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Public Health, Population Health, and Planning:

Ideas to Improve Communities

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Addressing the health of communities involves collaboration within different sectors to achieve these goals. “Public health” and “population health” are two terms that are often used interchangeably, but there are differences between the two and it is important to understand these differences. Addressing health in communities also involves planning, by ensuring that the built environment, where people live, work, and play, also promotes healthy lifestyles. Each of these subject areas bring unique frameworks, processes, and strategies to address issues of health in communities.

Public Health

The philosophies and principles surrounding public health have been around since the Hippocratic physiology described the four humours (blood, black bile, yellow bile, and phlegm) in ancient Greece.[1] Civilizations, then scholars and journalists noted health impacts, attempted remedies, and identified results. By the 1800s, industrialization and urbanization brought the spread of cholera, smallpox, dysentery, and other infectious diseases to New York City, Boston, Philadelphia, and beyond. Early public health efforts[1] included identifying environmental improvement to prevent endemic disease (Lemuel Shattuck), reporting of maternal and fetal mortality rates (Lemuel Shattuck), and improving sanitation practices (C.E.A. Winslow) – all which evolved into the public health that we know today.

Public health is the “science and art of preventing disease, prolonging life, and promoting health through organized efforts and informed choices of society, organizations, public and private, communities, and individuals.”[2] Public health focuses on the population’s health as a whole, initiates prevention strategies, and identifies problems that may affect the larger population.

According to the Centers for Disease Control and Prevention (CDC), the 10 great public health achievements of the 20th century[3] are:

1. *Immunizations*. There were dramatic declines in vaccine-preventable diseases and smallpox was eradicated.
2. *Motor vehicle safety*. There are fewer deaths from motor vehicle crashes through changes in driver and passenger behavior and enhanced safety laws.
3. *Workplace safety*. Government agencies improved mining safety and similar industries through research, education, and regulatory activities.

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4. *Control of infectious diseases*. Advances in sanitation, hygiene, vaccination, antibiotics, and technology detect and monitor infectious diseases.
5. *Declines in deaths from heart disease and stroke*. These resulted from prevention efforts and improvements in early detection, treatment, and care.
6. *Safer and healthier foods*. There were increased efforts in food safety, control of foodborne pathogens, and education about the role of essential nutrients in disease prevention.
7. *Healthier mothers and babies*. Maternal and child health achievements include environmental interventions, nutrition improvements, advances in clinical medicine, greater access to health care, disease monitoring and surveillance improvements, higher maternal education levels, and better living conditions.
8. *Family planning*. Educators pointed out the benefits of smaller families and longer birth intervals.
9. *Fluoridation of drinking water*. Fluoridation of public drinking water resulted in the decline in dental caries.
10. *Tobacco as a health hazard*. Educators taught that tobacco use is a leading preventable cause of death and disability.

Population Health

Population health is a relatively new term, having been coined in the 1990s to describe a conceptual framework for "thinking about why some populations are healthier than others."[4] Population health is the "health outcomes of a group of individuals, including the distribution of such outcomes within the group."[4] It describes conditions, or determinants, that are related and factors that "influence the health of populations over the life course, identifies systematic variation in their patterns of occurrence, and applies the resulting knowledge to develop and implement policies and actions to improve the health and well-being of those populations."[4]

Population health is focused on a defined community (state, county, city, etc.) and looks for effective ways to improve community health. Population health strategies improve health equity by addressing 'upstream' societal factors such as poverty, homelessness, and pollution before they lead to disease and other health problems. By addressing the underlying influences of health – such as the environment, education, and employment – we can improve the health of ourselves, our neighbors, and our communities. The population health approach relies on policies and broader practice and programmatic changes to influence large groups.

The Relationship of Public Health and Population Health

In the real world, public health and population health have a synergistic relationship (see Figure 1). In government agencies that promote the health of communities, public health and population health are used together to describe health issues, formulate educational materials, determine areas of focus, and inform policies for healthier communities.

Figure 1. The Relationship of Public Health and Population Health, modified from the Alaska Health Status Model[5]

