., Smargiassi, A., & Kosatsky, T. (2015). Ambient Heat and Sudden Infant Death: A Case-Crossover Study Spanning 30 Years in Montreal, Canada. *Environmental Health Perspectives*, 123(7), 712–716. <http://doi.org/10.1289/ehp.1307960>.

Battisti, D.S., and Naylor, R.L. (2009). Historical warnings of future food insecurity with unprecedented seasonal heat. *Science*, 323 (5911), 240–44. doi:10.1126/science.1164363.

Basu, R., Malig, B., & Ostro, B. (2010). High ambient temperature and the risk of preterm delivery. *American Journal of Epidemiology*, 172(10), 1108-17, doi: 10.1093/aje/kwq170.

Benson, W. F. (2009). CDC's disaster planning goal: Protect vulnerable older adults. Retrieved from http://www.cdc.gov/aging/pdf/disaster_planning_goal.pdf

Berry, H.L., Bowen, K. & Kjellstrom, T. (2010). Climate change and mental health: A causal pathways framework. *International Journal of Public Health*, 55(2), 23–132. Doi: 10.1007/s00038-009-0112-0

Berry, H., Waite, T.D., Dear, K.B.G., Capon, A.G., & Murray, V. (2018). The case for systems thinking about climate change and mental health, *Nature Climate Change* 8(4):282-290

Bourque, F., & Cunsolo Willox, A. (2014). Climate change: The next challenge for public mental health? *International Review of Psychiatry*, 26, 415-422. doi:10.3109/09540261.2014.92

Burke, M. & Lobell, D. (2010). Climate effects on food security: An overview. *Climate Change and Food Security Advances in Global Change Research*, 37(1), 13-30, doi: 10.1007/978-90-481-2953-9_2.

Burke, S.E.L., Sanson, A.V., & Van Hoom, J. (2018). The psychological effects of climate change on children. *Current Psychiatry Reports* 20(5), 35.

Carolan-Olah, M., Frankowska, D. (2014). High environmental temperature and preterm birth: a review of the evidence. *Midwifery*, 30(1), 50-9. doi: 10.1016/j.midw.2013.01.011. Epub 2013 Mar 7

Chalupka, S., Anderko, L. & Pennea, E. (2020). Climate Change, climate justice, and children's mental health: A generation at risk, *Environmental Justice* 13(1).

Chan, M. (September 2007). Address to the Regional Committee for the Western Pacific . World Health Organization. Retrieved from http://www.who.int/dg/speeches/2007/20070910_korea/en/.

Costello, A., Maslin, M., Montgomery, H., Johnson, A.M., & Ekins, P. (2011). Global health and climate change: Moving from denial and catastrophic fatalism to positive action, *Philosophical Transactions of the Royal Society of London, Series A, Mathematical and Physical Sciences*, 369(1942), 1866-82.

Cunsolo Willox, A., Harper, S., Edge, V., Landman, K., Houle, K., & Ford, J. (2013). The Rigolet Inuit Community Government 'The land enriches the soul': on climatic and environmental change, affect, and emotional health and well-being in Rigolet, Nunatsiavut, Canada. *Emotion Space and Society*, 6(14), 14–24.

Cusack, L, de Crespigny, C, Athanasos, P. (2011). Heatwaves and their impact on people with alcohol, drug and mental health conditions :A discussion paper on clinical practice considerations. *Journal of Advanced Nursing*, 67(4), 915-22. doi: 10.1111/j.1365-2648.2010.05551.x.

D'Amato, G., Cecchi, L., D'Amato, M., Liccardi, G. (2010). Urban air pollution and climate change as environmental risk factors of respiratory allergy: An update. *Journal of Investigational Allergology Clinical Immunology*, 20(2): 95-102.

Delpla, I., Jung, A.V., Baures, E., Clement, M., & Thomas, O. (2009). Impacts of climate change on surface water quality in relation to drinking water production. *Environment International*, 35, 1225–1233.

Diffenbaugh, N.S., Singh, D., Mankin, J.S., Horton, D.E., Swain, D.L., et al. (2017). Quantifying the influence of global warming on unprecedented extreme climate events. *PNAS*, 114 (19) 4881-4886. Available at: <https://doi.org/10.1073/pnas.1618082114>

Fritze, J.G., Blashki, G.A., Burke, S. & Wiseman, J. (2008). Hope, despair and transformation: Climate change and the promotion of mental health and wellbeing. *International Journal of Mental Health Systems*, 2 (13). <https://doi.org/10.1186/1752-4458-2-13> epub 2008 Sept 17

Food and Agriculture Organization of the United Nations (2014). Food balance sheets, 1970–2011. Rome, Italy: FAO.

Retrieved from: <http://www.fao.org/faostat/en/#data/FBS/visualize>

Gould, R. (April 12, 2011). Climate Change and the Role of Health Care Professionals: Education, Mitigation, and Advocacy. Earth Day Webinar hosted by Practice Greenhealth. Retrieved from <http://www.practicegreenhealth.org/private/material/3582>.

Haq, G. (2017). Growing old in a changing climate. Public Policy & Aging Report, 27(1), 8-12. doi.org/10.1093/ppar/prw027

He, Jianrong & Liu, Yu & Xia, Xiao-Yan & Ma, Wen & Lin, Hualiang & Kan, Hai-Dong & Lu, Jinhua & Feng, Qiong & Mo, Wei-Jian & Wang, Ping & Xia, Hui-Min & Qiu, Xiu & Muglia, Louis. (2015). Ambient Temperature and the Risk of Preterm Birth in Guangzhou, China (2001–2011). Environmental Health Perspectives. 124. 10.1289/ehp.1509778.

Homer, C. S.E., Hanna, E. & McMichael, A.J. (2009) Climate change threatens the millennium development goal for maternal health. Midwifery.25(6):606-12. doi: 10.1016/j.midw.2009.09.003

Johnson, L (March 1, 2011). Gains from Clean Air Act: Bull Market Without the Bust http://switchboard.nrdc.org/blogs/ljohnson/gains_from_clean_air_act_a_bul.html.

Kjellstrom, T., & McMichael, A. J. (2013). Climate change threats to population health and well-being: the imperative of protective solutions that will last. Global Health Action, 6, 10.3402/gha.v6i0.20816. <http://doi.org/10.3402/gha.v6i0.20816>

Knowlton, K. (2008). Preparing for Global Warming: A Framework for Protecting Community Health and the Environment in a Warmer World. Retrieved from <http://www.nrdc.org/globalwarming/preparedness.pdf>.

Kuehn, L., & McCormick, S. (2017). Heat Exposure and Maternal Health in the Face of Climate Change. International Journal of Environmental Research and Public Health, 14(8), 853. <http://doi.org/10.3390/ijerph14080853>

Kloog, .I, Sorek-Hamer, M., Lyapustin, A., Coull, B., Wang, Y., Just, A.C., Schwartz, J., Broday, D.M.. Estimating daily PM2.5 and PM10 across the complex geo-climate region of Israel using MAIACsatellite-based AOD data. Atmospheric Environment(122), 409-416. doi: 10.1016/j.atmosenv.2015.10.004. Epub 2015 Oct 8

La Greca, A.M., Lai, B.S., Llabre, M.M., Silverman, W.K., Vernberg, E.M., & Prinstein, M.J. (2013) . Children's post-

disaster trajectories of PTS Symptoms: Predicting chronic distress, Child and Youth Care Forum,42(4), 351-369.

Leffers, J. & Butterfield, P. (2018). Nurses play essential roles in reducing health problems due to climate change. Nursing Outlook, 66, 210-213.

Medek, D.E., Schwartz, J. & Myers, S.S (2017). Estimated effects of future atmospheric CO2 concentrations on protein intake and the risk of protein deficiency by country and region, Environ Health Perspectives, 125 (8), DOI:10.1289/EHP4

Miranda, M. L., Hastings, D.L, Aldy, J.E. & Schlesinger, W.H., (2011). The environmental justice dimensions of climate change. Environmental Justice, 4, 17-25. doi:10.1089/env.2009.00

Muller, C., Cramer, W., Hare, W., & Lotze-Campen, H. (2011). Climate change risks for African agriculture. Proceedings of the National Academy of Sciences of the United States of America, 108(11), 4313-4315.

Myers, S.S., Smith, M.R., Guth, S., Golden, C.D., Vaitla, B., Mueller, N.D., Dangour, A. D., & Huybers, P. (2017). Climate change and global food systems: potential impacts on food security and undernutrition . Annual. Review of Public Health, 38:259–77. <https://doi.org/10.1146/annurev-publhealth-031816-044356>

Myers, S, Zanobetti, A, Kloog, I, Huybers, P., Leakey, A.D., Bloom, A.J.,, Carlisle, E., Dietterich, L.H., Fitzgerald, G., Hasegawa, T., Holbrook, N.M.,, Nelson, R.L.,, Ottman, .MJ.,, Raboy, V., Sakai, H., Sartor, K.A., Schwartz, J., Seneweera , S., Tausz. M., & Usui , Y. (2014). . Increasing CO2 threatens human nutrition. Nature, 510, (7503):139-42. doi: 10.1038/nature13179. Epub 2014 May 7.

New York Times (2012, November 1). Mapping Hurricane Sandy's deadly toll. Retrieved from <https://archive.nytimes.com/www.nytimes.com/interactive/2012/11/17/nyregion/hurricane-sandy-map.html>.

Page, L. A. & Howard, L.M. (2010). The impact of climate change on mental health (But will mental health be discussed at Copenhagen? Psychological Medicine, 40, 177– 180. doi:10.1017/S0033291709992169.

Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J., Hanson, C.E., eds. (2007). Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge UK: Cambridge University Press.

Perera, E.M. & Sanford, T. (2011). Climate Change and Your Health: Rising Temperatures and Worsening Ozone

Pollution, The Union of Concerned Scientists, available at: http://www.ucsusa.org/assets/documents/global_warming/climate-change-and-ozone-pollution.pdf.

Pietrzak, R. H., Van Ness, P. H., Fried, T. R., Galea, S., & Norris, F. H. (2013). Trajectories of posttraumatic stress symptomatology in older persons affected by a large-magnitude disaster. *Journal of Psychiatric Research*, 47(4), 520–526. <http://doi.org/10.1016/j.jpsychires.2012.12.005>

Pillemer, K. and Filiberto, D. (2017). Mobilizing older people to address climate change. *Public Policy & Aging Report*, 27(1), 18–21. <https://doi.org/10.1093/ppar/prw030>

Pollitt, P., Sattler, B., Butterfield, P., Anderko, L., Brody, C., Mood, L., ... & Cook, K. (2020). Environmental nursing: Leaders reflect on the 50th anniversary of Earth Day. *Public Health Nursing* 00, 1-12. <https://doi.org/10.1111/phn.12703>

Portier, C.J. & Tart, K.T. (eds) (2010). The Interagency Working Group on Climate Change and Health (IWGCCCH): A human health perspective on climate change: Report outlining the research needs on the human health effects of climate change. Research Triangle Park, NC, Environmental Health Perspectives and National Institute of Environmental Health Sciences.

Reilly T.H. & Kirk M.A. (2007) Atypical antipsychotics and newer antidepressants. *Emergency Medicine Clinics of North America*, 25(2), 477–497

Rylander, C., Odland, J.O. & Sandanger, T. M. (2013) Climate change and the potential effects on maternal and pregnancy outcomes: an assessment of the most vulnerable the mother, fetus, and newborn child, *Global Health Action*, 6: 19538 <http://dx.doi.org/10.3402/gha.v6i0.19538>

Schifano P., Asta F., Dadvand P., Davoli M., Basagana X., Michelozzi P. (2016). Heat and air pollution exposure as triggers of delivery: A survival analysis of population-based pregnancy cohorts in Rome and Barcelona. *Environment International*, 88, 153–159. doi: 10.1016/j.envint.2015.12.01

Sheffield, P. E. & Landrigan, P. J. (2011). Global climate change and children's health: Threats and strategies for prevention. *Environmental Health Perspectives*, 119(3), 291–298. doi:10.1289/ehp.1002233

Sherman, J., Thiel, C., MacNeill, A., Eckelman, R, et al. (2020). A green print: Advancement of sustainability in healthcare. *Resources, Conservation & Recycling* (161).

Stone, B., Vargo, J., Liu, P., Habeeb, D., DeLucia, A., Trail, A., Hu, Y. & Russell, A. (2014). Avoided heat-related mortality

through climate adaptation strategies in three US cities. *PLOS ONE*, 9(6), DOI: 10.1371/journal.pone.0100852

Thacker, M., Lee, R., Sabogal, R., & Henderson, A. (2008). Overview of deaths associated with natural events, United States, 1979-2004. *Disasters*, 32, 303-315. doi:10.1111/j.1467-7717.2008.01041.

Trombly, J., Chalupka, S., & Anderko, L. (2017). Climate Change and Mental Health. *American Journal of Nursing*, 114(4), 44-52. doi: 10.1097/01.NAJ.0000515232.51795.fa

United Nations Department of Social Economic and Social Affairs (2017). The World Population Prospects: 2017 Revision. Retrieved from: <https://www.un.org/development/desa/publications/world-population-prospects-the-2017-revision.html>

US Environmental Protection Agency (EPA) (2011a). Heat Island Impacts. Retrieved from <http://www.epa.gov/heatisld/impacts/index.htm>.

US Environmental Protection Agency (EPA), Office of Air and Radiation. (March 2011b). The Costs and Benefits of the Clean Air Act: Summary Report. <https://www.epa.gov/sites/production/files/2015-07/documents/summaryreport.pdf>

US Environmental Protection Agency (USEPA) (2016). Climate change and the health of older adults. EPA 430-F-16-058. Retrieved from: <https://archive.epa.gov/epa/climate-impacts/communicating-vulnerabilities-climate-change-older-adults.html>

USGCRP (2016): The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. Crimmins, A., J. Balbus, J.L. Gamble, C.B. Beard, J.E. Bell, D. Dodgen, R.J. Eisen, N. Fann, M.D. Hawkins, S.C. Herring, L. Jantarasami, D.M. Mills, & S. Saha. M.C. Sarofim, J. Trtanj, and L. Ziska, Eds. U.S. Global Change Research Program, Washington, D.C. <http://dx.doi.org/10.7930/J0R49NQX>

Van Zutphen, A. R., Lin, S., Fletcher, B. A., & Hwang, S.-A. (2012). A Population-Based Case–Control Study of Extreme Summer Temperature and Birth Defects. *Environmental Health Perspectives*, 120(10), 1443–1449. <http://doi.org/10.1289/ehp.1104671>

Watts, N., Amann, M., Adger, W. N., Ayeb-Karlsson, S., Bellasova, K., Bouley, T., ... Costello, A. (2017). The Lancet Countdown on health and climate change: From 25 years of inaction to a global transformation for public health. *Lancet*, 390(10107).

World Bank. (2017). Climate-Smart Healthcare: Low-Carbon and Resilience Strategies for the Health Sector. World Bank.

World Health Organization (2017). G7 health ministers. Retrieved from <http://www.who.int/dg/speeches/2017/g7-health-ministers/en/>.

World Health Organization (WHO) (2009). Protecting Health from Climate Change: Connecting Science, Policy and People. Geneva: Author.

Zanobetti, A., O'Neil, M. S., Gronlund, C. J., & Schwartz, J. D. (2012). Summer temperature variability and long-term survival among elderly people with chronic disease. *PNAS*, 109, 17,6608–6613. doi:10.1073/pnas.1113070109

Zhang Y., Yu C., & Wang L. (2017). Temperature exposure during pregnancy and birth outcomes: An updated systematic review of epidemiological evidence. *Environmental Pollution*. 225:700-712. doi: 10.1016/j.envpol.2017.02.066

CLIMATE CHANGE AND THE HEALTH OF OLDER ADULTS

Stephanie Chalupka, EdD, RN, PHCNS-BC, FAOHN, FNAP

Professor and Director, Master of Science in Nursing Program, Department of Nursing, Worcester State University

Visiting Scientist, Environmental and Occupational Medicine and Epidemiology Program, Department of Environmental Health, Harvard T.H. Chan School of Public Health

Janna Trombley, MS, RN

Instructor, Department of Nursing, Worcester State University

INTRODUCTION

Climate change will affect everyone but will not affect everyone equally. Some population groups (e.g., children, older adults, those with chronic illness, and the poor) will be more severely impacted because of their unique vulnerabilities. For older adults, climate change is considered to be a “threat multiplier” exacerbating underlying or pre-existing problems (Smyer, 2017). Older adults are a particularly at-risk group due to changes in physiology, age-related mobility limitations, cognition, and restricted access to resources. These factors can increase social vulnerability, limit adaptive capacity, and have significant health implications.

The number of Americans 65 years and older is projected to nearly double from 52 million in 2018 to 95 million by 2060. Those 65 and older will comprise 23% of the US population by 2060 (Population Reference Bureau, 2020). Adults aged 65 and older in the United States are a very diverse population with distinct subpopulations. They can be differentiated by age, socioeconomic status, general health, level of disability, race/ethnicity, educational attainment, family/community support, or other characteristics. Therefore, the effects of climate change can be variable depending on health status pre-exposure, social characteristics and psychological well-being (Gamble et al., 2013). Understanding the threats that climate change poses to the health of older adults can help nurses work with older adults, their families, caregivers, community-based organizations, and policymakers to lower the risks and be prepared.

(Image credit: US EPA, 2016) Reproduced as part of public domain.

CLIMATE-RELATED FACTORS IMPACTING HEALTH



Heat

Extreme heat and heat waves are projected to increase in frequency, intensity, and duration as a result of climate change (Gamble et al., 2016). The aging adult is particularly at risk due to the adverse health effects related to extreme heat (Gamble et al., 2016). As one ages, the body's thermoregulatory mechanisms can become impaired, thus leading to increased risk of morbidity and mortality from heat related events among older adults (Carnes, Staats, & Willcox, 2014). Adults on multiple medications, specifically medications that impair the body's ability to thermoregulate such as anticholinergics or psychiatric medications, can be even more vulnerable to developing heat related illness (Gamble et al., 2016; McDermott-Levy et al., 2019). There is a well-documented association between increased temperatures and death in adults aged 65 years old or older (Sarofim et al., 2016). There have also been established relationships between increased temperatures and hospitalization for cardiovascular or respiratory conditions among this population (Sarofim et al., 2016; Smyer, 2017).

Extreme Events and Disasters

Older adults are particularly vulnerable to injury, illness, and mortality as a result of climate related disasters (Spurlock et al., 2019). These disasters may include wildfires, floods, and hurricanes. The vulnerability of older adults is largely due to disruptions in access to health services, medications, and safe shelter (McDermott-Levy et al., 2019). Those with impairments in cognition, sensory awareness, or mobility and those who are economically burdened are at even increased risk of poor health outcomes due to difficulty in evacuation and recovery from disaster events (Gamble et al., 2016; Spurlock et al., 2019). In fact, 71% of fatalities associated with Hurricane Katrina in 2004 (Centers for Disease Control and Prevention [CDC], 2018) and 50% of fatalities associated with Hurricane Sandy in 2012 were among those 65 years old or older (CDC, 2018; Haq &

Gutman, 2014; Spurlock et al., 2019). Transportation to safe shelter also increases the risk of delirium among this population (McDermott-Levy & Fick, 2020). Additionally, it has been found that this age group experience symptoms of post-traumatic stress disorder and adjustment disorders at a higher rate than younger adults (Parker et al., 2016). Inability to maintain medication regimens is of particular concern with the older adult population due to increased chronic conditions and functional impairment (McDermott-Levy & Fick, 2020). Due to interruption in health services as a result of disasters, the older adult may be forced to go without medications for an unknown period of time, which can exacerbate these conditions and cause increased morbidity and mortality (Spurlock et al., 2019).

Air Quality

Criteria air pollutants in the United States include ozone, particulate matter, nitrogen dioxide, sulfur dioxide, carbon monoxide, and lead, all of which can be harmful to human health (United States Environmental Protection Agency, 2017). Levels of these criteria pollutants are anticipated to increase as both a direct and indirect result of climate change (Mirsaeidi et al., 2016). Older adults are vulnerable to the impacts of air pollution due to decreased pulmonary function compared to younger individuals (George, Bruzzese, & Matura, 2017). There has been an association found between increased air pollution levels and worsening of chronic conditions such as diabetes, dyslipidemia, cardiovascular, and respiratory illness in older adults, even at levels below the recommended thresholds (Lin, Yan, Liu, Yin, & Kuang, 2017; McDermott-Levy & Fick, 2020). Additionally, exposure to air pollution has been found to be possibly associated with increased risk of dementia among the elderly (Chen et al., 2017; Power et al., 2016). Short-term increases in particulate matter exposure appear to be positively associated with depression related ED attendance risk (Braithwaite et al., 2019). Associations between short- and long-term exposure to ambient air pollution components (specifically fine particulate matter) and depression among older adults have been identified (Buoli et al., 2018; Kioumourtzoglou et al., 2017; Pun, Manjourides, & Suh, 2017).

Older adults will also be exposed to increased levels of allergens due to alterations in the seasonal production of pollen, especially in middle and high latitudes in the United States (Gamble et al., 2013). Additionally, drought and wildfires are anticipated to increase in both frequency and severity, causing increased levels of dust and smoke in the atmosphere, thus exacerbating pre-existing respiratory conditions (Gamble et al., 2013).

Infectious Diseases

Climate change is increasing the geographic range and seasonal distribution of many vector-borne illnesses. Vector-borne diseases, especially those carried by mosquitoes and ticks (e.g., Lyme Disease and West Nile Virus), are projected to become more prevalent as climate change progresses (U.S. Global Change Research Program [USGCRP], 2018). Older adults are more likely to have compromised immune systems, thus putting them at greater risk for the negative sequelae of these diseases (Gamble et al., 2013).

Climate-related extreme rainfall events impact water quality and can cause enteric disease. There are up to 59 million cases of enteric disease attributable to the consumption of contaminated groundwater globally each year. The main pathogens campylobacter, shigella, hepatitis A, giardia, norovirus, and cryptosporidium have also been the cause of several large outbreaks. Exposure to waterborne pathogens in drinking water and recreational water is predicted to continue to increase as the climate changes (Haq, 2017; Hales, 2019). Due to pre-existing medical conditions and lower functioning immune systems, older adults will have a higher risk of acquiring gastrointestinal illnesses, which can lead to increased mortality among this population (Haq & Gutman, 2014; Gamble et al., 2016; USGCRP, 2018).

Food Stress

It is anticipated that climate change will destabilize food systems and compromise food safety, nutrition, production, and distribution (Haq & Gutman, 2014; Ziska et al., 2016). Crop declines could lead to undernutrition, hunger, and higher food prices. More CO₂ in the air could make staple crops like barley and soy less nutritious (Chalupka, Anderko, & Pennea, 2020). Since 2001, the number of food insecure older adults in the United States has doubled to a staggering 5.4 million, and this number is projected to increase due to climate change (Haq & Gutman, 2014; Jih et al., 2018). Climate change will also affect the ability of the older adult to prepare effectively for weather related disasters and they may have difficulty obtaining nutritious food after extreme weather events due to interruptions in the food supply chain (Haq & Gutman, 2014; Ziska et al., 2016).

FACTORS DETERMINING EXPOSURE TO CLIMATE STRESSORS

Many factors impact the degree to which older adults are exposed to climate stressors. These include

socioeconomic characteristics, housing, neighborhood infrastructure and available social services. Socioeconomic characteristics including income/available financial resources, educational attainment, access to social and health services can impact the risk for exposure and capacity to adapt. Those living on a fixed income or in poverty, may be at greater risk in extreme heat events due to lack of access to air conditioning or reluctance to use air conditioning because of operating costs. Housing can impact exposure to climate stressors in several ways. Mobile home and manufactured housing residents are disproportionately older adults and lower income. In regions prone to natural hazards, this type of housing is particularly vulnerable to storm related damage (Prasad & Stoler, 2016). Relatively high concentrations of older adults live in areas that are expected to be particularly impacted by climate stressors such as extreme heat events, droughts, hurricanes, wildfires, floods, storm surges, increased airborne allergens, ground level ozone and other air pollutants. These include coastal zones and large urban areas in the Northeast, Midwest, and Southwest United States (USGCRP, 2018)



Figure 1. An urban heat island occurs when a city experiences much warmer temperatures than nearby rural areas. The difference in temperature between urban and less-developed rural areas has to do with how well the surfaces in each environment absorb and hold heat. *Image credit: NASA/JPL-Caltech. Reproduced as part of public domain.*

For older adults living in urban areas, the heat island effect (the city experiences much warmer temperatures than nearby rural areas) can pose additional risks to older adults. For those with limited mobility who reside in multistory buildings with an elevator, a storm-related power outage can make it extremely difficult to get food, medicine, or much needed services (Shih et al., 2018).

DETERMINANTS OF ADAPTIVE CAPACITY

Adaptive capacity is the capacity to adjust to changes in climate in order to moderate potential damage, take advantage of opportunities, or cope with consequences (Rhoades, Gruber, & Horton, 2018). Several factors impact the ability to which older Americans can adapt to our changing climate. Diminished adaptive capacity places older adults at high risk for experiencing persistent vulnerability in the aftermath of a disaster. Older adults are more likely to be socially isolated. Among Americans age 65 or older, about one-third of Medicare enrollees, or approximately 16 million nationally live alone (Shih et al., 2018). Social isolation is a significant risk factor for death during extreme heat events (National Collaborating Centre for Environmental Health, 2019).

Those with multiple chronic diseases, disabilities and mobility problems, dementia or cognitive impairments, and living in a long-term care facility are among the highest risk group of vulnerable older adults. Even those older adults living in the community can face interruptions in health care continuity as power outages in extreme weather can cripple hospitals and transportation systems and interrupt the delivery of social services when they are most needed.

This persistent vulnerability is seriously exacerbated by a lack of federal and local policies, disaster preparedness education, guidance specific to older adults, tracking systems, and warnings for individuals with sensory impairments (e.g., vision, hearing, and proprioception), compromised ambulation, and chronic conditions (Malik et al, 2018).

Functional limitation/mobility impairments including chronic disease, illness, decreased muscle strength and balance, and cognitive impairment can each significantly decrease the ability of older adults to respond effectively to climate-related stressors and events (Malik et al., 2018). Forty-four percent of people aged 65 and over enrolled in Medicare reported limitations in activities of daily living, instrumental activities of daily living, or were living in a long-term care facility. The prevalence of limitation varies with age and sex with older women reporting more impairment than older men (Federal Interagency Forum on Aging-Related Statistics, 2016). Of Americans 65 and older, about 20 to 25 percent have mild cognitive impairment while about 10 percent have dementia. As the population of older adults is expanding, the number of people affected by dementia is increasing (Langa et al., 2017). These limitations can make responding to climate-related events, evaluation, and recovery is much more challenging for older adults.

Financial resources can also have a powerful impact on adaptive capacity. Limited income or lack of access to transportation can be an impediment to evacuation. Older adults can be more vulnerable to property damage or loss and price-gouging (Federal Emergency Management Agency [FEMA], 2012). In the aftermath of climate-related disasters like hurricanes, tornados and floods, fraudulent contractors frequently prey upon older homeowners. Typically, these contractors request for upfront money but disappear before work is done or do poor quality work leaving the homeowner financially responsible (AARP, 2012; FEMA, 2012). Tools for communication and rapid dissemination of critical information (e.g., internet and social media) for preparation, survivability, and recovery from extreme weather events as well as technology to rapidly identify at risk populations including older adults can support adaptive capacity. Lack of access to, or disruption in, any of these systems can place older adults at greater risk (Gamble et al., 2013).

ADDRESSING THE CHALLENGE: REDUCING VULNERABILITY THROUGH EFFECTIVE ADAPTATION

There is strong evidence that in the absence of effective adaptation, climate change will have a disproportionate impact on older adults due to a wide variety of factors including biological and socioeconomic characteristics, housing, neighborhood infrastructure, and available social services. Effective adaptation measures will be central to addressing the risks associated with climate change faced by older adults. Development of community-based registries to identify location of older adults, particularly those who are homebound, outreach programs targeted towards older adults, and the development of community-based adaptation (e.g., Heat Alert and Response Systems [HARS]) can be effective adaptation strategies to reduce vulnerability of older adults. (See other examples in Table I). Finally, health care itself is also on the front lines of climate change. Hospitals, health centers, and health care providers must not only reduce their carbon footprint but be ready to respond effectively to climate-related extreme weather events. They must build capacity and resilience to stay operational and serve as community anchors during climate-related disasters. The nurse can be a powerful advocate for coherent policies that address the interface between climate change and older adults. Nurses, as trusted health professionals, have the opportunity to act as critical messengers by communicating the health impacts of climate change, advocating for climate-smart policies at all levels of government, and promoting measures to reduce the vulnerability of older adults and build adaptive capacity.

Table I

(United States Environmental Protection Agency, 2015)
Reproduced as part of public domain.

Heat Event Adaptation Strategies
Develop an emergency heat plan to prepare city services for a heat event
Establish cooling centers to reduce heat stress and heat-related deaths and illnesses
Provide emergency notification and well-being checks to protect the most vulnerable
Incorporate heat island reduction strategies - such as green or cool roofs, cool pavements, or increased vegetation and trees - into long-term planning efforts to help lower urban temperatures

REFERENCES

- AARP (2012). Avoiding post-disaster scams. Retrieved from: <https://www.aarp.org/money/scams-fraud/info-08-2012/avoiding-post-disaster-scams.html>
- Braithwaite, I., Zhang, S., Kirkbride, J.B., Osborn, D.P., & Hayes, J.F. (2019).
- Air pollution (particulate matter) exposure and associations with depression, anxiety, bipolar, psychosis and suicide risk: A systematic review and meta-analysis. *Environmental Health Perspectives*, 127(12), 126002-1-23. doi: 10.1289/EHP4595
- Buoli, M., Grassi, S., Calironi, A., Silva Carnevali, G., Mucci, F., Iodice, S., ... Bollati, V. (2018). Is there a link between air pollution and mental disorders? *Environment International*, 118, 154-168. doi: 10.1016/j.envint.2018.05.044
- Carnes, B.A., Staats, D., & Willcox, B.J. (2014). Impact of climate change on elder health.
- Journals of Gerontology: Biological Sciences*, 69(9), 1087-1091. doi: 10.1093/Gerona/glt159
- Chalupka, S., Anderko, L., & Pennea, E. (2020). Climate change, climate justice, and children's mental health: A generation at-risk. *Environmental Justice*, 13(1), <https://doi.org/10.1089/env.2019.0034>
- Centers for Disease Control and Prevention. (2018). Emergency preparedness & vulnerable populations:

Planning for those most at risk. Retrieved from <https://www.cdc.gov/cpr/whatwedo/vulnerable.htm>

Chen, H., Kwong, J.C., Copes, R., Hystad, P., van Donkelaar, A., Tu, K., ... Burnett, R.T. (2017). Exposure to ambient air pollution and the incidence of dementia: A population-based cohort study. *Environment International*, 217-277. doi: 10.1016/j.envint.2017.08.020

Federal Emergency Management Agency. (2012). Scam artists attempt to prey on disaster survivors. Retrieved from <https://www.fema.gov/news-release/2012/12/06/scam-artists-attempt-prey-disaster-survivors>

Federal Interagency Forum on Aging-Related Statistics. (2016). Older Americans 2016: Key indicators of well-being. Retrieved from: <https://agingstats.gov/docs/LatestReport/Older-Americans-2016-Key-Indicators-of-WellBeing.pdf>

Gamble, J.L., Balbus, J., Berger, M., Bouye, K., Campbell, V., Chief, K., ... Wolkin, A.F. (2016). Populations of concern. In *The impacts of climate change on human health in the United States: A scientific assessment* (chapter 9). Retrieved from <https://health2016.globalchange.gov/populations-concern>

Gamble, J.L., Hurley, B.J., Schultz, P.A., Jaglom, W.S., Krishnan, N., & Harris, M. (2013). Climate change and older Americans: State of the science. *Environmental Health Perspectives*, 121(1), 15-21. doi: 10.1289/ehp.1205223

George, M., Bruzzese, J.M., & Matura, L.A. (2017). Climate change effects on respiratory health: Implications for nursing. *Journal of Nursing Scholarship*, 49(6), 644-652. doi: 10.1111/jnu.12330

Hales, S. (2019) Climate change, extreme rainfall events, drinking water and enteric disease. *Reviews on Environmental Health*; 34(1): 1-3. doi: 10.1515/reveh-2019-2001

Haq, G., & Gutman, G. (2014). Climate gerontology. *Zeitschrift fuer Gerontologie und Geriatrie*, 47, 462-467. doi: 10.1007/s00391-014-0677-y.

Haq, G. (2017). Growing old in a changing climate. *Public Policy & Aging Report*, 27(1), 8-12. doi:10.1093/ppar/prw027

Jih, J., Stijacic-Cenzer, I., Seligman, H.K., Boscardin, J., Nguyen, T.T., & Ritchie, S. (2018). Chronic disease burden predicts food insecurity among older adults. *Public Health Nutrition*, 21(9), 1737-1742. doi: 10.1017/S1368980017004062

Kioumourtzoglou, M.A., Power, M.C., Hart, J.E., Okereke, O.I., Coull, B.A., Laden, F., & Weisskopf, M.G. (2017). The association between air pollution and onset of depression among middle-aged and older women. *American Journal of Epidemiology*, 185(9), 801-809. doi: 10.1093/aje/kww163

Langa, K., Larson, E.B., Crimmins, E.M., Faul, Levine, D.A., Kabeto, M.U. & Weir, D. R. (2017). A comparison of the prevalence of dementia in the United States in 2000 and 2012. *JAMA Internal Medicine*, 177(1), 51-58. doi:10.1001/jamainternmed.2016.6807

Liu, S., Yan, Z., Liu, Y., Yin, Q., & Kuang, L. (2017). Association between air pollution and chronic diseases among the elderly in China. *Natural Hazards*, 89, 79-91. doi: 10.1007/s11069-017-2955-7

Malik, S., Lee, D. C., Doran, K. M., Grudzen, C. R., Worthing, J., Portelli, I., ... Smith, S.W. (2018). Vulnerability of older adults in disasters: Emergency department utilization by geriatric patients after hurricane sandy. *Disaster Medicine and Public Health Preparedness*, 12(2), 184-193. doi: 10.1017/dmp.2017.44

McDermott-Levy, R., & Fick, D.M. (2020). Advancing gerontological nursing science in climate change. *Research in Gerontological Nursing*, 13(1), 6-12. doi: 10.3928/19404921-20191204-02

McDermott-Levy, R., Kolanowski, A.M., Fick, D.M., & Mann, M.E. (2019). Addressing the health risks of climate change in older adults. *Journal of Gerontological Nursing*, 45(11), 21-29. doi: 10.3928/00989134-20191011-04

Mirsaeidi, M., Motahari, H., Taghizadeh Khamesi, M., Sharifi, A., Campos, M., & Schraufnagel, D.E. (2016). Climate change and respiratory infections. *Annals of the American Thoracic Society*, 13(8), 1223-1230. doi: 10.1513/AnnalsATS.201511-729PS

National Collaborating Centre for Environmental Health (2019). Extreme heat. Retrieved from <http://www.nccch.ca/environmental-health-in-canada/health-agency-projects/extreme-heat>

Parker, G., Lie, D., Siskind, D.J., Martin-Khan, M., Raphael, B., Crompton, D., & Kisely, S. (2016). Mental health implications for older adults after natural disasters: A systematic review and meta-analysis. *International Psychogeriatrics*, 28(1), 11-20. doi: 10.1017/S1041610215001210

Population Reference Bureau (2020). Fact sheet: Aging in the United States. Retrieved from <https://www.prb.org/aging-unitedstates-fact-sheet/>

Power, M.C., Adar, S.D., Yanosky, J.D., & Weuve, J. (2016). Exposure to air pollution as a potential contributor to cognitive function, cognitive decline, brain imaging, and dementia: A systematic review of epidemiologic research. *NeuroToxicology*, 56, 235-253. doi: 10.1016/j.neuro.2016.06.004

Prasad, S., & Stoler, J. (2016). Mobile home residents and vulnerability in South Florida: Research gaps and challenges. *International Journal of Disaster Risk Science* 7, 436–439. <https://doi.org/10.1007/s13753-016-0101-x>

Pun, V.C., Manjourides, J., & Suh, H. (2017). Association of ambient air pollution with depressive and anxiety symptoms in older adults: Results from the NSHAP Study. *Environmental Health Perspectives*, 125(3), 342-348. doi: 10.1289/EHP494

Rhoades, J. L., Gruber, J. S & Horton, B. (2018). Developing an in-depth understanding of elderly adult's vulnerability to climate change. *Gerontologist*, 58(3), 567–577 doi:10.1093/geront/gnw167

Sarofim, M.C., Saha, S., Hawkins, M.D., Mills, D.M., Hess, J., Horton, R., ... St. Juliana, A. (2016). Temperature-related death and illness. In *The impacts of climate change on human health in the United States: A scientific assessment*. (chapter 2). Retrieved from <https://health2016.globalchange.gov/temperature-related-death-and-illness>

Shih, R. A., Acosta, J. D., Chen, E. K., Carbone, E. G., Xenakis, L., Adamson, D. M., & Chandra, A. (2018). Improving disaster resilience among older adults: Insights from public health departments and aging-in-place efforts. *Rand Health Quarterly*, 8(1), 3.

Smyer, M. A. (2017). Greening gray: Climate action for an aging world. *Public Policy & Aging Report*, 27(1), 4-7.

Spurlock, W.R., Rose, K., Goodwin Veenema, T., Sinha, S.K., Gray-Miceli, D., Hitchman, S., ... Miller, E.T. (2019). American Academy of Nursing on policy position statement: Disaster preparedness for older adults. *Nursing Outlook*, 67, 118-121. doi: 10.1016/j.outlook.2018.12.002

United States Environmental Protection Agency. (2015). Community-based adaptation to a changing climate. Retrieved from https://www.epa.gov/sites/production/files/2016-09/documents/community-based-adaptation_handout.pdf

United States Environmental Protection Agency. (2016). Communicating vulnerabilities to climate change: older adults. Retrieved from [https://archive.epa.gov/epa/climate-](https://archive.epa.gov/epa/climate-impacts/communicating-vulnerabilities-climate-change-older-adults.html)

[impacts/communicating-vulnerabilities-climate-change-older-adults.html](https://archive.epa.gov/epa/climate-impacts/communicating-vulnerabilities-climate-change-older-adults.html)

United States Environmental Protection Agency. (2017). Criteria air pollutants. Retrieved from https://19january2017snapshot.epa.gov/criteria-air-pollutants_.html

U.S. Global Change Research Program. (2018). Impacts, risks, and adaptation in the United States: Fourth national climate assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018.

Ziska, L., Crimmins, A., Auclair, A., DeGrasse, S., Garofalo, J.F., Khan, A.S., ... Walls, I. (2016). Food safety, nutrition, and distribution. In *The impacts of climate change on human health in the United States: A scientific assessment* (chapter 7). Retrieved from <https://health2016.globalchange.gov/food-safety-nutrition-and-distribution>

CLIMATE CHANGE MITIGATION

Erin Johnson MPH, MSN, RN

Health Promotion Council, Public Health Management Corporation

DEFINITION OF CLIMATE CHANGE MITIGATION

The direct and indirect impacts of climate change on health are well documented. Cardiac and circulatory disease, effects on pregnancy outcomes, respiratory illness, disease vector population patterns, and impacts on safe food and water access are among the health-related concerns associated with climate change (Ghazali et al, 2018). Achieved through policies, programs and individual actions, climate change mitigation generally attempts to reduce human emissions of greenhouse gasses. The United States healthcare sector contributes close to 10% of the nation's greenhouse gas emissions (Eckelman & Sherman, 2016).

In addition to reducing human emissions of greenhouse gasses, climate change mitigation efforts enhance the capacity of carbon reservoirs (such as forests or soil) to absorb carbon-containing greenhouse gases (Drawdown, 2017).

Some examples of climate change mitigation include reducing energy demand, increasing energy efficiency, replacing fossil fuels with lower carbon energy, and reducing the use of fossil fuels in products, processes and as a power source. Mitigation efforts are considered “upstream” determinants of health for current and future generations (Leffers, McDermott-Levy, Nicholas, & Sweeney, 2017 & Butterfield, 2017).

WHY CLIMATE CHANGE MITIGATION?

Prioritization of climate mitigation initiatives, projects, programs and efforts should take the relative potency of greenhouse gases into account – the gases differ in concentration, potency and lifespan, and are variously integrated into our life and industrial processes. Greenhouse gases include carbon dioxide, methane, nitrous oxide, and fluorinated gases. The potency of each gas as a greenhouse or “planet warming” gas depends on how long it remains in the atmosphere and how well it absorbs solar energy. Each of these gases remain in the atmosphere for varying amounts of time – some for just a few years, while others are in the atmosphere for thousands of years. For example, methane is in the atmosphere for a significantly shorter period of time than carbon dioxide, but is far more powerful at trapping heat. Over time, greenhouse gases mix across the entire planet. The Earth and its atmosphere are a closed system, much like a terrarium: greenhouse gases emitted in one place on the planet eventually impact every place on the

planet, and similarly gases that are emitted today can impact the climate, biodiversity, population sizes, experiences and survival of many future generations of people, plants, animals and ecosystems (EPA, n.d.).

