

Unit V:

Sustainable Communities

WHAT ARE SUSTAINABLE COMMUNITIES?

The term “sustainable communities” refers to a goal to ensure survivable communities globally. Sustainable communities use resources to meet current needs while considering the needs of future generations. Elements of sustainability include safe and healthy housing, transportation that reduces harmful exposures to the environment and provides opportunities for all citizens to engage in community life, access to healthy and affordable foods, smart growth, and social and economic opportunities all supported by involved community members.

For more than 25 years, civic groups, local communities and non-governmental organizations have worked to advance sustainable living. The [Institute for Sustainable Communities](#) has partners in the United States, China, Vietnam, Thailand, Bangladesh and India. There are [videos](#) online that show the work of sustainable cities, towns and neighborhoods.

Since 2009, the US Federal Government has a program entitled the [Partnership for Sustainable Communities](#) that is comprised of three federal agencies: the U.S. Department of Housing and Urban Development (HUD), U.S. Department of Transportation (DOT), and the U.S. Environmental Protection Agency (EPA). The goal of the partnership is to protect the environment while improving access to affordable housing, increasing transportation options and lowering transportation costs. According to their website, the “Partnership for Sustainable Communities (PSC) works to coordinate federal housing, transportation, water, and other infrastructure investments to make neighborhoods more prosperous, allow people to live closer to jobs, save households time and money, and reduce pollution. The partnership agencies incorporate six principles of livability into federal funding programs, policies, and future legislative proposals” (PSC, 2016).

Successful projects sponsored by the partnership include [Bridgeport, CT](#), [Greenville, SC](#) and [Milwaukee, WI](#). In addition, other examples of communities that have developed programs for sustainable communities include those supported by the [Making a Visible Difference in Communities](#) program of the EPA, as well as [Smart Growth](#) initiatives.

INTRODUCTION

Unit V offers a variety of topics that relate to healthy and sustainable communities. The beginning chapter introduces the National Library of Medicine’s ToxTown resource. This is an interactive and engaging resource for children and adults to learn about environmental health impacts in communities. Learning about communities such as cities, towns, farms and ports prepares nurses to understand concepts that relate to healthy and sustainable communities. Unit 5 next includes a discussion about Green Buildings, which is a topic that many nurses are likely to know about as a result of the current efforts to build environmentally responsible workplaces. The Green Cleaning in Homes chapter provides information and resources to inform nurses about healthier choices for cleaning products. Unit 5 also addresses transportation concerns, Brownfields in communities, and antibiotic use in agriculture. These topics impact the health and well being of community residents. The chapter, Environmental Justice, builds upon the issue of health disparities related to the social determinants of health. While communities work to foster social and economic health and well-being, hazardous exposures impact community citizens differently. This chapter addresses both the development of the environmental justice movement, the federal and state mandates developed in response to this movement and efforts by community members to address injustice and work toward healthy sustainable communities.

INTRODUCTION TO TOX TOWN

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Tox Town is an interactive teaching tool from the National Library of Medicine. The information presented in Tox Town was created to teach middle school students about the health impacts of the environments in which we live, work, and play. These lessons and activities may be useful to faculty and nursing students who are new to environmental health. The Tox Town program offers six separate communities to learn about the chemical risks to human health that are relevant to the specific community that is being assessed. The communities or neighborhoods are:

1. Town
2. City
3. US Border Region
4. Farm
5. Port
6. US Southwest.



Tox Town City

Within each community the learner can click on a variety of natural (streams, ocean, air) and built environments to discover environmental risks related to the area. Additionally, within Tox Town there are links to the Centers for Disease Control (CDC), Environmental Protection Agency (EPA), and Toxicology Data Network (TOXNET) to learn more information about specific environmental toxicants, including toxicological information and methods to reduce risk.

Although Tox Town was created for middle school students, many of the concepts covered in the program

are new to most nursing students. Furthermore, the program provides the foundation for a nursing student to visualize assessing a community from an environmental perspective. Environmental health in nursing can be further developed by examining the evidence based literature and other scientifically-based web sites, and using faculty developed case studies. Tox Town is also offered in Spanish. This could be valuable for nurses when teaching members of a Spanish-speaking community about environmental risk and prevention. Go ahead check out [Tox Town](#) for yourself.



Tox Town Farm

GREEN BUILDINGS

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Florence Nightingale identified the environment as a primary area of concern for professional nursing. Nursing's focus on the environment encompasses many levels. Levels range from the immediate patient environment and the in utero environment of the newborn to the local community environment where people live and ultimately the global environment.

WHAT IS THE BUILT ENVIRONMENT?

At the community and global levels, professional nursing has evolved to focus on assessment and interventions that address both the natural environment and the built environment. This focus includes advocating for changes to enhance the built environment (DeGuzman & Kulbok, 2012). The U.S. Environmental Protection Agency (U.S. EPA) defines the built environment as including patterns of land use, transport infrastructure, building orientation and design, and the natural environment. The natural environment includes ecosystems, endangered species, habitats, and water quality (U.S. EPA, 2001).

WHAT ARE GREEN BUILDINGS?

Green buildings have been defined as those structures that are created, maintained, and deconstructed using environmentally responsible and resource-efficient processes (U.S. EPA, 2014). Green buildings are intended to minimize the impact of the built environment on human health and on the natural environment by incorporating specific design features and processes that

- enhance energy and resource efficiency,
- protect human health,
- improve human productivity, and
- reduce waste, pollution, and degradation of the environment (U.S. EPA, 2014).

Building green in the U.S. grew largely out of two movements that emerged in the 1960s and 1970s, namely 1) the environmental movement and 2) the increasing focus on energy efficiency and sustainability following the oil shortage crisis of the 1970s (U.S. EPA, 2014). One year after the first local green building program was introduced in 1992 in Austin, Texas, the U.S. Green Building Council (USGBC) was founded (US EPA, 2014). The vision of the USGBC is to promote healthy, efficient, and equitable buildings and communities for all (USGBC, 2012-2015a).

As of February 2015, the USGBC directory listed 73 local chapters across 37 states, as well as a chapter in Washington DC and one in Puerto Rico (USGBC, 2012-2015b). The USGBC administers a green building certification program titled Leadership in Energy & Environmental Design (LEED). Building projects can receive LEED certification at a specific level based on meeting specific prerequisites and points for the desired certification level. The USGBC implemented the first LEED pilot program (version 1.0) in 1998; as of February 2015, Version 4.0 of LEED was in place (USGBC, 2012-2015c).

The World Green Building Council [WGBC] (n.d.a) identifies various features of green building design and processes that span the sequential phases of

- planning (e.g., location, design),
- construction (e.g., materials, methods), and
- functioning (e.g., access, transportation/commuting, maintenance, operating procedures and policies).

More specifically, indoor environmental factors are addressed. Factors include indoor air quality, energy and resource use, temperature, lighting, noise, functionality of layout, and 'active' design features that include opportunities for exercise as well as exercise services such as gym facilities (WGBC, n.d.a).

HOW IS THE GREEN BUILDING MOVEMENT BEING EVALUATED?

The green building movement has begun to focus increasingly on documenting the effectiveness of green buildings in meeting their intended purposes of protecting and promoting human health and the natural environment. The WGBC's 2013 report identified a framework to measure the effectiveness of green office buildings by examining:

- financial outcomes (e.g., worker absenteeism, turnover, medical costs)
- workers' perception of outcomes (self report of health and wellbeing, productivity)
- physical outcomes (e.g., temperature, ventilation, humidity, lighting, noise, pollution).

The WGBC's (n.d.b) 2013 report The Business Case for Green Building discusses reports of cost savings and other positive outcomes from green buildings. Different outcomes have been identified to evaluate the effectiveness of green buildings constructed for different purposes, e.g., green schools and green hospitals. The

state of Ohio required that all publicly-funded construction of kindergarten through 12th grade schools be LEED certified at the level of Silver or better; Ohio has the greatest number of green schools in the U.S. (130 as of 2015). The Battelle Memorial Institute was hired by the Central Ohio Chapter of the USGBC to study whether LEED-certified K-12 schools in Ohio make a difference in educational outcomes such as test scores, attendance, and discipline (Battelle Memorial Institute, 2014 April.)

NURSING AND ADVOCACY FOR GREEN BUILDINGS

Nurses must recognize that the mechanisms through which the environment can affect human health exist in both the natural environment and the built environment. This recognition has implications for the scope of assessment of the environment beyond the immediate locale to the broader built environment. Nursing interventions to enhance the environment include advocacy for responsive local and regional policies. Such policies capitalize on the increasing knowledge of how green buildings promote and protect human health. In addition, nurses can add to the knowledge regarding green building effectiveness through studies that provide insight into pathways that link green building to health outcomes of individuals, families, and communities (DeGuzman & Kulbok, 2012). As the green building movement continues to grow, nurses in different specialty areas (e.g., acute care, school nursing, public health, occupational health) can incorporate knowledge of the interaction between the specific built environment and health into the care they provide to the individuals, families, and/or populations who spend time in those buildings.

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GREEN CLEANING IN HOMES

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WHY GREEN CLEANING IS RECOMMENDED IN HOMES

Exposure to potentially toxic substances is often a result of common household activities. The Environmental Protection Agency (EPA) found levels of common pollutants to be 2 to 5 times higher inside homes than outside, regardless of the home's location (EPA, n.d.). Health effects from chemical exposures include eye, nose and throat irritation, headaches, nausea, contact dermatitis, and central nervous system dysfunction. Inhalation of respiratory irritants is a common trigger of asthma symptoms. Many toxic chemical cleaning products are not only more expensive than more natural methods, they also end up in the water systems after rinsing, and in landfills after disposal of unused products. Some cleaning chemicals are known or suspected to cause cancer in humans (EPA, 2012).

One way to avoid the exposures to potentially toxic chemicals is to read labels carefully. Non-toxic commercial products are available to the consumer who is willing to do some research. The market is full of products that claim to be “all natural”, “safe for the environment” or “biodegradable”, but these terms are not subject to guidelines for their use. When looking for environmentally safe products, look for certified green products with the Green Seal or EcoLogo mark on the label whenever possible (Environmental Working Group, 2011). Manufacturers are not required to list the content of cleaning products; however, household products should carry the following warnings if applicable:

- Caution – slightly toxic
- Warning – moderately toxic
- Danger – highly toxic
- Poison—use precautions to avoid exposure (Findley & Formicelli, 2009).