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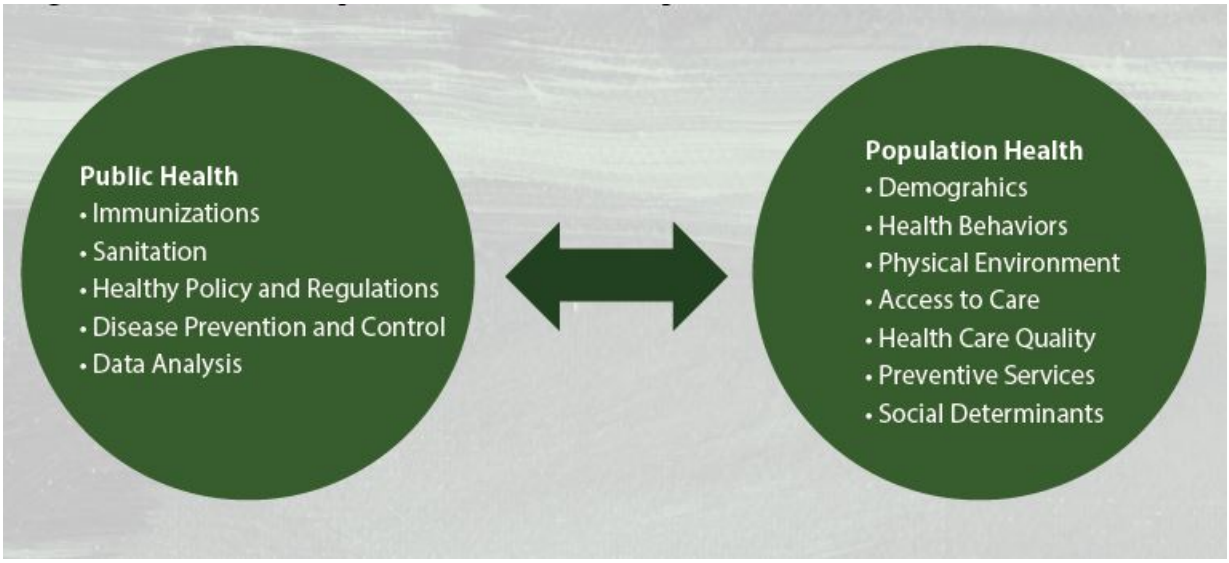

Data Sources

Information used for public health and population health is gained from different sources. Several state and national disease registries can be used to quantify disease in different locations. Registries that collect national and international data include the National Amyotrophic Lateral Sclerosis (ALS) Registry, the Severe Chronic Neutropenia International Registry, and the Alzheimer's Prevention Registry. Examples of registries that collect state-specific data include cancer registries like the Delaware Cancer Registry. These registries provide health professionals with the opportunity to describe disease conditions at either one point in time, or trend data over time. The ability to track diseases over time is important in formulating hypothesis about the burden of disease in a community.

Information on population demographics are also needed for this kind of work. Data sources like the National Health and Nutrition and Examination Survey (NHANES) includes additional information on health and nutrition status on adults and children by doing interviews and physical exams. This survey uses a representative sample of the United States so results can be extrapolated to the general population. Similar surveys include the National Health Interview Survey (NHIS) and Medical Expenditure Panel Survey (MEPS). In Delaware, the Behavioral Risk Factor Survey (BRFS) is an annual survey of a representative sample of the Delaware adult population about behaviors related to the risk of disease, premature death, and disability. Included in BRFS data is information for some disease screening.

The U.S. Census Bureau is the primary source for demographic data. It includes data for the United States that can be narrowed down to a geography of choice (state, county, census tract, municipality, etc.). The Census Bureau also has data tools and visualization mechanisms so that data can be presented in different ways.

Ideas for Using Public Health, Population Health, and Planning to Address Diabetes and Cancer in Delaware

The Delaware Department of Health and Social Services' Division of Public Health (DPH) is using a comprehensive multisector public health approach to prevent chronic disease by reducing overweight and obesity through physical activity and healthier eating. Part of DPH's strategic

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approach is to promote the adoption of these public health policies: menu labeling at restaurants and other food establishments; worksite policies that accommodate physical activity during the work day; school-based fitness and healthy-eating policies; and worksite policies that support healthy food and drink offered in vending machines.

> "By adapting or creating new public health policies, governmental public health and our traditional and non- traditional partners can initiate the most impactful health changes on our state population," said DPH Director Dr. Karyl Rattay, MD, MS. "This intersectoral approach reaches the most people in their various environments to promote health and prevent chronic physical and mental health conditions."

Diabetes and cancer, two chronic health conditions, affect Delawareans at rates higher than the national average (cancer incidence in Delaware was ranked 2nd in the nation for the most recent time period of 2009- 2013)[6] or increased rapidly in recent years (diabetes prevalence in Delaware has almost doubled between 1991 and 2015).[7] A possible link has been between Type 2 diabetes and certain kinds of cancer[6] due to some shared risk factors between the two conditions.

DPH's Comprehensive Cancer Control Program (CCCP) uses data from the Delaware Cancer Registry (DCR) and BRFS to describe the cancer population in Delaware. The DCR is a dynamic dataset of cancers diagnosed in Delaware, and analysis of this dataset is used to inform public health efforts like cancer prevention and control programs. Age-adjusted incidence rates are calculated from the DCR and can be compared to national cancer incidence rates. The data in the DCR allows for incidence rates to be stratified by several factors including race/ethnicity, sex, and county. BRFS data is used to describe the demographics of people living in Delaware, understand cancer screening trends, and other social determinants that are related to cancer diagnosis (health status, nutrition, physical activity, etc.). Similar to the DCR, BRFS data can also be stratified allowing for comparisons among groups.