While the United States healthcare industry is only one of many sources (of direct and indirect) contributors to climate change, it is a significant contributor. Eckelman and Sherman (2016) note that the healthcare industry contributes to acid rain (12%), greenhouse gas emissions (10%), smog formation (10%) criteria air pollutants (9%), stratospheric ozone depletion (1%), and carcinogenic and non-carcinogenic air toxics (1-2%). As a result, the healthcare industry contributes to the burden of disease correlated with fossil fuels pollution and corresponding climate change at the population level. Becoming aware of the connections between health, climate change and fossil fuels extraction and use can help motivate and target efforts to protect human and environmental health: Though climate mitigation, the health of people, communities, and the planet are protected (Schenk, 2019).

WHY NURSES

Nurses can be an enormous asset to mitigation efforts. Effective mitigation efforts are particularly challenging since high-quality policies, strategies, practices and workflows must be developed, implemented and enforced at the systemic level for the most significant impact. As of 2018, there were 2.7 million active registered nurses, the largest group of healthcare professionals (Schenk, 2019). Often working collaboratively, nurses are integrated across all levels of the healthcare system and are present in enormously diverse practice settings. They are intimately involved with the workflow and support of patients in the clinical setting, or in the home. As they go about their work, nurses are able to make gains in efficiency, reducing materials waste and energy use.

Nurses are familiar with the materials and instruments of care, enabling them to be informed participants in decision making about the necessity and utility of specific supplies. They can change how care is clustered, impacting energy consumed by appliances or lighting. Nurses can work together in small groups to conduct environmental projects, analyzing certain practices, products or work flows to determine how to increase efficiencies or reduce environmental impact. Nurses interact with most aspects of the waste stream, enabling them to influence the way in which wastes are segregated, measured and reduced (Schenk, 2019).

A holistic approach to care enables nurses to gain a fluid understanding of which factors impact patient admissions to clinical settings, and subsequent health outcomes upon discharge to home. Through a variety of means, nurses can gather information on how their individual patient is situated in the milieu of family and community life, and how socio-economic factors contribute to environmental health exposures in homes and neighborhoods. For example, a nurse might suspect that the compounded effects of proximity to industrial air pollutants, and a lack of access to prenatal care have put a pregnant woman at greater risk for having a low birthweight baby. Nurses have a great opportunity to provide education, to prevent harm and to care for the well-being of individuals and communities.

For all of these reasons, nurses are uniquely positioned to work individually or collaboratively to initiate and support climate mitigation efforts (Schenk, 2019).

MITIGATION EXAMPLES

Energy efficiency reduces the amount of energy utilized to provide products and services. At the systems level, hospitals and clinics depend on appliances, such as freezers, refrigerators, washers, and dryers to function optimally. Updating older appliances to newer, more efficient appliances can yield great energy efficiency gains (Practice Greenhealth, n.d.). Systems-wide efficiencies can also be achieved through thoughtful changes to lighting (such as passive lighting through design or upgrading fixtures), utilization of window tints to reduce solar heat (and thereby reducing the need for air conditioning), and the installation of green roofs (Practice Greenhealth, n.d.). Hospitals and clinics can work with group purchasing organizations to select products that utilize fewer fossil fuels in the manufacturing and distribution process, and that have a lesser impact on natural systems. Analyzing and considering the entire supply chain of products ordered, from resource extraction, impact on natural systems, to packaging, and distribution can help make decisions about which products to order (McDermott-Levy, Upshall, Moore & Leffers, in review). Working with operating rooms and anesthesia professionals, decisions can similarly be made about which inhaled gases are best for patients and also produce fewer greenhouse gases (Practice Greenhealth, n.d.). Practice settings can work to enhance transportation-related efficiency by creating and utilizing incentive programs to bike to work, to carpool or take public transit (Ghazali, 2018; Schenk, 2019). There are many other small and large steps that organizations and individuals can take to mitigate the most devastating effects of climate change. Most require research, some

require changes in policy, purchasing strategies, communications, collaborative strategies or in work flow.

MORE WAYS TO INVOLVED

Organizations like [Healthcare Without Harm](#) and [Practice Green Health](#) are working hard to address climate impacts in the healthcare setting via materials sourcing, supply chains analyses, changes to workflow, the introduction of metrics, or transportation of goods. Their websites provide tools for institutional-level change and offer resources to stay motivated and informed.

Inspiring and motivating, [Project Drawdown](#) “is a world-class research organization that reviews, analyses, and identifies the most viable global climate solutions, and shares these findings with the world.” Project Drawdown researches and prioritizes solutions to shift the global climate change conversation from “doom and gloom” defeatism to actionable opportunity and empowerment. The website and accompanying book (called Drawdown) enhance learning and action through a variety of online courses, resources and support and include information on carbon impact, relative costs and savings, the path to adoption and how the proposed solutions work (Drawdown, 2017).

Has your city established an office of sustainability or of climate change? Many municipalities are working to mitigate the impacts of climate change by establishing offices of sustainability or an office specifically dedicated to address climate change. Some cities are creating efforts such as the [Philadelphia Climate Collaborative](#). In other localities, nurses are working alongside governmental officials and corporate leaders to mitigate climate change. For example, in a fascinating and inspiring interview, Beth Schenck (of the Alliance of Nurses for Healthy Environments [podcast](#)) spoke to nurse Heidi Ritchie, Director of Policy for Minneapolis about her work on energy and environmental policy at the municipal level. (Schenk, 2019, podcast).

REFERENCES

Butterfield, P.G. (2017). Thinking Upstream. *Advances in Nursing Science*, 40, (1), pp. 2–11. doi: 10.1097/ANS.000000000000161

Climate Collaborative of Greater Philadelphia. <https://phillyclimatecollab.com>

Drawdown: The most comprehensive plan ever proposed to reverse global warming (2017). Hawken, P., ed. New York, NY: Penguin Books. <https://www.drawdown.org/solutions>

Eckelman, M.J., & Sherman, J. (2016). Environmental impacts of the US health care system and effects on public health. *PloS one*, 11(6), e0157014.

Environmental Protection Agency (EPA). Overview of Greenhouse Gases. (2021). <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>

Ghazali, D.A., Guericolas, M., Thys, F., Sarasin, F., González, P.A., & Ghazali, E.C. (2018). Climate Change Impacts on Disaster and Emergency Medicine Focusing on Mitigation Disruptive Effects:an International Perspective. Review. *International. Journal of Environmental Research and Public Health*, 15 (7) 1379-1382; doi:10.3390/ijerph15071379

Health Care Without Harm. <https://noharm.org>

Leffers, J., McDermott-Levy, R., Nicholas, P. K., & Sweeney, C. F. (2017). Mandate for the Nursing Profession to Address Climate Change Through Nursing Education. *Journal of Nursing Scholarship*/, 49/(6), 679–687; doi: 10.1111/jnu.12331

Practice Greenhealth. (n.d.) <https://practicegreenhealth.org>

Schenk, E. C. (2019, April 12). This nurse directs city policy. Alliance of Nurses for Healthy Environments podcast. Podcast retrieved from <https://www.stitcher.com/podcast/alliance-of-nurses-for-healthy-environments/nurses-for-healthy-environments-podcast>

Schenk, E. C. (2019). Addressing Climate Change: We Can't Afford Not To. *Nursing Economic\$*, 37/(1), 6–8. <https://digitalcommons.psjhealth.org/publications/1280>

Upshall, A., Moore, C., Leffers, J., McDermott-Levy, R., (in review). Turning Up the Heat. *Journal of Nurse Practitioners*.

FOOD, AGRICULTURE, AND CLIMATE CHANGE

Cara Cook, MS, RN, AHN-BC

Director of Programs

Alliance of Nurses for Healthy Environments

Without swift action to address climate change, food supply and security is set to be significantly impacted by a warming planet. Yet, industrialized food systems and consumption patterns are a large contributor and driver of climate change. Solutions such as transitioning to more plant-based diets and sustainable food systems are key to addressing climate change.

CLIMATE IMPACTS ON FOOD & AGRICULTURE

According to the Fourth National Climate Assessment, climate change will impact food quality, availability, and supply by affecting crop yields and production. Extreme weather events, such as extreme temperatures, droughts, and floods can reduce crop yields leading to reductions in the amount of food produced and supplied globally impacting access to food (Ebi et al., 2018). Food quality is threatened as higher levels of carbon dioxide concentrations in the atmosphere are shown to lead to reductions in critical nutrients, such as iron, zinc, and protein in crops (Ebi et al., 2018). Further, research draws the connection between hotter temperatures and extreme weather to contamination of food crops with harmful pathogens that cause food-borne illness, such as *Salmonella* and *Campylobacter* (Ebi et al., 2018). These are all particularly concerning for areas that already experience challenges to access to quality, nutritional foods. In addition, livelihoods for farmers and those who grow their own food are threatened from the impacts of climate change.

FOOD & AGRICULTURE AS A CONTRIBUTOR TO CLIMATE CHANGE

Climate change is projected to impact food and agriculture. However, our food system itself contributes to worsening climate change. Agriculture, forestry, and other land use contribute 23% of total human-caused

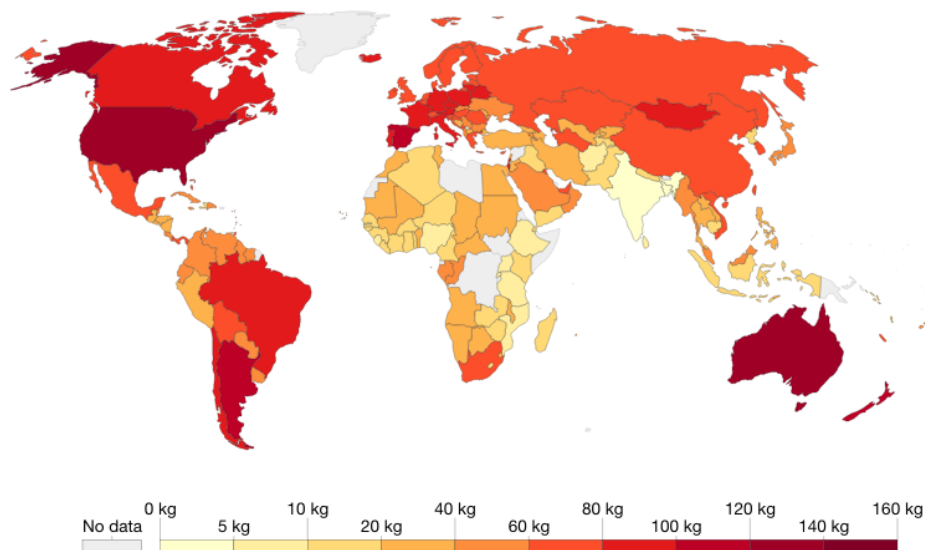
greenhouse gas emissions globally, accounting for 13% of carbon dioxide emissions, 44% of methane emissions, and 82% of nitrous oxide emissions (Intergovernmental Panel on Climate Change [IPCC], 2019). Livestock production overall is the source of approximately 14.5% greenhouse gas emissions, mainly from methane emissions because of ruminant animal digestion, manure, production of crops for feed, and deforestation for agriculture use (Center for a Livable Future [CLF], 2015). The Paris Agreement outlines the goal to keep average temperature rise globally to 2 degrees Celsius, however if a business-as-usual scenario is continued agriculture-related emissions will use up almost the entire allowance of greenhouse gas emissions by 2050 (Bajzelj, 2014). Two important areas to consider when looking at food and the agriculture sector's contribution to climate change, and therefore that provide the solutions for addressing agriculture-related emissions, include meat consumption patterns and food waste.

Meat Consumption

When identifying the greenhouse gas footprint of various foods to get an accurate estimate the entire lifecycle including growth, production, transportation, and disposal must be considered. Food ranked as high emitters of greenhouse gases, and also more resource-intensive (e.g.

Meat supply per person, 2017

Average total meat supply per person measured in kilograms per year.

Our World
in Data

Source: UN Food and Agriculture Organization (FAO)

Note: Data excludes fish and other seafood sources. figures do not correct for waste at the household/consumption level so may not directly reflect the quantity of food finally consumed by a given individual.

OurWorldinData.org/meat-production • CC BY

Figure 1: Meat Supply Per Person, 2017. Reprinted from Our World in Data In Our World in Data, n.d., Retrieved April 6, 2021, <https://ourworldindata.org/grapher/meat-supply-per-person>. Reprinted with permission, Creative Commons BY license.

water, pesticide, and feed use) foods to produce compared to plant-based protein sources include lamb, beef, cheese, pork, and farmed salmon (Environmental Working Group [EWG], 2011). Higher-income countries have the highest patterns of meat consumption, with Australia and the United States ranked as the top two consumers of meat globally (Ritchie & Roser, 2017). See Figure 1 for a global view of average total meat consumption by country.

Food Waste

Food waste is also a significant contributor to climate change, as much of our food waste goes to the landfill in which it decomposes and releases methane. An estimated 30% of food is wasted globally, meaning if food waste were a country it would be the third largest greenhouse gas emitter (CFL, 2015). The cause of food waste differs by country and is important to note when identifying solutions to address this issue. In high-income countries most of the food waste occurs during consumption and in low to middle-income countries waste occurs due to inadequate transport, storage, or harvesting (Papargyropoulou, Lozano, Steinberger, Wright, & Ujang, 2014).

FOOD AS A CLIMATE SOLUTION

Including solutions to improve food systems and agriculture processes is essential to reduce greenhouse gas emissions and address climate change. There are certainly complexities in food and agriculture climate solutions as these may vary by country and need to account for population growth, food insecurity, and the differing needs of low and high-income countries. The Intergovernmental Panel on Climate Change (IPCC) (2019) released a special report on climate change and land in which they highlight policies that reduce food waste and shift dietary choices have positive impacts such as reducing desertification and land degradation, promoting sustainable land-use, enhancing food security, and reducing emissions.

Additionally, commitments to reduce greenhouse gas emissions from agriculture and food systems must be part of major climate agreements. As part of the Paris Agreement, countries have made commitments, called Intended Nationally Determined Contributions (INDCs) to reduce carbon emissions across sectors. There is an overall lack of commitments to reduce emissions from food waste, dietary patterns, and livestock

production among the INDCs put forth thus far (CFL, 2015). It is estimated that by decreasing meat intake alone by 2050, a reduction in agriculture-related emissions of upwards of 72% could be realized.

Project Drawdown, a research organization that provides an analysis of the top 100 climate solutions globally, has identified 17 solutions relating to food in which reducing food waste and promoting plant-rich diets are among the top five most impactful solutions (Hawken, 2017). Reducing meat and dairy consumption and preventing food waste, through improvements in infrastructure, storage, and processing in low-income countries and changes at the retail and consumer levels in high-income countries are identified as critical to cutting carbon (Hawken, 2017). View the full list of food and agriculture solutions: <https://www.drawdown.org/solutions>. Nurses Drawdown, a project of the Alliance of Nurses for Healthy Environments and Project Drawdown, identifies action steps that nurses can take to reduce food waste and transition to plant-based diets: <https://www.nursesdrawdown.org/food/>.

The Food Recovery Hierarchy (figure 2) additionally offers guidance on preventing food waste. Interventions



Figure 2: Food Recovery Hierarchy, 2017, Reprinted from the United States Environmental Protection Agency, reproduced as part of the public domain. In U.S. EPA, 2020, Retrieved April 6, 2021, <https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy>.

are ranked in terms of environmental and economic benefits with the most preferred, such as reducing food surplus and feeding the hungry, at the top moving down to the least preferred, such as sending food to landfills, at the bottom. The Alliance of Nurses for Healthy Environments' 2020 Student Nurse Committee members developed the Mindless Composting: At Home Starter Guide (<https://envirn.org/wp-content/uploads/2020/12/ANHE-Mindless-Composting-Guide.pdf>) aimed at raising awareness of the food waste generated and how to implement a composting method at home.

There are numerous campaigns aimed at promoting more plant-based diets and include the Meatless Monday Campaign – eliminating meat one day a week (www.meatlessmonday.com), the Cool Food Pledge – a guidance for facilities and organizations to serve more climate-friendly foods (<https://www.wri.org/our-work/project/cool-food-pledge>), and the 50by40 (<https://50by40.org/>) campaign to reduce meat production 50% by 2040. For the health sector Health Care Without Harm (HCWH) has developed various resources to assist hospital and healthcare facilities in reducing meat consumption and serving more sustainable meats. These resources include a “Less Meat, Better Meat” approach that encourages hospitals to reduce the amount of meat served by 20% and with the cost saving purchase more sustainably produced foods (HCWH, 2019) and a “Redefining Protein: Adjusting Diets to Protect Public Health and Conserve Resources” report that summarizes alternative non-meat protein options to guide food purchasing decisions (HCWH, 2017).

National dietary guidelines are another opportunity to promote dietary shifts through the promotion of non-meat protein sources and an emphasis on diets high in fruits and vegetables. The 2015-2020 guidelines in the United States are a step forward in including more options for plant-based proteins, however, these guidelines could be stronger in outlining the health benefits of reducing meat consumption (U.S. Department of Agriculture, 2018). Canada's latest dietary guidelines specifically recommend consuming more plant-based proteins options and the health benefits of such (Health Canada, 2019).

Looking to the solutions present in the agriculture sector and in global food systems provides numerous opportunities for nurses to engage in efforts that promote healthier people through sustainable food systems and curb carbon emissions that contribute to climate change.

REFERENCES

- Bajzelj B., Richards, K.S., Allwood, J.M., Smith, P., Dennis, J.S., Curmi, E., & Gilligans, C.A. (2014). Importance of food-demand management for climate mitigation. *Nature Climate Change*, 4(10), 924-929. doi:10.1038/nclimate2353.
- Carlsson-Kanyama, A. & Gonzalez, A.D. (2009). Potential contributions of food consumption patterns to climate change. *Am J Clin Nutrition*, 89(suppl), 1740S - 9S.
- Ebi, K.L., Balbus, J.M., Luber, G., Bole, A., Crimmins, A., Glass, G., ... White-Newsom, J.L. (2018). Human Health. In D.R. Reidmiller, C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (Eds.), *Impacts, risks, and adaptation in the United States: Fourth national climate Assessment, volume II* (pp. 572-603). Washington, DC: U.S. Global Change Research Program. doi: 10.7930/NCA4.2018.CH14.
- Environmental Working Group. (2011). Meat eater's guide to climate change and health. Retrieved from <https://www.ewg.org/meateatersguide/>.
- Health Canada. (2019). Canada's dietary guidelines for health professionals and policy makers. Retrieved from <https://food-guide.canada.ca/static/assets/pdf/CDG-EN-2018.pdf>.
- Health Care Without Harm. (2017). Redefining protein: Adjusting diets to protect public health and conserve resources. Retrieved from <https://noharm-uscanada.org/RedefiningProtein>.
- Health Care Without Harm. (2019). Less meat, better meat. Retrieved from <https://noharm-uscanada.org/content/us-canada/less-meat-better-meat>.
- Intergovernmental Panel on Climate Change. (2019). IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems summary for policymakers (Approved Draft). Retrieved from https://www.ipcc.ch/site/assets/uploads/2019/08/4.-SPM_Approved_Microsite_FINAL.pdf.
- Kim, B., Neff, R., Santo, R., & Vigorito, J. (2015). The importance of reducing animal product consumption and wasted food in mitigating catastrophic climate change. Retrieved from https://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-a-livable-future/_pdf/research/clf_reports/importance-of-reducing-animal-product-consumption-and-wasted-food-in-mitigating-catastrophic-climate-change.pdf.

Papargyropoulou, E., Lozano R., Steinberger J.K., Wright, N., Ujang Z. (2014). The food waste hierarchy as a framework for the management of food surplus and food waste. *Journal of Clean Production*, 76, 106-115. doi:10.1016/j.jclepro.2014.04.020.

Paul Hawken. (2017). *Drawdown: The most comprehensive plan ever proposed to reverse global warming*. London, UK: Penguin Books.

Ritchie & Roser. (2017). Meat and seafood production and consumption. Retrieved from <https://ourworldindata.org/meat-and-seafood-production-consumption>.

U.S. Department of Agriculture. (2018). Dietary guidelines for Americans 2015-2020: Dietary guidelines and myplate. Retrieved from <https://www.choosemyplate.gov/dietary-guidelines>.

U.S. Environmental Protection Agency. (2017). Food recovery hierarchy. Retrieved from <https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy>.

CLIMATE CHANGE IMPACT ON MENTAL HEALTH

Adrienne Wald EdD, MBA, RN, CNE, MCHES

Associate Professor, School of Health and Natural Sciences, Mercy College

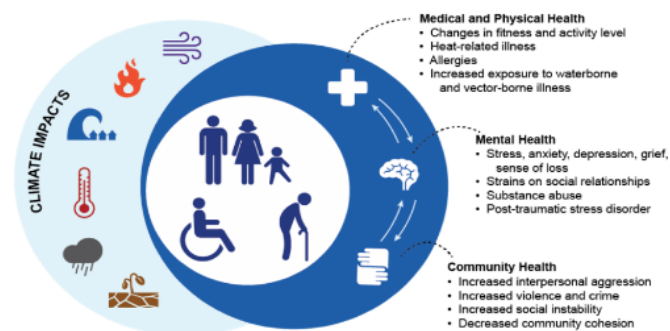
INTRODUCTION

Climate change is widely recognized as a leading threat to global health with outcomes mental health professionals confront (Borque & Cunsolo, 2014; Crimmins, Balbus, Gamble, Beard, Bell, & Dodgen, 2016). According to the American Psychiatric Association, climate change poses a threat to public health, including mental health, and is widely recognized as a current and accelerating threat to psychological or mental health worldwide (APA, 2017; Clayton, Manning & Hodge, 2014; Clayton, Manning, Krysgman, & Speiser, 2017; Trombley, Chalpuka, & Anderko, 2017; Hayes, Blashki, Wiseman, Burke, & Reifels, 2018). Mental health includes emotional, psychological, behavioral, and social well-being and extends beyond addressing mental illness, mental problems, and mental health disorders to include states of mental wellness, emotional resilience, and psychosocial wellbeing (Butler et al., 2014; Hayes et al., 2018; WHO, 2017). The American Academy of Nursing identifies mental health as an urgent public health issue and recognizes the significant global impact of climate change on the mental health and well-being of individuals (Liu et al., 2020).

GENERAL TOLL OF CLIMATE CHANGE ON MENTAL HEALTH

The impacts of climate change on mental health can be direct or indirect. Direct impacts include acute effects of exposure to extreme weather disaster events such as floods, extreme heat, tornadoes, hurricanes, and wildfires. Indirect effects are due to more gradual, longer chronic exposures to climate- or weather-related disaster events such as droughts or rising sea levels, increasing average air temperature, vector-borne diseases, poor or unsafe air or water quality, deforestations, economic or food insecurity, and unsafe food (Cianconi et al., 2020; Clayton et al., 2014; Dodgen et al., 2016; Hayes et al., 2018). Additionally, the threat of climate change, or secondary exposure, is recognized as a “stressor” and leads to adverse impacts on individuals and populations threatening connections to place and identity (Dodgen et al., 2016). Figure 1 illustrates how climate change impacts health in the U.S. including mental health.

An Illustration on How Climate Change Impacts Physical, Mental, and Community Health



At the center of the diagram are human figures representing adults, children, older adults, and people with disabilities. The left circle depicts climate impacts including air quality, wildfire, sea level rise and storm surge, heat storms, and drought. The right circle shows the three interconnected health domains that will be affected by climate impacts—Medical and Physical Health, Mental Health, and Community Health.

Image source: U.S. Global Change Research Program. 2016. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment.

Fig. 1 U.S. Global Change Research Program, 2016. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment (reproduced as part of the public domain).

ACUTE MENTAL HEALTH TOLL OF EXPOSURE TO CLIMATE CHANGE-RELATED DISASTERS

The acute mental health impacts of climate change can be psychological trauma from the immediate exposure to climate change-related disasters, including exposure to flooding, wildfires, hurricanes, tornadoes, and extreme heat events (Berry et al., 2010; Cianconi et al., 2020). All of these climate change-related events are now occurring with greater frequency, severity, and intensity (APA, 2017; IPCC, 2018). Before, during, and after these disaster events potential mental health effects ranging from symptoms of mild anxiety or distress to extreme post-traumatic stress or severe psychological trauma, or exacerbation of underlying mental health conditions may occur (APA, 2017; Cianconi et al., 2020; Dodgen et al., 2016; Clayton et al., 2017).

Those exposed to life-threatening extreme weather events are more likely to experience acute- and post-traumatic stress disorder (PTSD), depression, and anxiety (Dodgen et al., 2016; Galea, Nandi, & Vlahov, 2005). Impacts may also include somatic disorders, drug and alcohol abuse, higher rates of suicide, complicated grief, and elevated risk of child abuse (Cianconi, et al., 2020; Kessler, et al., 2008; Burke et al., 2018).

Climate disasters may impact individual and population mental health and psychological functioning, and may include strains on social relationships, domestic abuse, mental health emergencies, or may include a sense of loss, hopelessness, fatalism, and resignation, as well as a loss of autonomy and sense of control, and a loss of personal and occupational identity (APA, 2017; Cianconi et al., 2020; Clayton et al., 2014).

Data indicate that 25-50% of people exposed to an extreme weather disaster are at risk of adverse mental health effects. Up to 54% of adults and 45% of children suffer depression after a natural disaster (APA, 2017). There has been high rates of common mental health disorders and increased cases of new-onset mental health conditions among previously healthy individuals and those with pre-existing mental illness following hurricanes (Espinel, Kossin, Galea, Richardson & Schultz, 2019). Almost half (49%) of the survivors of Hurricane Katrina developed an anxiety or mood disorder, 1 in 6 (16.7%) developed PTSD, and suicide and suicidal ideation more than doubled (APHA, nd; Kessler et al., 2008; Lowe et al., 2013). Table 1 identifies those at high risk for adverse mental health outcomes.

Along with exposure to any of these events, several other risk factors for PTSD have been identified and are shown to be important across multiple studies (Galea et al., 2005). Those at risk of PTSD include:

- Women (shown to have a higher prevalence of PTSD after disasters than men)
- Those with preexisting or concurrent psychiatric comorbidity

Table 1: Vulnerable Populations at Higher Risk or Adverse Mental Health Outcomes Due to Exposure to Climate- or Weather-Related Disasters*

Vulnerable Population*	General Risk	Specific Mental Health Risk(s)
Children	At particular risk for distress, anxiety, and other adverse mental health effects in the aftermath of an extreme event	Significantly more children than adults have shown continued PTSD symptoms more than two years post-disaster; and, in general, children are more likely to be impaired by a disaster with possible adverse childhood experiences (ACEs)
Emergency Workers & First-Responders	Increased risk for mental health consequences including substance abuse	PTSD rates have ranged from 13% to 18% up to 4 years after large scale response events; impact of more frequent and intense events increase stress and vulnerability
Women, Pregnant Women & Post-partum Mothers	Women have higher PTSD rates and other mental health conditions after disasters than men	Higher rates of domestic abuse after a disaster Access to clean air and water threaten health and nutrition may affect coping ability and health of pregnancy
Economically Disadvantaged	Disproportionately experience the most negative impacts	More fragmented overall health, lower mobility, reduced health care access, economic limitations for recovery
People Who Are Homeless	High rates of mental illness	Increased risk for PTSD Vulnerable to vector-borne illness Increased vulnerability to extreme heat due to isolation and care deficits
Older Adults	Increased risk due to physical and cognitive vulnerability and depression	Greater challenges facing trauma
Individuals with Pre-existing or Prior Mental Illness	Disruption of behavioral health services Threats of psychological trauma	Those on psychiatric medications that interfere with temperature regulation are particularly vulnerable to extreme heat
Other at-risk groups: Farmers, immigrants, indigenous people, & veterans	Lack of access to care and social connections, language and cultural barriers	Difficulty identifying mental health problems and limited access to care.

* Based on data from Dodgen, Donato, Kelly, La Greca, Morganstein, Reser & Ruzek, et. al (2016) Ch. 8: Mental health and well-being. The impacts of climate change on human health in the United States: A scientific assessment., U.S. Global Change Research Program, Washington, DC, 217–246. doi:10.7930/J0TX3C9H.

**Also, farmers, those with limited mobility, immigrants, those living in coastal areas, those from Indigenous communities or tribes and veterans are also expected to experience higher risk of poor mental health outcomes

- Those who have previously experienced traumatic events or substantial stressors
- Low social support has been shown to be a risk factor for PTSD
- Poor coping is a psychological characteristic that emerges as particularly predisposing to post-disaster

PTSD (after psychiatric comorbidity has been accounted for)

- The potential role of television viewing as a correlate of post-disaster PTSD (Galea et al. 2005).

Those especially vulnerable to significant mental health impacts following a disaster may need urgent care and can present a significant challenge in an emergency context where pre-existing mental health services may have been destroyed or severely disrupted by the disaster (Fritze, Grant, Blashki, Burke & Wiseman, 2008).

Most individuals who suffer disaster-related psychological impacts from a traumatic event will recover over time (Bonanno, 2004). However, as many as 20% of individuals directly exposed experience chronic dysfunction which may not improve (Dodgen et. al., 2016). Recovery time varies for individuals after direct exposure. A 30% to 60% PTSD prevalence for victims of disasters, 5% to 40% for rescue workers, and 1% to 11% for the general population has been reported (Galea et al., 2005). Women are at greater risk for PTSD, as are individuals who have extreme guilt, anger, external locus of control, impaired coping ability, or a history of trauma. The severity of exposure to a disaster often predicts post-disaster symptoms; young and middle-aged adults are at greater risk for symptoms (Norris, 2002). For example, after Hurricane Andrew in Florida, 38% of children affected likely experienced PTSD at 3 months, with a decline to 18% at 10 months (USGCRP Global Change Research Program, 2016). Multiple risk factors contribute to poor psychological effects including physical injury, death of loved ones, property loss and displacement, among others (USGCRP, 2016). However, in some, positive psychological changes, or post-traumatic growth (PTG), is experienced as the result of successful coping with a traumatic event (USGCRP, 2016).

Consequences for mental health vary by type of extreme event, with unique impacts of specific disaster type and mental health consequences covering a wide range of disorders (Cianconi et.al., 2020). After extreme weather or other natural disaster events, there may be factors that constrain the ability to care for the mental health needs of affected people (Fritze, Blashki, Burke et al., 2008). Constraints may include:

- limitations in service capacity (resources and skills)
- high levels of immediate chaos
- widespread distress,
- and delays before essential services are reestablished (Silove & Steel, 2006).

In the aftermath of a climate change-related disaster the need for mental health services increases, while at the same time disruption in services or a reduced availability and accessibility of health services often occurs. Mental health nurses along with other health professionals are needed to provide evidence-based, trauma-informed, culturally competent care for those suffering from PTSD and other mental health conditions resulting from climate change-related events and exposures (Kameg, 2020; Nichols et al., 2020). Nurses and emergency mental health service professionals need a combination of interventions to meet the mental health needs of a distressed community, as well as the needs of those individuals who are traumatized, and those with severe mental illness (Rao, 2006).

Nurses in the emergency department (ED) should be prepared to address acute mental health trauma and to play a key role in assessment and screening of depression, suicide risk, anxiety, and substance abuse. The use of validated screening tools is important to identify acute mental health impacts from climate change-related events (Nichols et al., 2020). Documented surges in emergency department (ED) visits following climate change-related events require clinician attention to physical trauma as well as to mental health impacts (Sheikhbardisi, 2017; Wald, 2019). Evaluation and assessment, especially of those at increased risk of mental health impacts with careful attention to risk factors associated with specific climate change-related events (i.e.: those on psychiatric medications or those who are homeless are at high risk during heat waves) are important. Additional education for clinicians may be necessary to ensure disaster planning and mental health care are addressed (Nichols et al., 2020; Veneema et al., 2017).

Surges in mental health-related visits to the ED following various types of climate change-related disasters are documented in both the acute and longer-term phases of these events (Nichols et al., 2020). Nurses in the ED should also be prepared to offer referrals for patients to appropriate community resources and mental health professionals (Nichols et al., 2020). In the public health arena, nurses can assist individuals and the community with disaster planning and preparedness and help them prepare for mental health treatment beyond the disaster area should it be necessary (Veneema et al., 2017).

GRADUAL, LONGER-TERM CLIMATE CHANGE EFFECTS IMPACT ON MENTAL HEALTH

More gradual, chronic, and long-term mental climate change-related exposures of excessive heat or air temperatures due to rising environmental deforestation, droughts, or rising sea levels may be similar or may differ

from consequences related to acute, direct exposures (Cianconi et al., 2020; Clayton, et. al., 2014; Clayton, et. al., 2017). Wildfires may cause polluted air or contaminated water from erosion (Dodgen, et. al., 2016). Flooding from sea level rise due to melting glaciers can cause adverse environmental conditions impacting mental and physical health. Coastal erosion due to increasing floods may cause fears of relocation or forced migration (Cianconi, 2020). Long droughts have been associated with elevated levels of anxiety, depression and suicide, and post-traumatic stress disorders (Dodgen, et. al., 2016). After a record drought in the 1980s, the suicide rate doubled, including more than 900 farmers in the Upper Midwest (APHA, nd).

Effects on physical health may occur and indirectly impact mental health: increased heat stress, physical injury, or disease may impact mental wellbeing. Food supply disruptions, food insecurity or water insecurity, or unsafe food or water supply affect individual and community wellbeing with economic damage that can affect the social fabric of communities (Berry et al., 2010). Major upheaval may disrupt social, economic, and environmental factors that promote mental health at the community level (Fritze, 2008). Also, economic insecurity and economic crisis may lead to an increase in suicide rates and other mental health disorders especially among working men. Strong correlations of economic and climatic variables with suicide were found in Europe with higher male (62.4%) vs. female (41.7%) suicide variability among men (Fountoulakis et al., 2016).

Recovery and the severity and distribution of mental health problems may be influenced by aspects of community—resources, cohesion, resilience, and external supports. The term resilience is frequently used in climate change response and can be defined as the ability of a person (or a community) to cope with, grow through, and transcend adversity (Hobfoll et al., 2015). With strong community support, communities appear to fare better than where less support is available. This suggests the importance of investing in community social ties to enhance resilience and improve mental health outcomes for communities affected by climate change (Berry, 2018; Cloverdale et al., 2018). Planned relocation, risk communication, violence prevention, public health education, individual and collective participation in environmental activism, advocacy, and conservation are some of the approaches associated with positive psychological outcomes. Also, some anxiety, worry, or concern about climate change can be adaptive. Taking pro-environmental actions and engaging in activism and advocacy may support mental health and serve as

effective mental health interventions (Verplanken & Roy, 2013).

Impact of Higher Average Air Temperatures and Prolonged Extreme Heat

There is evidence regarding the impact of rising temperature on suicidality. Suicide rates increase during extreme heat. In Finland, suicide rates were found to be positively correlated with temperatures (based on historical records from 1751 to 1990), when a national suicide prevention program was put into place (Helama et al., 2013). Suicide rates were found to increase by 0.7%, and by 2.1% in Mexico, for every 1°C increase in average monthly temperature over a period of decades (Espinal et al., 2019). If there is no reduction in greenhouse gas emissions and temperatures continue to increase, climate change may cause between 9,000 and 40,000 additional suicides by 2050 in the US and Mexico (Espinal et al., 2019). Analysis of social media communications also indicates that depressive language and suicidal thought was correlated with increased temperatures suggesting a decline in mental well-being. Evidence also links extreme heat to aggressive behavior or violence, including homicides. Hsiang and colleagues found an increase in the likelihood of interpersonal violence of 4%, and of 14% in group violence, occurs with a temperature increase of one standard deviation (Hsiang et al., 2013). By 2050, projections of 2°C to 4°C of warming in locations worldwide may impact these behaviors, with higher rates of human conflict possible. Even higher possible temperatures, of up to 10°C increases in urban areas due the urban heat island effect, may contribute to a rise of summer violence in urban communities (Hsiang et al., 2013; Burke et al., 2018).

Normal sleep onset and maintenance are triggered by a drop in core body temperature. Sleep is an essential function for overall well-being and for mental health with negative impacts of poor sleep on mood, depression, and cognition. Increased heat contributes to insomnia and sleep disturbances potentially aggravating many psychiatric problems and reducing coping abilities (Obradovich et al., 2017). Those in urban areas without access to air-conditioning or cool places when heat is trapped by high night-time temperatures, sleep disturbances may occur (Obradovich et al., 2017).

Those with severe psychotic disorders or mental illnesses, substance abuse disorders, or cognitive impairments including dementias, may be challenged during extreme heat. Psychiatric patients and the homeless are particularly vulnerable to the physical effects of heat events. Preexisting mental illness alone

raises the risk of mortality during extreme heat events between two- and three- fold (Cooper, 2000). Those with mental illness may have diminished judgment or have less ability to care for themselves and are therefore more likely to experience heat stroke and other heat-related morbidity or mortality. Extreme heat can affect behavior and psychiatric conditions leading to feelings of agitation or listlessness. People with schizophrenia may have underlying impairments in thermoregulation, intrinsic to the disease, as indicated by many psychotic patients who wear multiple clothing layers on hot days. Also, some psychiatric medications including antipsychotics, anticholinergic antidepressants have the potential to impair the body's heat regulatory functioning; sweating and dehydration can increase lithium levels, putting patients at greater risk for dangerous toxicity during heat waves (Martin-Latry et al., 2007). Longer and more severe heat waves associated with climate change are likely to be associated with increasing mortality, homicide, suicide, physical assault, and spousal abuse (Anderson, 2001; Basu & Samet, 2002; Qi et al., 2009).

Public health nurses should plan preventive measures for the protection of vulnerable populations prior to, during, and immediately after extreme heat events including availability of cooling centers and warning systems (Ciancino, 2020; Wald, 2019). Emergency departments should prepare for surge in visit volume (Wald, 2019) and increased inpatient mental health service use, self-injurious behavior, and suicidality (Kameg, 2020).

At-Risk Individuals, Vulnerable Populations, and Climate Change Inequity

Mental illness and substance abuse disorders are high among those who are most vulnerable to the effects of extreme heat and other climate change-related events. Poverty, substandard housing, and lack of access to cool environments all contribute to increased vulnerability. Homeless mentally ill people have little control over their environments, limited ability to protect themselves from heat exposures, and therefore they are at among the most vulnerable to mental health problems.

The burden of climate change is also expected to fall disproportionately on the poor, children, the older adults, women (especially pregnant women), and first responders. Thus, climate change is likely to widen health disparities of people already suffering from inequities such as poor health, poverty, homelessness, mental illness, and food insecurity. The disproportionate effects on those of less economic privilege or lower social status therefore have social justice implications (Dodgen et al., 2016; Doherty & Clayton, 2011).

Climate Displacement and Migration

According to the United Nations High Commissioner for Refugees (UNHCR) population migration linked to climate change is already happening. They report that each year since 2008, an average of over 20 million people have been forced to move because of weather-related events, such as floods, storms, wildfires or extreme temperatures (UNHCR, <https://www.unhcr.org/en-us/climate-change-and-disasters.html>). Many others leave their homes because of slower or more gradual events, such as droughts, rising sea level, or coastal erosion. In areas ravaged by heat waves, long-term drought, rising sea levels, eroding coastlines, with food insecurity due to insufficient agricultural production or loss of other food sources, or increased levels of poverty and interpersonal conflict and violence is leading to a humanitarian crisis. The only option may be to flee. People exposed to these various types of climate change-related problems are forced to adapt their homes or communities to make them habitable or to leave their homes or communities, forcing them to migrate (UNHCR). The terms climigration and climigrant were coined by Bronen (<http://www.climigration.org/>) to refer specifically to this type of migration to replace misuse of the term “refugee.” According to the UNHCR (<https://www.unhcr.org/en-us/climate-change-and-disasters.html>) while “climate refugee” is often used in the media and by others, this phrase does not exist in international law. Per the UNHCR, a “refugee” is defined as a person who has crossed an international border “owing to well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion.” Climate change affects people inside their own countries, and typically creates internal displacement before it reaches a level where it displaces people across borders. The term “climate refugee” is not endorsed by UNHCR, making it more accurate to refer to “persons displaced in the context of disasters and climate change” (UNHCR).

Displacement or migration as a response to climate change adaptation poses considerable mental health threats. Leaving home and often all belongings as a “climigrant” may lead to a range of mental health problems: depression, anxiety, PTSD, substance abuse, and interpersonal violence. Most vulnerable are the poor, the old, the young, women, those with pre-existing mental health conditions, and those with less education. Negative mental health effects are linked with this climate change-related migration due to disrupted community ties, potential exacerbation of conflict and political instability (Torres & Casey, 2017). For example, those exposed to

sea level rise and coastal erosion are more likely to experience anxiety and interpersonal conflict with others in their community (Torres & Casey, 2017).