Sprays, especially aerosols, can linger in the air for hours or days. If used on a regular basis, the result is chronic inhalation of chemical substances. This is important to consider in light of the increasing popularity and frequent (often continuous) use of air “freshening” and scented candles, sprays, plug-ins, etc. A clean home will be odorless; however, many American consumers have become fond of scented their home. There are effective ways to ensure that your home has a pleasant scent without using

expensive commercial scented products, for example using flowers or essential oils.

SAFER CLEANING PRACTICES IN HOMES

To reduce exposure of family members to chemicals in the home, greener cleaning products can easily be made from common household ingredients. Many of these cleaning substances have been used effectively for years, but have fallen out of favor due to the successful marketing of “new and improved” methods.

This chapter will explore safer practices for effective home cleaning, inexpensive common household items that can be used for house cleaning, home scented ideas, and some basic pest management. References for more detailed information are provided at the end of the chapter.

CLEANING BASICS

One strategy for keeping the home clean is to reduce clutter, which in turn reduces dust. In addition, some houseplants are effective at removing toxins from the air. Through photosynthesis, houseplants use carbon dioxide and emit oxygen and can remove a significant amount of toxic chemicals from the air. Recommended plants include English Ivy, ferns, and rubber plants (Leader, 2013).

Avoid using “antibacterial” soaps and cleaners as they are unnecessary for cleanliness and can be harmful. Many antibacterial products contain triclosan, which has been associated with endocrine system disruption, environmental pollution, and the increasing emergence of drug-resistant strains of bacteria. In addition, antibacterial soaps offer no additional health benefits over washing with soap and water (U.S. Food and Drug Administration, 2013).

Basic cleaning ingredients include the following:

- Distilled water (for mixing ingredients – works better than tap water)
- Baking soda (abrasive)
- Liquid dish soap (non-toxic formula)
- White vinegar (deodorizer, disinfectant)
- Hydrogen peroxide (disinfectant, whitener)
- Lemons (disinfectant, deodorizer, degreaser)
- Spray bottle
- Essential oils (optional, for scented).
Suggestions: lavender, lemongrass, lemon, lime, orange, cinnamon, clove, pine, rose, tea tree.

- Cotton rags (recommended over commercial products that are often made from plastics) (Dadd, 2011; Findley & Formicelli, 2009)

Other helpful items for specific purposes include the following: activated charcoal (deodorant), raw potatoes, (to remove rust from cookware), isopropyl “rubbing” alcohol (disinfectant), and newspapers (use for window washing instead of paper towels).

RECIPES FOR HOME-MADE CLEANING PRODUCTS (adapted from Dadd, 2011 and Findley & Formicelli, 2009)

All-purpose Cleaner:

- 1 part white vinegar
- 2 parts liquid soap
- 4 parts water
- 2-3 drops of essential oil (optional) for scenting

Mix ingredients in a spray bottle. This mixture can be used as a basic cleaner for kitchen and bath surfaces, as well as a window cleaner.

Disinfectant:

- White vinegar or
- Hydrogen peroxide
- (do not mix)

Wipe with straight white vinegar, followed by hydrogen peroxide for particularly messy clean-ups, for example after handling raw meat. For best results, use hydrogen peroxide from a bottle that has been open for less than six months.

Abrasive Scrub:

- Baking soda
- Liquid soap

Place baking soda in a dish. Add soap until it makes a paste; dilute with a small amount of water if desired for a looser mixture. Apply to a sponge or brush and scrub.

CLEANING A HOME, SPECIAL TOPICS (adapted from Dadd, 2011 and Findley & Formicelli, 2009)

KITCHEN

Oven:

- 2 cups hot water
- 1 tablespoon liquid soap
- 1 teaspoon baking soda

First, remove as much soil as possible by scrubbing with crumpled aluminum foil or newspaper. Mix ingredients, apply to soiled areas, let stand for 20 minutes and wipe off. Repeat as needed.

Drain (with garbage disposal) Opener:

- 1 quart hot water
- 1 tablespoon of liquid soap

Boil water, then add soap. Pour directly into the drain.

Grill Cleaner:

Crumple aluminum foil into a ball and use as a scrub.

Rusty Cookware:

Cut a raw potato in half. Dip the cut end in salt or baking soda and use as a scrub.

BATHROOM

Toilet Bowl Cleaner:

- 1 cup vinegar
- 1/4 cup baking soda

Mix ingredients and let sit for 15 minutes to a few hours in the toilet bowl (Overnight is another suggested method). Scrub and flush.

Drain Opener:

- 1 cup vinegar
- 1/2 cup baking soda

Combine the ingredients and pour into the drain. Let sit for 15-20 minutes. Rinse with hot water. Repeat if necessary or leave the mixture to sit overnight.

Mold/Mildew Remover:

- 2 parts water
- 1 part hydrogen peroxide

Mix ingredients and spray affected area. Let stand for 10-15 minutes and wipe clean. (Note: hydrogen peroxide may bleach surfaces such as wallpaper, linens or clothing.)

Mirror cleaner:

Use all-purpose cleaner, above. Or half vinegar and half water.

Tub and tile cleaner:

Use abrasive scrub, above.

LIVING AREAS

Dusting/Furniture Polish:

- Lemon or pine essential oil
- Liquid beeswax

Mix the ingredients and apply a small amount to a lint-free cotton cloth and wipe surfaces.

Windows:

Use the all-purpose cleaner, above. Wipe with newspapers.

Air Freshening:

Baking soda is a traditional and effective odor eliminator. Place an open box in areas where odors accumulate. Some ideas for home scenting include:

- Add essential oils to an aromatherapy infuser. Alternately, mix an essential oil with water in a spray bottle and spritz the air or surfaces. (Try a small amount first to make sure the oils do not stain fabrics.)
- Decorate with fresh or dried flowers, herbs, or citrus
- Simmer aromatics (e.g., citrus fruits or cinnamon) to combat cooking odors.
- Soy candles with essential oils are available commercially.
- Remember to bring in some fresh air from time to time. Even in winter, on milder days briefly open a window a few inches.

CLEANING CLOTHING**Washing:**

In general, washing machines clean clothing in cold water as effectively as in hot or warm water. Hot water is needed only for heavily soiled items (such as diapers) or greasy items.

- 1 bar natural soap, shaved
- 1 cup borax* or baking soda
- 1 cup washing soda

Combine the ingredients and store. If a liquid detergent is desired, use liquid (e.g., castile) soap and heat the ingredients in enough water to cover and mix.

*Note: While borax is commonly recommended as a laundry booster, and is safe for the environment, the Environmental Working Group (EWG) rates borax as “high concern” for developmental and reproductive toxicity and is best avoided, particularly by women and children (EWG, 2011; EWG, 2014).

Fabric softener:

Add distilled white vinegar or baking soda to the rinse cycle.

Drying:

Clothes dryers are the second-largest users of home appliance energy, after refrigerators (Steingraber, 2011). They are also a leading cause of home fires. Keep in mind that the purpose of a clothes dryer is to evaporate water; wet clothing would dry anyway if exposed to air. The sun

has been the traditional “solar dryer” since humans began wearing clothing. A brief time spent outdoors can save energy and money and leave your clothing smelling fresh. (Be careful of pollens if allergies are a problem for your family members.) Indoor drying systems can be used in inclement or cold weather. Heavy clothing, such as jeans and towels, can be dried in the drier for 10-15 minutes to remove wrinkles, and then air dried.

DRY CLEANING

The standard cleaning solvent used in commercial dry cleaning facilities is tetrachlorethylene (perchloroethylene), or “perc”. The Environmental Protection Agency (EPA) classifies perc as “likely to be carcinogenic” (EPA, 2012). While the EPA does not recommend that consumers avoid wearing clothing that has been dry cleaned with perc, the solvent is a highly toxic environmental contaminant. Consumers can look for dry cleaner facilities that use less toxic methods, such as liquid silicone (“D5”), liquid CO₂, or Professional Wet Cleaning (PWC). If clothing is dry cleaned with perc, remove the plastic and air out the clothing prior to bringing it into the home. When purchasing clothing, consider buying garments that can be machine or hand washed.

INTEGRATED PEST MANAGEMENT

Integrated Pest Management (IPM) is an environmentally sensitive approach to pest control. IPM uses knowledge of the behavior and life cycles of pests to achieve the least possible hazard to people, property, and the environment (EPA, 2014). Pests need a place to live, food, and water. The first step in the home setting is to avoid keeping food in open containers and to keep surfaces free of food and soil. In addition, cracks and holes where pests enter the home should be repaired. Fix areas where there are water leaks, such as pipes and faucets.

Avoid using insect sprays and foggers; in general, enclosed traps expose family member to fewer chemicals. Be sure to handle any traps according to the directions and keep out of the reach of children. For crawling insects, food-grade diatomaceous earth, a non-toxic fine powder, can be applied to surfaces where these pests are found, such as in cracks and crevices, in garbage cans, or in drains. But keep this powder away from pets, children, and food. When seeking a pest management company, select a company that uses integrated pest management.

RESOURCES

- Guides to product safety: [Environmental Working Group](#)
- Toxic substances information: [Agency for Toxic Substances and Disease Registry](#)

- Pediatric environmental hazards: [Children's Environmental Health Network](#)
- [Green Seal of Approval](#)
- Health indoor living information: [Healthy House Institute](#)
- Alternatives to pesticides: [Pesticide Action Network](#)
- Information/advocacy on cold-washing and air-drying laundry: [Project Laundry List](#)
- Information/advocacy on protecting families from toxic chemicals: [Safer Chemicals, Healthy Families](#)
- Information/advocacy for safer products for women: [Women's Voices for the Earth](#)

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TRANSPORTATION AND HEALTH IMPLICATIONS

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In addressing health issues, transportation is almost always part of the problem or part of the solution. That is so whether improving air quality, getting children immunized, providing early prenatal care, utilizing appropriate preventive and primary care services, or responding to an emergency. Transportation can be defined broadly as the means of moving people and goods to desired destinations. Transportation includes public transit options of rail and bus; individual automobile use and shared rides; bicycling and walking.

The health benefits of biking and walking as part of a pattern of regular exercise are well known in preventing obesity and numerous chronic diseases, and in promoting health and quality of life. Public transit carries with it exercise benefits because transit riders walk or bike to transit stops. In addition, public transit lessens the health effects of air and water pollution, the risk of injury and deaths from automobile accidents, the stresses of driving in congested traffic and driver road rage. An often overlooked benefit of transit is its role in developing a sense of community among regular riders, reducing social isolation as a risk to health.