DPH's Diabetes and Heart Disease Prevention and Control Program (DHDPCP) uses the principles of population health and public health to drive healthier outcomes for Delaware adults diagnosed with diabetes. Population health maximizes DPH's limited funding allocations and other resources for the most impactful interventions. The DHDPCP uses the BRFS for state-based and county-based diabetes prevalence estimates, which can be stratified by age, race, sex, income, education, and other variables to determine health inequities.

Information collected using public health and population health methods on cancer and diabetes, DPH can identify target areas for different initiatives. Areas with high incidence rates of cancer and high prevalence of diabetes can be identified. Further analysis can be conducted to explore risk factors within the target areas that are common to both cancer and diabetes, and to create interventions. Risk factors common to both diseases include non-modifiable risk factors (age, race/ethnicity, sex) and modifiable risk factors (tobacco use, alcohol use, obesity, poor nutrition, physical inactivity). A different way of approaching some of the risk factors like physical inactivity, poor nutrition, and obesity is through planning.

Planners can use information gathered from the target areas described above to improve health in the community. Planners should take all aspects of the built environment into consideration: clean air and water, green buildings, walkable neighborhoods and trails, active transportation, access to healthy food, and overall community design.[8] Part of this process incorporates the

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"Four A's" to influence healthy eating and an active lifestyle.[9] These principles address different reasons why communities may not engage in healthy activities. Are the healthy behaviors:

1. *Available*: Is the healthy behavior available to the individual where they live, work, learn, and play?
2. *Affordable*: Is the healthy behavior affordable to the individual?
3. *Accessible*: Can an individual get to the healthy opportunity?
4. *Appealing*: Is the opportunity to engage in healthy behavior appealing?

To start, planners would identify if the targeted areas with high cancer incidence rates and diabetes prevalence are areas with low walkability, lack stores with fruits and vegetables, safe recreational spaces, or health care centers. There may be different ways to address health challenges including:

1. Encouraging neighborhood markets and convenience stores to stock more fruits and vegetables.
2. Encouraging neighborhood clean-up efforts to make outdoor recreational activities more appealing.
3. Partnering with local law enforcement to ensure safe outdoor spaces.
4. Reducing advertisements for tobacco and alcohol products in area stores.
5. Ensuring that there are facilities offering health services in close proximity to the community.

Once evidence-based best practices are implemented, public health and population health systems evaluate possible changes in cancer incidence or diabetes prevalence. Both the DCR and BRFS collect data on a yearly basis allowing for trend analysis. Planners should modify solutions to better suit the needs of specific communities.

Data shows nearly a quarter of Delaware adults diagnosed with diabetes are age 65 and older[10] so interventions for this chronic disease focus on older populations. DHDPCP's Diabetes Self-Management Program (DSMP) is an evidence-based intervention program provided to Delaware adults diagnosed with diabetes. The DSMP provides individuals with evidence- based self-management skills, including proper nutrition, regular physical activity, medication adherence, and regular provider visits, so Delawareans can manage their chronic illness. It is not uncommon to find the DHDPCP's workshops at senior centers and older adult housing facilities, though they are held statewide for adults of all ages. This intersection of population health and public health targets disparate populations for intervention to help those diagnosed with diabetes become active self-managers. Self-management helps prevent life-changing and costly complications such as nerve damage, blindness, and amputations. Better health outcomes improve clients' overall quality of life while reducing health care spending for participants, the State of Delaware, and the federal government. In this case, planners might partner with the DSMP to address some of the areas discussed above to improve physical activity and nutrition access in areas of the state with high populations with those age 65 and older. These are just two examples of how public health, population health, and planning can come together to improve communities.

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Conclusion

DPH and health agencies across the country use the principles of public health and population health to provide services, design health promotion activities, and consult with internal and external stakeholders to improve health. The concepts defining these two areas work synergistically to address health challenges of populations. Current DPH initiatives involve using elements of public health and population health to address and formulate health guidelines, programs, and prevention strategies for the people of Delaware.

Practitioners who influence health outcomes benefit from assessing public health issues through a population health lens and partnering with planners to improve the environments where people live. Data can be used to describe the problem in the population, identify areas of concern or risk, measure current health care practices in the population, and hypothesize methods for improving health outcomes.[11] Planners can use this data to infuse opportunities for healthy behaviors into new communities and built environments. Once target areas are identified, planners can bring their expertise in the built environment to help reinforce ideas surrounding healthy living. It is crucial for all sectors to work together to ensure the health of communities.

> "DPH has evolved and improved to better meet the needs of Delaware's growing and diverse population by emphasizing population-based activities as our core services, and working to strengthen our community- based public health system," said DPH Director Dr. Karyl T. Rattay, MD, MS. "It may take several years for us to see improvements and subsequently, a return on investment, but ultimately, prevention efforts are the best levers to improve health. We continue to address health inequities and help decision-makers understand that the systems that have been developed and policies put into place don't always treat people fairly, and this impacts health. Our challenge is to help others see that certain populations need more support than others."

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