Nurses must become part of the voice at national and international levels to address the needs of people who are forced to migrate due to climate change. Nurses must advocate urgently for their immediate safety and health needs and for the resources to be available to support communities following migration. Availability of support and economic opportunities in receiving countries are linked to better mental health outcomes for newly arrived communities (Porter & Haslam, 2005).

THREAT OF CLIMATE CHANGE: AWARENESS OF CLIMATE CHANGE IMPACTS MENTAL WELLBEING

There may be subtle, indirect effects of climate change that may influence mental health in varying degrees. For some people, the accumulated effects of multiple stressors may mean the difference between a person being mentally healthy or becoming mentally ill (USGCRP, 2016). Of late, terminology has emerged to describe specific mental health effects of climate change threats as relates to mental health (Cianconi et al., 2020).

Eco-Anxiety

In 2017, the American Psychological Association (APA) urged recognition of the term “eco-anxiety” as a genuine source of mental distress; it is considered an existential anxiety related to concerns about the enormous impacts of climate change or “a chronic fear of environmental doom” (APA, 2017). There is now recognition that climate change awareness and media coverage of climate change impacts can cause and intensify stress and anxiety, adversely affecting mental health (APA, 2017). Descriptions of climate change events in the news and other media can influence a person’s stress response and mental well-being (Hayes, et al., 2018). Even without any direct exposure to the effects of climate change there is a growing number of people of all ages and across many geographic areas of the world who are suffering negative mental health effects from the threat posed by climate change. According to a national survey conducted in 2018, almost 70% of people in the United States are worried about climate change, with 51% reporting they feel “helpless” (Leiserowitz et al., 2018). As awareness of the impact and potential harm and future risk from climate change has increased, there is growing anxiety and fear related to the uncertainty it creates. Young people are especially vulnerable. A survey of Australian children reported that 25% feared that the world would end before they got older (Tucci et al., 2007). A recent survey of youth living in the United States found that

over 70% believe climate change will be harmful to people in their generation. About 57% of those interviewed reported that climate change makes them feel afraid (Palinkas, 2019). As a result of eco-anxiety, people are becoming anxious about their future and the future of the planet as we currently know it.

Climate or eco-anxiety is not considered pathologic or a clinical anxiety disorder, rather it is viewed as a reasonable and healthy response to an existential threat (Cunsolo & Ellis, 2018) or “a constructive and adaptive response to a serious problem” (Verplanken & Roy, 2013, p. 4). However, while many may continue to function normally despite fear or anxiety about climate change, this anxiety is associated with reduced or threatened mental health (Castelloe, 2018; Pihkala, 2018). Panic attacks, insomnia, obsessive thinking, and/or appetite changes caused by environmental concerns have been self-reported (Castelloe, 2018). While some people are driven to act others may become overwhelmed and anxious and for some individuals, intense anxiety or panic render them unable to act (Usher et al., 2019). This “eco-paralysis” or becoming so distressed they are unable to act, can be misinterpreted as apathy or lack of concern (Albrecht, 2011). Significant psychiatric morbidity may be produced by climate change in the form of eco-anxieties. Ecopsychology has emerged as a field focused on treatment of eco-anxieties (Cianconi et al., 2020).

To manage eco-anxieties, the American Psychiatric Association offers recommendations for building individual self-resiliency:

- Fostering caring, trusting relationships that provide support and encouragement
- Not viewing problems as unsolvable
- Making achievable goals and moving steadily toward them
- Looking at problems in a wider context
- Practicing good self-care and focusing on a positive self-image
- Keeping personal connections with places and cultural ties when possible
- Avoiding isolation and trying to connect with like-minded people (APA, 2017).

Solastalgia or Eco-Angst: Sense of Loss of Place

Some people experience a sense of loss or distress as climate change permanently effects the landscapes where they live, imposing a mental health burden. Land

destruction may weaken or eliminate the feeling of belonging and comfort gained from a sense of connectedness. Solastalgia is the distressing feeling of losing a valued natural place or environment that is important (Albrecht, 2005). The phenomenon of solastalgia may be experienced or characterized by a sense of desolation and loss experienced by people suddenly forced to migrate from their home environment or may be more gradual when it is due to slower onset of changes in the local environment. Eco-anxiety refers to the sense of distress people experience when valued natural environments are negatively transformed (Goleman, 2009; Albrecht, Sartore, Connor, Higginbotham, Freeman, et al., 2007).

Eco-grief: Loss of Connection to Nature and to Nature's Mental Health Benefits

There is evidence that contact with natural environments can improve mental health, function, and offer rehabilitative benefits (Bowler et al., 2010; Seymour, 2016) and further research is exploring these connections (Frumkin, 2017). The biophilia hypothesis suggests that humans have an innate desire for connection with the natural world and derive important psychological and well-being benefits from this connection (Wilson, 1984). However, climate change-related adverse environmental impacts are disrupting this connection. As a result, there are growing feelings of loss from changes to personally significant places including one's home, community, natural habitats, and precious ecosystems. This phenomenon is known as "ecological grief" (Cunsolo & Ellis, 2018). Witnessing degradation of the natural environment may lead to strong grief responses (Gordon, Radford, & Simpson, 2019). "Nature deficit disorder" a term credited to Louv (2005) similarly refers to the lack of connection with the natural world in an increasingly technologic and indoor world, particularly in children. Although it is not an official "diagnosis" it is a label used to convey the impact on children as they are increasingly deprived direct contact with nature during outdoor play (Driessnack, 2009). Nature deficit disorder is related to rates of youth obesity rates, attention-deficit disorder, as well as impaired social skills including increased violence. As well as alterations in mental health such as depression (Driessnack, 2009). Mental health nurses have a key role to play in reducing and responding to the distress related to climate change as they counsel and serve as role models for their patients and colleagues (Usher, Durkin, & Bhullar, (2019).

ADDRESSING MENTAL HEALTH IMPACTS IN NURSING PRACTICE, EDUCATION AND POLICY

Nursing leadership across the care spectrum is an important part of the emergency and ongoing response to climate change impacts (Espinel, 2019). Nurses, along with psychiatric nurse practitioners, working with other mental health and health professionals are needed to address the growing threat of climate change to mental health and wellbeing. It is anticipated that many individuals and communities will need help to build resilience, foster optimism, cultivate active coping, increase preparedness, and support social connections. Disaster events increase the need for a range of mental health services especially among vulnerable populations. There is a critical role for nurses to take preventive action and collaborate with public health, community, and emergency-preparedness partners to reduce population vulnerability, and to support people whose mental health has been affected by climate change impacts. There are crucial roles in education for preparedness and planning for possible disaster impacts as well as for prevention and interventions for those who develop or exacerbate mental health disorders (Veneema et al., 2019). Nurses can help individuals and communities build resilience for optimal recovery.

Nurse educators must incorporate mental health impacts of climate change into the curriculum to ensure future nurses are equipped to care for and advocate for patients and are trained to counsel them to further the response to climate change for individual and collective mental health (McDermott-Levy et al., 2018). Faculty in colleges of nursing and other nursing programs can participate in the Nurses Climate Challenge (<https://nursesclimatechallenge.org/>) and commit to leadership in integrating climate change content into the nursing curriculum.

In addition, an expert panel of national nursing education experts have developed consensus recommendations for the advancement of disaster nursing education in the United States. National nurse readiness for disasters related to climate change, human conflict, and emerging infectious diseases triggering an ever-increasing number of disaster events is envisioned. Thus, a global nursing workforce prepared with the knowledge, skills, and abilities to respond to any disaster or large-scale public health emergency in a timely and appropriate manner is needed. The panel offers a strong mandate and specific action steps for the advancement of disaster nursing education in the nation (Veneema et al., 2017).

Similarly, a policy brief by the Environmental and Public Health Expert Panel of the American Academy of Nursing Alliance of Nurses for Healthy Environments

addresses the importance of the essential role of nurses in reducing health impacts due to climate change and outlines dual policy recommendations for nurses (Leffers & Butterfield, 2018). Upstream policy recommendations include reducing pollution, building resilient communities, and increasing the public's understanding of the connection between health and climate health. Downstream policies focus on climate adaptation, disaster response, and the importance of preparing the nursing workforce to address the health consequences of climate change (Leffers & Butterfield, 2018). An emphasis on both adaptation and prevention with urgency in advancing mental health awareness in the context of climate change are the stated position of the American Academy of Nursing (Liu, et al., 2020).

Nurses have a professional and moral obligation to educate patients and populations to support individual action and policies to address climate change. Efforts to reduce greenhouse gas emissions, to advocate for efforts and policies to limit pollution and protect the environment, and taking personal action are important actions. Participation by nurses in the Nurses Drawdown (<https://www.nursesdrawdown.org/>) is an option for obtaining expertise, resources, and tools to empower nurses, patients, and communities. This initiative aims to support nurses to lead and engage in policy change and civil action to tackle negative climate change impacts on overall health, mental health, and wellbeing.

MENTAL HEALTH RESOURCES ON CLIMATE CHANGE IMPACTS

Videos

- Climate Change and Mental Health, Harvard T.H. Chan School of Public Health (2017) (9:56) <https://www.youtube.com/watch?v=eUI2YkBTpNY>
- Eco-Anxiety in Kids: Expert Weighs in (6:10) <https://www.youtube.com/watch?v=GXtBaDDbm4E>
- How Climate Impacts Mental Health (Solastgia explained) (3:12 minutes) <https://www.youtube.com/watch?v=tXsrla5UnHo>
- How Your Mental Health is Impacted by Climate Change (9:25 minutes) https://www.youtube.com/watch?v=CK_GUFR8r6M
- Sundarbans: The Next Climate Refugees, The Atlantic (9:44) <https://www.youtube.com/watch?v=m0xD4lg2Vmg>

Webinars

- Mental Health and Our Changing Climate: Impacts, Implications, and Guidance (March 29, 2017) (1:00:29) <https://ecoamerica.org/research/#mentalhealth>

PDFs/Links

- 101 Things You Can Do to Help Address Climate Change https://www.psychology.org.au/getmedia/2a2156ab-559c-4316-888a-a8cd82fcb780/101-things-you-can-do-climate-change_1.pdf
- Climate Psychology Alliance <https://www.climatepsychologyalliance.org/>
- Ecoanxious Stories <https://www.ecoanxious.ca/>
- Disaster Preparedness, Response, and Recovery <https://www.samhsa.gov/disaster-preparedness>
- Good Grief Network <https://www.goodgriefnetwork.org/>
- Making the Connection: Climate Changes Mental Health https://www.apha.org/~media/files/pdf/topics/climate/climate_changes_mental_health.ashx
- Mental Health and Our Changing Climate: Impacts, Implications, and Guidance March 2017 <https://www.apa.org/news/press/releases/2017/03/mental-health-climate.pdf>
- Nurses Drawdown <https://www.nursesdrawdown.org/>
- Nurses Climate Challenge <https://nursesclimatechallenge.org/>
- U.S. Climate Resilience Toolkit
 - Steps to Resilience <https://toolkit.climate.gov/#steps>
 - Climigration toolkit.climate.gov/tool/climigration

Climate Change and Mental Health Position Statements

- American Psychiatric Association: Position statement on the impact of climate change on mental health and psychological well-being www.psychiatry.org
- American Psychological Association. Resolution on affirming psychologists' role in addressing global climate change www.apa.org

REFERENCES

American Psychiatric Association (2017). Position statement. Accessed at: <https://www.psychiatry.org/patientsfamilies/climate-change-and-mental-health-connections/affects-on-mental-health>

Albrecht, G., Sartore, G.M., Connor, L., Higginbotham, N., Freeman, S., Kelly, B., Tonna, H.S., & Pollard, G. (2007). Solastalgia: The distress caused by environmental change. *Australasian Psychiatry*, 15(S1), 95–98

Albrecht, G. (2011). "Chronic Environmental Change and Mental Health," in *Climate Change and Human Well-Being: Global Challenges and Opportunities*, Weissbecker, I. (ed). Berlin: Springer SBM, 43–56.

Anderson, C. A. (2001). Heat and violence. *Current Directions in Psychological Science*, 10(1), 33–38.

APHA, Making the connection: Climate changes mental health. Accessed 2/15/20 at: https://www.apha.org/~media/files/pdf/topics/climate/climate_changes_mental_health.ashx

Basu, R., & Samet, J.M. (2002). Relation between elevated ambient temperature and mortality: A review of the epidemiologic evidence, *Epidemiologic Reviews*, 24(2), 90–202, <https://doi.org/10.1093/epirev/mxf007>

Berry, H.L., Bowen, K. & Kjellstrom, T. (2010). Climate change and mental health: A causal

pathways framework. *International Journal of Public Health*, 55(2), 23–132. doi: 10.1007/s00038-009-0112-0.

Berry, H. L., Waite, T.D., Dear, K.B., Capon, A.G., & Murray, V. (2018) The case for systems thinking about climate change and mental health, *Nature Climate Change*. doi:10.1038/s41558-018-0102-4

Bonanno, G.A., 2004: Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events? *American Psychologist*, 59, 20-28. <http://dx.doi.org/10.1037/0003-066x.59.1.20>

Bourque, F., & Cunsolo, W.A. (2014) Climate change: The next challenge for public mental health? *International Reviews in Psychiatry*, 26:415–422

Bowler, D.E., Buyung-Ali, L.M., Knight, T.M. & Pullin, A.B. (2010). A systematic review of evidence for the added benefits to health of exposure to natural environments. *BMC Public Health*, 10:456.

Butler, C.D., Bowles D.C., McIver L, & Page L. (2014). Mental health, cognition and the challenge of climate change. *Climate Change Global Health*, 26:251.

Burke, M., González, F., & Baylis, P., et al. (2018). Higher temperatures increase suicide rates in the United States

and Mexico. *Nature and Climate Change*. 8, 723–729. doi:10.1038/s41558-018-0222-x

Castelloe, M. (2018). Coming to terms with ecoanxiety; Growing awareness of climate change. *Psychology Today*. Available from: <https://www.psychologytoday.com/au/blog/the-me-in-we/201801/coming-terms-ecoaanxiety>

Cianconi, P., Betrò, S., & Janiri, L. (2020). The impact of climate change on mental health: A systematic descriptive review. *Frontiers in Psychiatry*, 11, 74. <https://doi.org/10.3389/fpsy.2020.00074>

Clayton, S., Manning, C. M., & Hodge C. (2014). Beyond storms & droughts: The psychological impacts of climate change. Washington, DC: American Psychological Association and ecoAmerica.

Clayton, S., Manning, C. M., Krygsman, K., & Speiser, M. (2017). Mental health and our changing climate: Impacts, implications, and guidance. Washington, D.C.: American Psychological Association, and ecoAmerica.

Cloverdale J., Balon R., Beresin E.V., Brenner A.M., Guerrero A.P., & Louie A.K., et al. (2018). Climate change: A call to action for the psychiatric profession. *Academic Psychiatry* Accessed at <https://doi.org/10.1007/s40596-018-0885-7>

Cook, C., Demorest, S.L., Schenk, E. Nurses and climate action. (2019). *AJN The American Journal of Nursing*, 119(4), 54-60.

Cooper, R. (2000). Impacts of extreme heat on mental health. *Psychiatric Times*. Accessed 2/15/20 at: <https://www.psychiatrictimes.com/climate-change/impacts-extreme-heat-mental-health>

Crimmins, A., Balbus, J.L., Gamble, C.B., Beard, J.E., Bell, D., & Dodgen, R.J., et. al. (2016). The impacts of climate change on human health in the United States: A scientific assessment. Eds. U.S. Global Change Research Program, Washington, D.C. <http://dx.doi.org/10.7930/J0R49NQX>

Cunsolo A. & Ellis, N. (2018). Ecological grief as a mental health response to climate change-related loss. *Nature and Climate Change*. 8: 275-281.

Dougherty, T.J. & Clayton, S. (2011). The psychological impacts of global climate change. *American Psychologist*, 66(4), 265–276.

Dodgen, D., D. Donato, N. Kelly, A., La Greca, J. Morganstein, J., & Reser, J., et. al (2016). Ch. 8: Mental health and well-being. The impacts of climate change on human health in the United States: A scientific assessment., U.S. Global Change Research Program, Washington, DC, 217–246. doi:10.7930/J0TX3C9H.

Driessnack, M. (2009). Children and nature-deficit disorder. *Journal for Specialists in Pediatric Nursing*, 14(1), 73-5.

Espinell, Z., Kossin, J.P., Galea, S., Richardson, A.S., & Schultz, J.M. (2019). Forecast: Increasing mental health consequences from Atlantic hurricanes throughout the 21st century. *Psychiatric Services*, 70(12), 1165-67. doi:10.1176/appi.ps.201900273

Fact Sheet 2006– 3015 February 2006. USGS Science Helps Build Safer Communities Wildfire Hazards—A National Threat Accessed 2/15/20 at: <https://pubs.usgs.gov/fs/2006/3015/2006-3015.pdf>

Fountoulakis, K.N., Chatzikosta, I., Pasiadis, K. et al. (2016). Relationship of suicide rates with climate and economic variables in Europe during 2000–2012. *Annals of General Psychiatry*, 15, 19.

Friedli, L. (2009). Mental health, resilience and inequalities. World Health Organization. http://www.euro.int/_data/assets/pdf_file/0012/100821/E92227.pdf

Fritze, J.G., Blashki, G.A., Burke, S. et al. (2008). Hope, despair and transformation: Climate change and the promotion of mental health and wellbeing. *International Journal of Mental Health Systems* 2, 13 <https://doi.org/10.1186/1752-4458-2-13>

Frumkin H., Bratman, G.N., Breslow, S.J., Cochran, B., Kahn, P.H., Lawler, J.J., et al. Nature contact and human health: A research agenda. *Environmental Health Perspectives*. 2017;125(7):075001. <https://doi.org/10.1289/EHP1663>.

Galea, S., Nandi, A., Vlahov, D. (2005). The epidemiology of post-traumatic stress disorder after disasters. *Epidemiologic Reviews*, 27, (1), 78–91, <https://doi.org/10.1093/epirev/mxi003>

Gordon, T.A.C., Radford, A.N., & Simpson, S.D. (2019). Grieving environmental scientists need support. *Science*, 366, 6462. 193. doi: 10.1126/science.aaz2422

Goleman, D. (2009). The age of eco-angst. *New York Times* 27.9. <https://opinionator.blogs.nytimes.com/2009/09/27/the-age-of-eco-angst/?mcubz=1>.

Gordon, T.A., Radford, A.N., & Simpson, S.D. (2019). Grieving scientists need support. *Science*, 366, 193.

Hayes, K., Blashki, G., Wiseman, J., Burke, S., & Reifels, L. (2018). Climate change and mental health: risks, impacts and priority actions. *International Journal of Mental Health Systems*, 12(28). doi:10.1186/s13033-018-0210-6

Helama, S., Holopainen, J., Partonen, T. (2013). Temperature-associated suicide mortality: Contrasting roles of climatic warming and the suicide prevention program in Finland. *Environmental Health Preventive Medicine*, 18:349-355.

Hobfoll, S. E., Stevens, N. R., & Zalta, A. K. (2015). Expanding the science of resilience: Conserving resources in the aid of adaptation. *Psychological inquiry*, 26(2), 174–180. <https://doi.org/10.1080/1047840X.2015.1002377>

Hsiang, S., Burke, M., & Miguel, E. (2013). Quantifying the influence of climate on human conflict. *Science*, 13, 341:1235367.

IPCC, 2018 <https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/>
<https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/>

Intergovernmental Panel on Climate Change. Climate Change 2014: Synthesis Report, Summary for Policymakers. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental panel on Climate Change. Core Working Team. Pachauri, R.K. & Meyer, L.A. editors. IPCC, Geneva, Switzerland.

Kameg, B.N. (2020). Climate change and mental health: Implications for nurses. *Journal of Psychosocial Nursing*, 58(9), 25-30.

Kessler, R. C., Galea, S., Gruber, M. J., Sampson, N. A., Ursano, R. J., & Wessely, S. (2008). Trends in mental illness and suicidality after Hurricane Katrina. *Molecular psychiatry*, 13(4), 374–384. <https://doi.org/10.1038/sj.mp.4002119>

Lancet Countdown: Tracking Progress on Health and Climate Change, 2019

Leffers, J. & Butterfield, P. (2018). Nurses play essential roles in reducing health problems due to climate change. *Nursing Outlook*, 66(2), 210-213.

Leiserowitz, A., Maibach, E., Rosenthal, S., Kotcher, J., Ballew, M., Goldberg, M., & Gustafson, A. (2018). Climate change in the American mind: December 2018. Yale University and George Mason University. New Haven, CT: Yale Program on Climate Change Communication.

Liu, J., Potter, T., & Zahner, S. (2020). Policy brief on climate change and mental health/well-being. *Nursing Outlook*, 68, 517-522.

Louv, R. (2005). Last child in the woods: Saving our children from nature-deficit disorder. Chapel Hill, NC: Algonquin Books.

Lowe, S. R., Manove, E. E., & Rhodes, J. E. (2013). Posttraumatic stress and posttraumatic growth among low-income mothers who survived Hurricane Katrina. *Journal of consulting and clinical psychology*, 81(5), 877–889. <https://doi.org/10.1037/a0033252>

Martin-Latry, K., Goumy, M.P., Latry P., et al. (2007). Psychotropic drugs use and risk of heat-related hospitalization. *European Psychiatry*. 22:335-338.

McDermott-Levy R., Jackman-Murphy K.P., Leffers J.M., Jordan L. (2018). Integrating climate change into nursing curricula. *Nurse Educator*. 44:43–47. doi: 10.1097/NNE.0000000000000525

Nichols, P., Breakey, S., White, B.P., Brown, M.J., Fanuele, J., Starodub, R., Ros, A.V. (2020). Mental health impacts of climate change: Perspectives of the ED Clinician. *Journal of Emergency Nursing*, 46(5), 590-599.

Nurse, J. Basher, D., & Bone, A. (2010). An ecological approach to promoting population mental health and well-being—A response to the challenge of climate change. *Perspectives in Health*, 130(1), 27-33.

Nurses Climate Challenge. Accessed September 6, 2020 at <https://nursesclimatechallenge.org/>

Nurses Drawdown. Accessed July 15, 2020 at <https://www.nursesdrawdown.org/>

Nobel, J. (2007, April 9). Eco-anxiety: Something else to worry about [Electronic version]. *The Inquirer*. Retrieved from <http://www.philly.com>.

Norris, F. H. (2002). Psychosocial consequences of disasters. *PTSD Research Quarterly*: 3(2), 1-8.

Obradovich, N., Migliorini, R., Mednick, S., & Fowler, J.H. (2017). Nighttime temperature and human sleep loss in a changing climate. *Science Advances*. Accessed February 20, 2020. <https://advances.sciencemag.org/content/3/5/e1601555>.

Palinkas, L.A. (12/2/2019). One of the most overlooked consequences of climate change? Our mental health. *Environmental Health News*. <https://www.ehn.org/how-climate-change-affects-mental-health-2641458829.html>.

Pihkala, P. (2018). Eco-anxiety, tragedy, and hope: Psychological and spiritual dimensions of climate change. *Zygon*, 53(2), 545–569.

Porter M, Haslam N. Predisplacement and postdisplacement factors associated with mental health

of refugees and internally displaced persons: A meta-analysis. *JAMA*. 2005;294(5):602–612. doi:10.1001/jama.294.5.602

Qi, X., Tong, S., & Hu, W. (2009). Preliminary spatiotemporal analysis of the association between socio-environmental factors and suicide. *Environmental Health*, 8, 46. doi:10.1186/1476-069X-8-46

Rao, K. (2006). Psychosocial support in disaster-affected communities. *International Review of Psychiatry*, 18(6):501-505.

Seymour, V. (2016). The human–nature relationship and its impact on health: A critical review. *Frontiers in Public Health*. 4, 260. doi: 10.3389/fpubh.2016.00260

Sheikhbardsiri, H., Raeisi, A., Nekoei-Moghadam, M., & Razaei, F. (2017). Surge capacity of hospitals in emergencies and disasters with a preparedness approach: A systematic review. *Disaster Medicine and Public Health Preparedness*, 11(5), 612-620. doi: 10.1017/dmp.2016.178

Silove D., & Steel Z. (2006). Understanding community psychosocial needs after disasters: Implications for mental health services. *Journal of Postgraduate Medicine*. 52: 121-125.

Torres, J.M., & Casey, J.A. (2017). The centrality of social ties to climate migration and mental health. *BMC Public Health*. 17, 600. <https://doi.org/10.1186/s12889-017-4508-0>

Trombley, J., Chalupka, S. & Anderko, L. (2017). Climate change and mental health. *AJN The American Journal of Nursing*, 117(4), 44-52. doi: 10.1097/01.NAJ.0000515232.51795.f

UNHCR (n.d.). Climate change and disaster displacement <https://www.unhcr.org/en-us/climate-change-and-disasters.html>.

Tucci, J., Mitchell, J. and Goddard, C. (2007). Children's fears, hopes and heroes: Modern childhood in Australia. Melbourne: Australian Childhood Foundation.

USGCRP (2016). The impacts of climate change on human health in the United States: A scientific assessment. Crimmins, A.J., Balbus, J.L., Gamble, C. B., Beard, J.E., Bell, D., Dodgen, R.J., Eisen, N., Fann, M.D., Hawkins, M, S.C., Herring, L., Jantarasami, D.M., Mills, S., Saha, M.C., Sarofim, J. & Ziska, Eds. U.S. Global Change Research Program, Washington, DC, 312 <http://dx.doi.org/10.7930/JOR49NQXhttps://health2016.globalchange.gov/>

Usher, K., Durkin, J. & Bhullar, N. (2019). Eco-Anxiety: How thinking about climate-related environmental

decline is affecting our mental health. *International Journal of Mental Health Nursing*, 28, 1233–1234. doi:10.1111/inm.12673

Veenema, T.G., Lavin, R.P., Griffin, A., Gable, A.R., Couig, M.P. & Dobalian, A. (2017). Call to action: The case for advancing disaster nursing education in the United States. *Journal of Nursing Scholarship*, 49: 688-696. doi:10.1111/jnu.12338

Verplanken B., Roy, D. (2013). “My worries are rational, climate change is not”: Habitual ecological worrying is an adaptive response. *PLoS ONE* 8(9): e74708. <https://doi.org/10.1371/journal.pone.0074708>

Wald, A. (2019). Emergency department visits and costs for heat-related illness due to extreme heat or heat waves in the United States: An integrated review. *Nursing economic\$,* 37(1). 35-48.

Watts, N., Amann, M., Ayeb-Karlsson, S., Belesova, K., Bouley, T., & Boykoff, M., et. al. (2018). The Lancet countdown on health and climate change: From 25 years of inaction to a global transformation for public health. *Lancet*, 391, 581–630.

Weir, K. 2016. Climate change is threatening mental health. *Monitor on Psychiatry*, 47(7), 28. <https://www.apa.org/monitor/2016/07-08/climate-change>

Wilson, E.O. (1984). *Biophilia*. Cambridge, MA: Harvard University Press.

World Health Organization. (1948). Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19–22.

World Health Organization. (2017). Mental health. http://www.who.int/mental_health/en/. Accessed <https://www.psychologyandglobalhealth.org/>

A SYSTEM RESPONSE TO OUR CLIMATE EMERGENCY: INTERPROFESSIONAL EDUCATION

Teddie Potter PhD, RN, FAAN

School of Nursing, University of Minnesota

INTRODUCTION

Any nurse who has cared for a patient in multi-system failure knows that the patient's survival depends on the full participation and collaboration of an interprofessional team. The pulmonologist, cardiologist, nephrologist, and skilled intensive care nurse cannot turn the situation around on their own. They must work together, each bringing their own unique knowledge and a commitment to collaborate on behalf of the patient. Complex systems like the human body require systems solutions; likewise, the climate emergency is a system crisis and therefore requires highly effective interprofessional and interdisciplinary collaboration. We cannot restore the health of the planet on our own.

BACKGROUND

If we think of planet Earth as a patient, there is evidence that this “patient” is in multi-system failure. From pollinator collapse, massive biodiversity loss, and ocean acidification, to the growth in population that outpaces our available resources, we are seeing the impact that humans have on the health of the planet. In fact, our impact is so great that this epoch is now known as the Anthropocene (Whitmee, et al., 2015).

One of the most immediate, and serious, “symptoms” of this planetary multi-system failure is climate change or more appropriately, the climate emergency (American Public Health Association, 2019). In fact, the World Health Organization (WHO) recognizes that, “Climate change is the greatest threat to global health in the 21st century” (WHO, n.d.). This climate emergency is a symptom of systemic failure; siloed disciplinary thinking has prevented us from seeing the intricacies of the connected ecosystem that our lives depend on. Our policies have failed to protect population health and our health profession curriculum has failed to prepare professionals for the health impacts of a collapsing planetary ecosystem.

Both the Intergovernmental Panel on Climate and Climate Change (IPCC) report, Global Warming of 1.5°C (2018), and the 4th National Climate Assessment (U.S. Global Change Research Program, 2018) indicate the window to prevent the most catastrophic impacts of climate change is rapidly closing. The enormity and severity of the climate crisis and the direct experience of

climate related disasters is leading to increased mental health and wellbeing challenges including post-traumatic stress disorder (Boscarino, Hoffman, Adams, Figley, & Solhkhah, 2014) and eco-anxiety (Albrecht, 2011). These symptoms can be seen in patients, families, and communities and also in the health professionals and first responders who care for people in the midst of a climate related disaster.

One of the antidotes to despair is working on a solution in collaboration with others. In the words of the Planetary Health Alliance (n.d.)

Everything is connected — what we do to the world comes back to affect us, and not always in ways that we would expect. Understanding and acting upon these challenges call for massive collaboration across disciplinary and national boundaries to safeguard our health.

We are connected and our greatest hope for a solution to the climate emergency is interdisciplinary collaboration and partnership-based interprofessional practice.

AN INTERPROFESSIONAL APPROACH TO THE CLIMATE EMERGENCY

In the report, Crossing the Quality Chasm: A New Health System for the 21st Century, the Institute of Medicine (2001) recognized the growing complexity of health challenges and the care system. The report acknowledges, “Cooperation among clinicians is a priority. Clinicians and institutions should actively collaborate and communicate to ensure an appropriate exchange of information and coordination of care” (p. 4). Similarly, interprofessional education and collaborative practice (IPECP) offer the best chance of effectively addressing the complexities of the climate emergency.

The World Health Organization (WHO, 2010) further defines the unique nature of interprofessional collaboration:

Many health workers believe themselves to be practicing collaboratively, simply because they work together with other health workers. In reality, they may simply be working within a group where each individual has agreed to use their own skills to achieve a common goal. Collaboration, however, is not only about agreement and communication, but about creation and synergy. Collaboration occurs when two or more individuals from different backgrounds with complementary skills interact to create a shared understanding that none had previously possessed or could have come to on their own (p. 36).

Solving the climate emergency will require the “shared understanding” that collaboration affords.

But even collaboration needs further refinement. Eisler and Potter (2014), warn that collaboration can exist even in societies and organizations that orient toward hierarchies of domination. What we really want to work toward is networks that orient toward partnership. Key elements of hierarchies of domination include rigid ranking, scarcity thinking, and a high degree of shame, blame, and fear. Whereas, relationships that orient toward partnership are recognizable by members feeling valued and respected; communication flows both ways, instead of only top down; there is a sense of abundance; and leaders employ a “power with” rather than “power over” approach (Eisler & Potter, 2014). Partnership-based interprofessional collaborative practice offers the best model to disrupt some of the old patterns that have created the climate emergency in the first place.

Partnership practice acknowledges that one profession or discipline does not hold all the knowledge that is required to address systemic challenges such as the climate emergency. Partnership practice involves open communication across disciplinary boundaries with particular emphasis on inclusion of groups traditionally ignored or marginalized. In partnership-based networks, members respectfully dialog about possible solutions and do not rank one aspect of the system as being more important than other aspects of the system; i.e. the health of the planet is not superseded by the needs and wants of humans. In a partnership approach fear, shame, and blame are minimized, and in their place, we see hope and possibility. In that possibility is the possibility of a healthy planet and a healthy future for us all.

REFERENCES

Albrecht, G. (2011). Chronic environmental change: Emerging “psychoterratic” syndromes. In I. Weissbecker (Ed.), *Climate change and human well-being: Global challenges and opportunities* (pp. 43–56). New York, NY: Springer.

American Public Health Association. (2019). Climate change. Retrieved from <https://www.apha.org/topics-and-issues/climate-change>

Boscarino, J., Hoffman, S., Adams, R., Figley, C., & Solhkhah, R. (2014). Mental health outcomes among vulnerable residents after Hurricane Sandy. *American Journal of Disaster Medicine*, 9, 107–120.

Eisler, R., & Potter, T. (2014). *Transforming interprofessional partnerships: A new framework for nursing and partnership-based health care*. Indianapolis, IN: Sigma Theta Tau International.

Institute of Medicine. (2001). *Crossing the quality chasm: A new health system for the 21st century*. (Report brief). Washington, D.C.: National Academies

Intergovernmental Panel on Climate Change [IPCC]. (2018). *Global warming of 1.50 C*. Retrieved from https://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf

Planetary Health Alliance. (n.d.). Our health depends on our environment. Retrieved from <https://planetaryhealthalliance.org/>

U.S. Global Change Research Program. (2018). 4th national climate assessment: Volume II- impacts, risks, and adaptation in the United States. Retrieved from <https://nca2018.globalchange.gov/>

Whitmee, s., Haines, A., Beyrer, C., Boltz, F., Capon, A., Ferreira de Souza Dias, B. Ezech, A., Frumkin, H., ... Yach, D. (2015). Safeguarding human health in the Anthropocene epoch: Report of the Rockefeller Foundation–Lancet Commission on planetary health. *The Lancet*, 386, 1973–2028.

World Health Organization [WHO]. (n.d.). WHO calls for urgent action to protect health from climate change. Retrieved from <https://www.who.int/globalchange/global-campaign/cop21/en/>

World Health Organization [WHO]. (2010). *Framework for action on interprofessional education and collaborative practice*. Geneva, Switzerland: WHO Press.

EXTREME WEATHER: HEAT STROKE SIMULATION

Kathryn P. Jackman-Murphy, Ed.D, MSN, RN, CHSE

Professor, Naugatuck Valley Community College

INTRODUCTION

Climate Change and extreme weather events are incidents that nurses need to integrate into their assessment and plan of care for all patients. The use of simulation in nursing education is now common in the preparation for practice and provides opportunities for nursing students and nurses alike to practice providing care for populations and illnesses they may not come in contact on a daily basis. Participants are able to perform skills and actively learn in a standardized manner without risk of harming actual patients. Simulation also provides opportunities for “do overs,” where the learner is able to participate in another scenario after debriefing and apply the knowledge learned from the previous experience. Debriefing is an important component to the learning of simulation (Lavoie & Clarke, 2017). Debriefing questions are provided with simulation scenarios.

The following simulations are for older adult, pregnant, pediatric, and young adult (occupational risk) patients. There are details for the older adult scenario that could be adapted for the other patient populations. The ANHE Education Workgroup would be very interested in sharing any adaptations you have developed.

PATIENT OVERVIEW**Geriatric Patient**

Henry Murphy is a 72-year-old African American male with a past medical history which includes COPD, hypertension, and high cholesterol. He is a retired toolmaker who lives in an urban area in a small 3rd floor apartment with his wife Jean.

It has been quite warm over the past few days, with temperatures over 90 degrees with high humidity. The Murphys have limited funds and worry about the cost of running fans and air conditioning throughout the day to cool their apartment. In addition, there have been episodes of “brown-outs” in the Murphy’s community. This has limited electricity to their home and the air conditioner does not run during these periods.

Social: Henry and Jean had one son who was killed in an automobile accident 10 years ago. They have a daughter-in-law Sandra, who is a nurse and one grandson, Sam who lives a few hours away. They try to be as involved and supportive to Henry and Jean Murphy as they can.

Henry is concerned about Jean because she is experiencing frequent memory lapses. He has assumed

much of the household duties from his wife, such as cooking and cleaning. Henry’s strength and endurance is limited due to his COPD. He has had several admissions for COPD exacerbations, and he spends much of his limited energy caring for and watching over his wife.

Henry Murphy Home Medications			
Advair diskus	250mcg/ 50mcg	inh	Q am/pm
Lisinopril	12.5 mg	po	Daily
Lopressor	50 mg	po	Daily
ASA	81 mg	po	Daily
Crestor	20 mg	po	Every evening
Singular	10 mg	po	Every evening

Pregnant patient

Patrice is a 28 year old female (GI-T0-PI-AI-LI) who is in her 8th month of an uncomplicated pregnancy. She began prenatal care as soon as she realized she was pregnant (8 weeks) and has maintained her appointments and medical recommendations (i.e. medications), only missing one appointment in her 5th month.

It has been quite warm over the past few days, with temperatures over 90 degrees with high humidity. Patrice and her husband have a limited income and they worry about the cost of running fans and air conditioning throughout the day as they have so many expenses to prepare for the new baby (i.e. crib, diapers, etc.). Additionally, to conserve energy, the town has had “brown-outs,” where electricity has been limited to their home at times.

Patrice has come for a scheduled clinic visit. She walked to the appointment. Patrice tells the nurse that she has been feeling tired and dizzy and has leg cramps. Patrice stated that she must be “getting out of shape, I’m so big.”

Social: Patrice lives with her husband in a three-family house, on the second floor, near her health provider’s office. Her mother and father live on the first floor, and the 3rd floor is rented to a long-term tenant. She is able to walk to appointments instead of obtaining a ride or

paying for a taxi/Uber. She works as an office assistant in a large company in the area and has health insurance coverage for prenatal visits and the delivery of the baby. She lives with her husband, Mark, who is supportive and both are looking forward to meeting their new baby.

Patrice Home Medications			
Prenatal Vitamin	1 tablet	po	Q am
Ferrous Sulfate	235 mg	po	Q am

Pediatric Patient

Ryan is a 4-year-old who lives with her parents, Patrice and Mark, in an urban area near the health care provider's office. Their residence is a three-family house. Ryan's family live on the second floor of the house and his grandparents live on the first floor. The third floor is rented to a long-term tenant.

Ryan has not been feeling well over the past few days, complaining of nausea and leg cramps and her parent(s) are concerned about her complaints and take her to be evaluated by the health care provider. Ryan has a history of mild asthma, no hospitalizations, but has occasional wheezing that is treated with a rescue inhaler (Albuterol) as needed. Patrice, Ryan's mother, reports that dust and mold trigger Ryan's asthma.

It has been quite warm over the past few days, with temperatures over 90 degrees with high humidity. The family has limited income and worry about the cost of running fans and air conditioning throughout the day. The city has had periodic "brown-outs," where electricity has been limited to their home at times. During the brown-outs, Ryan's family is unable to use their air conditioner and fans.

Social: Ryan likes to play outside with her friends in the neighborhood. She also goes to the summer program in the neighborhood park. She lives with her parents in an urban area, and her mom is pregnant with her second child. Ryan is looking forward to meeting her new baby brother or sister and starting kindergarten in the next school year.

Ryan Home Medications			
Albuterol 90 mcg	2 puffs with spacer	inhalation	Every 4 hours as needed for wheezing

Young adult (outdoor worker)

Alex is a 19-year-old, working over the summer as a camp counselor at a local park for children in the neighborhood. He presents to the camp's first aid office after complaining of being very dizzy after a spirited softball game — counselors vs. campers. He also is complaining of a headache, abdominal discomfort—some "cramping" and nausea. He denies any medical issues/history and had a physical for college in which no issues were noted. He is accompanied by Pat, another camp counselor, who is concerned about Alex and related that she thinks Alex may have "passed out for a few seconds" and not just dizzy as Alex stated.

Social: Alex is home for the summer from college where he is majoring in theater. He is living on the camp property while camp is in session. His parents live one hour away and are expected shortly.