Adequate, available, affordable public transit provides access to health care, to jobs, to education, to grocery stores, to religious and social gatherings, all of which are essential components of healthy living. Without alternatives to driving individual cars, some of the most vulnerable segments of the population—the poor, persons with disabilities, the elderly—are even more likely to be unable to meet basic requirements for daily living, much less to have productive roles in society. Not having to own a car or reduced use of an automobile lessens stress on family budgets.

Public transportation helps alleviate environmental, energy, and economic problems. As documented in the American Public Transportation Association's 2014 Fact Book: "Public transportation plays an important role in reducing the nation's energy use and greenhouse gas emissions. Due to the combined reduction in private passenger vehicle miles, reduced automobile congestion and reduced travel distances due to the proximity created by public transportation, more than 4 billion gallons of gasoline are saved and 37 million metric tons of carbon dioxide emissions are avoided" (APTA, 2014, p.21).

"According to the US Environmental Protection Agency's Greenhouse Gas Calculator, it would require 7.2 million acres of new pine or fir forests per year to match the annual carbon dioxide reductions provided by public transportation. Priced at \$3.60 per gallon, the 4 billion gallons of gasoline saved annually saves the US consumer \$14.4 billion per year" (APTA, 2014, p.21).

"Transit's impact on reducing congestion has also resulted in significant savings for drivers and their communities. Without transit, drivers would have used 450 million more gallons of gasoline because of added roadway congestion during 2011. Drivers would have been stuck in traffic an additional 865 million hours if there were no transit. Overall, the costs of congestion to drivers would have been an additional \$20.8 billion if there had been no transit service" (APTA 2014 Fact Book, p. 21-22).

Opportunities for improving health through transportation include:

3. Policies that support adequate funding for public transit as well as safe roads.
4. Built community design/modification that includes:
 - cross streets,
 - eliminating single entrance/exit neighborhoods,
 - safe spaces for walking and biking for children and adults, i.e. bike lanes/paths, sidewalks,
 - mixed used neighborhoods to increase ease of access to shopping and services
5. Applying proven strategies for rural transit, e.g., van pools, park and rides, flexible routes.
6. Use of existing and additional rail lines for passenger as well as freight service.
7. Programs that assist first time riders, especially the elderly.
8. Collaborative efforts with schools and employers to encourage, facilitate and provide incentives for transit use.

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BROWNFIELDS AND NURSING IMPLICATIONS

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In this chapter we will learn what brownfields are and what the nursing implications should be related to them. This will include nursing education, practice, policy/advocacy, and research.

DEFINITION OF A BROWNFIELD

Brownfields can be defined in a variety of ways, but the term typically refers to urban industrial or commercial facilities that are abandoned or underutilized due, in part, to environmental contamination or fear of contamination. There have been special efforts in recent years to target brownfields for cleanup and reuse for several reasons, including the potential to revitalize distressed communities, increase tax dollars, and provide new jobs.

AUTHORIZING LEGISLATION AND ENVIRONMENTAL PROTECTION AGENCY (EPA) MISSION

In January, 2002, Public Law 107-118 (H.R. 2869): "Small Business Liability Relief and Brownfields Revitalization Act" was enacted:

"To provide certain relief for small businesses from liability under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, and to amend such Act to promote the cleanup and reuse of brownfields, to provide financial assistance for brownfields revitalization, to enhance State response programs, and for other purposes" (GPO, 2002). EPA's Brownfields Initiative empowers States, communities, and other stakeholders in economic development to work together in a timely manner to prevent, assess, safely clean up, and sustainably reuse brownfields.

WHY IS THE BROWNFIELDS ISSUE IMPORTANT?

In recent years, many manufacturing plants and military bases have closed or relocated. Often, new development on these "brownfield" sites is made difficult by real or perceived environmental contamination. Through the Brownfields Cleanup and Redevelopment Program, EPA helps states, tribes, communities, and other organizations to:

- environmentally assess existing properties,
- prevent further contamination,
- safely clean up polluted properties, and
- design plans to re-use them.

EPA's investment in the Brownfields Program has resulted in many accomplishments, including leveraging more than \$14.0 billion in brownfields cleanup and redevelopment funding from the private and public sectors and leveraging approximately 60,917 jobs. The momentum generated by the Program is leaving an enduring legacy. The Brownfields Program and its partners have provided guidance and incentives to support economic revitalization, and empower communities to address the brownfields in their midst. EPA's Brownfield Program continues to look to the future by expanding the types of properties it addresses, forming new partnerships, and undertaking new initiatives to help revitalize communities across the nation (EPA, 2015).

To view the brownfields and other related sites in your area, go to Clean-ups in my Community. You have a choice of mapping cleanups across the USA, mapping or listing cleanups for a ZIP code or city, or creating a table of cleanups or grants.

STATE EXAMPLE: MARYLAND

As indicated above, EPA does not regulate the Brownfields program alone, but delegate's authority to the States. States take a wide range of approaches and use an assortment of tools. Some States specifically address brownfields through their voluntary cleanup programs, others supplement their voluntary program activities, and still others have separate brownfields cleanup and redevelopment programs.

In Maryland, this program is called the Brownfields Redevelopment Initiative (MD Department of the Environment, 2015). Brownfields are included in Voluntary Cleanup Program and the goals are:

1. Encourage the investigation of eligible properties with known or perceived contamination;
2. Protect public health and the environment where cleanup projects are being performed or need to be performed;
3. Accelerate cleanup of eligible properties; and
4. Provide predictability and finality to the cleanup of eligible properties (MD Code, 1997).

WHY NURSES?

So what can nurses bring to the very technical world of hazardous waste cleanup, like brownfields? There are actually a lot of important roles that we are uniquely trained to do. We can:

- Enhance community connections / facilitate dialog
- Identify populations at risk

- Improve community education and risk communication
- Expand the multidisciplinary nature of your environmental health (EH) work
- Assist with translating science into policy
- Enlist undergraduate and graduate students for data collection.

CHALLENGES OF COMMUNITY INVOLVEMENT AT BROWNFIELD CLEANUPS

One of my former roles was providing community outreach and technical assistance to residents with hazardous waste sites in their midst. Through the six plus years I worked for the US EPA funded Hazardous Substances Research Center (the only regional center that had a school of nursing conducting the outreach), I learned some important lessons.

Including all stakeholders: It was often difficult to know who the stakeholders were, when first interacting with a community. I was often approached by a small group of concerned citizens or someone from the local government. This is not a comprehensive list, but you need to make sure to include:

- Community members
- Local businesses
- Representatives from local, state and federal government
- Local and state health department
- Department of Environment
- Health care providers
- Religious leaders
- Schools
- Financial institutions
- Developers
- Contractors
- Youth
- Responsible party(s)

Multiple agendas: I learned very early, there were often multiple agendas and they were not always obvious. Mostly citizens were concerned about health and then property values or effect on business. Then there would be other hidden agendas, like avoiding liability.

Who's in charge: One of my major tasks was trying to help the community understand the roadmap of who was in charge of the decision-making authority. Depending on the type of site and what city and state it is in, who is in charge can change. It is possible for EPA or State Department of Environment to have the lead. Also involved will be potentially responsible parties and their contractors, EPA's contractors, other consultants, Agency for Toxic Substances and Disease Registry (ATSDR), State Health Department, Local Health Department, and other local officials.

Agency responsibilities and limitations: Closely tied to who is in charge, is what each organization is allowed to do by the regulations that govern them. EPA and state departments are directed and limited by their legislative mandates. There are some things they have to do and some processes are set by the regulations. Some things they have no control over. For example, they cannot address property values or zoning; this is a local level issue. That is why it is important to have a large group of stakeholders at the table, so if an issue does not fall under one agency, it probably does fall under another.

POLICY GAPS

After introducing the brownfields definition, legislation, program and implementation, some policy gaps have been identified for future advocacy:

- Environmental justice in permitting process: Need to consider the cumulative impacts already in the community before siting new facilities.
- No program exists to address community-wide elevations of background contaminants
- No program exists to address multimedia problems
- No program exists to address school siting. Some sites do not have coverage under current regulations; schools are one of these. They often fall through the cracks and a school can build without any testing or cleanup.

ADDITIONAL RESOURCES

National Library of Medicine

- [Toxicology and Environmental Health Information Program](#)
- [Tox Town](#)
- [MEDLINEplus](#)
- [TOXNET](#)

- [ToxFAQs](#)
- [Toxicological Profiles](#)

Environmental Protection Agency

- [Envirofacts](#)
- [IRIS](#)
- [Tools and Technical Information](#)
- [Brownfield Training Conference Newsletter emails](#)

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ANTIBIOTIC USE IN AGRICULTURE: PUBLIC AND ENVIRONMENTAL HEALTH IMPACT

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This section will discuss the use of antibiotics in agriculture and how this affects the development of antibiotic resistance and human health. An overview of the purposes for antibiotic use will be provided followed by a review of the evidence surrounding the link between antibiotic resistance in humans and antibiotic use in agriculture. The current state of federal regulations and government agency recommendations will be reviewed along with current research on potential alternatives to antibiotic use in food-producing animals. Finally, the role of nurses in reducing antibiotic use in agriculture will be discussed.

ANTIBIOTIC USE AND RESISTANCE IN HUMANS

The overuse and inappropriate use of antibiotics has resulted in the emergence of antibiotic resistance as a significant threat to public health. The Centers for Disease Control and Prevention (CDC) (2013) estimate that annually at least 2 million people in the United States acquire antibiotic-resistant infections, with approximately 23,000 deaths as a result of these infections, and even more deaths from resulting complications. Further, antibiotic resistance infections contribute a significant burden to the U.S. healthcare system and economy. The estimated economic cost associated with these infections in the health system ranges from \$21 billion to \$34 billion each year and accounts for over 8 million additional hospital days (Infectious Disease Society of America, 2014). The economic burden is increased when accounting for indirect costs associated with these infections, such as lost productivity as a result of absence from work due to illness. The emotional burden to patients and family members should also be considered as a significant adverse consequence of infections on individuals and society.

The rate at which new antibiotics are being produced is significantly less than the rate at which bacteria are developing resistance to the antibiotics used to treat clinical disease in humans. In a recent report by the British government, researchers found that unless action is taken to reduce antibiotic resistance, it would surpass cancer as the number one cause of death by 2050 and account for 10 million deaths annually worldwide (Review on Antimicrobial Resistance, 2014). Many invasive procedures, such as routine surgical procedures and chemotherapy,

may no longer be done safely without effective antibiotics due to the risk of infection. Certain populations, such as immunocompromised patients, patients undergoing surgical procedures, including women giving birth by caesarean section, patients receiving cancer treatments, and the very young and elderly, are at the greatest risk of contracting resistance infections and experiencing associated complications.