Alex Home Medications			
None			

Scenario Progression Outline Henry Murphy				
Time	Monitor Settings	Pt./Manikin (Actions)	Student Nurse Interventions (Events)	Cue/Prompt
Begin	Initial State: Patient in the Emergency Room/ Clinic with HOB elevated approx. 45 degrees. VS 100.5-102-24-102/50, O2 91% R/A, sweaty	Use only for Henry “I knew I was in trouble when I was at home, I couldn’t breathe...but I didn’t want to leave Jean” Henry relates his usual BP is much higher-about 140/80	Nurse(s) enter room, wash hands, introduces self to patient and family member/support person if present, and identifies patient. Obtains vital signs T-100.5-102-24-102/50, O2 91% R/A	Role member providing cue: Family member/support person chats with patient. Discussing how Jean, Henry’s wife is doing. Be reassuring that she is doing fine, but anxious to see Henry and doesn’t understand why she can’t be home.
00:10	100 mL of dark urine at bedside	States he doesn’t have pain, but has had leg cramps and a bit of a headache over the past few days, as well as some abdominal discomfort and nausea-so it has been a challenge to eat/drink	Nurse(s) ask if Henry has any pain Nurses begin assessment	
00:15		Patient is a bit irritable, impatient with assessment Discusses that it is hard to drink “enough”, he’s watching over Jean-making sure she is okay and reminding her to eat and drink	Noting poor skin turgor, dry mucous membranes, small amount of dark colored urine Nurses review I and O over past day or so Nurse assesses for signs of heat-related illness Identifies symptoms of heat-related illness Heat cramps • Heavy sweating • Painful muscle cramps or spasms Heat exhaustion • Heavy sweating • Weakness • Fatigue • Headache • Dizziness • Nausea or vomiting • Fainting • Irritability • Thirst • Decreased urine output Heat stroke • Very high body temperature • Altered mental state • Throbbing headache • Confusion • Nausea • Dizziness • Hot, dry skin or profuse sweating • Unconsciousness	

Scenario Progression Outline Henry Murphy (Continued)				
Time	Monitor Settings	Pt./Manikin (Actions)	Student Nurse Interventions (Events)	Cue/Prompt
		Henry asks what he can do to feel better and not get sick again	Nurse assesses for risk factors for heat-related illness • Vulnerable population (elderly) • Urban environment • Physical activity (caring for self and wife) • Limited social network • Age • Ethnic minority • No central AC cooler • Living alone • Co-morbidities (HTN, COPD) • Fixed income • Direct exposure to sun Nurse provides education • Maintain indoor temperature not higher than 82 degrees • Eating fresh fruits/vegetables (light, easy to digest foods) • Stay hydrated - drinking water or beverages without caffeine, sugar, or alcohol throughout the day • Avoid fats in high humidity • Air conditioning/community centers • Taking cold showers, bath or body wash • Contact with families/others • Rest breaks • Wear protective clothing • Wear loose, light colored clothing • Supply of power • Water/cooling area • Know signs and symptoms of heat stress • Stay out of the sun • Minimize physical activity • Use fans/air conditioners or cooling centers Nurse collaborates with other health care professionals • Social Service consult • VNA • Location of calling centers • Possible free transportation to cooling centers	Role member providing cue: Family member/support person chats with patient. Discussing how Jean, Henry's wife is doing. Be reassuring that she is doing fine, but anxious to see Henry and doesn't understand why she can't be home.

OBSERVER CHECKLIST

To be completed by observers and discussed in debriefing

Proposed correct treatment	Performed	Notes/Comments- Be sure to note specifics
Performs hand hygiene		
Introduces self to patient		
Identifies patients with 2 identifiers		
Utilizes therapeutic communication techniques		
Identify non-therapeutic communication techniques		
Completes Vital Signs		
Initiates head to toe assessment		
Performs head to toe assessment		
Modifies plan of care based on interaction with client i.e. performs focused assessment		
Identifies symptoms of heat-related illness Heat cramps • Heavy sweating • Painful muscle cramps or spasms Heat exhaustion • Heavy sweating • Weakness • Fatigue • Dizziness • Nausea or vomiting • Fainting • Irritability • Thirst • Decreased urine output Heat stroke • Very high body temperature • Altered mental state • Throbbing headache • Confusion • Nausea • Dizziness • Hot, dry skin or profuse sweating • Unconsciousness		

Proposed correct treatment	Performed	Notes/Comments- Be sure to note specifics
Identifies contributing factors to heat stress • Vulnerable population (elderly) • Urban environment • Physical activity (caring for self and wife) • Limited social network age • Ethnic minority • No central AC cooler • Living alone • Comorbidities (Htn, COPD) • Fixed income • Direct exposure to sun		
Instructs patient on methods for heat stress prevention • Maintain indoor temperature not higher than 82 degrees • Eating fresh fruits/vegetables (light, easy to digest foods) • Stay hydrated-drinking water or beverages without caffeine, sugar or alcohol throughout the day • Avoid fans in high humidity • Air conditioning/community centers • Taking cold showers, bath or body wash • Contact with families/others • Rest breaks • Wear protective clothing • Wear loose, light-colored clothing • Supply of power • water/cooling area • Knows signs and symptoms of heat stress • Stay out of the sun • Minimize physical activity • Use fans/air conditioners or cooling centers		
Interdisciplinary collaboration • Social Service consult • VNA • Location of cooling centers • Possible free transportation to cooling centers		

SUPPLIES LIST

- Hi Fidelity Simulation with the following parameters
- Vital signs Temp 100.5
- Pulse 102 slightly thready
- RR 24-breath sounds with diffuse mild inspiratory and expiratory wheezing thru-out
- BP 102/50
- O2 Sat 91% R/A
- Spray bottle with water to simulate sweating
- Urinal with 100 mL dark urine

ROLES

- Nurse

- Observer (see checklist)
- Daughter-in-law or grandson
 - You live about 45 minutes away and cannot physically check on them every day, but stay in contact via phone and visit as much as possible.
 - You are very concerned about Henry and his condition. Henry has been tired lately and having difficulty caring for himself and his wife. He's been having difficulty for several weeks and you know he avoided getting care as he is more concerned for his wife, Jean. She is with your family while Henry is in the hospital. Jean seems to be more confused since she has been away from Henry and her home.
 - You are visiting hoping to reassure Henry and be supportive.

DEBRIEFING QUESTIONS

Outcomes:

1. Student(s) will recognize symptoms of heat-related illness and employ proper treatment
2. Student(s) will instruct patient/family regarding strategies to avoid future issues with heat related illness (heat cramps, heat exhaustion, and heat stroke, and death)
3. Student(s) will effectively communicate with patient, their support person, and other team members

POSSIBLE QUESTIONS TO GUIDE DEBRIEFING:

1. What were the priority problem(s) for this patient?
2. What were your goals for this patient?
3. What intervention(s) did you plan for these problems?
4. Were the intervention(s) effective?
5. How did you use effective communication with this patient?
 - A. With their family member?
 - B. With other members of the team?
6. How did you modify your plan of care based on the interactions and assessments with this patient?
7. What is your evaluation towards the goals you developed for this patient?
8. What would you do differently next time to meet these goals?

REFERENCES

CDC. (2016) Climate Change and Extreme Heat: What You Can Do to Prepare. Retrieved from: www.cdc.gov/climateandhealth/pubs/extreme-heat-guidebook.pdf

Gamble, J. L., Hurley, B. J., Schultz, P. A., Jaglom, W. S., Krishnan, N., & Harris, M. (2013).

Climate Change and Older Americans: State of the Science. *Environmental Health Perspectives*, 121(1), 15–22. <http://doi.org/10.1289/ehp.1205223>

Harlan, S. L., Declet-Barreto, J. H., Stefanov, W. L., & Petitti, D. B. (2013). Neighborhood Effects on Heat Deaths: Social and Environmental Predictors of Vulnerability in Maricopa County, Arizona. *Environmental Health Perspectives*, 121(2), 197–204. <http://doi.org/10.1289/ehp.1104625>

Hess, J., Saha, S. & Luber, G. (2014). Summertime acute heat illness in U.S. emergency departments from 2006 through 2010: Analysis of a nationally representative

sample. *Environmental Health Perspectives*. 122(11), 1209-1215.

Lavoie, P., & Clark, S. (2017). Simulation in Nursing Education. *Nursing 2017*. 47(7), 19-20.

Okwuofu-Thomas, Benjamin, MAgeHlth; Beggs, Paul J, PhD; MacKenzie, Ross J, PhD. *Journal of Environmental Health; Denver* 79(8), (Apr 2017): 28-37.

Perera, F. (2017). Multiple threats to child health from fossil fuel combustion: Impacts of air pollution and climate change. *Environmental Health Perspectives*; 125(2), 141-148.

CLIMATE CHANGE AND HUMAN MIGRATION

Sheila Stone, MSN, RN, CNE

ANHE Fellow 2019–2020

Nurses address complex, nonstable, and interacting stressors to human systems every day in extremely varied practice settings. Nurses deeply understand that health breakdowns result from interaction of multiple forces that overwhelm system adaptation and resilience. Nurses also know that addressing health crises in isolation, without addressing the interactions of causes and conditions, can result in solutions that are ineffective or even harmful (Neuman & Fawcett, 2002). The intersection of climate change, human migration, and human health is one such complex issue. It is increasing in importance, and aspects of it will become part of every nurse's practice. This section is intended to provide context, background, and resources for nurses to understand and apply nursing knowledge and skills for the benefit of our patients on multiple levels.

Climate-related migration has been part of the human story since the beginning of the species, and this is reflected in religious, mythological, and archaeological records (DeMenocal & Stringer, 2016). In modern times, climate change has become a leading cause of human migration (Benko, 2017; Burkett, 2009; Climate and Migration Coalition 2018 a, Groundswell, 2019; Institute for the Study of Diplomacy, 2017). In the first half of 2020, weather-related disasters displaced 9.8 million people and are the leading cause of new internal migrations worldwide. (IDMC, 2020, cited in Migration Data Portal, 2020). Although the developed world is currently a receiving location for international climate migrants, that is forecasted to change in the next few decades as the effects of global warming expand in severity and geographic range. Meanwhile, climate change and accompanying internal migration is already occurring in even the most stable economies.

Climate change complicates everything about human migration. Climate change differs from previous contexts in its geographic scope; the complex network of institutions in global society that is threatened; and the irreversible and urgent nature of the crisis. Some related issues with clear health implications include food and housing, social stability and social safety nets, violent conflict over natural resources, and health-related human rights (McLeman, 2020; McMichael, 2020; Smith-Cannoy, 2019). **Food security is compromised by short- and long-term climate effects.** Many Central American migrants claim food insecurity. Throughout the world, local agriculture is the direct source of food survival for at least 80% of rural residents, who lack

access to global food markets (Campbell et. al., 2016) and are thus experiencing increased hunger. Climate-related crop yields, and therefore, human health, are directly affected by wildfire, drought, floods, and changing seasonal rainfall patterns. Cash and commodity crops are also affected, which lowers income and employment. These effects are already being felt worldwide (Baez et al., 2017; Climate Impact Map, 2021; Shaw, 2020; World Bank, 2018). Large monoculture crops are failing (NBC, 2019), and pivoting to other agricultural programs is difficult and expensive for several reasons: the need for large infrastructure investments, historical colonial land patterns, and the international scale of supply chains and marketing.

The availability of clean, suitable water for agriculture is decreasing due to weather changes and sea level rise. Water pollution is increasing, due to floods; typhoons; increased pests and, therefore, pesticides; and groundwater salinization related to coastal erosion and sea-level rise, which causes upstream river, irrigation canal, and wastewater treatment facility flooding. Feed and forage for livestock have become scarce and more expensive in parts of the world, including the United States. Fisheries and indigenous local cultural foodways, and large and small economies dependent on them, are also challenged by these forces.

Sea level rise is affecting habitability and, therefore, migration patterns. One third of the global population lives near a coast (Miller, 2017). Sudden extreme weather, such as typhoons, tornadoes, and hurricanes, has increased in geographic spread and severity. Changing weather patterns mean new locations are vulnerable. Storms stay in one place longer, increasing local wind and precipitation damage in some areas, and drought in others. Storms cause direct health effects via trauma, drowning, electrocution, and hypothermia, and indirect health effects via their impact on housing, healthcare facilities, energy, transportation, and workforce availability. Agricultural land is also submerged by river basins backing up and by coastal erosion. Up to one third of Bangladesh, for example, is at risk (Naser et al., 2019; Vidal, 2018). Small island nations and far northern indigenous lands are shrinking and even disappearing under rising sea levels caused by polar ice melt, raising international questions of nationhood, culture, and legal and financial responsibility (Noy, 2017).

Climate-related flooding also affects low-income coastal and river-adjacent housing in the United States (Flavelle, 2020; Herrmann, 2017; Holtz, 2019; Milman, 2020). This can be rapid-onset, as in sudden floods and hurricanes, or slower; for example, the increased frequency of

basements flooding in the Gulf Coast and coastal Northeast. Residential water intrusion impacts electrical access and safety, property value, and health, for example increased mold, allergens, and unsafe food, medication, and property storage. Recovery from floods is influenced by economic disparities in terms of both initial and ongoing ability to invest in infrastructure and housing stock, as well as loss of labor due to trauma and temporary or permanent relocation. Also, seawalls and similar investments by high-resource communities may inadvertently direct water flow toward adjacent communities (Flavelle, 2020).

Climate change has well-established effects on human health. These areas are discussed in detail in the chapter by Anderko and Chalupka in the Climate and Health section in this text. These effects include heat-related morbidity and mortality, water- and vector-borne disease spread, decreased energy supplies and raw materials for individuals and health systems, wildfire and impaired air quality, cardiovascular and lung disease, cancer, occupational exposure to heat and to chemicals that combine differently at higher temperatures, and inability to meet healthcare infrastructure and emergency preparedness needs, as well as hunger, drowning, crowding, and mental health impacts related to environmental change (United States Centers for Disease Control, 2020).

Climate-related costs for health care will rise. Causes include increased need for outpatient care, decreasing availability of raw materials for devices and medications, and lost wages from increased illness (Limaye, V., 2019; Limaye et al., 2019)). Increased health care costs stress local and national budgets and create social instability (Limaye, Max, Constible, & Knowlton, 2019; Smith-Cannoy, 2019). These costs contribute to people's sudden or longer term needs and plans to migrate to more life-sustaining locations; they also impact health outcomes for individuals and societies (McMichael, 2020; Schwerdtle, Bowen, & McMichael, 2018; Shultz et al., 2019).

Climate change affects the availability of natural resources, and thereby affects and is affected by resource-related violence (Burrows & Kinney, 2016; Brzoska, 2019; Climate and Migration Coalition, 2018b; Hsiang, Burke, & Miguel, 2013; Thompson, 2019; Reuveny, 2008). Even functional governments can fail to address this issue in the face of immense needs caused by climate change. Food insecurity destabilizes societies (Smith-Cannoy, 2019). Areas of increasing violent conflict include urban systems, transportation, health care, indigenous rights, international commerce, marine resources, and land

ownership and use (IRC, 2019; Nicholas & Breakey, 2019). Internal migration to urban areas due to agriculture failure often precedes civilian violence in the receiving areas, and migrants without land and community are vulnerable, leading to cross-border migration (Abel et al., 2019; Sheller, 2018; Smith-Cannoy, 2019). Migrants are vulnerable to both state and nonstate violence (Bower & Olson, 2018;). Also, the conversion of forest to agricultural land affects and is affected by ecosystem health (Carr, 2009).

Climate migration is often conceptualized, in the United States and other countries, as a national and societal security risk. (Climate and Migration Coalition, 2019; Miller, 2017; Miller, 2019; Randall, 2018). This has led to specific priorities in funding for climate change adaptation. The individuals and nations most affected by climate change are not generally the entities most responsible for emitting greenhouse gases (Burkett, 2009). Divisions between environmentally secure and environmentally exposed individuals, communities, and nations are increasing (Sheller, 2018). To manage this conceptualization, governments have instituted policies, processes, and agreements. A brief overview of these follows.

GOVERNMENTAL RESPONSES

It is important to understand some of the legal and political background against which our patients' lives play out.

The terms "climate migrant" and "climate refugee" have no legal definitions, so they offer no legal status or protection. This lack of definition impairs accurate data collection, impeding planning and international cooperative agreements (Randall, n.d.[a]; Randall, n.d. [b]). The terms "climate-related displacement" and "environmental migrant" likewise lack universal definition. In the current global political climate, there is widespread resistance to adding any more legal reasons for cross-border migration (Keyes, 2019; Keyserlingk, 2018; McAdam, 2017; Randall, n.d. [c]). To assist in progressing on these issues, a number of useful frameworks have been developed, including those related to human migration, climate drivers of migration, and climate response. Here are a few of them.

Human migration varies along several spectra. These include voluntary/forced, planned/urgent, fast/slow, temporary/permanent, high/low agency, high/low resource, and internal/cross-border (international) (Climate and Migration Coalition, 2018 a). Proposed **categories of climate-linked human migration** include all of the above, plus driver-related

factors such as habitability, resource conflict, and food and water scarcity. Additional categories include “trapped,” those who want to leave but cannot, and “planned relocation of whole communities” (Ferris & Weerasinghe, 2020; Warner et al., 2013), including in the United States (Lewis, 2019).

The UN climate talks and the Paris Agreement of 2015 mentioned climate migration, but are not binding and neither addresses internal migration. The talks in 2018 built on that framework and made more concrete, but still nonbinding, recommendations for global cooperation in several areas, including data collection (Climate and Migration Coalition, 2018d; Climate Outreach, 2016). The 2019 UN climate talks in Madrid were notable for the failure to progress on a proposal for a global “climate damage fund” (United Nations OHCHR; Rowling, 2019). One hopeful note is that the United States has now rejoined the Paris climate agreement and there is a mention of climate migration in this statement of intent from U.S. President Joseph Biden, so there will be a U.S. task force (Aton, 2021).

TERMINOLOGY AND DEFINITIONS

It is important to understand the meanings of specific terms to understand the challenges that climate migrants face.

A “refugee” meets the conditions of the 1951 Convention Relating to the Status of Refugees (Geneva convention). These conditions include “real” risk of harm to an individual, by the government, based on belonging to a “protected class” of individuals. A “refugee” is outside of their destination country when they apply; an “asylum seeker” applies for humanitarian resettlement under the refugee convention but is inside the destination country when they apply. Both these categories are making legal claims for humanitarian protection.

There have been various unsuccessful attempts to update the definition of “climate refugee.” One stumbling block has been the difficulty of proving specific governmental causes in the case of climate-displaced people (Huggel et al., 2015; Keyserlingk, 2018), although that is being addressed in political, legal, and scientific research (e.g. Aton, 2021; Burkett 2009; Huggel et al., 2015).

A “migrant” is anyone who is moving to a new residence and represents a spectrum of situations. “Internally displaced persons” are migrants moving involuntarily within their own national borders. A “stateless” person is not considered a national by any nation; examples might be born during migration, or failed refugee or asylum

case with no permission to reenter the country of origin. “Circular migration” refers to people who have two or more homes; it can be occupational or economic. Circular migration has long been used by agricultural workers and is ever more common in the context of climate related agricultural failure. The principle of “non-refoulement” states that “a person should not be returned to a country where they face serious threats to life and freedom” (IOM, 2019b; UNHCR, 2017; 2021). An “economic migrant” leaves their home solely for financial reasons. Again, the distinction between “climate-caused” or “climate-related” and “economic” migration is not universally defined—how far, or how frequently, does the water need into the house to come before it is a reason to move?”

The current scope of climate migration: It is hard to gather accurate data regarding climate displacement, since we lack definitions, tools, and surveys and since climate displacement is often only part of a complex, interacting process, which may lack a legally precipitating cause (Randall, n.d. a; Randall, n.d. b). Projections of numbers of climate migrants range from 150–300 million by 2050: a number of people equal to the fifth (or possibly fourth) largest country in the world. (Keyserlingk, 2018). People who live in the 48 least developed countries in the world are five times more likely to die in a climate-related disaster than those living in the rest of the world (Ciplett, Roberts, & Cahn, 2015; Miller, 2017). According to one estimate, in 2016 anthropogenic climate change displaced 10–26 million people globally, disproportionately from the global south and low-emitting countries. In 2019, the total number of international migrants was at least 272 million (United Nations Department of Economic and Social Affairs, 2019).

This is not just an international issue that will affect migration TO the United States; these effects will also be felt within the United States (Climate Impact Lab, 2021; U.S. Global Change Research Program, 2014). Internal migration will occur, and in some projected scenarios, people will be trying to migrate north from the United States to Canada (Shaw et al., 2020).

Human rights violations are both drivers and results of displacement. Climate change-related human rights violations are novel in scale and scope and are tightly interwoven with international development, aid, and commerce. There are many areas of overlap, including displacement of former refugees by current refugees, temporary flight in cases where the refugee’s home is not rebuildable, repeated loss displacement, and vulnerability during travel (IRC, 2019; Sheller, 2018; Smith-

Cannoy, 2019). For example, national greenhouse gas reduction strategies may conflict with land rights (McLeman, 2020; Smith-Cannoy, 2019). Fatal Journeys reports that at least 16,000 people died crossing international borders between 2014 and 2019 (IOM, 2019a; 2020). The industries that extract fossil fuels to run our cities have negative consequences on places that we think of as distant (Sheller, 2018).

The U.S. response to climate change has been characterized as an “armed lifeboat” (Ross-Brown, 2013). Most research and resources addressing climate change in the United States have gone to the military sector. Energy resources are a major component in geopolitics. The Department of Defense was planning for climate change as early as 1993 (DOD, 1994) and funds and resources have been allocated to a military response to climate migration since the United States government began addressing this issue (Miller, 2017; National Intelligence Council, 2006; Ross-Brown, 2013; Schwartz & Randall, 2003; US GAO, 2019). This includes equipment, training, research and development, and personnel and personnel maintenance (Miller, 2017; 2019).

The U.S. immigration system has become ever more militarized and restrictive (American Immigration Lawyers Association, 2021; Davis & Shear, 2019). U.S. immigration laws have been heavily politicized since their beginning in the late 1800s (Kerwin, 2018; McNeill, 2020). The immigration system includes the State Department, which issues visas (permission to cross borders), the Department of Justice, the Immigration and Nationality Act, residence and citizenship permissions, the Department of Homeland Security, Customs and Border Patrol, and Immigration and Customs (ICE). Categories of the United States immigration system affected by changes accelerated in the last four years include work- and family-based permissions, per-country ceilings, refugees, asylees, and deferred deportation programs such as Temporary Protected Status (TPS) and Deferred Action for Childhood Arrivals (DACA).

All of these interlocking systems are complex and expensive and have been further expanded in the last four years (American Immigration Council, 2019; American Immigration Legal Council, 2020). This has prevented resources from flowing toward climate mitigation, adaptation, or resilience, both in the United States and abroad (Gustin & Henninger, 2019). Instead, resources have been focused on military defense against immigrants and immigration (Miller, 2017; Miller, 2019; Whitehead, 2014). The U.S. budget for immigration is 27 times higher than it was 30 years ago (American

Immigration Council, 2020) and has increased by 133,567% since 1980 (Miller, 2019). Although the United States spends millions of dollars on foreign aid, most of that money is spent on border security and policing (Miller, 2017; Miller, 2019).

The border itself poses human rights concerns, as normal laws don't apply in border zones (Kawakubo, 2020; Walia, 2013). In the last few years, the U.S. border zone has expanded to 100 miles from the border, including 65% of the U.S. population (Miller, 2019; Misra, 2018). “Interior enforcement” has provided new powers, including targeted surveillance and warrantless searches, to border patrol agents far away from the border. This expansion of power has been justified through appeals to common beliefs about the migrant population. Common narratives about migrants include that they are opportunists, security threats, victims, political pawns, economic drains, criminals, and unassimilable aliens.

NURSING IMPLICATIONS

Nurses can take action on multiple levels: as individuals, as nursing professionals, and as American citizens. In choosing and engaging in action, various facets of this human rights crisis should be considered. These include the challenge/opportunity spectrum; the complex, historical, intersectional, global, and urgent nature of this crisis; the scope of influence; various frameworks, such as economic, political, health, humanitarian, justice, and security perspectives; and considerations for nursing practice.

Some international legal organizations have released overarching **conceptual frameworks for environmental migration**, including the concept of the uncompensated wrong (Burkett, 2009) and a proposed humanitarian framework for environmental migrants (Kalin & Weerasinghe, 2017), partially operationalized for further work in the IOM and United Nations initiatives discussed in the previous section. Solutions ranging from local to global will be needed. It is essential to realistically assess the climate adaptive capacity of “remain in place” solutions and to objectively consider both collective and individual safety and survival. Global disparities in the interdependent rights “to a home” (Manuel, 2018) and “freedom of movement” (Sheller, 2018) are among human rights that influence conflicting political approaches to global climate change. As Zenju Earthlyn Manuel (2018, p. 8) writes, “It looks like homelessness is happening to particular groups, but it is happening to all. We are in a free fall toward the unknown. Our whole species is faced with homelessness.”

Nurses can serve as informed political advocates. Advocacy includes promoting policies that facilitate a decrease in individual and collective contributions to climate change. This includes recognizing the disproportionate impact of the United States and the healthcare sector's significant production of greenhouse gases. The healthcare sector has a unique responsibility and opportunity to act. The healthcare field has a healing mission and has committed to "do no harm," yet its operations contribute significantly to climate change and, as a result, to the very diseases it is trying to treat. The healthcare sector's greenhouse gas emissions make up 9.8% of the U.S. total; if it were its own country, healthcare would rank 13th in the world for greenhouse gas emissions, more than the United Kingdom (Eckelman et al., 2020; Eckelman & Sherman, 2016). Specific healthcare efforts to ameliorate this impact include Healthcare Without Harm (2021), Nurses Climate Challenge (2021), Nurses Drawdown (Project Drawdown, 2021), Planetary Health (Planetary Health Alliance, 2021), Practice Greenhealth (2021) and local interventions that make global warming reduction behaviors accessible and feasible.

While mitigating climate change in the ways above is important, nurses also can be involved in climate adaptation and resilience efforts. This is where there is the greatest need for nurses to understand climate migration.

Nurses can advocate for migrants' human and health rights, including recognition of the impact of climate change on human migration. For example, migrants are heavily represented in healthcare settings, and many have a wealth of knowledge and experience that is either untapped or is tapped without recognition or reimbursement (American Immigration Council, 2018; 2020). Healthcare professionals can actively support their migrant coworkers and patients and intervene if they witness individual and systemic discrimination in the workplace or community (McNeill, 2020).

Nurses can also become more aware and share their knowledge about migrant health risks and the link between climate change and migration in local communities. In migrant-heavy workplaces, such as those in the food service, cleaning, agricultural, and manufacturing industries, health risks may include mandatory overtime; unsafe or broken equipment; heat, chemical, and infectious disease exposure; sexual harassment; and inadequate protective supplies. In some

workplaces there are separate healthcare facilities for migrants, which potentially increases their risk of abuse and inferior health care. In some of these situations, migrants and healthcare workers alike are afraid to speak up about health risks, knowing that retaliation has occurred in the form of physical and legal threats. Nurses working in these settings, and in detention facilities, need and deserve professional support to uphold professional standards by substantively addressing these issues, either within the systems or, in some cases, by "whistle-blowing."

Nurses can be aware of basic best practices for caring for migrant patients, and advocate in their spheres for their implementation.

Specific best practices for migrant health care for nonspecialist providers in the United State include prioritizing screening, accommodation, and knowledge of local resources, and implementing measures to ensure that health information is not misunderstood. Climate migrants are dealing with losses, not only of previous roles and resources, but of the very landscape of "home". It is important to recognize and respond to grieving, and work with and support the strengths that have made it possible for them to arrive to our care settings. Nurses are positioned by education and work roles to effectively both assess and respond with to these strengths and challenges. For more information about environmental risks for migrating people, please see the Immigrants and Refugees section in the Vulnerable Population unit.

CONCLUSION

Climate change, human migration, and human health crises intersect in ways that can be overwhelming. However, the intersectionality of this situation means that many opportunities exist for nurses to apply our compassion, knowledge, and determination toward effective action. We know that moving forward one step at a time can lead to transformation. The very foundations of our profession rest on caring combined with knowledge, hard work, and moral courage. Nurses can care effectively for the health of climate migrants and communities by understanding more about the causes and conditions that have led to their suffering. As practice Greenhealth (2021) states, "Efforts aimed at protecting and improving our health will not succeed without addressing the social, economic, and ecological catastrophes that largely underpin the health, safety, and happiness of individuals and communities worldwide." The knowledge and resources presented in this article and bibliography is intended to provide context for understanding and thus working with the climate

migration related health issues that are certain to arise in each nurse's practice.

The author of this section would like to acknowledge to following people for their comments and support in this work: Nancy Chaney, Chris Fasching Maphis, Barbara Gottlieb, David Holland, Katie Huffling, Kaira Jewel Lingo, Gene Locke, Ruth McDermott-Levy, Matthew Paterson, Nancy Rudner, Barbara Sattler, Marcy Schneck, Eva Stitt, Jennifer Jacoby Anne Trippeer, Erica Uhlman, and Stephanie Marshall Ward.

REFERENCES

Abel, G. J., Brottrager, M., Cuaresma, J. C., & Muttarak, R. (2019). Climate, conflict, and forced migration. *Global Environmental Change*, 54, 239–249. <https://doi.org/10.1016/j.gloenvcha.2018.12.003>

American Immigration Council (2018, January 17). Special report: Foreign-trained doctors are critical to serving many US communities. <https://rb.gy/ei1yuo>

American Immigration Council (2019, October 10). How the United States immigration system works [Fact Sheet]. <https://www.americanimmigrationcouncil.org/research/how-united-states-immigration-system-works>

American Immigration Council (2020, August 6). Immigrants in the United States [Fact Sheet]. <https://www.americanimmigrationcouncil.org/research/immigrants-in-the-united-states>

American Immigration Lawyers Association (2021, February 17). Tracking notable executive branch action. <https://www.aila.org/advo-media/agency-liaison/tracking-notable-executive-branch-action>

Aton, A. (2021, February 8). Biden pushes U.S.—and the world—to help climate migrants. *Scientific American*. <https://www.scientificamerican.com/article/biden-pushes-u-s-and-the-world-to-help-climate-migrants/>

Baez, J., Caruso, G., Mueller, V., & Niu, C. (2017). Droughts augment youth migration in northern Latin America and the Caribbean. *Climatic Change*, 140, 423–435. <https://doi.org/10.1007/s10584-016-1863-2>

Benko, J. (2017, April 19). How a warming planet drives human migration. *The New York Times*. <https://www.nytimes.com/2017/04/19/magazine/how-a-warming-planet-drives-human-migration.html>

Bower, E., & Olson, J. (2018, December). Women on the move in a changing climate: A discussion paper on gender, climate, and mobility. *Sierra Club & UN Women*. <https://>

contentdev.sierraclub.org/sites/www.sierraclub.org/files/program/documents/Women-Climate-Report.pdf

Brzoska, M. (2019). Understanding the disaster-migration-violent conflict nexus in a warming world: The importance of international policy interventions. *Soc. Sci*, 8(6), 167. doi:10.3390/socsci8060167

Burkett, M. (2009). Climate reparations. *Melbourne Journal of International Law*, 10(2).

Burrows, K., & Kinney, P. (2016). Exploring the climate change, migration and conflict nexus. *International Journal of Environmental Research and Public Health*, 13(4), 443. doi:10.3390/ijerph13040443

Campbell, B. M., Aggarwal, P. K., Corner-Dolloff, C. A., Girvetz, E. H., Loboguerrero, A. M., Ramirez-Villegas, J., Rosenstock, T., Sebastian, L. S., Thornton, P. K., Wollenberg, E., & Vermeulen, S. (2016). Reducing risks to food security from climate change. *Global Food Security*, 11, 34–43. doi:10.1016/j.gfs.2016.06.002

Carr, D. (2009). Population and deforestation: Why rural migration matters. *Progress in Human Geography*, 33(3), 355–378.

Ciplet, D., Roberts, J. T., & Cahn, R. (2015). Power in a warming world: The new global politics of climate change and the remaking of environmental inequality. MIT Press.

Climate Impact Lab. (2021). Climate Impact Map. <http://www.impactlab.org/map/#usmeas=absolute&usyear=1981-2010&gmeas=absolute&gyear=1986-2005>

Climate and Migration Coalition. (2018 a). December 4, 2018. Climate change and migration 101. <https://www.youtube.com/watch?v=-Xq7QEdVIB0&t=5s>

Climate & Migration Coalition (2018b). December 10, 2018. Hot wars: climate change and conflict. <https://www.youtube.com/watch?v=PiMCxTaxZ8I&t=1843s>

Climate and Migration Coalition. (2018c). December 16, 2018. Migration and displacement at the climate talks. <https://www.youtube.com/watch?v=3XOTcY6weYU>

Climate and Migration Coalition. (2019). July 25, 2019. Security, for who? <https://www.youtube.com/watch?v=i5LNIeSyDII>

Climate Outreach. December 14, 2016. Fixing climate-linked displacement: are the climate talks enough? https://www.youtube.com/watch?v=m4L-hzBeBlg&feature=emb_imp_woyt

Davis, J. H. & Shear, M. D. (2019). Border wars: Inside Trump's assault on immigration. Simon & Schuster.

deMenocal, P. & Stringer, C. (2016). Climate and the peopling of the world. *Nature*, 538, 49–50. <https://doi.org/10.1038/nature19471>

Department of Defense, United States. (2015, July 23). Congressional report: National implications of climate change. <https://archive.defense.gov/pubs/150724-congressional-report-on-national-implications-of-climate-change.pdf>

Department of Homeland Security, United States. (2012). Climate Change Adaptation Roadmap. <https://rb.gy/fxxjzz>

Eckelman, M. J. & Sherman, J. (2016, June 9). Environmental impacts of the U.S. health care system and effects on public health. *PLoS ONE*, 11(6), e0157014. <https://doi.org/10.1371/journal.pone.0157014>

Eckelman, M. J., Huang, K., Lagasse, R., Senay, E., Dubrow, R., & Sherman, J. D. (2020, December). Health care pollution and public health damage in the United States: An update. *Health Affairs*, 39(12). <https://www.healthaffairs.org/doi/10.1377/hlthaff.2020.01247>

Ferris, E. & Weerasinghe, S. (2020). Planned relocation as a protection tool in a time of climate change. *Journal on Migration and Human Security*, 8(2), 134–149. doi: 10.1177/2331502420909305

Flavelle, C. (2020, August 26, 2020). U.S. flood strategy shifts to ‘unavoidable’ relocation of entire neighborhoods. *The New York Times*. <https://www.nytimes.com/2020/08/26/climate/flooding-relocation-managed-retreat.html>

Gardiner, S. M. (2011). *A perfect moral storm: The ethical tragedy of climate change*. Oxford University Press.

Groundswell. (2019, March 19). New report says climate change could force millions to move within their countries [Video]. You Tube. https://m.youtube.com/watch?feature=emb_logo&v=d6ijhQn_ww4&time_continue=11

Gustin, G. & Henniger, M. (2019, July 9). Central America's choice: Pray for rain or migrate. *NBC News*. <https://www.nbcnews.com/news/latino/central-america-drying-farmers-face-choice-pray-rain-or-leave-n1027346>

Healthcare Without Harm. (2021). <https://noharm-uscanada.org/HealthyClimate>

Herrmann, V. (2017, August). The United States climate change relocation plan: What needs to happen now. *The Arctic Institute*. https://www.thearcticinstitute.org/wp-content/uploads/2017/09/The-United-States-Climate-Change-Relocation-Plan_2017.pdf

Holtz, J. (2019, March 19). Managed retreat due to rising seas is a public health issue. *UW News*. <https://www.washington.edu/news/2019/03/19/managed-retreat-due-to-rising-seas-is-a-public-health-issue/>

Hsiang, S.M., Burke, M., & Miguel, E.. (2013). Quantifying the influence of climate on human conflict. *Science* 13 341(6151). 1235367. doi: 10.1126/science.1235367

Huggel, C., Stone, D., Eicken, H., & Hansen, G. (2015). Potentials and limitations of the attribution of climate change impacts for informing loss and damage discussions and policies. *Climatic Change*, 133(3): 453–467. DOI:10.1007/s10584-015-1441-z

IDMC. (2020). Migration Data Portal. Institute of Migration.

Institute for the Study of Diplomacy, Edmund A. Walsh School of Foreign Service, George Mason University. (2017, April). New challenges to human security: Environmental change and human mobility. Georgetown University.

International Organization for Migration (IOM). (2019a). Fatal journeys: Missing migrant children. IOM. https://publications.iom.int/system/files/pdf/fatal_journeys_4.pdf

International Organization for Migration (IOM). (2019b). Glossary on Migration. Retrieved in 2019. https://publications.iom.int/system/files/pdf/iml_34_glossary.pdf

International Organization for Migration (IOM). (2020). World migration report 2020. <https://www.iom.int/wmr/>

International Rescue Committee (IRC). (2019, September 27). Rescue facts: How climate change affects refugees [Video]. You Tube. https://m.youtube.com/watch?time_continue=4&feature=emb_logo&v=VcmVSfHvITk

Kalin, W. & Weerasinghe, S. (2017). Environmental migrants and global governance: Facts, policies, and practices. *International Organization on Migration*.

Kawakubo, F. (2020). Privatizing border security: Emergence of the border-industrial complex and its implications. *Public Voices* 2020 17(1), 32-38.

Kerwin, D. (2018). From IIRIRA to Trump: Connecting the dots on the current US immigration policy crisis. *Journal on Migration and Human Security*, 6(3), 192–204. doi:10.1177/2331502418786718

Keyes, E. (2019). Environmental refugees? Rethinking what's in a name. *North Carolina Journal of International Law & Commercial Regulation*, 462–486.

Keyserlingk, J. G. (2018) Immigration control in a warming world. Imprint Academic.

Lewis, A. S. (2019). *The Drowning of Money Island: A forgotten community's fight against the rising seas threatening coastal America*. Beacon Press.

Limaye, V. (2019, September). Bitter pill: The high health costs of climate change [Fact Sheet]. National Resources Defense Council (NRDC). <https://www.nrdc.org/resources/bitter-pill-high-health-costs-climate-change>

Limaye, V. S., Max, W., Constible, J., & Knowlton, K. (2019). Estimating the health-related costs of 10 climate-sensitive U.S. events during 2012. *GeoHealth*, 3, 245–265. <https://doi.org/10.1029/2019GH000202>

López-Carr, D. & Marter-Kenyon, J. (2015). Human adaptation: Manage climate-induced resettlement. *Nature* 2015 Jan 15, 517 (7534), pp. 265-7.

Manuel, Z. E. (2018). *Sanctuary: A meditation on home, homelessness, and belonging*. Wisdom Publications.

McAdam, J. (2017, June 6). Seven reasons the United Nations Refugee Convention should not include “climate refugees.” *The Sidney Morning Herald*. <https://www.smh.com.au/opinion/seven-reasons-the-un-refugee-convention-should-not-include-climate-refugees-20170606-gwl8b4.html>

McLeman, R. (2020, December) How will international migration policy and sustainable development affect future climate-related migration? Transatlantic Council on Migration, Migration Policy Institute. <https://www.migrationpolicy.org/research/international-migration-policy-development-climate>

McMichael, C. (2020, June). Human mobility, climate change, and health: Unpacking the connections. *The Lancet: Planetary Health*, 4(6), e217–e218. [https://doi.org/10.1016/S2542-5196\(20\)30125-X](https://doi.org/10.1016/S2542-5196(20)30125-X)

McNeill, T. (2020, September 2020). The long history of xenophobia in America. *TuftsNow*. <https://now.tufts.edu/articles/long-history-xenophobia-america>

Miller, T. (2017). *Storming the wall: Climate change, migration, and homeland security*. City Lights Books.

Miller, T. (2019). *Empire of borders: The expansion of the US border around the world*. Verso.

Milman, O. (2020, December 1). Climate crisis to triple flooding threat for low-income US homes by 2050. *The Guardian*. <https://www.theguardian.com/environment/2020/dec/01/climate-crisis-triple-flooding-threat-low-income-us-homes-by-2050>

Misra, T. (2018, May 14). Inside the massive U.S. ‘border zone’. *Bloomberg CityLab*. <https://www.bloomberg.com/>

[news/articles/2018-05-14/mapping-who-lives-in-border-patrol-s-100-mile-zone](https://www.bloomberg.com/news/articles/2018-05-14/mapping-who-lives-in-border-patrol-s-100-mile-zone)

Naser, M. M., Swapan, M. S. H., Ahsan, R., Afroz, T., & Ahmed S. (2019). Climate change, migration and human rights in Bangladesh: Perspectives on governance. *Asia Pacific Viewpoint*, 60(2), 175–190.

NBC News. (2019, July 8.) How climate change drives migration [Video]. YouTube.

Neuman, B. & Fawcett, J. (2002). *The Neuman Systems Model* (4th ed.). Prentice-Hall International.

Nicholas & Breakey (2019). The economics of climate change and the intersection with conflict, violence, and migration: Implications for the nursing profession. *Nursing Economics*, 37(1) 23 – 34.

Noy, I. (2017). To leave or not to leave? Climate change, exit, and voice on a Pacific island. *CESifo Economic Studies*, 63(4), 403–420. doi: 10.1093/cesifo/ixf004

Nurses Climate Challenge. (2021). <https://nursesclimatechallenge.org/>

Planetary Health Alliance (2021). *Planetary Health*. <https://www.planetaryhealthalliance.org/planetary-health>

Practice Greenhealth. (2021). Sustainability Solutions for Healthcare. <https://practicegreenhealth.org/>

Project Drawdown (2021) Nurses Drawdown. <https://www.nursesdrawdown.org>

Randall, A. (n.d.[a]) Climate refugee statistics: how many, where, and when? <https://climatemigration.org.uk/climate-refugee-statistics/>

Randall, A. (n.d.[b]) Environmental refugees: who are they, definition, and numbers. <https://climatemigration.org.uk/environmental-refugees-definition-numbers/>

Randall, A. (n.d.[c]). Why governments will eventually, reluctantly, back migration as climate adaptation. <https://climatemigration.org.uk/governments-back-climate-migration-adaptation/>

Randall, A. 2018. Migration is a successful climate adaptation strategy: opinion. *Al-Jazeera*, March 11, 2018. <https://www.aljazeera.com/opinions/2018/3/11/migration-is-a-successful-climate-adaptation-strategy>

Reuveny, R. (2008). Ecomigration and violent conflict: case studies and policy implications. *Hum Ecol* (2008) 36:1–13 DOI 10.1007/s10745-007-9142-5

Ross-Brown, S. (2013, September/October). Armed lifeboat: Government's response to natural disaster. *Utne*

Reader. <https://www.utne.com/politics/natural-disaster-zm0z13sozros>

Schwartz, P. & Randall, D. (2003), An abrupt climate change scenario and its implications for United States national security. Homeland Security Digital Library. <https://www.hsdl.org/?abstract&did=444312>

Schwerdtle, P., Bowen, K., & McMichael, C. (2018). The health impacts of climate-related migration. BMC Medicine, 16(1). doi: 10.1186/s12916-017-0981-7.

Shaw, A., Lustgarten, A., & Goldsmith, J. W. (2020, September 15). New climate maps show a transformed United States. ProPublica. <https://projects.propublica.org/climate-migration/>

Sheller, M. (2018). Mobility justice: The politics of movement in an age of extremes. Verso Press.

Shultz, J.M., Rechkemmer, A., Rai, A., & McManus, K.T. (2019). Public health and mental health implications of environmentally induced forced Migration. Disaster Medicine and Public Health Preparedness 13 (2). 116-122. doi: 10.1017/dmp.2018.27 Smith-Cannoy, H. (Ed). (2019). Emerging threats to human rights: Resources, violence, and deprivation of citizenship. Temple University Press.

Thompson, B. (2019, October 15). Climate change and displacement: How conflict and climate change form a toxic combination that drives people from their homes. The UN Refugee Agency USA. <https://www.unhcr.org/en-us/news/stories/2019/10/5da5e18c4/climate-change-and-displacement.html>

UNHCR. (2017, June). Key concepts on climate change and disaster displacement. <https://www.refworld.org/docid/594399824.html>.

UNHCR. (2021). The 1951 Refugee convention. Retrieved on February 27, 2021. <https://www.unhcr.org/en-us/1951-refugee-convention.html>.

United Nations Department of Economic and Social Affairs (2019, December 17). The number of international migrants reaches 272 million, continuing an upward trend in all world regions, says UN. UN DESA News. <https://www.un.org/development/desa/en/news/population/international-migrant-stock-2019.html>

United Nations OHCHR. (2015) Understanding human rights and climate change. Submission of the Office of the High Commissioner for Human Rights to the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change. <https://www.ohchr.org/Documents/Issues/ClimateChange/COP21.pdf>

United States Centers for Disease Control. (2020). Climate and health: Climate effects on health. <https://www.cdc.gov/climateandhealth/effects/default.htm>

U.S. Global Change Research Program. (2014). Future Climate. <https://nca2014.globalchange.gov/highlights/report-findings/future-climate>

U.S. Government Accounting Office (US GAO) (2019, January). Climate change activities of selected agencies to address potential impact on global migration. <https://www.gao.gov/assets/700/696460.pdf>

Vidal, J. (2018, January 4). Boats pass over where our land was: Bangladesh's climate refugees. Guardian.

Walia, H. (2013). Undoing border imperialism. AK Press.

Warner, K., Afifi, T., Kälin, W., Leckie, S., Ferris, B., Martin, S. F., & Wrathall, D. (2013, June). Policy brief: Changing climate, moving people: Framing migration, displacement, and planned relocation. UN University: Institute for Environment and Human Security (UNU-EHS).

Whitehead, J. (2014, June 17). Has the department of homeland security become America's standing army? River Cities' Reader. <https://www.rcreader.com/commentary/has-department-homeland-security-become-americas-standing-army>

World Bank. (2018, March). Groundswell: Preparing for Internal Climate Migration. <https://www.worldbank.org/en/news/infographic/2018/03/19/groundswell---preparing-for-internal-climate-migration/>

It has been reported that climate change is one of the greatest public health threats that we face today. The consequences of climate change have been well documented. These include morbidity and mortality from intense heat, asthma exacerbation, and mental health issues related to displacement due to severe weather events.

However, we know that these health issues do not affect every community equally. For instance, African Americans have a 36% higher rate of asthma incidents and are 3 times more likely to die or visit the emergency room from asthma-related complication than non-Hispanic Whites (Hoerner & Robinson, 2008). Native American and Alaskan Native communities lack access to clean, potable drinking water at higher rates than others. Warmer water temperatures may exacerbate already-high rates of diarrhea-associated hospitalizations for Native American and Alaskan Native children (Singleton, et al., 2007). Nearly 1 in 2 Latinos live in counties with poor air quality. Latino children are twice as likely to die from asthma as non-Latino Whites, and Latino children living in areas with high levels of air pollution have a heightened risk of developing Type 2 diabetes (Morello-Frosch, et al, 2009).

Equity refers to the act of being fair and impartial. Health equity means that everyone has a fair and just opportunity to be as healthy as possible. However, due to systemic barriers, many marginalized communities are more susceptible to the health effects of climate change, despite their having contributed less to the mechanisms responsible for climate change. Many of these systemic issues are historic, such as the past racist redlining practices, which was the mid-20th-century practice by banks and insurers to concentrate African Americans and other minority homeowners within certain neighborhoods. Many of the nation's historically redlined districts "now contain the hottest areas" in the United States, according to data collected from 108 cities across the country (Hoffman, Shandas, & Pendleton, 2020). As a result, residents of those areas face a disproportionate risk of heat-related mortality and health impacts associated with heat and carbon pollution.

Another example of this inequity is tree canopies. The benefits of trees are well known, not only for the shade that is provided but trees are vital as a force against climate change as they remove carbon dioxide, a

greenhouse gas, from the atmosphere. However, a map of tree cover among major cities is also a map of minority, low-income neighborhoods as they usually do not have trees due to lack of investment in minority, urban neighborhoods. African Americans are more likely to live in neighborhoods with few trees and more heat-trapping pavement (Morello-Frosch, et al, 2009). The rate of heat-related deaths in African Americans is 150–200% greater than that for non-Hispanic Whites (Morello-Frosch, et al, 2009).

Many cities across the nation are now developing climate adaptation and mitigation plans. These plans must acknowledge that, due to historic racist policies, not all community members contribute equally to climate change, nor have the same resources or capabilities to protect themselves from its negative effects. Currently, San Antonio, TX, the SA Climate Ready Plan is using a climate equity framework that will prioritize communities burdened the most by climate change and those most vulnerable to it. Climate equity will ensure that these communities will play a central role in the just transformation of the institutional systems that have created the unequal burden of climate impacts. This will be operationalized by a screening tool that will be used to measure the equitable nature of all adaptation and mitigation strategies going forward. The themes include 1) access and accessibility; 2) affordability; 3) cultural preservation; 4) health, and 5) safety and security (SA Climate Ready, 2019, pg 58).

Nurses play an important role in advocating for and with minority communities that are experiencing the inequitable impacts of climate change. Nurses must also educate policymakers about the health impacts of climate change, the greater risk for low-income communities of color, and assure that this is addressed in climate change adaptation plans.

REFERENCES

Hoerner, J.A & Robinson, N. (2008). A climate of change: African Americans, global warming, and a just climate policy for the U.S. The Environmental Justice and Climate Change Initiative. Retrieved on April 18, 2021 from <http://urbanhabitat.org/files/climateofchange.pdf>.

Singleton, R.J., et al. (2007). Diarrhea-associated hospitalizations and outpatient visits among American Indian and Alaska Native children younger than five years of age, 2000–2004. The Pediatric Infectious Disease Journal, 26(11), 1006–13. <https://doi.org/10.1097/INF.0b013e3181256595>

Morello-Frosch, R., Pastor, M., Sadd, J., Shonkoff, S. (2009). The climate gap: Inequalities in how climate change hurts

Americans & how to close the gap. Retrieved from http://dornsife.usc.edu/assets/sites/242/docs/ClimateGapReport_full_report_web.pdf.

Hoffman, J.S., Shandas, V., & Pendleton, N. (2020). The effects of historical policies on resident exposure to intra-urban health: A study of 108 US urban areas. *Climate*, 8(1), pp. 1-15. <https://www.mdpi.com/2225-1154/8/1/12/htm>

American Forests. 2021. Tree equity in America's cities. Retrieved from <https://www.americanforests.org/our-work/urban-forestry/>

City of San Antonio City Council. (2019). SA climate ready: A pathway for climate action and adaptation. <https://www.sanantonio.gov/Portals/0/Files/Sustainability/SAClimateReady/SACRRReportOctober2019.pdf>

CLIMATE JUSTICE AGENDA FOR NURSING

In the fall of 2021, the Alliance of Nurses for Healthy Environments (ANHE) released the [Global Nurse Agenda for Climate Justice](#). The introduction to the Agenda states:

“This document has been created by an international group of nurses representing seven nursing organizations and two continents. Developed over a six month period leading up to the twenty sixth meeting of the United Nations Conference of the Parties (COP26) to the climate change accords and the UN Framework Convention on Climate Change. It is inspired by the leadership of the Alliance of Nurses for Healthy Environments who are applying for observer status to the convention and have a long-standing interest in the human and planetary impacts of climate change. Our intention is to draft a document to catalyze discussion and action for all nurses on climate justice.

We realize the urgent need for nurses to play a more significant role in climate justice. The idea of an Agenda is conceived to give space for the inclusion of the voices of others in the development of particular actions. We approach our role with humility in positioning this document as a way to stimulate discussion and debate amongst nurses across the globe who are working in international, governmental, regional, and local contexts.

The text for the agenda is modeled after the Principles of Climate Justice inspired by the Bali Earth Summit (2002), the Principles of Environmental Justice (1991), and the Mary Robinson Foundation-Climate Justice organization. Committee members identify several theoretical frameworks for conceptualizing climate justice from a nursing frame: Ways of Knowing in Nursing (Carper, 1978; Swift & Twycross, 2020), the United Nations Sustainable Development Goals, Human Rights, the Rights of Indigenous Peoples, Planetary Health, and the Just Transition Framework. These frameworks help the committee move conceptions of climate justice from empirical to emancipatory, reframing the interconnection of nursing with caring for Nature, and shifting from extractive to regenerative orientations for research, education, advocacy, and practice.

The committee is developing and curating a podcast series devoted to conversations with nurses across the globe with the intention of hearing new voices and ideas for climate justice in nursing. Two podcasts were conducted in Spanish in partnership with ANHE Latinoamérica. The committee also considered input from a set of previously published ANHE podcasts with

leading nurse scholars in climate justice and a bibliography on climate justice in the nursing literature.

The value-filter of the Just Transition Framework (2016) provides the inspiration for principles within five domains of the agenda: Shift economic control to communities (economics); Advance ecological restoration (ecology); Drive racial justice and social equity (ideologies); Democratize wealth and the workplace and relocalize most production and consumption (politics); and retain and restore cultures and traditions (social systems) while amplifying an intergenerational commitment to the future. What follows is a preamble stating our position and defining terms, followed by the five domains with suggested principles for action, and a brief conclusion for the way forward.”

Accompanying the release of the Agenda was the development of an initial definition of climate justice in nursing to guide climate justice strategies in nursing:

Climate justice in nursing addresses the social, racial, economic, environmental, and multispecies justice issues of the climate crisis through centering the experiences and ways of knowing in frontline and fenceline communities and safeguarding the rights of Nature to achieve planetary health (LeClair, Evans-Agnew, Cook, 2022). Read the Agenda and supporting resources on the [ANHE website](#).

REFERENCES

- Climate Justice in Nursing Steering Committee (2021). Global Nurse Agenda for Climate Justice. Alliance of Nurses for Healthy Environments. <https://envirn.org/climate-justice-agenda-for-nursing/>
- LeClair, J., Evans-Agnew, R., & Cook, C. (2022). Defining climate justice in nursing for public and planetary health. *American Journal of Public Health*, 112(S5). DOI: [10.2105/AJPH.2022.306867](https://doi.org/10.2105/AJPH.2022.306867)

Unit VII:

Advocacy

INTRODUCTION

The well-placed recent focus on structural issues that have contributed to racial and ethnic inequities, particularly in health and healthcare, have strengthened the importance of nurses intervening on the social determinants of health. Many of those structural issues are policies that in many ways contribute to factors that lead to health disparities. Nurses are uniquely educated and positioned to advocate for policies that improve the health of populations and communities through the creation of policies that place health in the forefront. The nursing process, though commonly applied in the clinical practice setting, provides the foundation for advocacy and policy in a broader setting. According to Gallup polls, nurses are the most trusted professionals and therefore play a critical role in shaping policies aimed at protecting the public. This section contains chapters that will demonstrate how the steps in the nursing process, assessment, diagnosis, implementation and evaluation, are readily transferable to the policy arena. In addition this section will also provide guidance, through stories, on how nurses can, and should, engage in advocacy initiatives to shape broader public health policy at the organizational, local, state and federal levels. Strategies for advocacy are discussed; these include building coalitions and influencing policy through legislative lobbying for environmental health policies.

USING NURSING PROCESS TO GUIDE ADVOCACY FOR ENVIRONMENTAL HEALTH

Aislynn Moyer, DNP, RN, Director of Nursing
Penn State Milton S. Hershey Medical Center
Hershey, PA

The nursing process is one of the first, and arguably most important, frameworks a nurse will ever learn. The key elements of assessment, diagnosis, planning, implementation, and evaluation guide everything that nurses do regardless of the area in which they practice. It is the very act of assessing and diagnosing patients with nursing problems that allows a nurse to best advocate for the patients he or she cares for. It only makes sense then that the same process would guide the way in which nurses advocate for themselves, and the larger nursing profession. Additionally, nurses can advocate for individuals and families, populations, policies, legislation, and environmental justice.

Advocacy can be defined as the act of supporting a cause (Merriam-Webster, 2014). The important piece of the definition is the act of supporting the cause. It is one thing to agree with a cause or a process, but to support it through an act is where advocacy is born. Many nurses have particular passions within the profession but are unsure of how to advocate for them. The nursing process is the natural guide to successful advocacy.

ASSESSMENT

The first step in the nursing process is assessment. A thorough assessment takes into account both objective and subjective data that then helps the nurse better understand the problem. It is important to gather as much data on a specific topic so that advocacy can be successful. Not understanding every side of an issue can be a big mistake. When an opponent of the issue raises a concern or a neutral party asks a question, the nurse advocate must be prepared to address the concern. This is not to say that the nurse advocate must know everything, but he or she should have a baseline comprehensive understanding of all sides of the issue. What is most important is that the nurse advocate understands how the issue impacts the profession of nursing.

DIAGNOSIS

Assessment leads naturally to the second step in the advocacy process: diagnosis. Diagnosing the problem requires the nurse advocate to step away from the collected data, form themes, and determine the root problem. It is important during this step to remember that the data collected is evidence of a problem. It is the problem that must be identified to successfully advocate

for a solution. For example, if one were to advocate for all residents in a particular area to recycle but no recycling programs were easily accessible (pick up, drop off centers, etc.) the true problem would not be addressed. The advocacy would need to focus on recycling programs first.

PLANNING

The planning phase of advocacy comes naturally to most nurses in clinical practice. Once the problems are identified, there are usually specific actions that need to take place. This is not the case with advocacy, as many nurses are not sure how to take action for advocacy. As the old saying goes, knowledge is power. Education is always a good starting point. Think about who needs to understand the problem. Once education starts, others will begin to ask questions and challenge ideas. The nurse advocate must be able to discuss the given issue from all sides. In planning for advocacy there may not always be a clear direction to take. This is why it is important to stay open minded and be ready for opportunities. Always be willing to talk to those around you about your concerns; you never know who you may be talking to or what connections that person may have.

IMPLEMENTATION

The implementation phase of advocacy is continuously evolving and requires multiple skills.

Be ready. As mentioned in the planning phase, there may be new opportunities that present themselves so the nurse advocate should always be ready. It is important to get the information out to the public and key people who need to know about it such as legislators, agency leaders, and other nurses.

Do not be shy; be assertive. Using the knowledge the advocate has gained, it is important to not be shy. Write letters to newspapers, government officials, large organizations, and nursing journals. Post information to blogs and other social media outlets. Call in to radio or television shows that are discussing related topics. Offer to speak on the topic at local schools, conventions, or town hall meetings. Remember that how the advocate presents themselves verbally and in writing, will determine how much weight others put on the information being shared.

Be professional. Be sure to always be professional and objective. Do not get into arguments but rather state facts and allow others to share their opinions. If the advocate knows the problem well, they will already be expecting what those on the other side of the issue may say.

Be persistent. If important people with action power only hear about the issue once in a while, they tend to not put much weight to it.

Collaborate with others. The more decision-makers hear a message, the more they will be aware of the issue and possible solutions. Nurse advocates display their leadership by partnering with existing groups and requesting others' support for nurses engaged in advocacy. The foremost nursing organization that advocates for environmental health is the Alliance of Nurses for Healthy Environments (ANHE). The Policy/Advocacy Forum of ANHE can be found at <https://envirn.org/policy-advocacy/>

The following Table lists examples of environmental organizations that nurse advocates can partner with to reduce environmental health risks and promote healthy communities.

Organization name	Website	Organizational purpose
Safer Chemicals, Healthy Families	http://saferchemicals.org/	A national effort to protect families from toxic chemicals
Environmental Working Group (EWG)	http://ewg.org/	Empowers people to live healthier lives in a healthier environment. EWG drives consumer choice and civic action with breakthrough research and an informed public
Environmental Defense Fund (EDF)	http://edf.org/	We think differently about how to solve environmental problems, working across disciplines and with diverse groups of people

Health Care without Harm (HCWC)	https://noharm.org/	An international coalition of hospitals and health care systems, medical professionals, community groups, health-affected constituencies, labor unions, environmental health organizations and religious groups leading the global movement for environmentally responsible
Center for Health, Environment, and Justice	http://chej.org/	Mentors a movement, empowering people to build healthy communities, and preventing harm to human health caused by exposure to environmental threats
Physicians for Social Responsibility (PSR)	http://www.psr.org/environment-and-health/	PSR's Environment and Health Program addresses toxics and global warming — challenges to life and well-being that pervade the entire planet

EVALUATION

Contrary to how it may seem, evaluation is not the end of the nursing process, but rather a checkpoint along the way. It is also a necessary step in the advocacy process. It is important that the nurse advocate take time to reflect on the advocacy that has been done and determine how

to move forward. The nurse advocate should ask themselves questions: Is there more information that needs to be collected? Are there people or groups that I have not yet reached out to? What change has taken place in regards to this issue? What change is left? What other initiatives exist that support this cause? Can we partner together? Always go back and relook at assessment, diagnosis, planning, and implementation to see if anything needs to be updated or changed. This step is crucial in keeping your advocacy relevant.

Part of evaluation is also celebrating where you have come. Even if big change has not occurred, celebrate the fact that people were educated who previously did not fully understand the issue. Each small win contributes to bigger change. Do not be discouraged but rather be encouraged to keep pressing forward.

CONCLUSION

The nursing process becomes the subconscious guiding force behind all that nurses do. The same can be said for advocacy. By taking one's time to thoughtfully move through each phase, the nurse advocate can develop a successful plan of advocacy. Remember advocacy is a form of action. Find others who are passionate about the same topics and join together to take action. Advocacy is a powerful tool that can be used to transform people and guide change. Why wait? Get started today!

REFERENCE

Merriam-Webster. (2014). Advocacy. Retrieved from <http://www.merriam-webster.com/dictionary/advocacy>

COALITION BUILDING: A POWERFUL POLITICAL STRATEGY

Anne Hulick, JD, MS, RN

Director, CT Clean Water Action and Coordinator of the Coalition for a Safe and Healthy Connecticut, Hartford, CT

Hacah Boros, MSN, RN

Coordinator of Environmental Health CT Nurses' Association East Berlin, CT

Mary Jane Williams, PhD, RN

Professor Emeritus

Central Connecticut State University

Chairperson, Government Relations Committee

CT Nurses' Association

Meriden, CT

Nurses are the most trusted professionals according to Gallup polls year after year (Gallup Poll, 2016). We hear this a lot. So what does it mean and how do we utilize the public's trust to advocate for policies that improve health for all citizens? The fact is that nurses are viewed by the public as highly educated healthcare practitioners that truly have their clients' best interest at heart. Patients trust us to advocate for them at the bedside, in the clinical setting and broadly, in the public arena. Unfortunately, nursing education does not often include courses or practicums on how nurses can advocate for more health protective policies. As a result, we don't view ourselves as the powerful leaders that we really are. We advocate daily with physicians and other members of the health care team but somehow don't think we are qualified to talk to lawmakers—who usually know far less than you do about nursing and healthcare. So can nurses play a role in shaping policy? It seems like a daunting task and one that most nurses are not comfortable with. And yet, we are from the very beginning, educated to advocate for patients. The irony is that while we may not think of ourselves as proficient at advocating with policy makers for laws that protect the health of citizens, nurses are uniquely positioned—and educated—to do just that!

So, how do we transfer the skills that we've learned and applied at the bedside to our state houses to be effective advocates for improving health? How do we acknowledge the trust placed in us by the public to make a difference on a broader scale? In this chapter, the reader will

- review the theoretical underpinnings and skills gained in our nursing education that are readily transferable to advocating for public policies to improve health for all citizens,

- learn how to apply those skills outside of the traditional healthcare setting, and
- learn to incorporate the leadership skills of team or coalition building to enhance the nurses' capacity to effect change on a broader scale.

Our professional role as advocates started with Florence Nightingale. Florence Nightingale was a strong nurse advocate who shaped the delivery of healthcare and health policy. She recognized the value of collecting and analyzing data to improve outcomes and to effectively communicate with leaders to help implement changes that improved health outcomes. She worked with supporters, colleagues and policymakers to enact broad social change (Mason et al, 2007).

Since this time, the professional role of nurses includes competence in advocacy. The ANA Revised Code of Ethics for Nurses with Interpretive Statements states the nurse is expected to collaborate with “other health professionals and the public in promoting community, national, and international efforts to meeting health needs” and to shape social policy (Mason et al, 2007).

The International Council of Nurses (2008) states “nurses have an important contribution to make in health services planning and decision-making, and in development of appropriate and effective health policy. They can and should contribute to public policy related to preparation of health workers, care delivery systems, health care refinancing, ethics in healthcare and determinants of health.” It is essential that the nurse recognize the concept of “upstream thinking” of primary prevention that addresses the notion that to protect the health of an individual, it is imperative to see the person holistically (Butterfield, 2002).

Despite this, nurses often don't recognize the skills and preparation gained through their nursing curriculum that enables them to serve as professional, credible advocates outside of the traditional clinical setting. Our educational preparation usually does not include practicum opportunities that allow us to apply the very same skills used in a hospital or clinical setting advocating for what is best for our patient to the statehouse or the board room where we advocate for public policies to improve health care systems. This is unfortunate as nurses often don't recognize that they are highly skilled advocates in these settings. Nurses often shy away from taking advantage of these opportunities and lose out on utilizing our collective power for transformative change (Patton, 2015).

NURSING PROCESS

How do we become more comfortable transferring the skills and expertise we gain from our practice to non-traditional settings where we can influence policy? It might not seem readily apparent but the nursing process that we use every day provides a strong framework for advocating for policy at the state house or other non-traditional setting. Without even thinking about it, nurses are adept at assessing the situation, developing a plan, implementing and evaluating that plan to achieve desired outcomes.

Lesson Applied

As a critical care nurse and nursing director, the nursing process was something that became second nature in my daily practice. Without thinking, I would assess my patients, develop and implement plans and evaluate outcomes. As a director, I would do the same—assess the situation, develop a plan to implement a new program on the units, implement the plan in collaboration with other members of the health care team and evaluate how it all went. This all changed when I had the opportunity to go to meetings at our state house to discuss concerns about the health impacts of exposure to chemicals. I found that I was nervous and unsure of how or what to say and lacked confidence in my ability to talk to legislators despite being knowledgeable on the subject. What I found, after reflecting on the meeting, was the nursing process applied here as well. I realized that during the meeting, I assessed the legislators' knowledge base and level of support and this guided how we proceeded during the meeting. Intuitively, we were able to gauge our discussion and develop a plan for next steps. This awareness helped to build confidence for future meetings, our advocacy work and our evaluation of next steps.

COMMUNICATION

From the start, nurses are taught effective communication skills in order to interact with patients, family members, and other members of the health care team. We are used to speaking with physicians to advocate for what we think is best for our patients—even when the physician or other member of the health care team may not agree. We are educated to take complex issues and explain them to different audiences and we are good listeners. Nurses are also used to giving organized reports to on-coming shift personnel which turns out to be a very effective template for advocating for policy changes with legislators.

Talking to policy makers or legislators is no different. Generally, nurses are much more educated on patient

care, health issues, the health care system and relevant policies than most lawmakers. As we do in the clinical setting, nurses should incorporate peer-reviewed research and evidence-based practice when advocating for policy changes. Nurses' credibility as informed health professionals goes a long way in influencing policymakers that often have little experience with the health care issues you are working to address. Policy makers are often very busy with multiple issues from multiple constituents. Here again, nurses are highly skilled to communicate effectively in these types of situations. The practice of giving a report to another healthcare practitioner in advocating for a patient readily transfers to communicating with legislators. Nurses often use a consistent format to present the situation, background, assessment and resolution needed for a patient. Advocating for a change in policy fits this format nicely.

Lesson Applied

When I first started working as a nurse lobbying for more health protective chemical policies—like banning bisphenol-A from recyclable containers including baby bottles and infant formula containers, I was unsure what to say to legislators that I would see at the state house. I found they would often not have much time and somehow, I assumed that they knew more than I—after all, they were legislators. However, I always introduced myself, stated I was a nurse and explained that BPA is a synthetic chemical that disrupts hormones and is particularly harmful to infants and young children. Depending on the legislator's questions and time, I'd provide some background and hand them a research fact sheet that explains the problem and I'd end by asking for their support of the bill to ban BPA in these products. I realized that this method of communicating was no different than speaking with a physician or health care practitioner when I felt a patient needed an order for pain medication.

WORKING IN TEAMS

Nurses are critical members of the health care team, working with both licensed and unlicensed personnel to achieve the patient's goals. By virtue of our academic preparation, we learn to work collaboratively, to delegate, to supervise and to build effective working relationships with co-workers. Working with other team members, we identify patients' needs and work to achieve patient care goals. Nurses utilize leadership skills to coordinate patient care and advocate on behalf of the patients and families that they serve. These skills are vital to the work of advocacy and crucial to building coalitions—an important vehicle for advancing policy and one that will be discussed in more detail.

Nurses, often without recognizing it, are uniquely qualified and have critically important roles as advocates outside of their traditional work setting. Our knowledge and expertise, use of the nursing process, communication and leadership skills and our ability to work effectively in teams are the foundations for being effective leaders in health policy and advocating for changes that broadly impact public health. Providing mentoring and academic opportunities to practice these skills in non-traditional settings are needed to expand nurses' involvement in shaping policy at the local, state and federal levels.

COALITIONS - POWERFUL VEHICLES FOR CHANGE

Coalitions are groups of individuals and groups that come together around a common interest and agree to work together to achieve agreed upon goals (Berkowitz, 2007). Coalitions are actually a lot like health care teams—individuals with different backgrounds working to achieve patient care goals. These teams can be extremely effective or sources of frustration if the dynamics of the group are not managed well or mutual respect and a sense of team is lacking. In this section, we'll discuss what makes a coalition successful and share a case study in which nurses have led a successful coalition working to advocate for more health protective chemical policies.

COMPONENTS OF A COALITION

Mason, Leavitt and Chaffee suggest that successful coalitions have four common ingredients—leadership, membership, resources and serendipity or opportunity (2007). Leaders who can facilitate open dialogue; work with coalition members to tap into individual skills, comfort levels and expertise; and foster camaraderie and a sense of team are critical to a successful coalition. A leader who inspires others, creates a vision and organizing plan for the work, and facilitates sharing of the workload helps to build and sustain a passion for keeping coalition members engaged. The work of the coalition often arises from a problem or issue that is not easily solved within routine structures or methods. It is incumbent upon the leader to be able to help shape and articulate a winning strategy, build consensus, and communicate often so that all members feel included and empowered.

While the leader has an important role, successful coalitions utilize a shared governance framework and structure rather than the typical organizational structure that most are used to working in. While shared governance models have been typically implemented in health care and academic settings, this framework is well suited for coalitions. While there are numerous definitions of shared governance, the concepts of

partnership, accountability, equity and ownership are fundamental (Anthony, 2004). A shared governance structure means that accountability for outcomes is shared, that all members are on equal footing and decisions are made by consensus rather than a majority vote. This structure may be viewed as inefficient and cumbersome by some at first. However, proper facilitation and supporting individual members as they learn and grow in this work environment yields a strong commitment to the team, a sense of empowerment, and pride in the accomplishments of individual members and the group as a whole. Coalition partners that collaborate in this manner “demonstrate their willingness to enhance each other's capacity for mutual benefit and a common purpose by sharing risks, responsibilities, resources and rewards” (Himmelman, 2001).

Membership

When people come together to discuss collaborating on an issue, community problem or the need for policy change, the first step is to identify who else should be involved. Building diverse groups of individuals helps strengthen a coalition, build the base and power of the group, and promote a cohesive and unified vision. Reaching out to all stakeholders in the process is an important first step. Members of the coalition often represent various groups that lend strength and capacity to the overall mission. Again, similar to working in health care teams, nurses are used to working with members from different academic disciplines and yet are competent to coordinate the care plan for their patients. Similar skills apply when working with diverse coalition members. Here again, it is important to recognize and solicit the input of all coalition members, evaluate their skills and contributions to the work and achieving the goal, utilize this information to collectively develop a plan for achieving the goal and, together, implement the plan. Coalition membership may change for a variety of reasons including shifting priorities for coalition group members and individuals, funding, capacity to continue to support the coalition, and individual life choices. It is important to acknowledge this as a normal part of a Coalition's life cycle and to work to continue to build and strengthen relationships with new stakeholders, continue to develop coalition leaders, empowering them to their full capacity, and to stay focused on the overall goal.

STRUCTURE

The structure of the coalition may vary depending on the work, the membership, and the resources. Some coalitions may have a formal steering committee that almost serves as a board or advisory group along with

other committees to achieve certain aspects of the work such as marketing and social media and advocacy. Other coalition structures may not be as formalized, with members assisting with all aspects of the work. No matter the structure, it is important for the leader and the members to assure that the principles of shared governance and the overall campaign are moving forward. While these structures are often not as formalized as those in a typical health care setting, the inherent nature of nurses' ability to apply the nursing process provides a valuable framework for routinely assessing and revising the plan. Nurses work collaboratively with other members of the team to gain consensus on adapting to changes, while still working towards the overall strategic goal.

COALITION MEETINGS

Nurses frequently interact with other members of the health care team as they are planning for and taking care of patients. These interactions help to build trust, promote collegiality and a sense of common purpose, and serve as the mechanism to achieve the goal—what is best for the patient. The same principles apply in coalitions though there are struggles. Regular meetings and communications are critically important for coalitions yet often challenging as members have regular jobs and other priorities. Face to face meetings allow coalition members to further develop personal relationships, a sense of belonging, and ownership for achieving the goal of the coalition. Using on-line meeting scheduling technologies help to schedule meetings at times that are best for all coalition members. See <http://doodle.com/>. In addition to in-person meetings, regular conference calls enable members to stay connected and develop short-term goals and activities that build the coalition's momentum. A combination of these formats is vital to establishing an overall identity and sense of purpose and structure for coalition members. Also these meetings help provide a framework for getting work done by busy coalition members. Coalition leaders must work hard to develop and strengthen relationships and a sense of “esprit de corps” outside of the traditional workplace setting.

RESOURCES

Coalitions may not have a lot of resources like funding or marketing or communications departments; so the membership of the coalition is often the most valuable resource. Members are involved for a reason—a common passion or vision. There is nothing more powerful and it is critical that this energy is tapped into and utilized to its fullest capacity. Each member brings unique skills and abilities to the team, which the leader

must tap into, develop and rely on. Empowering members of the coalition so that they are contributing and growing in their roles helps to achieve and sustain momentum and builds the power of the coalition far beyond what a marketing or communications department might be able to do.

Members of the coalition also serve as the best marketers of the coalition and the goal that the group is working on. Using social media, setting up on-line invitations to events, sharing the day to day work on websites, Facebook and other sites, helps to build the campaign, expand name recognition and engage others in the coalition's work.

NEXT STEPS

Now that you have the coalition's goal in mind, the key stakeholders involved and a structure and processes for getting the work done, what are next steps? Again, our basic nursing preparation serves us well. Developing a campaign plan with a coalition is not all that different from developing a plan of care for a patient with other members of the health care team—and nurses do this with great skill.

The coalition plan or campaign plan is really no different in that it includes the team's assessment of problems and barriers, identifying stakeholders and developing a plan that lays out the key steps and accountabilities that ultimately lead to achieving the goal. The plan is often laid out so that it provides a long-term view of all the steps and processes needed to achieve the goal and is intended to be a working document that is revised, updated and modified along the way. More on campaign planning can be found here: <http://knowhownonprofit.org/campaigns/campaigning/planning-and-carrying-out-campaigns/planning>.

PROMOTING THE COALITION

The importance of building name recognition and promoting the work of the coalition cannot be underestimated. Doing this well assures that current members will stay engaged and energized, new members will be attracted, decision-makers will be aware of the objectives and goals of the coalition, and a momentum for success will be developed and shored up for the long haul—even when the going gets tough. Everyone wants to be on a winning team so it is important to convey the message that you are winning or at least, achieving concrete positive steps towards a win even if you are not winning right now. It is critical that you keep the coalition in the news and in the forefront of people's minds.

How do you promote the Coalition with limited resources and capacity? Fortunately, using social media is a great first step. Setting up a campaign website and Facebook page can make a huge difference in sharing the coalition's name and goal as well as serve as a vehicle for 'action-alerts' and mobilizing people to events. Encouraging coalition members to write letters to the editor and opinion editorials are also great ways to share the coalition's priorities develop coalition leaders and show a diversity of members that support the cause. Also, it is helpful to identify contact members of key media outlets who will receive press advisories and releases from the coalition. Reaching out to members of the media to build relationships and educate them on the issues that the coalition is working on also goes a long way to building momentum for your campaign. Here again, nurses are well suited to promote communications and marketing of the coalition's work. Typically, printed letters and opinion pieces need to be short, concise and compelling, much like the routine communication skills that nurses use to advocate for patients' needs. Similarly, when talking with reporters and other members of the media, nurses are highly credible and adept at framing the issue and the means to resolve the problem. Gaining comfort talking with members of the media is really no different than talking with other members of the health care team and is a valuable skill for nurses to utilize when working with coalition partners on policy initiatives.

While social media is a great tool, there is nothing more important in building and sustaining a coalition than building true relationships. Coalition leaders should invest time in personal connections, reaching out to new members and groups and understanding the value of supporting mutually beneficial work. A new group that may be interested in the Coalition's mission will likely appreciate and remember an offer to attend the group's meeting or event. Helping new members or groups with things that they need builds a symbiotic relationship that strengthens a coalition. Staying connected with personal phone calls, thank you notes or meeting for coffee go a long way to help new members and groups feel engaged in the coalition and build a sense of team, even when members are not physically working together on a daily basis

RESOURCES FOR COALITION BUILDING

- Beyond Intractability: [Coalition Building](#)
- [Developing Effective Coalitions: An Eight Step Guide](#)
- [Community Tool Box: Starting a Coalition](#)

CASE STUDY: The Coalition for a Safe and Healthy CT

In 2007, members of the Connecticut (CT) Nurses' Association, CT Nurses Foundation, the CT Public Health Association, the CT Coalition for Environmental Justice, Connecticut, CT Citizens Action Group, CT Clean Water Action and ConnPIRG, came together to discuss the growing body of evidence linking exposure to toxic chemicals in consumer products with the rise in many diseases. None of these organizations were working on this issue at the time yet, key leaders of these groups recognized a need to collaborate to raise awareness and to develop campaign strategies to press for more health protective policies at the state and federal level. During the initial meetings, a decision was made to form a coalition of like-minded organizations and member groups and to map out a plan to educate policymakers and citizens across Connecticut. It also provided an opportunity for the organizing groups to share resources, garner expertise, and set short term and long term goals to address environmental issues in a coordinated proactive manner. It provided an opportunity to bring a more powerful voice to the legislative process. The Coalition provided a more organized effort as we approached issues considered relevant to changing policy at the state level.

Coalition leaders identified that focusing on the presence of toxic chemicals such as lead and phthalates in toys would serve as a great way to elevate the profile of the issue, garner media attention and generate public support. Giving presentations at events, schools, and meetings all over the state helped to get the word out and to establish the Coalition's identity. These forums were also effective at engaging new members and building momentum for a winning campaign to pass a law in Connecticut restricting lead and phthalates in toys!

The Coalition continued to build on this success by working with national experts and partners to identify other chemicals like bisphenol-A (BPA), a commonly used chemical found in polycarbonate plastic (like baby bottles), thermal receipt paper and the lining of aluminum cans. BPA is also a hormone disruptor and strongly linked to breast cancer, reproductive disorders, insulin resistance and diabetes. In 2009, the Coalition expanded its grassroots campaign, added new members, organized several high profile events to garner media attention and successfully passed a landmark bill banning BPA from recyclable containers and infant formula containers! This was a huge win against extraordinary odds and tremendous opposition from the industry lobbyists. No other state had successfully banned BPA this broadly and Connecticut was now leading the way!

The Coalition has stayed together and grown stronger through in-person meetings, weekly conference calls, and using consensus-based decision making in all of its work. A strong focus on developing individual members' interests and leadership skills helps to keep people feeling good about their contributions even as they fluctuate over time and as other commitments come up. Coalition partners continue to work hard on outreach, engaging new members, providing education, and engaging with media outlets and policy makers to press for ongoing reform. Frequent updates to the website and social media help to keep citizens engaged and active in Coalition activities.

references

Anthony, M., (January 31, 2004). Shared Governance Models: The Theory, Practice, and Evidence. Online Journal of Issues in Nursing. Vol. 9 No. 1, Manuscript 4. Available: www.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Volume92004/No1Jan04/SharedGovernanceModels.aspx.

Berkowitz, B, Wolf, T (2000). *The Spirit of the Coalition*. Washington D.C. American Public Health Association. Cited from Mason, D; Leavitt, J and Chaffee M; (2007) *Policy and Politics in Nursing and Health Care*, 5th edition p. 135.

Butterfield, P. G. (2002). Upstream Reflections on Environmental Health: An Abbreviated History and Framework for Action. *Adv Nurs Sci*, 25(1), 32–49. Retrieved from [http://nursing.wsu.edu/Research/PDFs/Upstream_Reflections_on_Environmental_Health__An.6%20\(1\).pdf](http://nursing.wsu.edu/Research/PDFs/Upstream_Reflections_on_Environmental_Health__An.6%20(1).pdf).

Gallup. (2016). Honesty/Ethics in Professions. Retrieved from <http://www.gallup.com/poll/1654/honesty-ethics-professions.aspx>.

Himmelman, AT (2001). On Coalitions and the Transformation of Power Relations: Collaborative Betterment and Collaborative Empowerment. *American Journal of Community Psychology*, (29)2:278.

International Council of Nurses. (2008). Participation of nurses in health services decision making and policy development. Retrieved from http://www.icn.ch/images/stories/documents/publications/position_statements/D04_Participation_Decision_Making_Policy_Development.pdf.

Mason, D; Leavitt, J and Chaffee M; (2007) *Policy and Politics in Nursing and Health Care*, 5th edition p. 14.

Mason, D; Leavitt, J and Chaffee M; (2007) *Policy and Politics in Nursing and Health Care*, 5th edition p. 36.

Mason, D; Leavitt, J and Chaffee M; (2007) *Policy and Politics in Nursing and Health Care*, 5th edition p. 137.

Patton, R.M., Zalon, M. L., & Ludwick, R. (Eds.). (2015). *Nurses Making Policy: From Bedside to Boardroom*. New York, NY: Springer Publishing Company.