Antimicrobial stewardship programs have been implemented across healthcare facilities to address the growing concern of antimicrobial resistance. These programs are coordinated interventions to limit the inappropriate use of antibiotics by determining optimal drug selection, dose, and duration of treatment, with the goal of promoting optimal patient outcomes (Dellit et al., 2007). Simultaneously such programs limit the development of antibiotic resistance and selective development of pathogenic bacteria. When antimicrobial stewardship programs are implemented with appropriate infection control guidelines, these programs are shown to limit the overuse of antibiotics in health care settings, ultimately decreasing the risk for development of antibiotic resistance pathogens and subsequent transmission of resistant bacteria among humans (Dellit et al., 2007).

USE OF ANTIBIOTICS IN AGRICULTURE

Efforts to decrease antibiotic use in hospitals and healthcare facilities have been widely adopted; however, little focus has been directed towards limiting inappropriate use in agriculture. Although the use of antimicrobials in the agriculture industry has become a mainstay of farming practice in the U.S., their use in food-producing animals is largely unregulated. To put this in perspective, it was estimated that in countries such as Sweden and Denmark, where limitations on antimicrobial use have been implemented, antibiotic use was less than 3 grams per pig slaughtered in comparison to 47 grams in the U.S. (Gilchrist et al., 2007). Estimates of the actual percentage of antibiotics used in the agriculture industry are unknown due to the lack of required regulation and tracking of usage. The U.S. Food and Drug Administration (FDA) currently only tracks sales of antimicrobials sold for farming purposes. It has been shown that these products are often used in a non-therapeutic manner. A 1995 U.S. Congressional Office of Technology assessment report identified that approximately 90% of antibiotics used in agriculture were for disease prophylaxis or growth promotion purposes rather than for therapeutic treatment of diseased animals (Ranke, Mitchell, St. George, & D'Adamo, 2014).

Antibiotics are used in food-producing animals for several purposes including prophylactically for disease prevention, therapeutically for disease treatment, and for animal growth promotion. To differentiate, therapeutic use of antibiotics is using short-term and high doses of antimicrobials to effectively treat clinical signs of disease. For the purposes of disease prevention and growth promotion, antibiotics are used routinely in low-doses at subtherapeutic levels, often times in large numbers of animals. In addition to the benefit of utilizing antimicrobials to reduce the risk of animals developing infections, using routine, low doses for disease prevention in turn decreases the energy needed by the animal to fight off infection, which is hypothesized to attribute to growth promotion (National Association of Local Boards of Health, 2010). Adding antibiotics to animal feed in water for purposes of growth promotion has become popular in farming practice due to the ability of these products to enhance feed efficiency, quality of animals produced, and decrease the time and amount of feed necessary to grow animals (Cheng et al., 2014). This means that animals grow larger at a faster rate creating a financial incentive for producers to add these agents as feed additives to increase production outputs.

While collectively, the FDA, United States Department of Agriculture (USDA), and CDC have called for judicious use of antimicrobial drugs in food-producing animals that are used to treat disease in humans, use in the industry remains largely unregulated. National agencies have identified use in agriculture as a concern in the emergence of resistance bacteria, however have failed to implement the necessary safeguards to address this issue. The FDA is the regulatory body that determines which antibiotics are approved for use in agriculture. To minimize non-therapeutic use, the FDA developed a report of guidance for industry (guidance #209 and guidance #213) outlining recommendations for the voluntary discontinuation of antimicrobials for inappropriate use in food-producing animals. Guidance #209 titled *The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals* outlines the voluntary recommendations for limiting antimicrobials drugs in food-producing animals for growth promotion purposes (FDA, 2012). Guidance #213 titled *New Animal Drugs and New Animal Drug Combination Products Administered in or on Medicated Feed or Drinking Water of Food Producing Animals: Recommendations for Drug Sponsors Voluntarily Aligning Product Use Conditions with Guidance for Industry #209*, outlines voluntary recommendations for drug companies on the labeling of antimicrobial drugs use for animal production purposes (FDA, 2013).

While the FDA has identified the use of antibiotics for growth promotion purposes as an inappropriate use in food-producing animals, the recommendations developed under the guidelines fail to identify disease prevention as an inappropriate application in agriculture. With the FDA promoting the view that disease prevention is considered as a therapeutic use, even though this use involves utilization of routine and low doses of antibiotics, it creates the loophole in which industry can still use antimicrobials for growth promotion purposes, while labeling use for disease prevention. With this loophole and the voluntary nature of the recommendations, there have been conflicting reports of whether these guidelines will be effective in controlling the use of antibiotics in the animal industry. Further, the guidance lacks an adequate tracking system to monitor and regulate the amount and usage in food-producing animals. As previously mentioned, sales figure data on the total amount of antibiotics used in food animals are currently the only data collected in the U.S.

LINK BETWEEN ANTIBIOTIC RESISTANCE IN HUMANS AND ANTIBIOTIC USE IN AGRICULTURE

It is important to note that many of the antibiotics used in this industry are the same medications used to treat human disease, contributing to the threat of the development of resistant pathogens. Using antibiotics at subtherapeutic levels for disease prevention and growth promotion provides an environment for bacteria to thrive and develop resistance to medically important antibiotics. Cross resistance, when bacteria become resistant to an entire class or across different classes of antibiotics than the originally used antibiotic, is a significant concern that can also result from the overuse and inappropriate use of these agents. For further information on how using subtherapeutic doses of antibiotics contributes to resistance, view these two short videos depicting the process: Natural Resources Defense Council's "[Stop the Superbugs](#)" video and FDA's Center for Veterinary Medicine "[Animation of Antimicrobial Resistance](#)".

Numerous peer-reviewed research articles have linked antibiotic use in food-producing animals to the development of antibiotic resistant bacteria. For example, research has shown the link between the use of antibiotic growth promoters to the development of antibiotic resistant pathogens, such as *Campylobacter*, *Salmonella*, *Enterococcus* and *Escherichia coli* (Graham, Boland, & Silbergeld, 2007). Antibiotic-resistance bacteria can then be transferred to humans through direct contact with animals, consumption of contaminated food, and environmental contamination (CDC, 2013). Health Care

Without Harm (2014) identified over 147 scientific studies demonstrating the transfer of resistant bacteria from agriculture to humans. Additionally, studies conducted in the Delmarva Peninsula region, one of the top five leaders in poultry production in the U.S., have shown transfer of antibiotic-resistant bacteria to farm workers from occupational exposure (Price et al., 2007) and environmental contamination from inadequate animal transport methods (Rule, Evans, & Silbergeld, 2008). Other environmental hazards include risks of soil and water contamination from agricultural runoff and animal waste practices, as 25-75% of antibiotics were shown to pass from animal feed to manure (Walker, Rhubarb-Berg, McKenzie, Kelling, & Lawrence, 2005).

AGRICULTURAL INDUSTRY IN THE UNITED STATES AND RELATED ANTIBIOTIC RESISTANCE

The progression of the agriculture industry from small family farms to large-scale industrial farming practices has contributed to the need to use antimicrobials in farming animals. Concentrated Animal Feeding Operations (CAFOs) are large-scale industrial facilities that house large numbers of livestock and have become a mainstay in the agricultural industry as the demand for mass produced meats increases. These operations confine large numbers of animals in small spaces leading to unhygienic conditions in which disease can spread rapidly through concentration of manure, feed, and diseased animals in close quarters. The majority of food-producing animals are raised in these farm environments, with animal populations ranging from thousands to tens of thousands confined in small spaces (Silbergeld, Davis, Leibler, & Peterson, 2008). For example, in poultry farms one house of broiler chickens typically contains around 20,000 chickens. Overcrowding conditions, along with the hygiene, temperature, and ventilation of CAFOs greatly affects the health and the stress state of the animals (Gilchrist et al., 2007). With poor CAFOs conditions, animals are more likely to become diseased with the risk of rapid disease spread due to overcrowding conditions.

The increased risk of rapid disease spread as a consequence of confining such a large number of animals into this type of environment results in the need to use antibiotics as a disease prevention strategy. However, as previously discussed, use in this manner contributes to antibiotic resistance and a heightened risk of transferring resistant bacteria to humans through direct contact or environmental contamination. Research has shown that antibiotic resistant bacteria can spread via air, water, and direct contact with CAFO workers (Gilchrist et al., 2007). CAFO workers have an increased risk of becoming colonized with resistant bacteria that is abundant in

industrial farm settings, which can then be spread to contacts in the community. A study of poultry workers in the U.S. showed an increased risk of colonization with gentamicin-resistant *Escherichia coli* compared to community referents (Price et al., 2007). Similarly, in a study evaluating workers at a hog slaughter processing plant, a larger percentage of workers carried strains of *Staphylococcus aureus* resistant to at least one antimicrobial class in comparison to residents in the community (Neyra et al., 2014). Workers are frequently provided little protective equipment, which further increases occupational exposure risk of colonization and subsequent transference to community contacts (Silbergeld et al., 2008).

Environmental contamination with resistant bacteria can occur as a result of the practices utilized on CAFOs in regards to waste management and housing conditions. Due to the high concentration of animals in such a small area, specific ventilation practices have to be utilized which contribute to the transfer of bacteria to the environment through contamination of air, soil, and ground and surface water (Silbergeld et al., 2008), with older and inadequate ventilation systems increasing this risk. Waste management and disposal practices become an issue from the large number of animals raised in a small space leading to large amounts of waste produced. Often times, animals poorly absorb antimicrobial products, with antimicrobials shown to be excreted in animal waste consisting of upper estimates of 90% in urine and 75% in feces (Silbergeld et al., 2008). The combination of resistant bacteria present in animal waste and the passage of antibiotic compounds in animal feces further contribute to environmental contamination with resistant pathogens. Another significant concern from CAFO conditions is soil, groundwater, and surface water contamination from agricultural runoff and animal management practices especially where animal waste is used as a fertilization method, with liquid waste sprayed across agricultural fields. Research has shown greater quantities of resistant bacteria in ground and surface water sources in close proximity to these mass producing swine facilities (Silbergeld et al., 2008).

ALTERNATIVES TO ANTIBIOTIC USE

The USDA has developed an action plan to address antimicrobial resistance outlining current activities including surveillance of antibiotic use and antimicrobial resistance (AMR), research and development of alternative management practices and strategies to limit antibiotic use, and education. All these activities are aimed at decreasing inappropriate use of antibiotics in food-producing animals. Currently, antibiotic use is supported

by large scale and intensive farming practices (Cheng et al., 2014), making the need to develop effective alternative solutions essential to ensure adoption of strategies to limit antimicrobial use. The USDA is presently in the process of researching alternative products or strategies to antibiotic use that limit the emergence of antibiotic resistance pathogens. Such strategies include vaccines, probiotics and prebiotics, organic acids, essential oils, immune enhancers and phytochemicals. Probiotics, combinations of live bacteria known to be beneficial to health, in animal feed has been identified as one of the most promising alternative solutions due it's selectivity of action. The use of probiotics as an alternative strategy to antibiotics derives from its ability to restore intestinal microflora balance, while specifically targeting harmful organisms (Seal, Lillehoj, Donovan, & Gay, 2013).

In addition to the above mentioned strategies, improved animal husbandry practices have been shown to supplement the removal of non-therapeutic antibiotics in agriculture. In a USDA survey, producers that eliminated the use of low and routine doses of antibiotics relied on stricter sanitation practices and improved housing ventilation systems, and were more likely to follow a consistent set of animal management practices compared to growers that used non-therapeutic doses of antibiotics (McDonald & Wang, 2011). A complete list of alternative interventions and further detail on mechanism of action can be found on the [USDA's Alternative to Antibiotics Resource Center website](#), along with links to peer-reviewed articles and recent news/reports on the topic.

FEASIBILITY AND COST OF LIMITING ANTIMICROBIAL USE

Cost has been a concern within the agriculture industry in discussions of restricting the use of antibiotics in animals in terms of decreases in production and feed efficiency. However, research has demonstrated that bans may be successfully enacted with minimal effects on productions levels. For example, antibiotic bans placed on broiler chickens in countries in the European Union have shown minimal declines in production, which is compensated with cost-savings from a decrease in purchases of antibiotic growth promoters (Gilchrist et al., 2007). Specifically, in Demark after legislation was enacted that placed limitations on antimicrobial use in livestock, use in pigs decreased by over 50% from 1992 to 2008, with a noted increase in overall productivity (Levy, 2014). Additionally, the World Health Organization estimates a 1% cost increase associated with foregoing the use of antibiotic growth promoters in pig farmers, which is minimal in terms of the human health benefits from combating antibiotic resistance (Gilchrist et al., 2007).

Research done in the U.S. has shown similar results in terms of costs estimates of eliminating non-therapeutic use of antibiotics in the agriculture industry. A cost analysis study of eliminating antibiotic growth promoters (AGP) in the Delmarva Peninsula showed an actual increase in the net value of poultry flocks from \$0.0009 to \$0.0097 per chicken. This analysis suggests that withdrawing AGPs from feed is not associated with a significant cost to growers as has been argued previously by industry (Graham et al., 2007). Market demand for sustainable meats produced without the use of non-therapeutic antibiotics is shifting, with major companies taking notice. Perdue, one of the top poultry integrators in the U.S., has already eliminated the inappropriate use of antibiotics for both growth promotion and disease prevention purposes, with estimates of 95% of chickens never receiving antibiotics at all. This shows that this process can be implemented on an industrial scale. Other major corporations such as McDonalds, Chipotle, FreshDirect, and Chick-fil-A are either currently sourcing meat produced without the use of non-therapeutic antibiotics or have committed to eliminate purchasing of meat produced in this manner over the span of two to five years. This decision by major corporations recognizes the shift in consumer demand and shows that making these products available can be marketable and profitable.

NURSING ROLES

Recommendations from the USDA to reduce antibiotic resistance include adopting a comprehensive and integrated approach to implementing alternative strategies (UDSA, 2014). To assist with federal agency efforts, health care organizations can use their purchasing power to affect market demand. The health care food service is a \$12 billion industry and a large purchaser of meat in the U.S., demonstrating tremendous potential to shift local markets to increase the demand for sustainably produced meat (Lagasse & Neff, 2010). In the Northeast, U.S. region hospitals were found to serve an average of 344 patients and 1,974 visitors and staff daily, showing the significant population served and amount of purchasing power these organizations have (Ranke et al., 2014). This uniquely places health care facilities and health professionals in a position to set an example for the rest of the nation on the importance of producing and consuming sustainable meat to improve human health.

To assist with this process, nurses employed in hospitals and other facilities can encourage organizational leaders to take part in [Health Care Without Harm's Balanced Menus Initiative](#). The Balance Menus Challenge is a voluntary commitment for health care facilities to reduced meat purchases by 20% over a 12 month period. With

cost savings from decreased meat procurement, health care facilities can then work to purchase locally-sourced and sustainably produced meat, such as meat produced without the use of subtherapeutic antibiotics. By working to implement such initiatives, nurses can support grassroots efforts in local communities to contribute to collective change across the nation.

To enact more uniform change, policies at the federal and state level have been attempted to promote the judicious use of antibiotics in agriculture. States, such as Maryland and California, while unsuccessful at enacting legislation, have worked to introduce and advocate for policies that would regulate and limit the use of antimicrobials in food-producing animals. The Preservation of Antibiotics for Medical Treatment Act has been introduced in Congress on numerous occasions, with the most recent reintroduction in March 2015, and attempts to place similar restrictions on the agriculture industry at a federal level. Most recently in March 2015, the Obama administration released *The National Action Plan for Combating Antibiotic-Resistant Bacteria*, including recommendations for the FDA to place measures on the agriculture industry to restrict antimicrobial use, new proposals for an increase in funding for developing new antimicrobials, and the development of international partnerships to combat antibiotic resistance.

Nurses can work to advocate for the development or enactment of policy that attempts to limit inappropriate use of antibiotics in livestock in their own states or at a federal level. Learning from examples of successful policy changes and initiatives that have placed restrictions on antimicrobial use in livestock in European countries can assist with advocacy efforts and inform legislation in the U.S. In the European Union, medically important antibiotics were banned in animal use, with AGPs subsequently phased out by 2006 (Gilchrist et al., 2007). In Denmark, the Danish Integrated Antimicrobial Resistance Monitoring and Research Program was implemented to track the effect of legislation changes that imposed limitations on the use of AGPs, overall antibiotic use in agriculture, along with the prevalence of resistant bacteria (Wielinga, Jensen, Aarestrup, & Schlundt, 2014). This program helped engage stakeholders, educate leaders on the issue of antibiotic resistance, and led to the development of evidence-based policy and guidelines for the judicious use of antimicrobials in agriculture (Wielinga et al., 2014). The policy changes adopted in other countries not only serve as examples, but show that adoption of such initiatives is feasible nationwide.

Because there is a growing public health threat of antibiotic resistance, we must ensure that restrictions are

in place to limit non-therapeutic use of antibiotics in food animals. These restrictions are an important priority to protect environmental and human health. Unified efforts from a variety of stakeholders, including public health professionals, federal and state agencies, and the public will be necessary to combat this issue and promote the development of a sustainable food system in the U.S.

To further your knowledge regarding this topic, here are some links for additional information:

Organization	URL	Key Content
Centers for Disease Control and Prevention	Antibiotic Resistance Threats in the United States, 2013	Report on antibiotic resistant threats in the U.S. by microorganism Core actions to prevent antibiotic
Food and Drug Administration's Center for Veterinary Medicine	Animation of Antimicrobial Resistance	Nine-minute video explaining how antibiotic resistance develops and proliferates among bacteria
Health Care Without Harm	Antibiotic resistance and Agricultural Overuse of Antibiotics: What Health Care Food Systems Can Do	Outlines actions health care facilities can take to reduce antibiotic use in agriculture Sample food procurement guidelines
Health Care Without Harm	Balanced Menus Challenge	Outlines actions health care facilities can take to reduce antibiotic use in agriculture Sample food procurement guidelines

Organization	URL	Key Content
Keep Antibiotics Working	Fact sheet: Antibiotic Resistance and Animal Agriculture	Quick overview of issue and suggested solutions
Natural Resources Defense Council	Reduce Antibiotic Misuse in Livestock	Information and short video clips about food producing animals and spread of antibiotic resistance
Obama Administration	National Action Plan for Combating Antibiotic-Resistant Bacteria	Discusses goals and objectives of the action plan with set timelines and milestones
Pew Commission on Industrial Farm Animal Production	Putting Meat on the Table: Industrial Farm Animal Production in America, Executive Summary	Public and environmental health concerns related to farm animal production Recommendations of the commission to address public health, the environment, and animal health
U.K. Review on Antimicrobial Resistance	Antimicrobial Resistance: Tackling a Crisis for the Health and Wealth of Nations	Issue of antimicrobial resistance Economic cost of drug-resistant infections Impact of AMR on world health

Organization	URL	Key Content
U.S. Department of Agriculture	USDA Antimicrobial Resistance Action Plan	USDA's action plan to address antimicrobial resistance Current actions and proposed initiatives
USDA: Alternative to Antibiotics Resource Center	Alternatives to Antibiotics	Examples of alternatives to antibiotics Links to scientific publications and reports on AMR and ATA
U.S. Department of Health and Human Services Food and Drug Administration	Guidance for Industry #209: The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals	Voluntary guidance for industry outlining FDA's recommendations for limiting antimicrobial drugs in food-producing animals for growth promotion purposes
U.S. Department of Health and Human Services Food and Drug Administration	Guidance for Industry #213: New Animal Drugs and New Animal Drug Combination Products Administered in or on Medicated Feed or Drinking Water of Food Producing	Voluntary guidance for drug companies on how to label antimicrobial drugs for animal production purposes

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In order to understand health disparities it is essential to consider the inequities in environmental exposures among various population groups. Inequities are exposures that are not evenly distributed among populations; these uneven distributions are considered unfair or unjust. Environmental exposures are one of the social determinants of health: circumstances that occur where people live, learn, work, play, and pray. In response to inequities in environmental exposures and health outcomes, nurses and others seek environmental justice.

“Environmental Justice (EJ) is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies” (EPA 2015a). This definition suggests a legal mandate to respond to factors that cause health disparities related to environmental policies that fail to address health outcomes related to environmental hazards. The Environmental Protection Agency’s (EPA’s) explanation of fair treatment is that “no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies” (EPA, 2012). The EPA website further indicates that meaningful involvement means that “people have an opportunity to participate in decisions about activities that may affect their environment and/or health; the public’s contribution can influence the regulatory agency’s decision; their concerns will be considered in the decision making process; and the decision makers seek out and facilitate the involvement of those potentially affected” (EPA, 2012).

In response to the mounting concerns raised by citizens, scholars and activists, the federal government addressed environmental racism. Therefore, many communities bear the extra burden of waste, pollution and hazardous exposures. These communities across the globe are the homes to persons of color and those living in poverty. Considered a form of institutionalized racism, environmental racism, “refers to environmental policy, practice or directive that differentially affects or

disadvantages (whether intended or unintended) individuals, groups or communities based on race and color” (Bullard, 2002).