**CASE STUDY IN ENVIRONMENTAL HEALTH
ADVOCACY****Sarah B. Bucic, MSN, APRN-BC****Member, Nurses Healing Our Planet (NHOP)****Delaware Nurses' Association****Wilmington, DE**

It started with Styrofoam. The hospital cafeteria was under renovation and suddenly all plates and trays went from paper to Styrofoam. As a staff nurse and founder of Nurses Healing Our Planet (NHOP), Michelle Lauer took notice of the change and was concerned by the seemingly endless heaps of non-recyclable garbage being generated. Spurred by participation in the hospital's shared governance council as well as returning to school for her Master's in Nursing Science degree, Michelle felt empowered and compelled to get involved in changing hospital policy on recycling. She joined the 'green team' that was forming in the hospital and started learning about environmental nursing.

After a positive discussion with the Director of Nursing Education, Michelle was encouraged to reach out to the nursing staff for help in hospital waste reduction. Several volunteers, with a similar vision, agreed to participate in her efforts. To better understand the scope of the problem, the group followed the hospital trash trucks to the landfill. It was an eye opening experience as they noticed the landfill was filled to capacity. Turns out, hospitals in the United States [produce more than 5.9 million tons of waste annually](#) and often have not developed recycling strategies or green teams. This spurred the nurses to develop and implement a hospital-wide recycling program that started with placing recycling receptacles at the hospital. Eventually five baby units began to recycle baby bottles and, in the emergency room, one-time use items such as urinals, bedpans and emesis basins were changed from plastic to a durable cardboard.

The group agreed that environmental health issues should not be limited only to the waste the hospital generated but should be a state-wide effort. This led to the formation of [Nurses Healing Our Planet \(NHOP\)](#), an ad-hoc committee of the Delaware Nurses Association in 2007. "We were really on a roll," said Michelle.

Flushing or pouring down the drain was the standard practice for medication disposal which resulted in contaminated drinking water. One of the first projects for NHOP was to provide another means for the public to dispose of unused/unwanted medications. NHOP members worked with the Drug Enforcement Agency (DEA) to hold the first pharmaceutical drug take back events in the state of Delaware. These events became

successful due to the support and effort of State and Federal agencies, pharmacists and many volunteers. The take back events created public awareness of contamination of the drinking water caused by pharmaceuticals, how best to dispose of medications, and discussions about management of controlled substances. Many other states were moving in the direction of safe drug disposal at the time of these events. This led to national drug take back events coordinated by the Drug Enforcement Agency. Each year, spring and fall, drug take back events across the country eliminate thousands of pounds of drug waste from entering the nation's water supply and reduce risk of drug abuse.

NHOP received grant funding from the [Campaign for Safer Cosmetics](#) to increase awareness of toxics in personal care products among nurses and the public. The Campaign for Safer Cosmetics is a broad based coalition whose mission is, through public advocacy, to eliminate drugs known to cause cancer, reproductive harm and other adverse health impacts in cosmetics and personal care products. Through public education, NHOP crisscrossed the state advocating for safer products and elimination of cancer-causing chemicals. Nurses Healing Our Planet was very busy in 2009. The group developed a partnership with the University of Maryland Nursing Environmental Health Education Center. Through this relationship, NHOP members learned about an array of other environmental health issues that required attention at the State and National levels. NHOP nurses attended the Clean Med conference that year and collaborated with other nurses at the conference to send postcards requesting that cows, providing milk for a common brand of yogurt, not to be treated with growth hormone. One year later, the yogurt maker announced it would no longer make yogurt with milk from cows treated with recombinant bovine growth hormone (RBGH).

Concurrently, in Delaware, a coal burning power plant was being proposed for development. NHOP nurses testified against the power plant and in favor of a wind farm as an alternative energy source. Citizens for Clean Power and NHOP partnered for a grassroots campaign against the coal plant proposal, citing health effects of the coal and gas power plants. The efforts included letters to the newspaper and testifying before the regulatory body. Fortunately the outcome was the proposal did not move forward and Delmarva Power, the local utility, now factors in the health effects on how they generate electricity.

At this time, NHOP learned about babies being born "pre-polluted." A [study](#) showed an average of 200 industrial compounds, pollutants and other chemicals in

umbilical cord blood of 10 newborn babies, with a total of 287 chemicals found in a study group. Of the 287 chemicals found in umbilical cord blood, 180 cause cancer in humans or animals, 217 are toxic to the brain and nervous system, and 208 cause developmental problems. The dangers of exposure to these chemicals in combination have never been studied (EWG, 2005). An NHOP nurse worked at changing hospital policy by replacing plastic products with phthalates-free products in the NICU. At this time, nationally these products were being removed from IV bags and tubing in the hospital setting.

NHOP also met with Delaware congressional legislators regarding the Safer Chemicals Act of 2011. NHOP recognized that Federal law does not adequately protect Americans from toxic chemicals. These chemicals are being found in makeup, personal care products and items used everyday. The primary law responsible for ensuring the safety of chemicals, called the Toxic Substance Control Act (TSCA), was passed in 1976 and has not been updated since. The law is so weak that the U.S. Environmental Protection Agency (EPA) has only been able to require testing on less than 2% of the more than 80,000 chemicals that have been on the market since TSCA was adopted (Denison, 2009). NHOP continues to meet with our U.S. Senators regarding the [Chemical Safety Improvement Act \(CSIA\) S.1009](#). As drafted, the CSIA would not deliver the critical elements of meaningful public health and environmental protection. NHOP believes the bill should not move forward unless fundamental issues are fully addressed as outlined by [Safer Chemicals Healthy Families](#).

In 2010, NHOP became aware of Bisphenol-A (BPA), which is a hormone-disrupting chemical. BPA can mimic or block hormones and disrupt the body's normal functions and is found in baby bottles, sippy cups, the linings of food cans, and in paper register receipts. BPA is also found in medical devices and equipment such as plastic flasks, beakers and containers. BPA can leach, especially when heated, from products into food and drinks (Calafat, 2009). Monitoring studies find the chemical in more than 90% of the adult population (Calafat, 2008). With this information, members of NHOP worked with local legislators, some who were Registered Nurses, to pass a Resolution, which enumerated and recognized the health concerns related to BPA.

One year later, members of NHOP worked on helping Delaware become the 10th state to implement a ban on BPA in children's products by getting support letters, going to meetings and educating legislators about the harms of BPA. Working with State Senators and

Representatives who were Registered Nurses greatly accelerated the bill's movement and NHOP learned a lot about the legislative process in the interim.

The BPA ban passed unanimously in both House and Senate but members of NHOP had to prepare testimony about BPA and its effects should the legislature ask for more information. The bill's sponsors requested NHOP members to be present each time the bill was presented in a committee meeting or voting sessions should testimony be required or questions asked. This required a number of NHOP trips to Legislative Hall. NHOP quickly formed collaborations with Natural Resource Defense Council, the Mid-Atlantic Center for Children's Health and the Environment, Delaware Chapter of the American Academy of Pediatrics, Physicians for Social Responsibility, the Breast Cancer Fund, and the Consumers Union. Many provided support letters and some came in person from Washington D.C. in case testimony was necessary. In June 2011, the Governor of Delaware signed into law a ban on BPA in children's products. The ban prohibits manufacturers from selling or offering to sell any children's product containing BPA. Knowingly selling products with BPA intended for children under age 4 designed to be filled with food or liquid, is now a Class A Misdemeanor in Delaware. It was especially exciting to see that in 2012, when the FDA banned BPA from baby bottles and sippy cups nationally due to a request from the American Chemistry Council, the American Chemistry Council directly cited the number of state bans that had passed as a reason for requesting the FDA ruling (FDA Regulations, 2013; Safer States, 2013).

There are limited ways for the general public to safely dispose of mercury thermometers and thermostats. In 2011, NHOP organized a dual county mercury return in collaboration with the Delaware Division of Public Health and two local hospitals where mercury thermometers were collected, in exchange for a digital thermometer, and safely disposed of by the Division of Public Health. Overall, 10 pounds of liquid mercury was collected. Delaware Division of Public Health provided the electronic thermometers and disposed of the mercury waste free of charge. Collaborations are key in environmental health!

NHOP hosted an environmental health nursing conference in 2011 featuring our Secretary of Natural Resources in Delaware. NHOP invited nursing students, as we know that the next generation of nurses will need to understand the context in which they and their patients will be living and working.

In 2011, along with other environmental groups, NHOP requested the Governor of Delaware to create a Comprehensive Energy and Climate Change Plan.

NHOP members have testified in Washington D.C. for the American Nurses Association on the Clean Air Act to keep it strong for the health of their patients and the public. NHOP has participated in [stroller brigades](#) in Delaware and Washington D.C. and two nurses have been Delaware Clean Air Ambassadors on behalf of the American Nurses Association. There are also a number of [nurse luminaries](#) in the NHOP group.

NHOP continues to follow and support progress being made on uncovering the health effects of hydraulic fracturing (fracking) and flame-retardants. Flame retardants, used for over 30 years, can be found in consumer electronics, furniture, and mattresses and find their way into blood, breast milk, and umbilical cord blood impairing memory, learning, and behavior in laboratory animals at very low levels. They may also affect thyroid hormones and reproduction. Most at risk are developing fetuses, infants, and young children ([Washington Toxics Coalition](#), 2005).

Through 2014 and beyond, NHOP will continue to participate in work groups, such as the Delaware plastic bag workgroup, which discussed options of plastic bags, educates nurses and the public on environmental concerns that affect health, partners with environmental groups such as the Delaware Sierra Club and give talks on energy, air quality and their health effects.

NHOP writes an environmental article for each publication of the Delaware Nurses Association quarterly newspaper, The Reporter. Our group continues to write op eds and letters to the editor and most importantly be the voice for the health of our patients when environmental issues arise.

REFERENCES

American Nurses Association. (2007). ANA's principles of environmental health for nursing practice with implementation strategies. ANA: Silver Spring, MD. <http://www.nursingworld.org/mainmenucategories/workplacesafety/healthy-nurse/anasprinciplesofenvironmentalhealthfornursingpractice.pdf>.

Calafat, A.M., Weuve, J., Ye, X., Jia, L.T., Hu, H. Ringer, S., Huttner, K. & Hauser, R. (2009). Exposure to bisphenol A and other phenols in neonatal intensive care unit premature infants. *Environmental Health Perspectives*, 117(4), 639–644. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2679610/>.

Calafat, A.M., Ye, X., Wong, L.Y., Reidy, J.A., Needham, L.L. (2008). Exposure of the U.S. population to bisphenol A and 4-tertiary-octylphenol: 2003-2004. *Environmental Health Perspectives*, 116(1), 39–44. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2199288/>.

Denison R. (2009). Ten essential elements in TSCA reform. *Environmental Law Review*, 39, 10020-10028. Retrieved from http://www.edf.org/sites/default/files/9279_Denison_10_Elements_TSCA_Reform_0.pdf.

Environmental Working Group (2005, July 15). Body burden: The pollution in newborns: A benchmark investigation of industrial chemicals, pollutants and pesticides in umbilical cord blood. Retrieved from <http://www.ewg.org/research/body-burden-pollution-newborns>.

FDA. (2013). FDA Regulations No Longer Authorize the Use of BPA in Infant Formula Packaging Based on Abandonment; Decision Not Based on Safety. Retrieved from <http://www.fda.gov/Food/NewsEvents/ConstituentUpdates/ucm360147.htm>.

Practice Greenhealth. (2014). Waste: Background. Retrieved from <https://practicegreenhealth.org/topics/waste>.

Safer Chemicals Healthy Families. The Toxic Substances Control Act. Retrieved from <http://saferchemicals.org/legislative-update/>.

Safer States. Updates on the fight against BPA. (2013, January 17). Retrieved from <http://www.saferstates.com/assets/BPA-policy-history.pdf>.

Washington Toxics Coalition. (2005) Toxic flame retardants (PBDEs): A priority for a healthy Washington, A toxic free legacy coalition fact sheet. Retrieved from http://watoxics.org/files/pbde-factsheet/at_download/file.

CHEMICAL POLICY REFORM

TOXIC CHEMICALS IN THE ENVIRONMENT: EFFORTS TO CONTROL AND REGULATE

Jeanne Leffers, PhD, RN, FAAN

Professor Emeritus

University of Massachusetts Dartmouth

Katie Huffling, DNP, RN, CNM, FAAN

Executive Director

Alliance of Nurses for Healthy Environments

The issue of hazardous chemical exposure is a serious concern for nursing practice, education, research and advocacy. In the United States, efforts to regulate chemical safety have not been effective. The vast majority of the more than 80,000 chemicals developed during the past sixty years have not been evaluated for safety to humans. However, during that time, a large number of chemicals have been implicated as possible causes of a variety of health conditions such as cancer, reproductive health issues including birth defects, neurological conditions such as autism, and learning disabilities, and chronic diseases such as cardiovascular disease, pulmonary diseases and diabetes.

The first legislation to control chemicals was the Toxic Substances Control Act of 1976 (TSCA). TSCA was enacted with the purpose of controlling harmful chemicals but has not been an effective law to protect humans. Further, it was the only major piece of environmental legislation never updated.

During the past few years, US legislators have proposed changes to the law. The late Senator Frank Lautenberg first introduced a bill in 2005 to improve the federal government's surveillance, testing and control of chemicals for safety. In April 2011 Senators Senator Frank Lautenberg (D-NJ) Senator Inouye (D-HI) and Senator Kirsten Gillibrand (D-NY) introduced the [Safe Chemicals Act](#) but this bill died in Congress and was not enacted. Later efforts such as the [Chemical Safety Improvement Act](#) were not enacted. This bill would have limited individual state's power to enact stronger laws, creating weaker chemical standards and putting human health at greater risk.

On March 10, 2015, Senators Udall (D-NM) and Vitter (R-LA) introduced [S.697](#). The Senate passed this on December 17, 2015. Congressman John Shimkus (R-IL) introduced the TSCA Modernization Act in the House and it passed 398 to 1 on June 22, 2015. As these bills were different approaches to the same issue, the bills were sent into Conference Committee where members of the Senate and House negotiated a final bill that would be voted on in both Houses. On May 24, 2016, the

House of Representatives voted to pass a bipartisan House-Senate agreement of the [Frank R. Lautenberg Chemical Safety for the 21st Century Act, HR 2576](#) by a margin of 403-12. The US Senate then passed this on June 7, 2016 and the act was signed into law by President Barack Obama on June 22, 2016.

According to [Safer Chemicals Healthy Families](#), the new Lautenberg Act gives the EPA new authority to strengthen chemical safety and protection of the health of the people living in the United States. However, as EPA is only mandated to address 30 chemicals within the first 3.5 years after enactment, the pace with which unsafe chemicals will be addressed will be very slow. The law:

- Requires EPA to regulate a chemical based solely on its health and environmental impacts. This replaces TSCA's burdensome cost-benefit safety standard—which prevented EPA from banning asbestos.
- Establishes a minimum enforceable schedule and requires EPA to “begin safety reviews on 10 chemicals within 180 days of enactment and then another 20 chemicals from the high priority list within 3.5 years.”
- Expedites action on persistent, bioaccumulative, and toxic (PBT) chemicals;
- Explicitly requires protection of vulnerable populations like children and pregnant women.
- Gives EPA enhanced authority to require testing of both new and existing chemicals.
- Sets judicially enforceable deadlines for EPA decisions.
- “[R]equires that manufacturers substantiate the basis for claiming chemical identity as confidential and creates a deadline for EPA review of confidential business information (CBI) claims.” Under the new law, EPA can now share information with states and health and environmental professionals as long as confidentiality is maintained.
- Still has no minimum health and safety data requirements for new chemicals; however EPA must make an affirmative finding that the chemical is not likely “to present an unreasonable risk before a company can begin to manufacture.”
- States can regulate a chemical until the EPA designates it a “High-Priority” chemical. The state's regulation will then be pre-empted until EPA decides on its restrictions (a process that can take 2-3 years). (Safer Chemicals, Healthy Families, 2016)

While the health and advocacy community did not achieve many of the health protective policies that they had worked to include in TSCA reform, this bill is an improvement over TSCA and the June 22, 2016 signing was an historic event.

Concern for issues such as chemical policy reform does not end with the passage of this Act into law. Nurses, citizens and advocacy groups continue to advocate for better policies to protect human health. For example, the advocacy group Safer Chemicals, Safer Families is a coalition that represents millions of individuals from citizens to health care professionals. More than 450 organizations are represented in the coalition. Of these 16 are nursing organizations including the Alliance of Nurses for Healthy Environments (ANHE), the American Nurses Association, the National Association of Hispanic Nurses, the American College of Nurse Midwives, and state nurses associations from Connecticut, Delaware, Idaho, Maryland, Massachusetts, Ohio and Washington state.

The coalition seeks to achieve:

5. A well-educated public that can use its power as both citizens and consumers effectively. (Strong federal and state policies to protect the public from toxic chemicals.)
6. Strong corporate policies to substitute safer chemicals for those that are already known to be toxic.
7. A well-educated public that can use its power as both citizens and consumers effectively (<http://saferchemicals.org/what-we-want/>)

The Safer Chemicals, Safer Families coalition offers information for the public such as their section on chemicals and health as well as action plans such as the Stroller Brigade and the Mind the Store campaign.

Many nurses have been active in [chemical policy reform](#) for a number of reasons: to protect themselves, their patients and their families from chemicals that cause adverse health effects personally and for their offspring. Physicians for Social Responsibility (PSR) conducted a biomonitoring study of 12 doctors and 8 nurses to determine their exposures to hazardous chemicals. The report, [Hazardous Chemicals in Health Care: A Snapshot of chemicals in Doctors and Nurses](#) notes an average of 24 chemicals in their bodies, including those known or suspected to be carcinogens, endocrine disruptors, or neurotoxicants.

The nurses of the [Alliance of Nurses for Healthy Environments \(ANHE\)](#) have been working to support safer chemical policies with their advocacy efforts to protect vulnerable populations, preserve state's rights, establish deadlines and timetables, ensure adequate data, act on the worst chemicals and support the right to know. In addition to chemical policy reform, ANHE nurses work across all areas of environmental health as advocates for safer energy sources, climate action, healthier communities, and use of safer products among others.

REFERENCES

Safer Chemicals, Healthy Families. (2016). An Abbreviated Guide to the Frank R. Lautenberg Chemical Safety for the 21st Century Act. Retrieved from: <http://saferchemicals.org/get-the-facts/an-abbreviated-guide-to-the-frank-r-lautenberg-act-chemical-safety-in-the-21st-century-act/>

Resources:

1. [Nurses Chemical Policy Toolkit](#)
2. [Safer Chemicals, Healthy Families](#)

ANATOMY OF A LEGISLATIVE MEETING

Aislynn Moyer, DNP, RN

Director of Nursing

Penn State Milton S. Hershey Medical Center

Hershey, PA

Legislative meetings are a great opportunity to talk directly with decision makers of local, regional, and national governments. These meetings help educate and guide government leaders on important topics. Legislative leaders base their decisions on what they currently know and understand. This makes it important that nurses, and others, educate leaders on specific topics so that they can make truly informed decisions. Knowing the importance of meeting with legislative leaders is only the beginning. Before one can ever attend a meeting, it is imperative to understand the anatomy of such a meeting.

BEFORE THE MEETING

First and foremost before a legislative meeting, you must schedule the meeting. It is next to impossible to show up unnoticed and spend time with a legislative leader. Take time to schedule the meeting. Secondly, be sure to do all necessary homework. If the topic of the meeting is something that has already been discussed in legislative circles, be sure to understand all sides of the issue. It is also important to fully understand the message that you want to bring. Having evidence and personal stories to back your message is also helpful. Thirdly, the message should be condensed. Legislative meetings tend to be brief and you must be prepared to make all your important points in a timely fashion. This takes preparation ahead of time to be sure you do not miss anything. Although you can never guarantee that the legislative leader will read it, you can send information ahead of time or bring written materials with you. The fourth step to prepare for the meeting is to be on time. With such brief meeting times schedule, being even a few minutes late can result in not meeting with the leader at all.

DURING THE MEETING

Once inside a legislative meeting, begin to develop a relationship. Introduce yourself, what you do, and what brings you to the meeting. Be sure to stick to the message you want to send. Do not start talking on a tangent or switching issues. Take notes! If important information related to another issue is mentioned, write that down to follow up on later. Stay objective and truthful. If you are asked a question you do not know, say you do not know, but you will find out! Word your message in a way that is not threatening or critical of specific people or government parties. Allow time for

questions so you can be sure the legislative leader understands your message. Before leaving the meeting, be gracious for the time and thank the leader for meeting with you. This helps build the relationship.

AFTER THE MEETING

Legislative relationships should never end with the meeting. Always follow-up. If there was information you did not know during the meeting, research it and follow up with the leader. Send a letter or email or make a phone call thanking the leader for their time and reinforcing the key point of the message. Offer yourself for questions if the leader has any. Make sure to keep in contact with the leader. Legislative leaders keep track of how many points of contact people make with them. Having just one or two is not enough to make a strong statement. This is why developing a relationship is so important.

CONCLUSION

Legislative meetings are an effective way to advocate and educate legislative leaders on important issues. In order to ensure successful meetings, care must be taken to prepare for the meeting. With specific action before, during, and after the meeting, a relationship can be built that will be key in having your voice heard.

ACTS OF NURSING ADVOCACY

Kathryn P. Jackman-Murphy Ed.D., MSN, RN, CHSE
Professor, Naugatuck Valley Community College

Nurses have been ranked as the most trusted profession for the past 18 years according to Gallup polls. In the most recent poll, 85% of Americans rate nurses as having high levels in honesty and ethics (Reinhart, 2020). Nurses are the most trusted profession and we must use our collective voice to advocate for those we serve. Our voices as health professionals carry more weight now than ever before. Our patients and communities trust that we advocate for their health.

The Alliance of Nurses for Healthy Environments (ANHE) Policy and Advocacy Workgroup has monthly calls to discuss current policy issues and the critical role that nurses can play in advocating to protect public health and the environment. These discussions lead to actions that elevate the voice of nursing on some of the most pressing issues of our time including climate change, access to health care, environmental impacts and toxic chemical pollution. Please see the ANHE website (www.envirn.org) for the date and times for these calls—all are welcome to join!

Opportunities for Acts of Advocacy can happen in our everyday lives. These opportunities can be large or small, but each one can have a positive impact towards a healthier environment. We have highlighted a few stories of nurses in action towards advocating for their families, community, patients, and themselves.

Adelita Cantu PhD, RN
Associate Professor, UT Health San Antonio

Childhood asthma is the most common chronic disease in children. Although childhood asthma is the same asthma that adults get; children often have different and more intense symptoms due to their particular sensitivity when exposed to allergens such as pollen and chemicals. Childhood asthma disproportionately affects children that live in low income communities and children of color. Current data reports that 16% of African American children have asthma compared to 6% of Whites. Also Hispanic children with asthma are twice as likely to visit the Emergency Room as Whites. <https://minorityhealth.hhs.gov/omh/browse.aspx?lvl=4&lvlid=60> and <https://www.cdc.gov/vitalsigns/childhood-asthma/index.html>.

Often asthma attacks mean missed school days which can translate to poor academic progress further widening the disparities in academic achievement between

communities of color and White non Hispanic communities.

As a public health nurse and an Associate Professor at the University of Texas Health Science Center in San Antonio School of Nursing, I have been aware for many years that pediatric asthma cases in the city have been alarmingly high, especially among low income minority children. In 2017, the childhood asthma hospitalization rate for Bexar County was 14.8 per 10,000 population. In our city, non-Hispanic African Americans experience high hospitalization rates than non-Hispanic whites and Hispanics. The rates of asthma hospitalizations are almost five times higher in children than adults. In 2018, I began to work with a group of health professionals, hospital administrators, school districts, health insurance companies and community stakeholders to form the South Texas Asthma Coalition with the goal of reducing asthma hospitalizations through better management.

The Coalition implemented a program called SA Kids B.R.E.A.T.H.E. (Building Relationships, Effective Asthma Teaching in Home Environments). <https://www.sanantonio.gov/Health/HealthServices/Asthma>

The Coalition advocated to our city council to fund this program which used the community health worker model to go to the homes and work with families of children with asthma to assist in asthma management. This approach allows the community health worker, using a perspective of social determinants of health, to address all the barriers to asthma management. These include health literacy, medication management, developing an asthma care plan in collaboration with the schools and assisting the parents or caregivers in reducing exposure to asthma triggers. Referrals are made to SA Kids B.R.E.A.T.H.E. by health care providers, local schools and hospitals and the community health workers conduct home visits where screening of the home environment and social determinants of health are conducted. The community health worker continues to meet with the family for 6 months to guide them through an asthma management plan.

Using community health workers is an evidence-based method of health promotion and health education that is widely used throughout the globe. Advocating to use this approach to tackle some of the most challenging health issues is an important role that nurses can play.

Nurses can develop advocacy skills in a variety of ways. As a long-time nursing educator, I recognized that advocacy was essential to student competencies and integrated into many nursing courses I taught including public health, policy, environmental health and nursing leadership. Beginning students learned to advocate for patients and for safe practice settings. More advanced students recognized that their professional role must include advocacy in practice. So, many years ago when I completed my own baccalaureate education I began the journey to build advocacy skills. A common statement we hear as nurses is that a nurse must be “at the table” or in places where decisions are made. It is a learning process to develop skills to do so.

Early in my career I learned first-hand that policies can be changed with effort and advocacy when with a few other nurses and new mothers, advocated for family centered care for women who delivered their babies by cesarean section. At the time I was a certified childbirth educator and witnessed the difference in the experience that we prepared expectant mothers to anticipate and the reality for those who delivered their child with cesarean section birth. In 1975, all of the hospitals in the Washington, D.C. area had more restrictive birth policies for those having cesarean births regarding holding the baby at birth, having a support person including their significant other in the delivery room and the option of having the newborn stay in their hospital room. A group of childbirth educators representing the four childbirth education organizations in the Washington, D.C. area came together to advocate for change. Through our advocacy efforts and visiting the appropriate administrator at each local area hospital with a maternity unit, we were successful in cesarean delivery policy changes at 7 hospitals within a six-month time period. That confirmed to me the power of nurses to make a difference through advocacy.

My efforts through the ensuing years to make change in many areas of nursing education or practice included both direct efforts through letter writing; contact with elected officials; serving on the board of directors of a health center, family service center and visiting nurse agency; and joining with other nurses to write policy papers and position statements. However, I as a nursing educator also strongly believed that the classroom was a significant way to build advocacy. If students left their nursing programs with the firm belief in their ability to make a difference to not only the patients in their care, but also to population health, the practice setting, patient

outcomes, and nursing interventions through their advocacy, my efforts would be broader and more significant.

As my public health nursing focus broadened to include global health and environmental health I found that I needed more knowledge and skills to advance my advocacy work. This included participation in many programs, workshops and conferences on these topics as well as completing a global health course and environmental health course in an MPH program. I joined with other nurses as we met and developed the Alliance of Nurses for Healthy Environments (ANHE) and with a group of nurses in my own state of Rhode Island to build our Environmental Health Task Force, which was formally the Rhode Island State Nurses Association (RISNA) becoming the ANA-RI. We collaborated with other RI organizations, schools and elected officials to advance environmental health in nursing.

My most significant role as an advocate was as a member of the Environmental Protection Agency’s (EPA) Children’s Health Protection Advisory Committee (CHPAC) where my background as a nurse, public health nurse, and leader who had experience in pediatrics, public health, national nursing organizations, and environmental health education, research and advocacy led to my selection. During my five years as a member of CHPAC, we wrote letters with our professional advisement to the EPA Administrator on such children’s health topics as the social determinants of health, prenatal exposures to hazardous substances, farmworker protection, lead poisoning, national ambient air quality, chemical toxicants in water, pesticides, food, toys and other chemical exposures. We were also asked to review the United States Global Change Research Program draft report, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* where we made our recommendations in a letter to the Administrator. This role reinforced to me that as nurses our voices are significant and necessary to advance health for all. No other professional group brings the same unique skills and experience as nurses do.

My advice to all nurses and nursing students to advance their skills and experience in advocacy whether in policy development or change, services on advisory committees of boards can be summed up in the following:

3. Recognize your responsibility and power as a nurse to make a difference.
4. Begin where you have both passion for and knowledge of the issue.

5. Learn as much as possible about both the pros and cons of the issue.
6. Select a place to begin your efforts be it a letter to the editor, to an elected official, to the administrator of your workplace or an organization of which you are a member.
7. Seek out other nurses who can help you by working together or building a coalition.
8. Act. Take the first step and keep going to make the difference!

Each step becomes easier as you gain the skills and success to move forward. Remember you can serve in an advocacy role in nursing practice, research, education as well as the policy arena. The ultimate role of research is to improve practice while education is essential to becoming a strong advocate.

Mary Jane Mongillo Williams PhD, RN
Professor Emeritus Central Connecticut State University

Over the last five decades nursing evolved from a subservient, nearly all female profession to an autonomous, diverse profession. My education as a nurse began in the early sixties, our class of 31 was all female and was taught to respect the authority of the administration and the physicians who provided medical care for our patients.

During my first summer as a nursing student, I worked charge on nights on a thirty-four-bed surgical unit. It became immediately evident that I needed to advocate for my patients if I expected them to have the best care possible. I also realized that I had to be assertive and persistent in my communication with physicians and hospital administration – there were concepts not fostered in nursing diploma programs in the 1960's.

Over the next two years I devoted my time to being the best nurse possible. I studied and prepared for the practice setting. Nursing became my life.

Upon graduation, I went to work on a Medical Surgical floor, progressed to practice in the first Intensive Care Unit and decided it was time to go back to school. I completed a Bachelor's degree in Psychology and took a Head Nurse position in a local hospital on a General Medical Unit. During my time on this unit I developed my advocacy skills, along with a strong voice for my most vulnerable patients. I was often challenged by the nursing leadership and physicians regarding my requests, but in the end my requests were honored and my patients

received the care and treatment appropriate for their diagnosis.

It was during this clinical experience I learned to use available science and current research to ensure my arguments for change were as strong as possible. Over the following twenty plus years, I studied, I practiced and I moved from clinical practice into nursing education. My practice was always guided by the current theory and current research.

I have participated in my professional organization since becoming an RN and during my tenure as President of the Connecticut Nurses Association, I attended a meeting at American Nurses Association in Washington, D.C. The Executive Director and I met with the leadership of multiple national environmental groups. It was an exciting conference and I went back to Connecticut energized about the importance of the natural environment on public health. I was especially interested because the town I grew up in was a super fund site – meaning it received money from the Federal Government to clean up industrial pollution. Our water had been contaminated by solvents recovery and we had to borrow water from a nearby city.

In collaboration with the Executive Director of CT Nurses Association we bought together all of the environmental groups in CT. We developed a coalition to advocate for environmental health, which evolved into the "Coalition for a Safe and Healthy Connecticut", currently under the excellent leadership of Anne Hulick, JD, MSN, RN. This experience and the advocacy related to the environment was my first concrete experience advocating at the state level.

However, over the past 25 years I have been the spokesperson for nursing policy at the state level. I was drafted in 1997 when the Chair of Government Relations became ill. I felt totally unprepared. I was so nervous during the first few times I testified that I thought I would be physically ill. However, I managed to control my anxiety and I soon realized that as a nurse with a strong educational background in nursing theory, science and practice, I was more knowledgeable about the issues we were discussing than the individuals listening to my testimony.

My advice to all nurses interested in the advocacy role - we are all extremely well prepared by our education and practice to be strong policy advocates at the state and national level. What I found most useful was the knowledge I gained by virtue of education and practice. As an advocate, we all need to:

- Establish a sound base of knowledge related to the issue.
- Utilize current research and science to support your issue.
- Draw on your nursing education to support your issue, such as:
 - Theoretical Knowledge
 - Research Skills
 - Knowledge of Science
 - Assessment Skills
 - Communication Skills
 - Presentation Skills
 - Group Skills

These are just a few of the many concepts and skills that your nursing education affords you and help in a policy environment. Nurses bring to the policy table the most unique set of skills as a health care provider profession. We are exposed to life and death situations daily. We deal with all levels of administration and a variety of physiological and psychological challenges as part of our daily routine. We are taught to be proactive and we are the backbone of the profession.

The knowledge and skills we have make us the best overall advocates in multiple settings, the most important as I see it is in the policy arena. You must develop a “THICK SKIN”, politicians are not always gracious, nor are they always open to our suggestions and the expertise we bring to the table. But they often quickly learn to respect the research applicable to the legislation they are attempting to craft.

I have enjoyed every moment of my policy work at the state level. It has been one of the most satisfying experiences in my career and it resulted in the development of great respect for the profession and what we bring to the table as advocates for relevant issues.

Kathy Murphy Ed.D., MSN, RN, CHSE
Professor of Nursing, Naugatuck Valley Community College

I was completing my master’s degree at the University of Hartford when I was introduced to environmental health (EH). One of our projects was to present information on EH on several topics including personal care products, water and pesticides to several nursing groups. During

this time I learned the use of pesticides had some serious concerns, including neurodevelopmental disorders such as attention-deficit hyperactive disorder, autism spectrum disorder (Saffron, 2020), cancer, asthma, diabetes (Kim, 2017) and childhood poisoning (EPA, 2017).

I was working as a public health nurse and was aware of pending state legislation regarding regulating the regular, scheduled application of pesticides in kindergarten-12 grade schools. I knew children are more susceptible to the effects of chemicals as pound for pound, they breathe more air, drink more fluids, eat more food than adults (Pesticide Action Network, n.d.), their bodies were still growing and developing, as well as their hand-to-mouth behaviors to explore their world (American Academy of Pediatrics, 2020). I was very concerned about this possible legislation allowing the regular application of these chemicals of concern, regardless if they were needed and expose not only children but also the faculty, staff, visitors and community members to these potentially harmful products. But what actions could one person take that would make an impact?

I was asked to present nursing at Career Day at a local middle school and I was thrilled to be able to share information about the career that I love with the students. When I arrived, I found that one of the other presenters was a state legislator who would be considering the pesticide bill! Like most academics, I traveled with my flash drive and all of my academic information. One file was a collection of drawings by Yaqui Indian children, an indigenous group from Mexico. This seminal study demonstrated the effects of pesticides by comparing the drawings of 4-5-year-old children (Guillette, 1998). The two groups were similar genetic backgrounds, diets, water mineral contents, cultural patterns, and social behaviors, with the only difference being exposure to agricultural pesticides. The study found the children who had been exposed to pesticides had decreased stamina, gross and fine eye-hand coordination difficulties, memory deficits, and a decreased ability to draw a person as compared to a peer of similar age from the group that had not been exposed to pesticides. The children who had not had pesticide exposure had far more detail in their drawings, while the children that had been exposed to pesticides pictures were at times quite difficult to decipher they were of a person.

I had these pictures on my flash drive! I was able to quickly go to the library before meeting the children and print several of these pictures. Now, to approach my representative! We both were waiting in the queue to speak about our careers-I had my chance! I introduced myself as a pediatric nurse and was interested in

environmental health. I told him about the dangers of pesticides and that I did not want the legislation to pass. I showed him the children's drawings. While I explained the study and pointed out the differences in the different sets of figures. I offered to be available for other questions and as I finished, I reinforced my ask: Not to vote for this legislation. He seemed very interested and took the drawings with him at the closure of the event. I found out later that he voted against the regular schedule application of pesticides in K-8 schools!

I remembered the important points that had been taught to me from the very beginning by Dr. Barbara Sattler and Brenda Afzal RN: Say you are a nurse, tell them what you want and why it is important. Success!

My take-aways from my first act of advocacy were: it was easier than I thought, it was powerful to be able to talk with my legislator-the person who represents me in government and to tell them what I wanted them to do for myself, my family and my community. I would do it again-and I have!

REFERENCES

EPA. (2017, October 27). Reduce Your Child's Chances of Pesticide Poisoning. Retrieved from Environmental Protection Agency: <https://www.epa.gov/safepestcontrol/reduce-your-childs-chances-pesticide-poisoning>

Guillette, E. M. (1998, June). An Anthropological Approach to the Evaluation of Preschool Children. *Environmental Health Perspectives*, 106(6), 347-353. Retrieved from <https://ehp.niehs.nih.gov/doi/pdf/10.1289/ehp.98106347>

Kim, K. H. (2017). Exposure to pesticides and the associated human health effects. *The Science of the total environment*, 525–535.

Pediatrics, A. A. (2020). Protecting Children from Pesticides: Information for Parents. Retrieved from healthychildren.org: <https://healthychildren.org/English/safety-prevention/all-around/Pages/Protecting-Children-from-Pesticides-Information-for-Parents.aspx>

Pesticide Action Network. (n.d.). Retrieved from Children: <http://www.panna.org/human-health-harms/children>

Reinhart, R. J. (2020, January 6). Nurses Continue to Rate Highest in Honesty, Ethics. Retrieved from Gallup : <https://news.gallup.com/poll/274673/nurses-continue-rate-highest-honesty-ethics.aspx>

Saffron, J. (2020, March). Environmental Factor . Retrieved from National Institute of Environmental Health Sciences

: <https://factor.niehs.nih.gov/2020/3/science-highlights/brain-development/index.htm>

NURSES AND HEALTH POLICY: INTERVENING MACROSCOPICALLY AS ENVIRONMENTAL HEALTH ADVOCATES

Joanne F. Costello, MPH, PhD, CNSPH-BC

Professor

Rhode Island College School of Nursing

Nurses advocate in significant ways to protect individuals and families from environmental hazards. For example, nurses have worked in community settings with individual families of lead poisoned children in health clinics, screening for lead levels over 5 micrograms per deciliter and providing health education to assist parents to secure an environment free of paint dust and chips. Other nurses in acute care settings provide lifesaving respiratory treatments and pharmaceuticals to adults who suffer from severe environmentally triggered asthma. These nurses work directly with patients to provide education and intervention that prevents illness and injury and restores health. The following case illustrates how nurses and nursing students can have a strong impact on health policy to improve health outcomes.

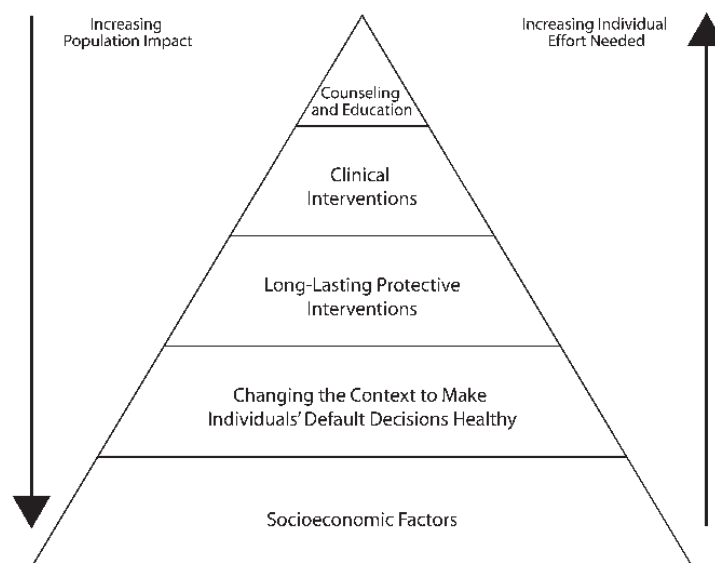
The role of educating and intervening to restore health when environmental agents threaten harm is, of course, essential to nursing practice and facilitates positive health status in people across the lifespan (ANA, 2015). It is important nursing work that prevents illness and injury and restores physical, social, and psychological wellness in individuals and families. Clinical intervention and counseling and education, common nursing roles, are frequent in our healthcare system, but are not the most efficient use of resources and do not provide the greatest potential impact at a population level. Interventions impacting families and individuals for whom services are provided are called microscopic interventions.

Frieden's Health Impact Pyramid (2010), seen below in Figure 1, illustrates the amount of resources required relative to the impact on health outcomes. According to this model, the two categories which have the least amount of impact on outcomes and yet require the greatest amount of resources for the intervention are clinical interventions and education and counseling, seen at the top of the pyramid. These are considered to be tertiary prevention interventions, with a focus upon minimizing complications and harm after the illness or injury has already occurred. The greatest impact with the least amount of resources required to promote health is upstream prevention at the base of the pyramid in the socioeconomic factors category. Lack of sanitation and increased exposure to environmental hazards are examples of risk factors that may be mitigated with

interventions that change socioeconomic status such as improving access to education, both of which affect critical social determinants of health such as housing and nutrition. These are considered to be health promotion and primary prevention interventions, occurring prior to any health issues already being present, and are the most efficient use of resources.

Advocacy through health policy interventions impacting on the lower categories of the pyramid are the most effective and efficient actions that will have the greatest impact on the greatest number of the population. An example of the most impactful intervention at base of the pyramid would involve promoting changes in

Figure 1 Health Impact Pyramid



(Freiden, 2010)

socioeconomic factors such as advocating for legislation raising the minimum wage which would allow families to live in healthier housing. The intervention at the second level of the pyramid that would have strong impact with a small amount of resources is making default decisions healthy. Assuring through regulation that lead is not in paint products as was done in 1978 in the United States is an example of this level of intervention. The unhealthy choice is eliminated by the health policy in this case. The third level of the pyramid, providing long lasting protective interventions, are interventions such as standardizing lead screenings for children at 1 and 5 years

old or mandating lead screening routinely for children living in high risk zip codes.

Interventions that demonstrate a large impact to a significant segment of the population such as those that are achieved using health policy initiatives are called macroscopic interventions. Martins (2015) provides a clear illustration of the difference between microscopic and macroscopic approaches. She notes that macroscopic nursing approaches examine interfamily and intercommunity themes of health and illness in contrast to microscopic interventions which examine individual response to health and illness. The focus of the macroscopic approach is on modifying social, economic, and environmental factors impacting health and illness, often through social and political action. In contrast, the focus of the microscopic approach is on modifying individual behavior to promote health (Martins, 2015).

Policy actions that impact on the base of the pyramid of social factors such as investments of a large amount of resources in housing, nutrition, and human services are more common in Europe. The United States, in contrast, invests a disproportionate amount of funds in the upper part of the pyramid on costly complex health care interventions that impact once disease has already occurred (Butler, Matthew, & Cabello, 2017).

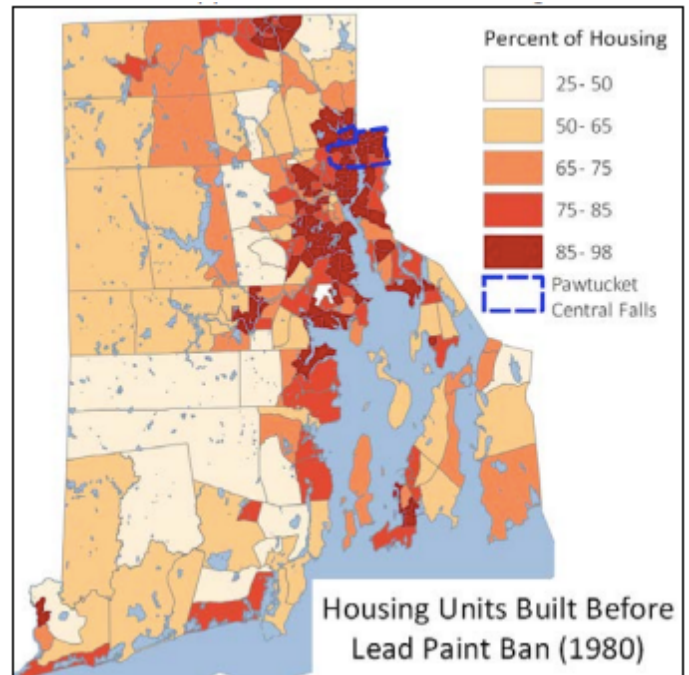
C. E. Winslow, founder of Yale School of Public Health, created a definition of public health in 1920 that still is the gold standard today. His emphasis upon health policy as a tool to promote the public's health is demonstrated in the definition which includes the need for the "development of the social machinery which will ensure to every individual in the community a standard of living adequate for the maintenance of health; organizing these benefits in such fashion as to enable every citizen to realize his birthright of health and longevity" (Kemper, 2015). This definition reflects the awareness that the barriers to individuals alone without societal infrastructure to improve their own health can often be insurmountable and that public policies can offer opportunities for significant population health changes that have far reaching and sustainable impact.

ADVOCATING FOR HEALTH POLICY: LEAD POISONING IN RHODE ISLAND

Rhode Island has some of the oldest housing stock in the country. It is the smallest state in the United States with a history of industrial labor, a high rate of immigration, and a high population density. These factors contribute to the reason that lead paint in older homes is the primary source of childhood lead poisoning (Rhode Island Department of Health, 2020). The Geographic

Information Systems (GIS) map below demonstrates variation in the age of properties in the state, illustrating areas where children are at highest risk for lead poisoning which is linked to high levels of poverty (Holler, 2016).

Figure 2 Percentage of Housing Built Prior to 1980



(Holler, 2016)

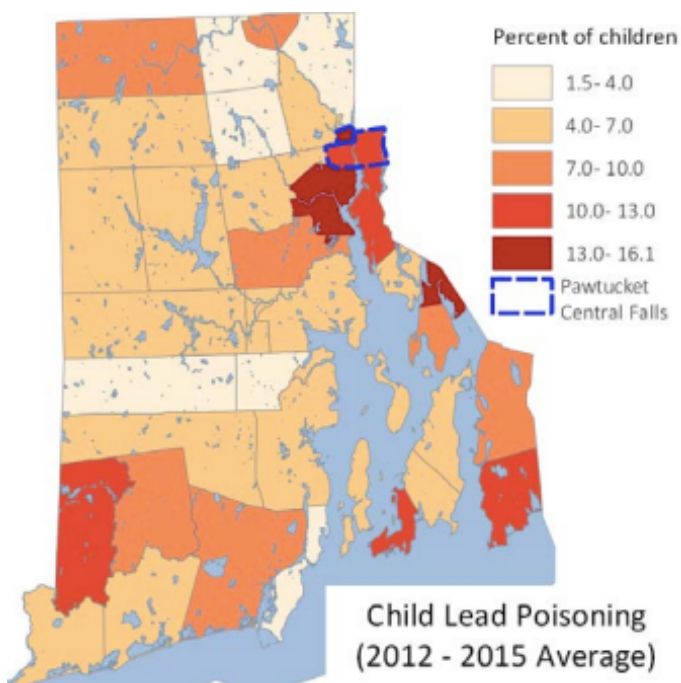
Housing built before the 1978 regulation of lead paint poses serious risks to human health, especially to pregnant women and children. Hauptman, Bruccoleri, and Woolf (2017) report that exposure of children to environmental lead in dust, paint, water, and other sources continue to pose serious health risks for children. Prevention of exposure is the optimal strategy requiring healthcare providers and advocacy groups to join in efforts to protect children from this serious threat.

Lead poisoning is a serious preventable childhood health issue causing irreversible brain damage leading to "an increased risk for behavioral problems, decreased cognitive abilities, and lower academic performance" (RI KIDSCOUNT, 2020). It also causes a variety of other serious health issues including decreased hearing, delayed puberty, and kidney damage. Significant negative academic impact has been demonstrated by even low levels of lead poisoning, with greater negative impact correlating to higher lead levels. RI KIDSCOUNT (2020) reports:

“The most significant declines in academic performance occurred among children with the highest blood lead levels and those living in the four core cities. Children with lead exposure are also at increased risk for absenteeism, grade repetition, and special education services.”

The GIS map of Rhode Island below shows geographically the average percent of children who were lead poisoned in the state from 2002-2015 (Holler, 2016).

Figure 3 Average Percentage of Lead Poisoned Children by RI Location 2012-2015



(Holler, 2016)

The highest levels of lead poisoning in the state are seen in Rhode Island's core cities of Central Falls, Pawtucket, Providence, and Woonsocket, areas where more than 25% of children in Rhode Island live in poverty and where high numbers of children are from minority backgrounds. The high numbers of children affected and dramatic disparities in who was impacted was a catalyst to state activists including nurses. Health professionals, advocates for children's health, minority church members, environmental justice groups, anti-poverty groups, and grass roots groups of families who were affected partnered with the Department of Health to form a strong coalition to combat this serious health issue affecting mainly children living in poverty from brown and black families.

A group of undergraduate nursing students in a community health nursing clinical practicum and I enthusiastically joined this coalition and were committed to engaging in an intervention that would shift the tide in favor of the affected kids. I had served on the Board of Directors of the Childhood Lead Action Project for several years, acting as Vice President and then President of the Board. The Board was diverse and composed of key members of the community including affected parents, attorneys, nurses and physicians, realtors, clergy, politicians, and bankers. I was able to introduce my students to these members and others in the community who were committed to the goal of reducing childhood lead exposure. My work on the Board of Directors provided an important perspective and allowed me to connect the students and network with other health activists who had similar goals in our community.

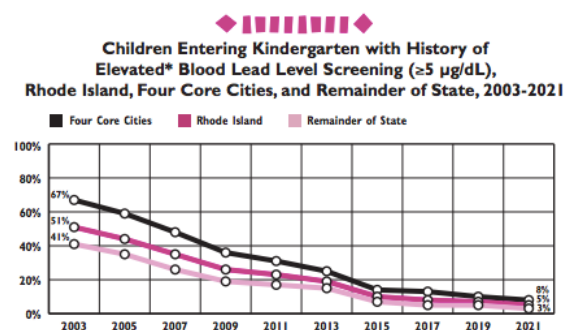
I engaged my students in the process through their public policy assignment, which gave them the opportunity to learn about the epidemiology of the issue, consequences to society, and to obtain real life experience in the legislative process. This assignment is a well-developed learning activity in the students' undergraduate community/public health nursing course. Public policy activity has been part of the curriculum at our program for over twenty-five years and has significantly increased the political astuteness of students (Byrd et al., 2012) and inspired many graduates to continue to be health activists throughout their careers.

State legislation was sponsored in both the RI House and Senate to influence health policy on a macroscopic level by requiring lead safe certificates for rental housing where most cases of lead poisoning were found to occur. This proposed legislation faced significant opposition from landlords and realtor groups. During the time the law was being considered by the legislature, the undergraduate nursing students and I appeared on a local radio program to educate the audience on the risks of lead poisoning and the benefit of laws that would require lead safe housing. We attended coalition meetings and educated legislators and the public about the data. We provided testimony for the RI state legislature at hearings as professionals who had directly seen the impact of lead poisoning. We participated in a press conference in support of the legislation which illustrated the number of kids affected by lead poisoning with children's handprints on a long banner.

The Childhood Lead Project was founded by a strong, and committed social worker who valued interdisciplinary collaboration and the nursing discipline's contribution to this important work. This group along

with other policy activists were responsible for passage of the Lead Hazard Mitigation Law (Lead Hazard Mitigation Law, 2012) which requires landlords to disclose lead hazards, maintain properties to keep them safe, and obtain a certificate of conformance to demonstrate lead safe status. This macroscopic intervention in which nurses and nursing students played a crucial role and has had a tremendous impact on reducing the number of children who have suffered from childhood lead poisoning. The graph below in Figure 4 demonstrates the dramatic reduction in cases of childhood lead poisoning from 2003-2020 from 67% to 8% of children living in the 4 core cities.

Figure 4 Percentage of Children Entering Kindergarten with Elevated Lead Levels 2003-2020



Source: Rhode Island Department of Health, Healthy Homes and Childhood Lead Poisoning Prevention Program, Children entering kindergarten between 2003 and 2021. *Elevated blood lead level of ≥5 µg/dL.

(RI KIDSCOUNT, 2020)

Clearly, many years of costly efforts at tertiary microscopic care did not come close to making the impact that this macroscopic intervention made. I have been involved with the Childhood Lead Action Project for the past thirteen years and have engaged large numbers of undergraduate and later graduate students in advocacy related to this issue. As new issues arise, such as COVID-19 which has caused more children to be in their unhealthy home environments for longer exposure and has decreased the number of children who are regularly screened, my students and I adapt to barriers and change our focus. The work is still not complete with disparities continuing to exist in the core cities. In 2020, 226 (8.6%) of children -226 too many-entering kindergarten in Providence had levels of lead greater than 5 micrograms/deciliter. The figure to the right shows the disparate variance in burden in Rhode Island's 39 cities and towns.

Since the legislative intervention which significantly improved, but did not eliminate, childhood lead poisoning in the state, nurses and nursing students have continued

to advocate and intervene on the macroscopic level, testifying before the legislature to maintain enforcement funding for certificates of conformance, lobbying a refugee resettlement organization to require lead safe certificates for housing for new refugees settling in the state, advocating for water line replacements to be equitably distributed, and broadening the fight to affordable safe housing. The current president of the Board of Directors of Childhood Lead Action Project is a nurse with an MSN in Population/Public Health Nursing who continues to collaborate with diverse grassroots groups to advocate for healthy housing for the state's most vulnerable families. Nurses from all specialties and at all levels should supplement their microscopic practice and use their status as a member of the United States' most trusted profession to advocate for legislation, initiatives, and programs that have large and sustainable impact on populations, especially the policy that benefits those who may not be able advocate for themselves.

Table 23. **Lead Poisoning in Children Entering Kindergarten in the Fall of 2021, Rhode Island**

CITY/TOWN	NUMBER TESTED FOR LEAD POISONING	CONFIRMED WITH BLOOD LEAD LEVEL ≥ 5 μ g/dL	
		NUMBER	PERCENT
Barrington	184	3	*
Bristol	151	5	*
Burrillville	129	3	*
Central Falls	300	26	8.7%
Charlestown	51	0	*
Covenry	289	7	*
Cranston	772	26	3.4%
Cumberland	352	6	*
East Greenwich	148	2	*
East Providence	491	16	3.3% [^]
Exeter	47	0	*
Foster	29	0	*
Glocester	63	1	*
Hopkinton	67	4	*
Jamestown	24	1	*
Johnston	241	4	*
Lincoln	213	7	*
Little Compton	15	1	*
Middletown	213	4	*
Narragansett	50	3	*
New Shoreham	16	2	*
Newport	265	20	7.5% [^]
North Kingstown	254	3	*
North Providence	331	3	*
North Smithfield	100	3	*
Pawtucket	833	46	5.5%
Portsmouth	146	4	*
Providence	2,636	226	8.6%
Richmond	39	2	*
Scituate	91	2	*
Smithfield	141	3	*
South Kingstown	200	8	*
Tiverton	132	3	*
Warren	83	2	*
Warwick	751	15	2.0% [^]
West Greenwich	30	0	*
West Warwick	325	7	*
Westerly	164	4	*
Woonsocket	539	23	4.3% [^]
Unknown Residence	1	NA	NA
Four Core Cities	4,308	321	7.5%
Remainder of State	6,597	174	2.6%
Rhode Island	10,906	495	4.5%

(RI KIDSCOUNT, 2020)

REFERENCES

American Nurses Association (ANA). (2015). Nursing: Scope and Standards of Practice, 3d Edition. ANA. Silver Spring, MD

Butler, S.M., Matthew, D.B., & Cabello, M. (2017, February 15). Re-balancing medical and social spending to promote health: Increasing state flexibility to improve health through housing. Brookings Institute. <https://www.brookings.edu/blog/usc-brookings-schaeffer-on-health-policy/2017/02/15/re-balancing-medical-and-social-spending-to-promote-health-increasing-state-flexibility-to-improve-health-through-housing/>

Byrd, M., Costello, J., Gremel, K., Schwager, J., Blanchette, L., & Molloy, T. (2012). Political astuteness of baccalaureate nursing students following an active learning experience in public policy. Journal of Public Health Nursing, 1-11.

Freiden, T.R., (2010). A framework for public health action: The health impact pyramid. American Journal of Public Health, 100 (4), 590-595.

Hauptman, M., Bruccoleri, R., and Woolf, A.D. (2017). An update on childhood lead poisoning. Clinical Pediatric Emergency Medicine, 18(3), 181-192.

Holler, J. (2016, July 26). Health geography primer for Rhode Island Family Medicine. <https://www.josephholler.com/files/HealthGeogRI.pdf>

Kemper, S. (2015, June 2). C-E.A. Winslow, who launched public health at Yale a century ago, still influential today. Yale News. <https://news.yale.edu/2015/06/02/public-health-giant-c-ea-winslow-who-launched-public-health-yale-a-century-ago-still-influe#:~:text=%E2%80%9CPublic%20Health%20is%20the%20science.principles%20of%20personal%20hygiene%2C%20the>

Lead Hazard Mitigation, Title 42 § 128-1 (2012). <https://law.justia.com/codes/rhode-island/2012/title-42/chapter-42-128.1/>

Martins, D. Thinking upstream: Nursing theories and population-focused nursing practice. In Nies, M.A. & McEwen, M., (Eds). Community/Public Health Nursing. Elsevier.

Rhode Island Department of Health. (2020). Childhood Lead Poisoning. Retrieved from <https://health.ri.gov/data/childhoodleadpoisoning/>

Rhode Island KIDSCOUNT Factbook (2020). Children with lead poisoning. <http://www.rikidscount.org/Portals/0/Uploads/Documents/Factbook%202020/Individual%20Indicators/lead-poisoning-2020fb.pdf?ver=2020-04-03-103700-983>

ENGAGING IN CIVIL DISOBEDIENCE: A PUBLIC STATEMENT TO INFLUENCE CLIMATE CHANGE POLICY

Ruth McDermott-Levy, PhD, MPH, FAAN

Professor, Villanova University

Co-director, Mid-Atlantic Center for Children's Health and the Environment

Fitzpatrick College of Nursing

The Superior Court of the District of Columbia, Criminal Division was the heading of the paper I was handed after paying a \$50.00 fine. About two inches lower on the paper was the statement, "You have been arrested for the following offence: 22-1307 Crowding, Obstructing or Incommoding." I grabbed the paper and with a friend we got a ride back to our D.C. hotel where we were to attend that evening's social activities of the American Academy of Nurses Transforming Health Driving Policy 2019 Conference appropriately titled: "Our Social Responsibility to Health: Impact and Influence."

In 2019, actress and climate change activist, Jane Fonda was motivated to bring attention to the existential risk of climate change by hosting Fire Drill Fridays at the Nation's capital in Washington, D.C (Fonda, 2019). After many years of educating nurses; advocating for effective climate change policy with state and national lawmakers; writing op-eds about the health impacts of climate change and the related air pollution; and speaking at the Global Climate & Health Summit held in conjunction with COP24 in Katowice, Poland, I took a step I never imagined I would do as a nurse. I put on my lab coat and wrapped my stethoscope around my neck and joined four other nurses, clergy, climate activists, and celebrities, Jane Fonda and Ted Danson to make a public statement. It is important that nurses make a public stand because climate change is real and if left unchecked it will have detrimental effects on the health of all of us with the greatest impact on society's most vulnerable: the poor, older adults, children, pregnant women, outdoor workers, people of color, immigrants, refugees, and indigenous people (Huffling, 2020).

As a public health nurse, educator, and researcher it is critical that I communicate the risks of climate change to protect and preserve the health of those at risk: all of us. The science is there. In 2016, the U.S. Global Change Research Program, made of 13 federal agencies issued their federally mandated quadrennial report that detailed the human health impacts across the United States: very few paid attention, and very little changed. In 2018 the world's leading scientist of the UN Intergovernmental Panel on Climate Change (IPCC) issued the sobering report that we cannot rise above a global average

temperature increase of 1.5° C. I thought that would capture the world's attention. Nothing changed.

The Scope and Standard of Nursing Practice (American Journal of Nursing, 2015) and our nursing license require that we advocate for the health of our patients. As a public health nurse that addresses environmental health risks, my patients are in communities, states, and regions. But with climate change, my patient seems to be the planet that sustains us. So, after doing everything I could to call attention to the climate crisis and influence U.S. climate change policy, I took a more public approach and joined others for Fire Drill Friday to engage in civil disobedience, also known as: 22-1307 Crowding, Obstructing, or Incommoding.

I did not do this lightly, as I mentioned I have been trying to "sound the alarm" with others for several years. So, before actually going to Washington I:

- Reflected on why I felt the need to participate in Fire Drill Friday.
- Spoke with an attorney who addresses occupational law.
- Reviewed the requirements of my home state board on nursing related to my nursing license and arrest.
- Learned about the procedures and what to expect related to the civil disobedience event.
- Discussed with my family and let them know my plans.



The event itself was well planned. We received detailed information in advance about what to expect, how to physically prepare (including being well hydrated and nourished the day before), what to bring and not to bring with us, and where to meet the day of the event. The early part felt like any environmental or climate rally I had attended in the past. At the end of the "rally portion", those of us who were willing to risk arrest

moved into the street and did not move. The Capital police were very respectful and asked us to move. After three warnings, when we did not move, we were handcuffed and taken to be processed. For our group, processing took about 5 hours. We sat in a police warehouse and we were able to talk with the others sitting near us. Overall, it was a humbling experience of climate change solidarity.

After we were released, we quickly headed back to the hotel to get something to eat and get cleaned up for an evening of celebration at the conference. I quietly returned to my normal professional life. A few people heard about what had happened and were commenting. I was surprised and a bit panicked, that it would get out that I had been arrested. After all, I had never been arrested before. I quickly learned, that is the whole point of civil disobedience. It is a public display to make a political statement. Civil disobedience is used to peacefully highlight an injustice, to undo a wrong. If nurses, the most trusted profession by the public, are willing to take the time to call public attention to a matter that affects our health, maybe others will pay attention. So, now I share my arrest, including a letter to my state board of nursing explaining why I did what I did and why more nurses must make a stand for our health. Our arrest was shared on social media and a quick photo of the nurses getting arrested made the national news. I have found that I get different responses. Some people congratulate me. Others ask why I got arrested. When asked I respond, "It is an opportunity to educate more people and help them make a link between air pollution, energy choices, and climate change policies and their health."

Civil disobedience is one of the last ways to influence policy, it is used when other more traditional methods have failed. However, nothing could be more important than addressing climate change and the associated health risks. Nurses do have a social responsibility to impact and influence health.

REFERENCES

American Nurses Association (2015). *Nursing: Scope and Standards of Practice*, 3rd ed. Washington, D.C.: Nursing World.

Fonda, J. (2019, December 5). We Have to Live Like We're in a Climate Emergency. Because We Are. *The New York Times*. <https://www.nytimes.com/2019/12/05/opinion/jane-fonda-climate-change.html>

Huffling, K. (2020). Our house is on fire. Join us in the streets. *Public Health Nurse*, 37 (1) 1-2. <https://doi-org.ezpl.villanova.edu/10.1111/phn.12704>

Intergovernmental Panel on Climate Change (n.d.). Special Report: Global Warming of 1.5°C. <https://www.ipcc.ch/sr15/>

U.S. Global Climate Research Program (2016). *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*. Crimmins, A., J. Balbus, J.L. Gamble, C.B. Beard, J.E. Bell, D. Dodgen, R.J. Eisen, N. Fann, M.D. Hawkins, S.C. Herring, L. Jantarasami, D.M. Mills, S. Saha, M.C. Sarofim, J. Trtanj, and L. Ziska, Eds. U.S. Global Change Research Program, Washington, DC, 312 pp. <http://dx.doi.org/10.7930/J0R49NQX>

Unit VIII:

Theory and Research

INTRODUCTION

Since the early days of professional nursing practice, nurses have been observing and analyzing environmental data. Nurses have used their findings to influence the care they provide. In the 1850's Florence Nightingale subscribed to the health theory of the time, miasma. Miasmatic theory held that "bad air" was responsible for diseases such as cholera and chlamydia. Of course, now we know that is incorrect. But, it took people willing to look at the problem differently, ask questions of those exposed, and conduct further research to advance our understanding of the impact of the environment on our health. Technological advances, such as the microscope, helped as well.

The scientific community, including nurses, has made observations and analyzed data to accurately identify what is happening related to human health and the environment. Over time the theories that frame our understanding of a problem have changed. Advancing our knowledge of how our environment influences our health does not occur unless we formally examine a problem through research methods. Nurses at all levels of practice are positioned to make observations, collect data, and analyze data regarding the environmental impact on the health of individuals, families, communities, and nations.

This unit describes the work of nurses who are engaged in environmental health research and environmental health theories and models to frame nursing research.

APPLICATION OF THE ECOJUSTICE EDUCATION THEORETICAL FRAMEWORK TO NURSING PRACTICE

Kristi Jo Wilson PhD, RN, FNP-BC, CAFCI

Assistant Professor of Nursing

University of Michigan-Flint- School of Nursing

While promoting and maintaining health, nursing care also creates pollution (about 5,500 tons daily or 2 million tons a year) and 20% of that pollution (400,000 tons) is hazardous (Anthony, 2015). Ironically, this is in contrast to the major concepts held within the foundational documents of nursing. For instance, Standard 7 and Standard 17 in The American Nurses Association Scope and Standards of Practice (ANA, 2015) contains language that supports ethical practice and the support of environmentally sound practices.

Although nursing education constructs sound values and attitudes in future nurses, like caring that is free of bias and strong patient advocacy, educators do not connect the dots when it comes to nursing and environmentally sound practices. For instance, outcomes in nursing education are successful completion of the NCLEX-RN passage rates and behaviors that contribute to sound patient care; however, consideration of the environment is not a strong priority of measurement. In addition, the American Association of Colleges of Nursing's (AACN) Baccalaureate Essentials (2008) that informs nursing curricula, does not include specific measures of environmental health. Although the Essentials are under revision, there are no specific indicators that environment and nursing will be strongly interrelated as the environment is described within the context of nurse and patient (AACN, 2019).

As a holistic profession, nurses must consider the connection of human beings and environment and bring about change in behaviors that contribute to waste and environmental concerns. The American Holistic Nurses Association (AHNA) describes holistic nursing as "all nursing practice that has healing the whole person as its goal" (AHNA, 2019, para 1) and the person as whole includes the consideration of human beings as embedded within the environment (AHNA, 2019). Author Wendell Berry (1995) reminded us of this notion when writing about health as embedded within a larger system: "To be healthy is literally to be whole; to heal is to make whole" (p. 87).

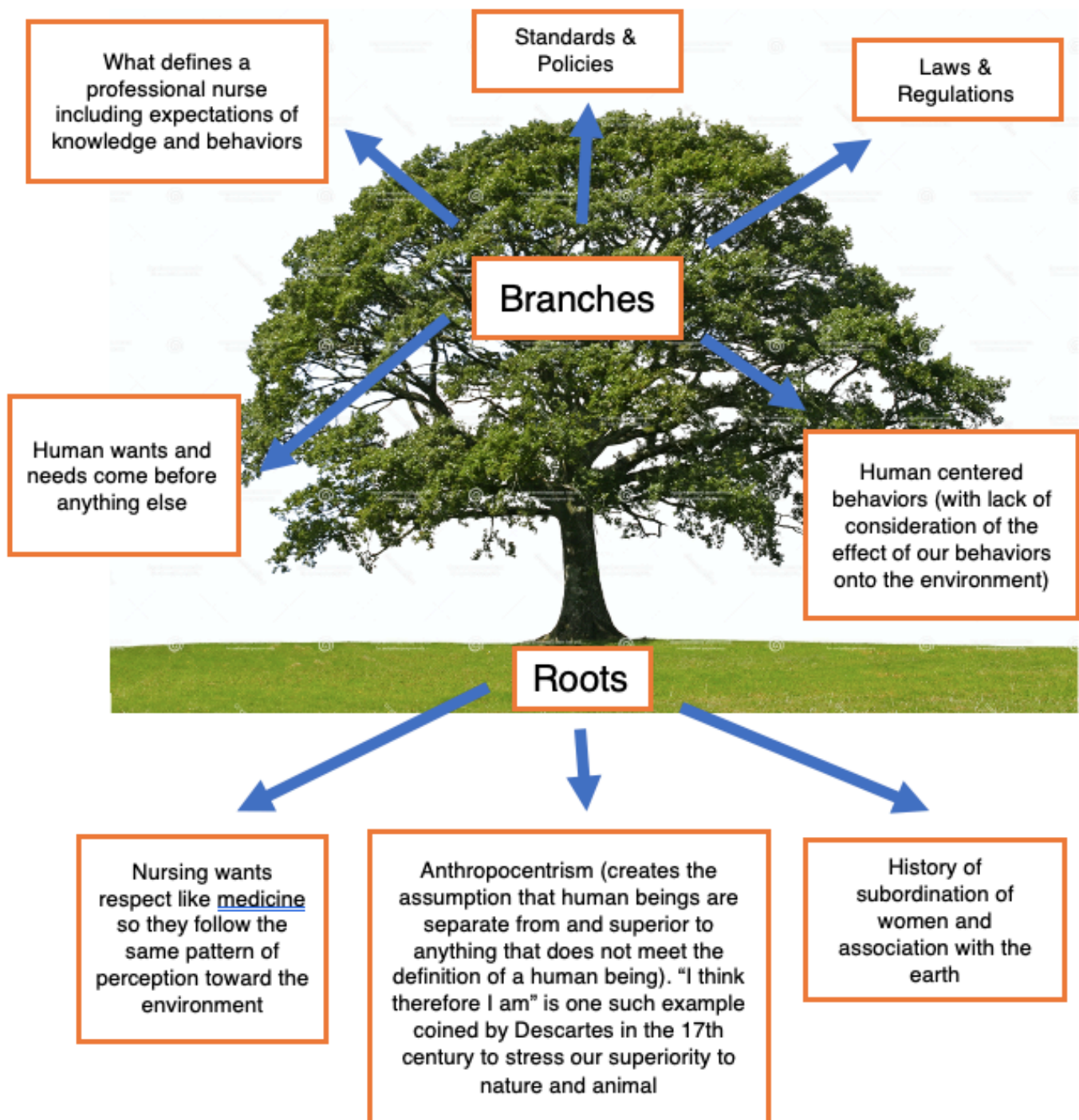
The Flint Michigan Water Crisis highlights the interdependence that is required among human beings and the environment. One cannot have true health if we are mired in toxic relationships and a polluted environment. In other words, human beings and environment have to be in

an interdependent relationship in order to recognize wellness. I have always counted the area of Flint, Michigan as my environmental commons. An environmental commons is filled with relationships with the environment that includes air, animals, rocks, soil and water (Bowers, 2006; Martusewicz, Edmundson & Lupinacci, 2015). For as long as I can remember, I have enjoyed activities within the commons that include walking by the Flint River and taking in the smells and sounds of the local fresh fruits and vegetables at the Flint Farmers Market. The importance of this relationship became real to me during the Flint Water Crisis. The poisoned river exposed the interdependence between human beings and the natural world. Not only do human beings rely on this body of water, but so do animals and wildlife like trees, soil, and plants. The consideration for the natural world is one of the tenets of an environmental commons, where all life can be affected as a result of a disregard of the social and ecological systems that we depend upon.

Theoretical frameworks such as The Ecojustice Education (EJE) theoretical framework help to deepen the awareness of connection to the environment and therefore the idea of what is health. The EJE framework reminds us that human beings cannot be separated from a larger entity, as we are fully dependent on a complex, interdependent system (Wilson, 2017). Unlike many approaches in nursing education that combine social and environmental issues into separate and distinct spheres, this framework operates from the position that social problems and environmental degradation emerge from the same foundational causes. A cultural ecological analysis (part of the EJE theoretical framework) helps to expose those causes because it examines the intersection between social and ecological problems and traces a deep history so that nurses can understand why things are the way they are today. Although there is no formal diagram to represent the framework, a tree with roots creates a strong metaphor or symbol for the EJE framework.

By looking at the diagram of a tree and applying the EJE theoretical framework, nurses can unpack the concept of health by becoming aware that health is constructed within socioeconomic, political, cultural, and ecological contexts that affect how personnel in the medical and nursing fields practice (see picture below). The deep history represents the roots of nursing and the branches represent the way things are today as situated in socioeconomic, political, cultural, and ecological contexts.

For example, the hospital culture is concerned with infection prevention and the use of gloves is recommended. However, as nurse researchers have noted, the use of gloves is not necessary in all cases and



contributes to the toxicity in the environment due to its petroleum-based origins of the gloves that are intended to support patient care (Grose & Richardson, 2015; Wilson, Prieto, Snigleton, O'Connor, Lynham & Loveday, 2015).

When the nurse is functioning from an Ecojustice Educational (EJE) Framework there can be a holistic perspective that addresses socioeconomic, political,

cultural, and ecological contexts in which the nurse practices. For example, there are specific actions that nurses can take to improve the environment and thus promote the health of those in the nurse's care. Consider the following questions to ask yourself during patient care and the resources that are available:

1. Consider using gloves for patients only when necessary. Ask yourself, "Do I have to wear gloves if I'm taking vitals and the patient is clean and dry?" Know the facts about what diseases are transmissible through bodily fluids and which fluids are vectors for the disease.
2. Become aware of the disposal practices of plastic or toxic items in your workplace. Are they recycled or thrown in the general waste? What is the problem with disposing them into the general waste?
3. Review the guidelines for the disposal of pharmaceutical items in your workplace. How certain are you that they won't end up in the water supply?
4. Educate yourself, your coworkers and patients on the need to be aware of environmental concerns that cause illness in humans or develop a "local eco-medical literacy" (Adlong & Dietsch, 2015, p. 20). One example is knowing that climate change and temperature increases can lead to food borne illnesses such as salmonellosis (Adlong & Dietsch, 2015). Another example is understanding that climate change is correlated with increasing incidents of allergies and asthma (D'Amato et al., 2015) and tend to affect human beings who live in economically depressed areas (McDermott-Levy, Jackman-Murphy, Leffers & Jordan, 2019; MacMunn, 2018).
5. Think of ideas to make products reusable. A reusable product cuts down on the energy needed to create a new product. For example, one nurse advocated for new patient slippers made of cotton scraps instead of cotton that is processed (Sattler & Choiniere, 2011). Another nurse suggested isolation gowns that are washable and items that were once assumed as single use can be reused safely such as oximeter probes, compression sleeves, and blood pressure cuffs (Schenk, 2017).
6. Become aware of food waste in your organization. Americans on average throw away 161 billion pounds of food each year (Aubrey, 2019). This statistic includes places where nurses work like hospitals and extended care facilities. Wasted food leads to an increased emission of methane, a gas that contributes to climate change. In addition, growing food requires land that is made available from deforestation in order to create space to grow food.
7. Inquire about the type of energy used at your workplace. The more fossil fuels used, the more dangerous gases are emitted to the environment that erode the ozone layer and lead to climate change. For example, the Alliance of Nurses for Healthy Environments (ANHE) in partnership with the Climate for Health, created a fact sheet that helps signify the specific actions nurses can take to support the environment (Cook, 2018).
8. Seek to understand that values within our culture that create hierarchization and exclusivity and lead to ecological crises. With this awareness, relationships that were once normalized or seen as that's just the way it is, will be questioned, seen as unethical and challenged by nurses. For instance, when nurses assume that a person who is admitted with a history of drug abuse is "faking it," "manipulative," or "drug seeking", it makes it easier for nurses to define them as someone who does not deserve their full attention or care. These assumptions feed into our actions of not fully advocating for the patient through rationalization that the patient is less than and not worthy of empathy and care. This separation of "us" and "them" feeds into other relationships and events such as the lack of consideration of something non-human and therefore perceived as less than (e.g., water) in comparison to human beings. The loss of connection embedded in these values and behaviors lead to the degradation of ecosystems that we depend upon and this is what happened in the Flint Water Crisis.
9. If you are a nurse educator, think about the overall purpose of nursing education. David Orr (2004) stressed that all education is environmental because the effects of our actions are not separate from the environment. Nurse educators are called to create a platform of learning that includes the ideas as described in the suggestions above in order to transform thinking and open students' minds up to the inter-relationality of environment and nursing.

A grounding in EcoJustice education can support nurses' understanding that becoming aware of the inner workings and values of their healthcare organization and getting involved in changes that support the environment will help reduce waste and affect change. After all, individual changes are powerful but changes at the institutional level affect change at a greater expanse. In order to accomplish the suggested tasks, nurses must reflect on their idea of what nursing is including the responsibilities that go along with the profession.

Given their scientific acumen and priority of caring and connecting with patients, nurses are in a prime position to be seen as experts on what attitudes and behaviors among human beings can create health in all members, including the more-than-human-world that includes the

water, animals, soil, air, and plants (Abrams, 1997). The EcoJustice Education theoretical framework is one way to challenge the assumptions in nursing and open nurses up to the risk of learning and embracing this broader perspective on health and thus be catalysts for change in nursing and nursing education. The immediate and long-range impact of that change bodes well for the health of the Earth as well as ALL of its inhabitants (Wilson, 2017).

REFERENCES

- Abrams, D. (1997). *The spell of the sensuous: Perception and language in a more-than-human-world*. New York, NY: Vintage Books.
- Adlong, W. & Dietsch, E. (2015). Nursing and climate change: an emerging connection: *Collegian* 22(1), 19-24.
- American Association of Colleges of Nursing (2008). *The Essentials of Baccalaureate Education for Professional Nursing Practice*. American Association of Colleges of Nursing: Washington, D.C.
- American Association of Colleges of Nursing (2019). Healthy work environments. Retrieved from: <https://www.aacn.org/nursing-excellence/healthy-work-environments?tab=Patient%20Care>.
- American Holistic Nurses Association (2019). What is holistic nursing? Retrieved from: <https://www.ahna.org/About-Us/What-is-Holistic-Nursing>.
- American Nurses Association (2015). *Scope and Standards of Practice* (3rd ed.). ANA, Silver Spring, MD.
- Anthony, S. (2015). How much waste do hospitals generate? Retrieved from: <https://www.medassureservices.com/blog/hospitals-medical-waste/>.
- Aubrey, A. (May 23, 2019). To reduce food waste, FDA urges best if used by date labels.
- The Salt, NY: NPR. Retrieved from: <https://www.npr.org/sections/thesalt/2019/05/23/726079350/to-reduce-food-waste-fda-urges-best-if-used-by-date-labels>.
- Berry, W. (1995). *Health is membership in Another turn of the crank*. (pp. 86–109). Berkeley: Counterpoint.
- Bowers, C. A. (2006). *Revitalizing the commons: Cultural and educational sites of resistance and affirmation*. Lanham, MD: Rowman & Littlefield.
- Cook, C. (July 24, 2018). Nursing advocacy for clean energy and climate solutions [Blog Post]. Retrieved from: <https://www.envirn.org/nursing-advocacy-for-clean-energy-and-climate-solutions/>.
- D'Amato, G., Holgate, S.T., Pawankar, R., Ledford, D.K., Cecchi, L., Al-Ahmad, M., ...Annesi-Maesano, I. (2015). Meteorological conditions, climate change, new emerging factors, and asthma and related allergic disorders. A statement of the World Allergy Organization. *World Allergy Organization Journal* 8(25). doi: 10.1186/240413-015-0073-0.
- Grose, J. & Richardson, J. (2015). Can a sustainability and health scenario provide a realistic challenge to student nurses and provoke changes in practice? An evaluation of a training intervention. *Nursing & Health Sciences* 18 (8), 256–261 doi: 10.1111/nhs.12241
- McDermott-Levy, R., Jackman-Murphy, K.P., Leffers, J.M. & Jordan, L. (2019). Integrating climate change into nursing curricula. *Nurse Educator* 44(1), 43-47.
- MacMunn, A. (December 6, 2018). 15 health and medical groups strongly oppose EPA's proposal to weaken carbon pollution limits on new power plants. Retrieved from: <https://www.lung.org/about-us/media/press-releases/15-health-and-medical-groups.html>.
- Martusewicz, R. A., Edmundson, J., & Lupinacci, J. (2015). *EcoJustice education: Toward diverse, democratic, and sustainable communities* (2nd ed.) New York, NY: Routledge.
- Martusewicz, R.A. & Wilson, K. (2017). Health as holism in Martusewicz, R.A. *A pedagogy of responsibility: Wendell Berry for EcoJustice Education*. Pp. 136 – 153. New York, NY: Routledge.
- Orr, D.W. (2004). *Earth in mind: On education, environment and the human prospect*. Washington: Island Press.
- Sattler, B. & Choiniere, D. (2011). Environments & health: The greening of a major medical center. *The American Journal of Nursing* 111(4), 60-62.
- Schenk, B. (2017). Reducing the environmental effects of healthcare and nursing practice. [Blog Post]. Retrieved from: <https://envirn.org/reducing-the-environmental-impacts-of-healthcare-and-nursing-practice/>.
- Wilson, K. (2017). *An EcoJustice Analysis of Nursing Education* (Doctoral dissertation). Retrieved from ProQuest Dissertations and These Global (10618978).
- Wilson, J., Prieto, J., Singleton, J., O'Connor, V., Lynham, S. & Loveday, H. (2015) The misuse and overuse of non-sterile gloves: Application of an audit tool to define the problem *Journal of Infection Prevention* 161- 24-31.

THE INTEGRATIVE MODEL FOR ENVIRONMENTAL HEALTH AND THE MODIFIED INTEGRATIVE MODEL FOR ENVIRONMENTAL HEALTH

Ruth McDermott-Levy, PhD, MPH, RN, FAAN

Professor, M. Louise Fitzpatrick College of Nursing & Co-director, Mid-Atlantic Center for Children's Health and the Environment

The Integrative Model for Environmental Health (IMEH), developed by Dixon and Dixon (2002), provides a useful framework for environmental health programs and research. The model has four environmental exposure domains: 1) Physiological, 2) Vulnerability, 3) Epistemological, and 4) Health Protection. These four environmental domains are linked by diffuse boundaries within each domain; thus, the domains are not discrete, and phases of a research project may address more than one domain. The domains are iterative and rely on one another to identify, understand, and address an environmental health risk or exposure. This also speaks to the complexity and the necessity of an interdisciplinary approach to environmental health problems (Dixon & Dixon, 2002).