HISTORY

Historically, people of color and those living in poverty have born the greatest burden of exposure to environmental hazards in their communities, homes, workplaces and schools. Such exposures most often come from landfills, garbage dumps, chemical plants, factories, smelters and incinerators that are built in low income and minority communities (Bullard, Johnson & Torres, 2011). The roots of the movement to address this injustice began in the 1960s with several key events. First, the publication of *Silent Spring* by Rachel Carson informed the general public of the health hazards associated with pesticides. In addition, during the 1960s Cesar Chavez and farmworkers protested their exposures to harmful pesticides in their agricultural work in fields treated with chemicals hazardous to human health (Skelton and Miller, 2014). The Civil Rights movement led to the Civil Rights Act of 1964 that prohibited the use of federal funds to discriminate based upon race, color or national origin.

Concerns for civil rights and equal opportunity under the law developed during the 1960s. Public concerns for both health and the environment also gained momentum and culminated with the creation of the Environmental Protection Agency in 1970 under President Nixon. The EPA was charged to protect human health and the environment. Legislation such as the Clean Air Act of 1970 and the Clean Water Act of 1972 launched a series of legal mandates for the EPA to regulate and enforce standards to protect health and the environment.

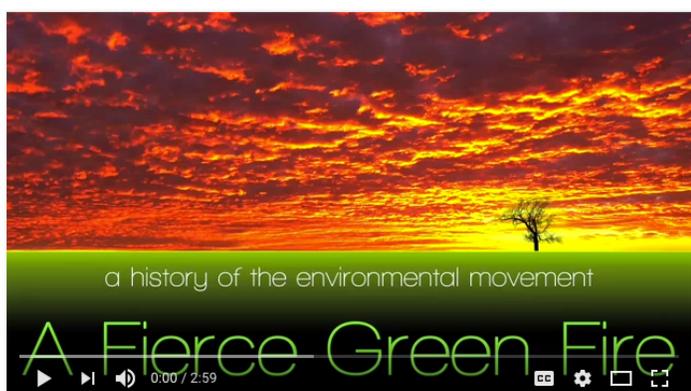
These inequities threatened those living in communities that were unjustly bearing the toxic burdens. Environmental racism is defined as “the disproportionate impact of environmental hazards on people of color” (Environmental Justice Network, 2015). (See <http://www.ejnet.org/ej/>)

Citizens in Warren County, North Carolina began what is known as the environmental justice movement. The dumping of 31,000 gallons of polychlorinated biphenyl (PCB) in 1973 along roadways in North Carolina contaminated large areas of soil. In response, the state devised a plan to build a landfill for the contaminated soil. The landfill was to be located in Warren County, a largely African American community that lacked both a mayor and a city council. In addition, it was ranked as one of the three poorest communities in terms of gross domestic product. The local African American citizens protested the plans for the landfill fearing that their water would

become contaminated by the PCBs to be dumped there. (Click on photos below to watch videos)



PCB Protest in Warren County 1982



Robert Bullard - The Genesis of Environmental Justice

Dr. Robert Bullard, currently the Dean of the Barbara Jordan-Mickey Leland School of Public Affairs at Texas Southern University in Houston, Texas, is considered by many to be the “father of environmental justice.” He became active in the environmental justice movement in the early 1980s when he actively investigated the siting of municipal waste sites in predominantly black communities in Houston. His scholarship led to his book, *Dumping in Dixie: Race, Class and Environmental Quality* published in 1990. During the past 25 years of his academic career he has published 18 books and championed topics such as environmental racism, regional equity, environmental justice, climate justice, sustainable development, urban land use, smart growth, industrial facility siting, community reinvestment, housing, and transportation. <http://www.ejnet.org/ej/bullard.html>

FEDERAL AND STATE MANDATES

Federal and state mandates were developed in response to the growing movement to address environmental injustice. President Bill Clinton signed [Executive Order](#)

[12898](#), "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," on Feb 11, 1994. The purpose of the Order was to address the human health and environmental conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed the EPA and other federal agencies to develop [environmental justice strategies](#) to help each agency address how their programs create disproportionately high and adverse human health or environmental effects on minority and low-income populations. The Order aims to provide minority and low-income communities access to public information and public participation in matters relating to human health and the environment through fair treatment and meaningful involvement (EPA, 2012).

At the Federal level, in February, 2014, the EPA's Office of Environmental Justice (OEJ) celebrated the 20th anniversary of the signing of EO 12898. The [OEJ webpage](#) offers links to their *Plan EJ 2014*, the Partnership for Sustainable Communities, the Interagency Working Group, grants, teleconferences among other informative information for the public.

STATE AND REGIONAL EPA ENVIRONMENTAL JUSTICE (EJ) OFFICES

The EPA also supports 10 regional offices across the United States where each includes an EJ office. [EPA Region 6](#) is comprised of Arkansas, Louisiana, New Mexico, Oklahoma, Texas, and 66 Tribal Nations, and offers links to their EJ strategy, EJ Training workshop, mapping tools, resources and other information for the region.

During the past two decades, state legislatures have addressed EJ for their communities. In Massachusetts for example, an Environmental Justice Policy was signed in 2002 and guides efforts to address inequities and injustices for people of color and low income populations. Their services include links to state policies and initiatives, modules to address smart growth/smart energy policies, and case studies. The Massachusetts toolkit is available [online](#).

An example of an educational module is [Brownfields](#) where the viewer can see examples of how former brownfields have been revitalized into useful and beautiful additions to the community. According to the EPA, "brownfield site" means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. The Jackson Square case study of a Jamaica Plain neighborhood in Boston, Massachusetts, highlights the development of an 11 acre

former urban intersection comprised of brownfields and heavy traffic use into a mixed-income, mixed-use, and sustainable transit-oriented area.

In addition, the Massachusetts Environmental Justice site offers tools such as [EJ mapping](#). With EJ mapping, Geographic Information Systems (GIS) tools can be used to map various toxic exposures to communities that meet the criteria for EJ.



RELATIONSHIP TO SOCIAL DETERMINANTS OF HEALTH (SDH)

The EPA published their [Plan EJ 2014](#) in 2011 to address the need to put the topic of environmental justice front and center across the entire agency to improve overburdened communities. The Plan includes areas such as community based programs, decision making, rule making, permitting, compliance and enforcement, as well as their work with other federal agencies. Now working on the draft [EJ 2020 Action Agenda Framework](#), the EPA is committed to advance the work to mark progress in achieving environmental justice in overburdened communities.

Environmental justice is essential for the protection of those who live in overburdened communities and to provide legal support to remedy the disparities in their environment. However, an upstream approach is required to more effectively address the needs of EJ communities. To address the root causes of such disparities, a social determinants of health (SDH) approach must be taken. The World Health Organization defines SDH as “the conditions in which people are born, grow, live, work, and age. These circumstances are shaped by the distribution of money, power and resources at global, national, and local levels” (World Health Organization, 2014b). In response to a charge from EPA to address the impact of social

determinants of health upon children’s health, the [EPA’s Children’s Health Protection Advisory Committee \(CHPAC\) sent a letter](#) to EPA Administrator Gina McCarthy in November 2013 urging EPA to “incorporate SDH in all programs, policies and regulatory efforts across all offices of the Agency.”

CASE EXAMPLES OF CITIZENS’ ENVIRONMENTAL JUSTICE EFFORTS

The first example of a citizen effort specifically to address environmental justice was the example from Warren County in North Carolina (Skelton & Miller, 2014). Since that time there have been a number of other examples where citizens join together to address the unjust environmental burdens of their community.

WE-ACT

In 1988, the organization [West Harlem Environmental Action \(WE-ACT\)](#) was founded in New York City to address environmental justice. WE-ACT was the first environmental justice organization in the city and one of the first in the U.S. run by people of color. Issues of environmental racism led to the siting and environmental exposures from the following: North River Sewage Treatment Plant, 6 out of 7 New York City diesel bus depots in Northern Manhattan, a 24-hour Marine Transfer Station in Manhattan, as well as the practice of using Northern Manhattan communities as New York City’s dumping ground.

Currently the organization has grown and serves to inform, educate, train and mobilize residents of North Manhattan on environmental issues that impact their health, lives and community. Recent efforts emphasize citizen participation in public policy and enforcement of environmental regulations. WE-ACT focuses on three organization priorities: 1) reduction of toxic exposures, 2) climate change preparedness and resiliency and 3) community access to green resources. These initiatives include solid waste management, pest management, healthy indoor environments, clean air, open green space and sustainable food and land use (WE-ACT, 2015)

JESUS PEOPLE AGAINST POLLUTION

[Jesus People Against Pollution \(JPAP\)](#) is a grassroots environmental justice organization located in Columbia, Mississippi. The organization was created in response to an explosion in March 1977 at the Reichold Chemical Company. “The explosion wrecked the facility and poisoned the local air, water and land with cancer-causing agents and other dangerous compounds. After the explosion, Reichold abandoned the site and left toxic, deadly substances buried in 55 gallon drums in the earth

and around the nearby community and in local landfills” (Earthjustice, 2015). In time, toxic chemicals oozed into the water tables and soil, causing the ground to spontaneously combust, vaporizing into the atmosphere, and leaving offensive odors making many people sick. The community has sustained health problems ranging from nose-bleeds and respiratory problems to cancers and premature deaths. Consistent with the well documented practice of “waste following waste,” the Reichold site was compounded further by pesticide spraying, oilfield operations, transportation, nuclear waste and incineration. Advocacy by JPAP played a role in the Reichold site being listed as a Superfund Site in the 1980s; however, it has since been delisted. It is now considered a brownfield site and continues to seek remediation in the form of relocation and life-time environmental/primary health care for impacted residents.

JPAP is a grassroots advocacy organization that has also embraced a mission to “educate and inform impacted communities about the availability of toxicology and environmental health information so that communities can better understand the relationship between environmental exposure and disease.” Its founder and primary spokesperson [Charlotte Keys](#), Evangelist and Environmental Justice Advocate, is a national figure frequently speaking in the policy arena and contributing to the EJ dialogue at relevant federal agencies.