The *physiological domain* addresses the physiological processes and impact that environmental exposures. It addresses the question, "What is the problem?" (Dixon & Dixon, 2002, p. 45). There are four elements within the physiological domain: agents, exposure, incorporation, and health effects. The agent is the environmental toxin or toxicant that can cause a health risk. Examples of an agent are particulate matter air pollution, pesticides, PFAS, a virus, or radiation. The *exposure* is the contact the agent has with the human being. The exposure can be dermal, ingestion, or respiratory routes. *Incorporation* is the accumulation of the agent in the body, the physiological response, and monitoring the agent. Finally, the *health effects* refer to the outcome of the agent, exposure, and incorporation leading to acute or chronic illness, a latency period, or death. Areas such as the toxicology of the environmental exposure, the epigenetic impact, biomonitoring, and physiological symptoms from the exposure would be considered in the physiological domain.

The *vulnerability domain* is concerned with the multiple factors and characteristics that influence the environmental health risks of individuals, families, communities, and populations. This domain would include the confluence of environmental justice, health disparities, and the social determinants of health. Examples that would be included in the vulnerability domain would be a child who lives with parents who smoke in the home; an incineration plant within a low-income community; or an

island nation that is experiencing sea-level rise with climate change. The vulnerabilities of environmental justice communities would also be highlighted within the vulnerability domain of the IMEHR framework.

The *epistemological domain* addresses what individuals, families, communities, or populations know and what they need to know related to environmental health risks. This domain examines people's awareness and how people learn about and understand environmental risks and the impacts on their health. This is an area that nursing has played an important role in communicating the evidence regarding an environmental agent and its risk upon human health.

The *health protective domain* includes the actions that people take to respond to an environmental health risk or exposure. Within this domain there are three elements: 1) people's *concerns about the health risk*; 2) their *sense of efficacy* or their confidence in their ability to address the health risk; and 3) the *actions* that they will take in response to an environmental health risk. This domain is closely associated with the way that nurses deliver educational interventions to individuals, families, and communities. Nurses assess learners' existing knowledge or understanding of the health problem; nurses determine the learners' ability to take action; and nurses provide evidence-based actions to make changes to improve environmental health.

The IMEH has been used in a variety of research and environmental health educational programming. Macdonald (2004) used the IMEH to analyze the SARS outbreak in Toronto, Canada. Larsson et al. (2006) used the framework to understand the perceptions of environmental health concerns of rural community leaders. Harnish et al. (2006) used the IMEH to guide research related to rural parents' understanding of environmental health risks for their children. Perron and O'Grady (2010) used the model to organize an integrative literature review of lead poisoning in children and McDermott-Levy (2016) relied on the IMEH to structure a community based participatory research project for environmental health education in a fracking community.

Polivka and colleagues (2013) used the model for a community based participatory research project with urban neighborhoods. Following focus groups to understand the needs of the community, the investigators determined that the IMEH should be modified to demonstrate the community's vulnerabilities and there should be a greater link to demonstrate that the physiological domain informs the epistemological domain, thus making the model much more iterative. Additionally,

the investigators changed an epistemological domain element from social knowledge to social understanding and added societal characteristics to the vulnerability domain to reflect the influence of public policy upon communities addressing environmental health risks. These changes yielded the Modified IMEH which has utility for community based environmental health research.

The Integrative Model for Environmental Health and the Modified Integrative Model for Environmental Health have utility for environmental health programs and research. This model and its modified version highlight the ways in which nurse address health risk by understanding the vulnerabilities of the population, examining the physiological impacts, including the existing evidence, and developing a plan to address the environmental health risks.

REFERENCES

Dixon, J.K. & Dixon, J.P. (2002). An integrative model for environmental health research. *Advances in Nursing Science*, 24(3):43–57.

Harnish, K.E., Butterfield, P., & Hill, W.G. (2006). Does Dixon's integrative environmental health model inform an understanding of rural parents' perceptions of local environmental health risks? *Public Health Nursing*, 23(5):465–471.

Larsson, L.S., Butterfield, P., Christopher, S. & Hill, W. Rural community leaders' perceptions of environmental health risks: Improving community health. *AAOHN Journal*. 2006; 54(3):105–112.

Macdonald, M.T. From SARS to strategic actions reframing systems. *Journal of Advanced Nursing*. 2004; 47(5):544–550.

McDermott-Levy, R. (2016). Evaluation of Environmental Health Education Resources for Residents of Unconventional Oil and Gas Development Communities in Pennsylvania. Conference proceedings, American Public Health Association Meeting, Denver, CO. Retrieved: https://apha.confex.com/apha/144am/meetingapi.cgi/Session/49253?filename=144am_Session49253.html&template=Word

Perron, A. & O'Grady, K. Applying Dixon and Dixon's integrative model for environmental health research toward a critical analysis of childhood lead poisoning in Canada. *Advances in Nursing Science*. 2010;33(1):E1–16

Polivka, B.J., Chaudry, R., Crawford, J.M., Wilson, R. & Galos, D. (2013). Application and modification of the integrative model for environmental health. *Public Health Nursing*, 30(2):167-76. doi: 10.1111/j.1525-1446.2012.01050.x.

NURSES DRAWDOWN: EVIDENCE-BASED STRATEGIES FOR NURSING

Sara Kramer, BSN, MS, RN, Worcester State University



Permission for image use from Nurses Drawdown

Nurses Drawdown is a project in collaboration with the Alliance of Nurses for Healthy Environments (ANHE) and Project Drawdown. Project Drawdown is an initiative that began in 2014 to identify scientifically based solutions to reduce, or drawdown, greenhouse gas emissions. As stated by the Project Drawdown project, “drawdown is the future point in time when levels of greenhouse gases in the atmosphere stop climbing and start to steadily decline. This is the point when we begin the process of stopping further climate change and averting potentially catastrophic warming. It is a critical turning point for life on Earth” (drawdown.org/drawdown-framework, 2021).

Nurses Drawdown moves the concept of Project Drawdown forward to include nursing and collaborative interdisciplinary interventions. The Nurses Drawdown carries on the mission of ANHE in promoting healthy people and healthy environments by educating and leading the nursing profession, advancing research, incorporating evidence-based practice, and influencing policy. It is important to develop Nurses Drawdown as nursing is the largest group of health professionals, with nurses and midwives accounting for nearly 50% of the global health workforce (who.int, 2020). Therefore, nurses are in positions to significantly impact climate change (who.int, 2020). Nurses Drawdown is positioned to engage nurses from all regions of the world to work toward evidenced-based climate change actions (nursesdrawdown.org, 2021).

The Nurses Drawdown website is a source for nurses to begin addressing climate change and to access evidence-based information, but Nurses Drawdown also offers inspiration from exemplars of the work that other nurses and midwives have done. The website provides videos and nurses testimonials. Actions described on the website at nursesdrawdown.org include five key areas that the

organization has identified for drawdown: Food, Mobility, Gender Equity, Energy, and Nature-Based solutions. These five key areas were selected because they are pertinent to the work of nurses and exhibit the importance of human health and the health of the planet.

- Food: Committing to eating a more plant-based diet, use clean-burning cookstoves, and reduce food waste.
- Mobility: Promoting walkable cities, including improving bike infrastructure and mass transit.
- Gender Equity: Supporting education for girls and access to family planning.
- Energy: Supporting a clean energy future by promoting energy efficiency and advocating for a transition to renewable energy.
- Nature-Based Solutions: Planting trees and protecting forests (nursesdrawdown.org, 2021).

These five focus areas are a way for nurses to get started in taking personal and professional action. Interested participants can learn more by clicking the “take action” tab and learn strategies to move their engagement in climate solutions forward.

Involving nurses in climate change action and enlisting their help in communicating messages is an important step toward mitigating the effects of climate change. Information and education are needed to help form a cohesive message that nurses can communicate to patients and other healthcare providers. Nurses are placed in positions where they work with people from all different backgrounds across the lifespan. This means that nurses can communicate messages to many different people of various backgrounds in communities (Leffers et al., 2016).

Preparing a nursing workforce to address climate change is important. In fact, public health nurses acknowledged that climate change threatened human health, with 65% of public health nurses noting that within twenty years health-related impacts of climate change would be considered serious (Polivka, Chaudry, and MacCrawford, 2012). However, the public health nurses also noted that they did not feel they had the tools or resources needed to address the issues related to climate change (Polivka et al, 2012).

Anaker et al (2015) also described that nurses were not prepared to address environmental health issues, stating “daily work requires substantial effort, leaving neither time nor energy to consider environmental health” with patients’ needs as the priority. Nurses’ and other health professionals felt that they were unable to address climate

change even if they viewed issues of sustainability important. The requirements of their work limited their ability to address climate change. An increase in nurses' awareness of their role in climate change and health can help to build foundations for a more sustainable healthcare sector (Anaker et al., 2015).



Permission for image use from Nurses Drawdown

Nurses Drawdown can be a valuable resource for nursing students, practicing nurses, nurse educators, and nurse scientists to learn, contribute to, and develop research questions to address climate change action. With more than twenty collaborating organizations from around the globe, Nurses Drawdown has global influence and brings about a platform for the organizations to engage together. Nurse Drawdown is an accessible tool to influence climate change education, climate action, and promote a healthier future for our planet and our patients.

REFERENCES

Anåker, A., Nilsson, M., Holmner, Å., & Elf, M. (2015). Nurses' perceptions of climate and environmental issues: a qualitative study. *Journal of Advanced Nursing* (John Wiley & Sons, Inc.), 71(8), 1883–1891. <https://doi.org/10.1111/jan.12655>.

Cooper, J., & Goren, A. (2007). Cognitive dissonance theory. In R. F. Baumeister, & K. D. Vohs, *Encyclopedia of social psychology*. Thousand Oaks, CA: Sage Publications. Retrieved from <https://gold.worcester.edu/login?url=https://search.credoreference.com/content/topic/cog>.

DiNapoli, L., Gomez, J., Chi, K., Hanoch, N., Li, J., Goresko, J., Kim, J., & Yung, T. (2019). Integrating Climate Change into the Nursing Curriculum. Retrieved from <https://www.sustainability.upenn.edu/sites/default/files/pdf/Final%20Report-Nursing%20Curriculum.pdf>.

Drawdown framework. (2020, August 19). Retrieved February 20, 2021, from <http://drawdown.org/drawdown-framework>.

El Ghaziri M., Morse B. (2020). Climate Change in Nursing Curriculum: The Time Is Now. *J Nurs Educ.* 59(11) 660. doi: 10.3928/01484834-20201020-14.

Leffers, J., McDermott-Levy, R., Nicholas, P. K., & Sweeney, C. F. (2017). Mandate for the nursing profession to address climate change through nursing education. *Journal of Nursing Scholarship*, 49(6), 679-687. <https://doi.org/10.1111/jnu.12331>.

Nurses Drawdown. (2021). A project of the Alliance of Nurses for Healthy Environments and Project Drawdown. Retrieved from <https://www.nursesdrawdown.org/>.

Polivka, B. J., Chaudry, R. V., & Mac Crawford, J. (2012). Public health nurses' knowledge and attitudes regarding climate change. *Environmental Health Perspectives*, 120(3), 321-5. Retrieved from <https://gold.worcester.edu/login?url=https://gold.worcester.edu:3475/docview/931505245?accountid=29121>.

World Health Organization (2020). Nursing and Midwifery. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/nursing-and-midwifery>.

BRIEF INTRODUCTION TO ONE HEALTH

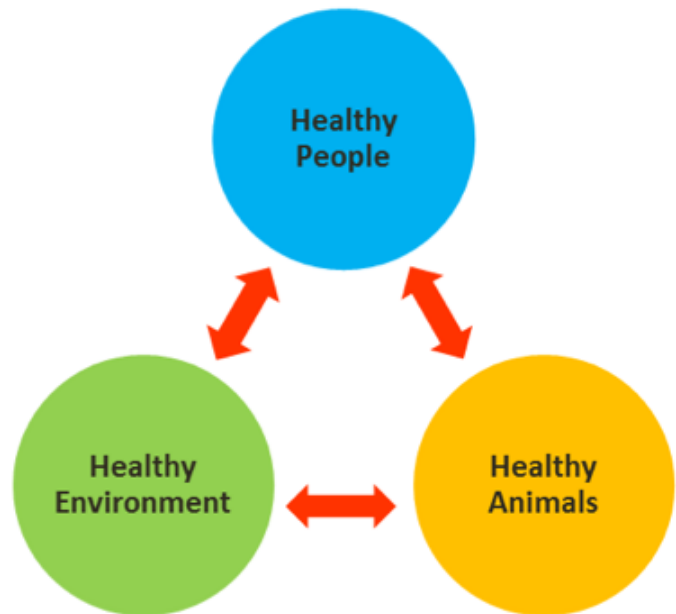
David R. Wolfgang, VMD, MPH, DABVP Dairy,
PA State Veterinarian, Retired

One Health is a collaborative effort of multiple disciplines — working locally, nationally, and globally — to attain optimal health for people, animals and the environment. “The One Health Initiative is a movement to forge co-equal, all-inclusive collaborations between physicians, osteopathic physicians, veterinarians, dentists, nurses and other scientific-health and environmentally related disciplines, including the American Medical Association, American Veterinary Medical Association, American Academy of Pediatrics, American Nurses Association, American Association of Public Health Physicians, the American Society of Tropical Medicine and Hygiene, the Centers for Disease Control and Prevention (CDC), the United States Department of Agriculture (USDA), and the U.S. National Environmental Health Association (NEHA). Additionally, more than 950 prominent scientists, physicians and veterinarians worldwide have endorsed the initiative” (One Health Initiative, 2019). One Health (formerly called One Medicine) is dedicated to improving the lives of all species—human and animal—through the integration of human medicine, veterinary medicine and environmental science.

One Medicine was a movement begun in the late 1990's into the early 2000's which focused on health issues that humans and domestic animals shared. Initially this concentrated on similar clinical diseases in humans and animals by examination of models, causality, zoonotic and emerging infectious diseases. This concept gained much exposure and popularity with the best-selling book *Zoobiquity* (Natterson-Horowitz, B. & Bowers, K., 2012).

It is increasingly recognized that for One Health to be effective, it must confront not only shared human and animal infectious diseases, but also the effects of toxic chemicals, malnutrition, trauma, climate change, declines and extinctions of species, and underlying societal drivers of these problems. The One Health approach promotes collaborations between clinicians, biomedical research scientists, public health laboratories, and environmentally related disciplines, who will work with others in agriculture, business, government and the broader society to address a broad array of emerging disease issues and thereby protect human, animal, and ecosystem health.

To better understand One Health it is important to be able to describe relationships between determinants of health and health outcomes in a very broad sense. It is appreciated that the health of human populations is critical. Elements of public health and epidemiology are essential to achieve this goal. It is impossible to truly



understand One Health without a grasp of epidemiology, epidemiological studies, and how health of individuals and populations can be affected by changes in society, domestic and wild animals, as well as the built and natural environments. In a majority of One Health epidemiology studies many more environmental components are included than have been traditional in earlier public health research.

Singular focus on people and their health can miss important clues and early indicators of environmental hazards and injuries that can foreshadow impending health challenges for society. A classic example is the documented effects endocrine (hormone) disruptors in the environment have had on amphibians. Amphibians have had the most precipitous decline of all vertebrate species since the last global survey in 2004 (Orton, F. & Tyler, C.R. 2015). The potential extent and deleterious effects these ubiquitous chemicals might have in people are just now beginning to be recognized (National Institute of Environmental Sciences, 2019).

Infectious diseases are probably the area in One Health that has received the most study and interest. It is nearly impossible to listen to the news each day and not hear of health cases involving communicable disease of some nature. These cases frequently have zoonotic, food safety, antibiotic resistant or emerging disease components (CDC, 2017). In these more complex cases, practitioners need to understand infection patterns in terms of risk factors, transmission dynamics, and evolution of the causative agent. A One Health perspective can help provide a more comprehensive understanding of the

principles of infectious disease epidemiology and strategies for disease control and prevention.

The health of current and future generations depends on wise decisions today. A growing population needs potable water, a nutritious diet, and a sustainable environment. Chemicals, natural and man-made, add impacts both intended and unintended on the food system as well as ecosystem (CDC, 2018). Creation of man-made structures and intrusions for agriculture and commerce fragment feral environments and wild populations making wild populations more vulnerable. Speed and distance by which people, animals, and products are moved globally make it easy to transport novel infectious disease agents and invasive species (CDC, n.d.). As human numbers grow and more resources are drawn from the Earth, it is imperative that systems be in place to ensure the vibrancy and resilience of our home. One Health is an initiative which can promote collaboration between health practitioners and scientists to more efficiently solve current health problems. One Health is also a preventative strategy which can help ensure the future health of people, animals and the environment is enhanced and sustainable.

SUGGESTED BOOKS

Atlas, R.M. and Maloy, S. (2014). One Health – People, Animals and the Environment. Washington, DC: American Society of Microbiology Press.

Nadakavukaren, A. (2011). Our Global Environment: A Health Perspective, 7th edition. Long Grove, IL: Waveland Press Inc.

Rabinowitz, P.M. & Conti, L.A. (2009). Human-Animal Medicine. Clinical Approaches to Zoonoses, Toxicants and Other Shared Health Risks. Maryland Heights, MO: Saunders.

Sala, O.E., Meyerson, L.A., & Parmesan, C. (2009). Biodiversity Change and Human Health. London: Island Press.

REFERENCES

Consumption of raw milk. (2017). CDC. Retrieved from www.cdc.gov/foodsafety/rawmilk/raw-milk-index.html

Endocrine Disruptors. (2019). National Institute of Environmental Health Sciences. Retrieved from <https://www.niehs.nih.gov/health/topics/agents/endocrine/index.cfm>

Harmful Algal Bloom (HAB)-Associated Illness. (2018). CDC. Retrieved from <https://www.cdc.gov/habs/illness-symptoms-freshwater.html>

Natterson-Horowitz, B. & Bowers, K. (2012). Zoobiquity. New York, NY. Knopf Doubleday.

One World-One Medicine-One Health. (2019). One Health Initiative. Retrieved from <http://onehealthinitiative.com/>

Orton, F. & Tyler, C.R. (2015). Do hormone-modulating chemicals impact on reproduction and development of wild amphibians? Biol. Rev. 90, pp. 1100 – 117 <https://doi.org/10.1111/brev.12147>

Zoonotic Diseases: How do germs spread between animals and people? (n.d.) U.S. CDC. Retrieved from <https://www.cdc.gov/onehealth/basics/zoonotic-diseases.htm>

NURSE RESEARCHERS

Kathy Jackman Murphy Ed.D., MSN, RN, CHSE
Professor of Nursing, Naugatuck Valley Community College

The Alliance of Nurses for Healthy Environments (ANHE) has several workgroups that nurses can join to become actively involved in the work of improving the health of the environment. This diverse group of nurses not only has a variety of nursing experience—both in tenure and areas of practice, but also in their focus areas of environmental health they champion.

The focus of ANHE's Research Workgroup is to frame and support an agenda for enabling nurses to solve environmental challenges to health through the creation of new knowledge. The Research Work Group provides excellent resources, support, and mentorship for all researcher experience levels – from novice to expert. The ANHE Research Work Group benefits from close partners working in advocacy, practice, and education. Critical research questions arise from these relationships and the resulting research agenda reflects the most current and pressing challenges of our profession. The workgroup meets monthly and all interested are encouraged to attend.

The members of the Research Committee demonstrate their commitment to environmental health in their research and the publication of their findings. Below are some examples of the wonderful nurse researchers involved in this workgroup, their areas of research and some of their publications. Come join us!

NURSE RESEARCHER: JESSICA CASTNER, PHD, RN-BC, FAEN, FAAN

Dr. Castner is the Editor-in-Chief of the Journal of Emergency Nursing and founding owner and principal of Castner Incorporated, a woman-owned small business research institute. Dr. Castner obtained her PhD from the University of Wisconsin-Milwaukee, MSN with a public health nursing focus from University of Missouri-Columbia, and her BSN from Marquette University. Dr. Castner has also completed advanced research training through NIH/NINR's intramural Summer Genetics Institute and Big Data Bootcamp. As a nurse scientist, Dr. Castner has been recognized as a Fellow in the Academy of Emergency Nursing and American Academy of Nursing for a unique and enduring contribution to the specialty by pioneering the integration of environmental health research, emergency nursing, and data science expertise. Clinically, Dr. Castner is a board certified Asthma Educator (AE-C) and emergency nurse (CEN).

Describe how you discovered ANHE and your interest in the organization:

I learned about ANHE from Dr. Barbara Sattler's keynote presentation at the Midwest Nursing Research Society's annual conference, and personal recommendations to engage from Drs. Laura Anderko and Barbara Polivka.

What is your research interest area?

My research program centers on multi-level environmental determinants of health and health emergency outcomes including inhaled toxicants, telehealth, disaster preparedness, healthy occupational environments.

With over 50 manuscripts in peer-reviewed journals, Dr. Castner's research can be found at the following link: <https://bit.ly/2JWnnf7>.

NURSE RESEARCHER: DORIAM ESPERANZA CAMACHO RODRÍGUEZ

Brief bio—please include where you went to nursing school, and schools for advanced degrees.

- Nurse, Cooperative University of Colombia Campus Santa Marta
- Specialist in quality management and health auditing, Cooperative University of Colombia Campus Santa Marta
- Master's in quality, Safety and Environment Management, Viña del Mar University
- Doctorate in Nursing, University of Carabobo

Describe how you discovered ANHE and your interest in the organization

I discovered ANHE through an internet search six years ago. This network inspired me to work in research in the area of environmental health and invite colleagues from my country (Columbia) to become interested in the subject.

What is your research interest area?

My area of interest in research is children's environmental health and right now I am in the process of publishing the products of my doctoral thesis entitled "Theoretical Model of Integral Care for the Promotion of Child Environmental Health: A Vision from the Nursing Professional."

Some examples of Dorian's work:

- Systematic review of the promotion of children's environmental health: its objective was to identify the relationship between environmental attitudes and behaviors in nursing students of a Colombian University.
- Application of environmental bioethics in the professional practice of nursing: To identify how environmental bioethics is applied in the professional practice of nursing: <http://www.revenfermeria.sld.cu/index.php/enf/article/view/1644/428>
- Systematic review of children's environmental health promotion: The purpose of this study was to identify the interventions aimed at the promotion of children's environmental health available in the literature and their relationship with the conditions and requirements to achieve health according to the Ottawa Charter: <https://revistas.unimagdalena.edu.co/index.php/duazary/article/view/2500/1943>

NURSE RESEARCHER: LISA M. THOMPSON, RN, FNP, PHD, FAAN

Lisa is an Associate Professor in the School of Nursing, with a secondary appointment in the Department of Environmental Health at Rollins School of Public Health. Before arriving at Emory in 2017, I was a faculty member in the School of Nursing at UC San Francisco from 2008-2017. I received my RN, MSN degrees and my FNP post-master's certification at San Francisco State University in 1996. I received my MS and PhD at University of California, Berkeley in 2008.

How did you discover ANHE and what is your area of interest in the organization?

I discovered ANHE in 2017 after moving to Emory. I attended a nursing conference and met nursing faculty who work in Environmental Health. We began to collaborate together, and published a paper (Castner, J., Amiri, A., Rodriguez, J., Huntington-Moskos, L., Thompson, L. M., Zhao, S., & Polivka, B. (2019). Advancing the symptom science model with environmental health. *Public Health Nursing*, 36(5), 716-725). I am currently co-chair of ANHE's research working group with Luz Huntington-Moskos. I attend the climate change working group meetings too.

What is your research interest area?

I spent the past 16 years working on research projects related to household air pollution in rural Guatemala, starting as a graduate student at UC Berkeley on an NIH-

funded randomized stove intervention study on infant pneumonia (RESPIRE trial). RESPIRE was the first-ever randomized intervention trial to measure reductions in childhood pneumonia from an introduced chimney stove intervention. The RESPIRE study provided a wood-burning chimney-stove to over 500 randomized households. We measured personal exposures among women and children and found that while we were able to reduce kitchen levels by 90%, personal exposures were only reduced by 50-60%. My analysis of birth weight among infants enrolled in the RESPIRE study was the first publication at that time that measured air pollution levels among pregnant women instead of relying on self-reported exposure.

In 2017, I completed a study where I developed a theory-driven behavioral intervention strategy that allowed women to adopt and sustain the use of liquid petroleum gas stoves during pregnancy and infancy (NACER study) in rural Guatemala. Currently I am co-investigator on the HAPIN trial, an NIH and Gates-funded randomized controlled trial of a liquid petroleum gas stove, 18-month free fuel distribution and behavior change communication to promote adoption of clean cookstoves in half of 3,200 households in four countries (India, Guatemala, Peru, and Rwanda). This study aims to deliver rigorous evidence regarding potential health benefits in children during the first year of life, including low birth weight, preterm birth, stunting, severe pneumonia and early childhood development.

Some examples of Lisa's work:

- Thompson LM, Bruce N, Eskenazi B, Diaz A, Pope D, Smith, KR. Impact of reduced maternal exposures to wood smoke from an introduced chimney stove on newborn birth weight in rural Guatemala. *Environmental Health Perspectives*. 2011 Oct; 119 (1): 1489-1494. PMID: 21652290. PMCID: PMC3230429

Article synopsis: Major constituents of solid fuel smoke, specifically carbon monoxide (CO), particulate matter (PM) and Polycyclic Aromatic Hydrocarbons (PAHs), are the same air pollutants found to contribute to adverse perinatal outcomes in ambient air pollution studies and tobacco studies. We have successfully conducted studies to measure urinary biomarkers of exposure to by-products of solid fuel combustion in rural Guatemala in the NACER study.

- Weinstein, J. R., Diaz-Artiga, A., Benowitz, N., & Thompson, L. M. (2019). Reductions in urinary metabolites of exposure to household air pollution in pregnant, rural Guatemalan women provided liquefied petroleum gas stoves. *Journal of Exposure Science and*

Environmental Epidemiology. doi:10.1038/s41370-019-0163-0

Article synopsis: Understanding how to influence behavior change among new stove adopters is an important area of focus when introducing new clean stove technologies. Theory-driven interventions are the cornerstone to understanding adoption and sustained use of complex technologies.

- Thompson LM, Diaz-Artiga A, Weinstein, JR, Handley MA. Designing a behavioral intervention using the COM-B model and the Theoretical Domains Framework to promote gas stove use in rural Guatemala: A formative research study. *BMC Public Health*, 2018, 18 (1), 253. PMID: PMC5813324
- Thompson LM, Hengstermann M, Weinstein JR, & Diaz-Artiga A. (2018). Adoption of Liquefied Petroleum Gas Stoves in Guatemala: A Mixed-Methods Study. *EcoHEALTH*, 15(4), 745-756. doi:10.1007/s10393-018-1368-8

NURSE RESEARCHER: ADRIENNE WALD EDD, MBA, RN, CNE, MCHES

Adrienne is an Associate Professor of Nursing at Mercy College in New York teaching undergraduate research and health promotion. She holds a doctorate degree (EdD) from Teachers College Columbia University focused on health behavior and nursing education; her MBA is in health care administration, and her BSN is from Boston University. Dr. Wald is a member of the American Public Health Association (APHA), active in the environmental and public health nursing sections, the American College of Sports Medicine (ACSM) as well as the Alliance of Nurses for Healthy Environments (ANHE), Sigma Theta Tau, and is a Fellow of the New York Academy of Medicine. Her expertise includes health education, health promotion, and primary prevention including obesity/weight management, tobacco control, physical activity, cancer prevention, and the impact of the environment on health behaviors. Her public health advocacy work has included serving as a state health promotion policy expert for the Society of Public Health Educators and as a member of the New York State and American Public Health Associations.

Describe how you discovered ANHE and your interest in the organization.

My introduction to ANHE was through a five-day writing retreat held on Martha's Vineyard held in 2017, organized by several ANHE members including Mary Jane Williams,

Ruth McDermott-Levy, and Barbara Sattler. It was an inspiring few days brainstorming on environmental issues and areas of interest, and focusing on individual writing projects, sharing with and obtaining feedback from colleagues. It was also a fabulous opportunity to connect with true ANHE leaders doing important work on a variety of environmental advocacy, education, and research projects. In addition to the work done at the retreat, there was a fabulous spirit of collaboration, dedication, and lots of "good" fun! Upon my return from the retreat, I became much more involved in the work of ANHE and in bringing this work to my students and faculty colleagues, as well as engaging them in local and NYS advocacy for environmental policies.

What is your research interest area?

My research has focused on health-promoting behaviors, with a particular interest in mainly physical activity, as well as nutrition, and sleep behaviors in college students. More recently I am interested in extreme heat events due to climate change and their impact on public health and the health care system; now I am examining the intersection of extreme heat events and physical activity behaviors and sports events. I was pleased to present a webinar for the ANHE Research Group last year on my article published in *Nursing Economics* (see below).

Some examples of Adrienne's work:

- Wald, A. (2019). Emergency department visits and costs for heat-related illness due to extreme heat or heat waves in the United States: An integrative review. *Nursing Economics*, 37(1), 35-48. http://www.nursingeconomics.net/necfiles/news/Climate_Change.pdf
- Wald, A. & Garber, C. E. (2017), A review of current literature on vital sign assessment of physical activity in primary care. *Journal of Nursing Scholarship*. doi:10.1111/jnu.12351. <https://bit.ly/34cTkGy>
- Wald, A., Muennig, P., O'Connell, K.O., & Garber, C.E. (2013). Associations between healthy lifestyle behaviors and academic performance in U.S. undergraduates: A secondary analysis of
- the American College Health Association's National College Health Assessment II. *American Journal of Health Promotion*, DOI: 10.4278/ajhp.120518-QUAN-265 (May/June issue). <https://bit.ly/2WfuOQT>
- Rooney, M., & Wald, A. (2007). Interventions for the management of weight and body composition changes in

women with breast cancer. *Clinical Journal of Oncology Nursing*, 11(1): 41-52.

NURSE RESEARCHER: KRISTI JO WILSON

Kristi is a 1986 diploma graduate from Hurley School of Nursing in Flint, MI and completed her BSN in 1989. She obtained her family nurse practitioner/MSN degree from Michigan State University and became certified in 2001. Kristi obtained her PhD in Educational Studies with a concentration in urban and nursing education from Eastern Michigan University in 2017. She is a full-time nurse educator at University of Michigan-Flint and also work in the acute care and the outpatient setting, consulting with endocrine patients and patients who need medical surgical management. Kristi is also a nurse practitioner who performs neuro-anatomical acupuncture after becoming certified in 1989.

Describe how you discovered ANHE and your interest in the organization

When I was directed toward ANHE due to my interests, I said "Where have you been all of these years? I thought I was alone as a nurse!" I am amazed at the courage and tenacity of these nurses who draw the connection between our bodies and the earth. They look beyond the way we were trained in nursing school (well at least I was) in that nursing school trained me to negate the environment and only focus on the environment of the nurse and the patient. I do not blame my teachers because they were so smart and dedicated. They taught me the way they were taught and were formed by the expectations of their profession. However, change is necessary and the risk of not changing is too great - for all of us.

What is your research interest area?

I am interested in EcoJustice Education (EJE). To further explain, the EJE framework reminds us that human beings cannot be separated from a larger entity, as we are fully dependent on a complex, interdependent system. Unlike many approaches in nursing education that combine social and environmental issues into separate and distinct spheres, this framework operates from the position that social problems and environmental degradation emerge from the same foundational causes and those causes are exposed through a cultural ecological analysis that examines the intersection between social and ecological problems.

Some examples of Kristi Jo's work:

- Wilson, K. (in Press). Application of the EcoJustice Education theoretical framework in nursing practice. In McDermott-Levy, R., Murphy, K, Leffers, J, Cantu, A., Curtis, K, and Hulick, A. (Eds). *Environmental Health in Nursing*, 2nd ed. Alliance of Nurses for Healthy Environments.
- Wilson, K.J. & Stanley, E. (2019). The crisis and the shutoffs: Reimagining water in Detroit and Flint, Michigan through an EcoJustice analysis. *Annual Review of Nursing Research* 38.
- Linton, M., Wilson, K., Dabney, B.W., & Johns, E. (in press). Integrating environmental sustainability content into an RN-to-BSN program: A pilot study, *Journal of Nursing Education*.

THE NURSE'S ROLE IN ENVIRONMENTAL HEALTH THROUGH THE LENS OF THE THEORY OF HUMAN CARING WITH A HEALTHY DOSE OF FLORENCE NIGHTINGALE

Lisa Jordan PhD, RN, CNE

Kathryn P. Jackman Murphy Ed.D, MSN, RN, CHSE

There is a great deal of focus on the care of the client within the healthcare environment with the realization that it is vital that nurses consider the client's entire environment. The environment is defined by the American Nurses Association (ANA) as: the atmosphere, milieu, or conditions where one lives, works, or plays (2007). This broader definition helps set the foundation to protect the health of our clients, their families, ourselves, and the global community.

Nurses realize through the utilization of Jean Watson's Theory of Human Caring we can use the connections between human values of caring, social justice, and economics. This includes the spectrum of environments of caring and healing as our inner selves, schools, homes, businesses, communities, healthcare settings, institutions and governments. Nurses must be involved in each of these caring-healing environments and be committed to equity, inclusion, universal respect and environmental thriving (Rosa, Dossy, Koithan et. al., 2020). As nurses, we must manage each environment while uniting across our differences and similarities of our peers, clients and communities.

The Theory of Human Caring recognizes the connection between health, caring, poverty, justice, and peace (Watson, 2008). It is through this world view nurses establish the basis for caring not only for others, but also extending across our communities and the world. Caring is a central component of nursing (Turkel & Watson, 2004) and caring for each and every person, no matter the environment needs to be included in the practice of every nurse in order to create and maintain a healthy environment for all. A healthy environment, supports a healthy planet and essentially will help provide a caring and healing environment. An unhealthy environment and unhealthy planet is lacking in caring behaviors leading to the detriment of humanity.

Promoting the health of the environment is not a new concept in nursing, quite the opposite-it is embedded in the very foundation of nursing. Florence Nightingale, the founder of modern nursing started the path of protecting and improving the environment by calling on nurses to manage the environment by controlling light and noise, ensuring clean air and water, and maintaining the cleanliness of the patient's environment with the goal to promote health and healing (Nightingale, 1860). She

believed a poor environment was detrimental to health and contributed to diseases and when the environment was improved, the patient would be in the best possible condition to improve and heal. Nightingale also addressed social injustices, advocated for policy for institutions, the public and communities to develop a moral, healthy and caring society for all citizens (Watson, 2008).

Nightingale demonstrated caring by altering the environment of the soldiers of the Crimean War to improve conditions and implementing seemingly simple changes such as adequate nutrition, preventing overcrowding of the wards, providing fresh air, clean bandages and hand washing to support the health and welfare of those in her care. She knew the importance of sharing the results of these changes by using statistics to communicate the effect of the changes and challenged stakeholders to support her institutions of care. For her work, Nightingale was ridiculed and not received positively by many involved in the care of the soldiers. For example, Dr. John Hall, head physician at the Scutari Hospital during the Crimean War called Nightingale a "petticoat imperieuse" (Florence the Woman, 2021) and reported her improvements to the care environment as harmful to the medical department (Hammer, 2020).

Nursing theorist Jean Watson (2012) calls on nurses to continue the work of human caring by advocating for improved global health and well-being and expanding the impact of human caring. Watson proposes that caring is the "highest form of ethical commitment to patients, families, communities, society, civilization, and planet Earth" (p. 58) noting the interconnection between human-to-human and human-to-environment relationships. The caring practices apply to all people, at all times, and transcend biological, physical, economic, geographic, religious, political, or social differences. Rosa, Dossey, Koitham et. al., (2020) notes Watson's theory demonstrates that the interconnectedness of humanity and human survival is linked to all aspects of the global environment including animal species and ecosystems.

Caring for all environments will help to create a healthy planet to ensure clean, pure air and water for each and every citizen. Nurses must work to protect vulnerable populations such as the very young, the very old, outdoor workers and those with comorbidities, such as mental illness and cardiac disease. These populations, along with the poor and underserved are more at risk of exposure and harm due to chemicals of concern, unclean water, and air. Children, whose organs are still developing and pound for pound eat more food, drink more fluids, breathe more air than adults, ingest more harmful substances. This result can lead to life-long effects of exposure such as asthma,

diabetes or cancer. In fact in 1979 the Surgeon General Julius Richmond reported that environmental factors contributed directly or indirectly to nearly every major chronic disease and 20% of the deaths in the United States (U.S, Department of Health, Education and Welfare as cited in Gerber & McGuire, 2000). A healthy planet will support healthy people and populations, protected from harmful substances which create illness, disease and death. As nurses, we must acknowledge our vital role in caring for health and the health of the environment.

Human caring and environmental caring are in direct alignment with the American Nurses' Association's (2010) Scope and Standard of Practice that called for the inclusion of environmental health into nursing practice. The third edition published in 2017 further strengthened the nurse's role in environmental health and health of the environment in each practice setting. These documents provide a framework for environmentally healthy and safe nursing care, guided by the foundation of disease prevention and social justice, built on the foundational work of early nurse leaders including Florence Nightingale and Lillian Wald and continues to be applicable to our daily practice today.

It is the responsibility of every nurse to demonstrate care for the earth or earth caring in order to protect the fragile health of the environment to protect our health, the health of the planet and the health of future generations. Citing Watson in her article, *Earth Caring*, Eleanor Schuster echoed the importance of care and caring behaviors while highlighting the importance of interconnectedness across the Environment, Nursing, and Caring. Schuster challenged nurses to recognize how our earth can be damaged by the need for profit and to take personal responsibility to support our global home through advocacy for our patients and our world. Schuster further stressed that nurses could manage such care through an interprofessional approach and partner together to heal our environment and foster health (2013).

Nurses must demonstrate caring and support other nurses and healthcare professionals involved in the work of environmental health. All nurses must work together to improve the environment and continue the work of Florence Nightingale and Jean Watson to support the health and welfare of all citizens. Incorporating caring for the earth into our everyday practices will guide nurses to consider the impact of our decisions not only for the present but also the future of our world.

REFERENCES

- Akerman, L. (2019). Caring Science Education: Measuring Nurses' Caring Behaviors. *International Journal of Caring Sciences*. 12(1). 572-583.
- American Nurses Association (Ed.). (2007). *Principles of environmental health for nursing practice with implementation strategies* Silver Spring, MD: nursesbooks.org
- American Nurses Association. (2010). *Scope and Standards for Nursing Practice*. Silver Springs, MD
- Florence the Woman. (2021). Retrieved from Florence Nightingale 200 Years: <https://www.florence-nightingale.co.uk/dr-john-hall-1795-1866/>
- Gerber, D. E., & McGuire, S. L. (2000). Teaching students about nursing and the environment: Part 2-Legislation and resources. *Journal of Community Health Nursing*, 16(2), 81-94
- Hammer, J. (2020, March). The defiance of Florence Nightingale. Retrieved from Smithsonian Magazine: www.smithsonianmag.com/history/the-worlds-most-famous-nurse-florence-nightingale-180974155/
- Nightingale, F. (1860). *Notes on nursing: What it is, and what it is not*. New York, NY: D.Appleton and Company.
- Rosa, W. E., Dossey, B.M., Koithan, M., Kreitzer M. J., Manjrekar, P., Meleis, A. I., Makamana, D., Ray, F.A., Watson, J. (2020). Nursing Theory in the Quest for the Sustainable Development Goals. *Nursing Science Quarterly*. 33(2). 178-182.
- Schuster, E.A. (2012). *Earth Caring*. In Wolf, Z, R., *Caring in Nursing Classics: An Essential Resource* (pp. 445-449). United Kingdom: Springer.
- Turkel, M., Watson, J. (2014). Advancing Caring Science through International Collaboration and Partnerships. *International Journal of Human Caring*. 18(4): 65-65
- Watson, J. (2012). Guest Editorial. *International Journal of Human Caring*. 16(2). 5.
- Watson, J. (2008). Social Justice and Human Caring: A model of caring science as a hopeful paradigm for moral justice for humanity. *Creative Nursing*. 14(2). 54-61.

The editors of Environmental Health in Nursing, 2nd edition would like to sincerely thank the authors who generously contributed their time, knowledge, and expertise to this edition. Without our dedicated authors we would not be able to share the quality of important environmental health information that is contained in the e-text. This work was a labor of love. Love of Earth's people, families, communities, and the planet that sustains us. We hope that you find this information useful to expand your nursing practice to include environmental health.

With gratitude,

Ruth McDermott-Levy, PhD, MPH, RN, FAAN

Kathryn P. Jackman-Murphy, EdD, MSN, RN, CHSE

Jeanne Leffers, PhD, RN, FAAN

Adelita Cantu, PhD, RN, FAAN



Alliance of Nurses for Healthy Environments

Mission of ANHE: Promoting healthy people and healthy environments by educating and leading the nursing profession, advancing research, incorporating evidence-based practice, and influencing policy.

enviRN.org