NATIVE AMERICANS AND NUCLEAR WASTE

During the 1990s a number of [Native American tribes fought legal battles](#) to protect their sacred land from radioactive waste disposal. The Eastern Navajo reservation residents fought to protect their land by filing a suit with the Nuclear Regulatory Commission to block a permit for uranium mining in Church Rock and Crown Point, New Mexico. Likewise, the Western Shoshone tribe in Nevada is fighting the [Yucca Mountain dumping](#) (University of Michigan, 2015). The Mohave tribe in California and the Skull Valley Goshutes in Idaho are also fighting the construction of radioactive waste dumps on their tribal lands (Bullard, 2002).

HYDRAULIC FRACTURING (FRACKING) AND ENVIRONMENTAL JUSTICE

A growing concern for energy justice is for communities throughout the United States that have fracking operations. Studies in Pennsylvania and in Texas indicate that poverty is closely correlated with communities where fracking occurs (Bienkowski, 2015). Citizens of such communities are taking action to address the concerns in their communities (Carre, 2012) by [addressing public policy](#). New York State has banned fracking and Maryland

has a moratorium on fracking, while many cities and counties have enacted legislation to limit fracking.

OCCUPATIONAL JUSTICE

As noted in our discussion of vulnerable populations, workplace exposures vary by type of occupation, location of work, and biologic, physical (including ergonomic), chemical, noise and radiologic exposures. Further, various population groups are more vulnerable such as pregnant women, children, adolescents, older adults and those from ethnic and racial minority groups. Adverse health effects can occur immediately or many years later. The federal government regulates worker safety primarily through the Occupational Safety and Health Administration (OSHA) within the U.S. Department of Labor. OSHA was formed in response to legislation passed in 1970. Other agencies offer guidance and support for education and research to improve workplace safety. One must consider all aspects of a work environment including job stress, opportunities for healthy diet and exercise, violence, and protective equipment, in addition to the specific workplace exposures in any particular occupation. The Centers for Disease Control (CDC) notes in their [Immigrant Worker Safety and Health](#) website that, “Immigrant workers face a disproportionate risk for workplace injury and illness. This is due to a confluence of factors including an overrepresentation in the most hazardous industries including construction and agriculture. Additionally, workplace safety interventions often do not reach immigrant worker populations due to barriers created by social, cultural, and economic issues including language, literacy, and marginal economic status. Furthermore, immigrant workers often lack knowledge of their rights to workplace safety and are reluctant to pursue these rights” (CDC, 2014).

Ethnic minorities are more likely to be employed in physically demanding jobs with hazards such as construction, farming, mining and meat packing (Frumkin, 2010). Immigrants are often employed in more hazardous work settings (Panikkar, et al., 2012). Factors such as language proficiency and access to occupational health services contribute to their type of employment. Murray (2003) studies low-income workers and their health risks. She reports that industries such as forestry, fishing, farming, and machine operators are among those with the highest proportion of workers who live in poverty. She further notes that Black and Latino workers lag behind White workers in both their compensation for their work and job desirability. Arcury and colleagues (2002) looked at the multiple risks of farmworkers from pesticide exposure in farm fields and also in their homes. Study findings indicate that the farmworkers were exposed to

pesticides to a great degree in their housing and workplaces. Ahonen and colleagues (2007) note that immigrant workers are not only overrepresented in the most hazardous work conditions but are exposed to the most danger within those jobs.

Although the Environmental Justice movement began in response to communities where residents experienced disproportionate exposures to hazardous chemicals, the federal government recognizes that many people are exposed not only in their homes but also in the workplace. The Department of Health and Human Services (HHS) developed the [HHS Environmental Health Strategy](#) and the Department of Labor the [Environmental Health Strategy](#) to promote environmental justice.

GLOBAL ENVIRONMENTAL JUSTICE

Low income communities and communities of color in the U.S. continue to experience gross inequities and discriminatory practices related to hazardous waste, pollutants, and the disposal of toxins. Such communities are at greater risks for adverse health effects than communities associated with less waste. Despite national and state environmental laws, policies, and regulations as well as governmental agencies dedicated to environmental protection, health problems associated with hazardous waste increase with potential for long term impact on the quality of life. People living in developing parts of the world are vulnerable and disproportionately plagued by negative extremes of social determinants of health, including the following:

- joblessness,
- poverty,
- lack of education and information,
- food insecurity,
- inadequate housing,
- poor access to health care,
- lack of clean water,
- premature deaths,
- air pollution,
- inadequate control of disease carrying insects such as mosquitos and other vectors transmitting malaria and others diseases, and an overall sense of powerlessness and despair.

Just as in developed countries, these disabling conditions, affect major segments of the population in the developing

world and classify them as potential victims of environmental injustices.

INTERNATIONAL HAZARDOUS WASTE DISPOSAL

In addition to the negative extremes of social determinants of health acting as magnets to environmental justice issues, the rise of economic globalization, liberalized trade rules and the dominance of multinational corporations play key roles in transporting environmental pollution from industrialized to developing countries (Clapp, 2014). Shipping hazardous waste from developed countries to developing countries for disposal is a regular practice. The receiving countries often have inadequate or lax regulations and protocols, inadequate resources, and insufficient training for the safe management and disposal of environmental waste. According to the [Basel Action Network](#), the primary motivation for exporting hazardous waste to developing countries is economic. As the deleterious health and environmental impacts of unsound disposal of hazardous waste have become increasingly apparent, governments of industrialized countries have enacted stringent regulations for waste disposal---a costly endeavor. An economist with the World Bank wrote (and later retracted) that “the economic logic behind dumping a load of toxic waste in the lowest wage country is impeccable and we should face up to that” (Lipman, 2011). He further noted, “health-impairing pollution should be done in the country with the lowest cost, which will be the country with the lowest wages.” Evidence collected in in the late 1980’s found that ‘the average disposal cost of one ton of hazardous waste in Africa was between US \$2.50 to \$50.00, while the cost in industrialized countries ranged from US \$100 to US \$2,000” (Lipman, 2011).

Dumping of waste in developing countries has occurred in some cases with the consent of government and in other cases as part of an illegal scheme frequently related to strategic motives of the sending country, and corruption of the receiving government (Lipman, 2011). This dumping occurs with little regard for the people who will handle or work with the received toxic waste. Just as the motives for permitting the siting of “dirty industries” in low income, often jobless communities in the U.S. are based on promises of jobs, money and political favor, the same inducements are evident in developing countries.

The Basal Convention on the Control of Trans boundary Movements of Hazardous Waste and their Disposal (Lipman, 2011) is an international treaty that was designed to reduce the movements of hazardous waste between nations and specifically to prevent transfer of hazardous waste from developed to less developed countries (Basel, 2015). It was signed in 1989 and became effective in May,

1992. As of February, 2014, 180 states and the European Union are parties to the Convention. Fourteen (14) of 194 UN member states have not signed, including the United States.

E-Waste is another environmental health problem of recent ascent (e-Stewards, 2008). E-waste results from the rapid obsolescence of electronic gadgets in response to the high demand for new technology. Electronic equipment contains toxins, including mercury, lead, cadmium, arsenic, beryllium brominated flame retardants, and on burning, dioxins and polycyclic aromatic hydrocarbons. The latter are some of the most toxic substances to humans. Early manufacturers gave little thought to their disposal, the level of toxicity in their products, or potential reclamation of non-toxic components of the electronic products.

There is little financial value in recycling outdated electronic waste in the U.S. and other industrialized countries. There are few incentives or government regulations at this time to safely manage the disposal of E-waste in industrialized countries. Many have advocated for humanitarian reasons to send old or refurbished computers and computer parts to resource poor countries. Others have found it considerably cheaper to dispose of E-waste in developing countries. The most common destinations of waste from Europe and the US are the Far East, India, Africa, and China (Greenpeace International, 2009). Targeted countries lack the proper infrastructure and regulations/or adherence for disposal of E-waste.

The growing numbers of scrap yards in developing countries seek to harvest parts and precious metals (copper, iron, silicon, nickel and gold) from electronic equipment during recycling and sell them for profit; workers and purchasers are exposed to toxins. In developing countries, children are used in recycling, removing metal and parts by hand. Mislabeling is a common practice in shipping hazardous waste, which is in non-compliance with the requirements of the Basel Convention. Because the U.S. has never signed the Basel Convention, its shipments are not illegal. Additionally, lax maritime and immigration regulations place vulnerable populations at-risk, particularly those who are poor and people of color. The U.S. also sends much of its hazardous waste to prisons in the U.S. to process in less-regulated environments without the same worker protections and rights afforded in the private sector (Greenpeace, 2015). These are serious environmental justice issues.

CLIMATE CHANGE AND ENVIRONMENTAL JUSTICE

In recent years, among the most pressing environmental threats is climate change which has been linked with international environmental justice. The [Center for Progressive Reform](#) provides a thorough overview of international environmental justice and climate change. Global warming and climate change result from the burning of fossil fuels, including coal, gas, and oil for cars and industries. Fossil fuels are primary sources of carbon dioxide that is one of the principal gases responsible for trapping heat in the atmosphere. The release of these gases has increased by one-third since the Industrial Revolution (middle of 19th century). The rate of discharge is expected to double by the end of the 21st century, associated with increasing energy consumption in developing countries. Of significance, the United States is responsible for 25 percent of the world's greenhouse gases, although it only contains 4 percent of the world's population (Center for Progressive Reform, 2013).

“Greenhouse gases will substantially disrupt ecosystems and water supplies across the globe, intensifying dangerous weather patterns and causing a host of other health, environmental, economic, and social problems” (EPA, 2015b). The effects of climate change are most devastating to populations in urban centers and coastal regions and those dependent upon subsistence fishing. Such populations are overwhelmingly people of color and dwell in poor communities. Contributing to already existing health and environmental problems, heavy rains, floods, and hurricanes occurring over a few days can further compound the health challenges of these vulnerable communities. Similarly, rural areas in developing countries experience droughts and excessive heat, limiting hydration for humans and animals and diminishing the production of food for subsistence and as a marketable crop. According to the World Health Organization (2014a & b), of the approximately 80,000 world-wide deaths per year resulting from natural disasters, approximately 95% are in poor countries. In weather-triggered disasters, people and animals die; homes, crops, and resources are destroyed; and public health infrastructure (hospitals and clinics, roads) are damaged. These catastrophes threaten the health, food security and livelihoods of poor populations across the globe, particularly people of color. Hence, these disparities can be characterized as environmental injustices and/or environmental racism (Environmental Justice Network, 2015).

Policy debates have prevailed over time to have all nations significantly reduce the use of carbon-based fuels. “Developing countries maintain that they should not have to bear social and economic burdens of controlling

greenhouse gas emissions disproportionate to their causal responsibilities, particularly when they have yet to achieve a basic level of development” (International Environmental Justice, 2013). “The Kyoto protocol was the first agreement between nations to mandate country-by-country reductions in greenhouse-gas emissions” (The Guardian, 2011). Kyoto emerged from the UN Framework Convention on Climate Control (UNFCCC), which was signed in 1997. The UNFCCC aimed to reduce the collective greenhouse gas emissions of developed countries by at least five percent below 1990 levels between 2008 and 2012. Nearly all industrialized countries have ratified the treaty with the exception of the United States, due to the Senate’s failure to ratify (The Guardian, 2011).

MOVEMENT TO GLOBALIZE ENVIRONMENTAL JUSTICE

Robert Bullard, the father of Environmental Justice, noted that “all people and communities are entitled to equal protection of environmental and public health laws and regulations” (Bullard, 1990). The concept of environmental justice applies to communities where there are perceived disadvantage, whether due to race, ethnicity, socioeconomic status, immigration status, lack of land ownership, geographic isolation, formal education, occupational characteristics, political power, gender, or other characteristics, which puts them at disproportionate risk for being exposed to environmental hazards (Claudio, 2007). The movement to globalize environmental justice parallels a series of environmentally-oriented agreements and global conventions. Following is a timeline of early, progressive milestones in the globalization of environmental justice:

1991: *Principles of Environmental Justice*, a guide for grassroots organizing, was adopted by environmental justice leaders during the First National People of Color Environmental Leadership Summit, Washington, DC.

1992: The Earth Summit in Rio de Janeiro, Brazil, lacked a focus on environmental justice within the context of human health; human health and urban centers were not considered part of the environment. However, a promising sign was that the *Principles of Environmental Justice (1991)* had been translated into Portuguese and circulated to local community leaders at the Summit.

2000: The United Nations Summit in New York adapted the eight *UN Millennium Development Goals* that included one on “Ensuring Environmental Sustainability.”

2002: The leadership of the World Summit on Sustainable Development in Johannesburg, South Africa formerly recognized the issue of environmental inequity.

Advocates, including grass roots workers for environmental justice, face common concerns around the globe and share a common goal: “to improve the conditions for vulnerable populations in their nations.” Throughout the world, disadvantaged communities typically suffer the highest burdens of environmental degradation. With increased attention to common international environmental justice issues, grassroots and other community-based advocacy groups have begun to communicate across national and continental borders. Such groups share concerns, approaches to advocacy, and educational materials and approaches, and coordinate strategies for addressing common offenses. Several universal concerns and international strategies are highlighted below:

- Rural farmworkers across Latin America, South Africa, among others, suffer from the effects of disproportionate exposure to pesticides and other chemical agents as well as the lack of access to health and education services. Members of the *Farmworkers Associations of Florida* have exchange visits with citrus farmers in Brazil to trade ideas on how to address environmental justice issues. The problems faced are the same across international borders: literacy, lack of government support, the strong influence of chemical industries that produce pesticides, and lack of access to health care and housing. <http://www.floridafarmworkers.org/>
- *Global Alliance for Incinerator Alternatives (GAIA)*, headquartered in the Philippines, aims to coordinate efforts to reduce waste and stop incineration around the world with a particular focus on representing disadvantaged communities in both developed and developing countries. Its approaches include sharing information electronically, coordinating regional meetings, developing joint strategies for community organizing, and hosting international training sessions where skills can be shared. GAIA has members in over 77 countries (Claudio, 2007). <http://www.no-burn.org/about>
- Poor and disadvantaged communities around the globe face similar problems associated with globalization and the advance of multinational corporations. Diamond, Louisiana is home to more than 130 petrochemical facilities, incinerators, and landfills known as the Chemical Corridor or Cancer Alley. Other similar sites are victims of the “waste follows waste” phenomena (<http://www.ejnet.org>). See the following site for images of the Vision Project http://www.visionproject.org/images/img_magazine/pdfs/canceralley_louisiana.pdf

- Grassroots organizations such as Concern Citizens of Norco, established in 1990, engaged and confronted leadership of The Shell Corporation, owner of nearby petrochemical facilities in Louisiana, to take responsibility for the pollution and to relocate people to cleaner locations. The group used strategies such as highly visible campaigns at the state, national, and international levels, winning the community relocations and a reduction in Shell's toxic emissions by 30%. The persistent advocacy and community organizing earned Margie Richard, founder of Concern Citizens Norco, the Goldman Environmental Prize (Claudio, 2007).
- Similar cases of multiple toxic waste facilities located in the same area have spread internationally and are generally owned by multinational corporations. The Shell Corporation has multiple toxic waste facilities such as plants, landfills, and incinerators in Texas, South Durban, South Africa, the Philippines, Nigeria, Brazil, Curacao, and Russia. Lessons learned about the strategies used by *Concern Citizens Norco* have been shared around the globe, linking environmental justice issues internationally.
- One grassroots organization is [Friends of the Earth International](#), described as the largest grassroots environmental network with 70 national members and 5,000 local activist groups who are supported in community organizing and finding common grounds for action.

International collaboration and partnering continues to grow. Collaborators share experiences, strategies and educational resources, and engage in collaborative problem solving. Common strategies for class advocacy for environmental justice include the following:

- use of media,
- mediation,
- expert testimony,
- community organizing,
- program development, and
- coalition building (Powell, 1999).

NURSES AND ENVIRONMENTAL JUSTICE

Nurses became involved in environmental justice largely through their work with communities and concern for social justice. Dorothy Powell, EdD, RN, FAAN, retired and Clinical Professor Emeriti of Duke University was one of the first nurses to become involved in the environmental justice movement. Active in the Civil Rights Movement in

Vance County, North Carolina, during her youth, she credits her involvement in environmental justice to the events in Warren County, a neighboring county to Vance County. She became aware of the oil dumping there through the work of her uncle and other community leaders. In 1978, when PCB-laced oil was dumped along the roadways of Warren County, critics claimed that the area was selected because it was rural and a majority of the residents were poor, black and politically unable to determine their fate. However, hundreds of community activists worked alongside environmental groups and civil rights groups to protest the dumping and the plan for a landfill by physically blocking truck access to the landfill. This powerful example led Powell, an African-American nurse, to be professionally swayed by her commitment to equality and justice as a youth and by the discriminatory practices in neighboring Warren County.

The Mississippi Delta Region (219 counties in 7 states) was another exemplar of environmental pollution and environmental injustices. Through a 1994 agreement with the Minority Health Professions Foundation, Howard University Nursing spearheaded a nursing initiative to enhance understanding of environmental health, including environmental justice, among nursing students and practicing nurses in the region. Funding for the work was through the Center for Disease Control and Prevention (CDC) and the Agency for Toxic Substance and Disease Registry (ATSDR). Dr. Powell and nursing colleagues developed a modular curriculum *Environmental Health and Nursing: The Mississippi Delta Project* (1999), published by ATSDR. Dr. Powell gained recognition as a leader in environmental justice following publication of the modules where she authored the unit on Environmental Justice and was overall project lead. Other modules included: *Environmental Health of the MDR* (Hansberry & White, 1999); *Role of Culture, Race and Economic Development on Environmental Health* (Lassister & Mitchem-Davis, 1999); *Toxicology: Major Substances Affecting the Delta* (Green, Mitchem-Davis, & Richardson, 1999); *Assessing Individual, Family and Community Responses to Toxic Substances* (Copes & Richardson, 1999); *Community Organization, Empowerment, Partnering and Education* (Lassister, 1999). The learning modules include learning objectives, content, learning activities, teaching methods and evaluation as well as appendices and references.

Other nurses have written on the topic to advance professional understanding of environment and social determinants, justice, and environmental justice (Butterfield, 2002; Larrison & Butterfield, 2002; Pope, Synder & Mood, 1995). Lillian Mood, RN, MSN, Director of Risk Communication and Community Liaison, Environmental Quality Control, South Carolina

Department of Health and Environmental Control chaired an Institute of Medicine committee to study enhancing environmental health content in nursing. The 1995 report, *Nursing, Health & Environment*, wove environmental justice throughout the curriculum. The report stressed the importance for nurses to understand the disproportionate risk of economically disadvantaged patients for exposure to hazardous environmental pollutants. Because nurses are accessible to members of vulnerable communities it is important for nurses to bring the concerns of impacted communities to the policy arena and health systems (Pope, Snyder, & Mood, 1995).

Patricia Butterfield, PhD, RN, FAAN, and Julie Postma, PhD, RN, of Washington State University applied an environmental justice lens to rural environmental health (Butterfield & Postma, 2009) through conceptualization of the Translational Environmental Research in Rural Areas (TERRA) Framework. Rural populations are increasingly challenged by confined animal feeding operations (CAFOs), groundwater exposures, agricultural run-off, as well as, exposure to specific hazardous waste sites located in their communities. The framework considers macro determinants as well as family level determinants to better understand the environmental health risks experienced by the rural poor.

Laura Anderko, PhD, RN, the Robert and Kathleen Scanlon Chair in Values Based Health Care at Georgetown University, has served on the National Environmental Justice Advisory Committee Research Workgroup, teaches a course on environmental justice, and worked with communities to address health disparities and justice issues. She serves to advance justice issues at not only Georgetown, but for nurses nationally. Anderko has also been selected as a [White House Climate Champion for Change](#).

The American Nurses Association in 2007 developed the [ANA's Principles Environmental Health for Nursing Practice and Implementation Strategies](#) that address environmental justice, citing concerns for social justice and health disparities. The nine assumptions upon which the principles are grounded include the following: "environmental and social justice is a right of all populations and assumes that disparities in health are not acceptable."

RESOURCES

Websites

- a. Environmental Protection Agency (EPA) Sources <https://www.epa.gov/environmentaljustice>
- b. EPA Plan EJ 2014 <https://www.epa.gov/environmentaljustice/plan-ej-2014>

- c. EPA Plan EJ 2014 Progress Report (2014) <https://www.epa.gov/sites/production/files/2015-02/documents/plan-ej-progress-report-2014.pdf>
- d. National Institutes of Environmental Health Sciences (NIEHS)-Environmental Health Disparities and Environmental Justice <http://www.niehs.nih.gov/research/supported/dert/programs/justice/index.cfm>
- e. NIEHS-Advancing Environmental Justice http://www.niehs.nih.gov/research/supported/assets/docs/a_c/advancing_environmental_justice_508.pdf
- f. NIEHS-Liam O'Fallon, Coordinator for Partnerships for Environmental Health <http://www.niehs.nih.gov/research/supported/dert/phb/ofallon/index.cfm>
- g. Environmental Justice Network www.ejnet.org/ and <http://www.ejnet.org/ej/>

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