Module 1: Determinants of Public Health

Slide 1: Introduction

Today we are going to be talking about the determinants of health, factors that influence the health of both individuals and the community in which they live.

Slide 2: Acknowledgements

APTR wishes to acknowledge the individuals and institution that developed this module:

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Slide 3: Presentation Objectives

1. Discuss the role of population-level determinants on the health status and health care of individuals and populations
2. Identify the leading causes of death, leading underlying causes of death, and health disparities in the United States
3. Describe the distribution of morbidity and mortality by age, gender, race, socioeconomic status, and geography in the United States
4. Describe the use of Healthy People objectives in public health program planning
“Common diseases have roots in lifestyle, social factors and environment, and successful health promotion depends upon a population-based strategy of prevention.”

“Common diseases have roots in lifestyle, social factors and environment, and successful health promotion depends upon a population-based strategy of prevention.”

Rose 1992

Slide 4: Importance of Health Determinants

Common diseases have roots in lifestyle, social factors and the environment. Successful health promotion depends on a population based strategy of prevention.

Slide 5: Life Expectancy Chart

Let’s look at this chart. The bottom right-hand corner shows the United States with a life expectancy shorter than that of other developed countries. This is despite the fact that the United States spends more on medical care than any of the other countries shown on the chart.

Slide 6: Impact on Death Chart

This chart shows the impacts of various domains on early deaths in the United States. It shows that shortfalls in medical care only contribute 10% to premature death. Many of us think that our health is determined by our genes, or our DNA, yet this chart shows that genetic predisposition only counts for 30% of premature death. Looking at behavioral patterns, environmental exposure, and social circumstances, these factors add up to 60%, the major impact on early death in the United States. Now this chart is from an article that was published 10 years ago. If anything this chart underestimates the influence of social
It is instructive to look at life expectancy in the United States. Beginning in the early 20th century, now through the year 2003, you will note a gain in life expectancy of approximately 30 years. It is instructive to note that 25 of those years, the majority of this gain, can be attributed to advances in public health affecting the determinants we are going to be speaking about in this presentation. It’s also interesting to look at life expectancy at 65 years of age; you’ll see that there hasn’t been much of an increase from the early part of the 20th century to 2003.

As health professionals, our training and the reimbursement we get from diagnostic and treatment services emphasizes the treatment model in medical care activities. We need to focus on those factors or determinants which have the most influence on the health of the population.
Focus on those determinants which have the most influence on the health of the population. Environment, Social, Biology. Current attempts at health reform will not be successful at improving health unless the population health determinants are addressed.

Current attempts at health reform will not be successful at improving health unless the population health determinants are addressed. In March of 2010, major legislation was enacted, the Patient Protection and Affordable Care Act, and that act contains many public health provisions, including reimbursement for clinical preventive services and also community-wide initiatives to improve health.

Let’s examine the 10 leading causes of death in 1900 and compare them with causes of death, more recently in 2007. There is a marked variation in pattern, so that in the early part of the 20th century the leading causes of death were infectious disease, primarily tuberculosis. In 2007, the leading causes of death are chronic disease. That is not to say that infectious diseases are not important, particularly emerging infectious diseases such as HIV and the possibility of pandemic flu. But it does show you that the pattern is now chronic disease and as we will see, determined by health behavior and the future health of our population and our efforts to improve it are going to be best addressed by working with behavioral determinants which are related as we will see to social determinants and environmental determinants.
Slide 11: Determinants of Health

This diagram shows the determinants of health: environment, biology, and social and how they all interact to determine the health of individuals and the communities in which they live.

Slide 12: Contemporary Concept of Health

As we have been discussing, health has multiple determinants. Factors important to health include social, economic, genetic, perinatal, nutritional, behavioral, infectious, and environmental.

Slide 13: Contemporary Concept of Health

Biologic or host factors include genetics, behaviors that determine the susceptibility of the individual to disease and other factors related to susceptibility. For example, immunization removes susceptibility to vaccine-preventable diseases including measles, mumps, and diphtheria. Other diseases such as HIV infection can increase susceptibility by decreasing immune response.
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Slide 14: Environmental Determinants

Environment includes physical environment, conditions of living, toxic agents and infectious agents.

Slide 15: Social Determinants

Social factors of importance include poverty, education, and cultural environments.

Slide 16: HIV Example

Let’s use the example of HIV. This is an excellent example of the agent-host-environment model, which explains the transmission of HIV in a community and explains which individuals become infected with HIV. This is dependent on the infectious agent, the host or individual, and the environment. The agent-host-environment model is a public health model. It’s important because disease can be stopped by addressing any one of these factors. So, for HIV, we do not have a vaccine that prevents it, we do not have a treatment that cures the disease, but we can still prevent the disease.
Slide 17: HIV Occurrence

Let’s take a look at this diagram. The occurrence of HIV, as I have explained, is dependent upon the interaction of the environment, the individual or host, and the agent. For the individual, the following is important: sexual behaviors, multiple partners, intravenous drug use, and condom utilization. For the environment: what are the peer norms, what information and education is available, how much drug use there is in the environment, and what is the availability of condoms in the environment. Now, let’s look over to the right side of this diagram, this is the prevention model. By simply splitting the agent from the environment and the individual, we can prevent the disease. This is what we are doing with mechanisms such as partner notification, needle exchange, safe sex practices, and the use of condoms.

Slide 18: Tuberculosis

Another example of what we are talking about is tuberculosis. What is the cause of tuberculosis? Is it mycobacterium tuberculosis? That’s the agent, but the agent does not explain the occurrence of tuberculosis unless we also consider the host and the environment. This is shown by an examination of the decrease in TB from 1900 to the present.

Tuberculosis

- What is the cause of TB?
- What explains the decrease in TB from 1900 to the present?
- The answer to both of these questions is related to the multiple factors that cause TB.
Slide 19: Tuberculosis

Let’s look at this graph. We see a sharp decrease in the occurrence of TB since mid-19th century to mid-20th century. This is not because of the advent of antibiotics that can treat the infectious agent, although they certainly helped at the tail end of this decrease, with the advent of streptomycin in 1948. Actually, the decrease can be explained by changes in social factors and the environment, namely, a decrease in crowding since the mid-19th century.

Slide 20: Factors Causing TB

This next diagram shows the multiple factors that explain the occurrence of TB. We know that individuals can be exposed to the TB agent. The next step is a primary infection and from the primary infection, some individuals will actually develop active TB, primarily the pulmonary type. But the actual factors that explain the development are not simply the agent. They include socioeconomic factors such as poverty and its relationship to alcoholism, crowding in homeless shelters and prisons, and urbanization. Other factors that affect the susceptibility of the host are also important and this includes HIV infection, which can accelerate development of the disease for individuals who already have the primary infection.
Slide 21: Social Determinants

Returning to our diagram, we will now look in more depth at the social determinant.

Slide 22: Institute of Medicine, 2003

A 2003 Institute of Medicine report concludes that Americans today are healthier, live longer, and enjoy lives that are less likely marked by injuries, ill health, or premature death, but these gains are not shared fairly by all members of society.

Slide 23: Death Rates Among the Poor

Elevated death rates for the poor are evident in almost all of the major causes of death and in each major group of diseases, including infectious, nutritional, cardiovascular, injury, metabolic, and cancers.
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Slide 24: Risk of Death

Let's look at this chart and look at the risk of death from all causes according to annual household income, and the risk increase with decreasing income.

Slide 25: Cardiovascular Disease

Heart disease is the leading cause of death in the United States and is one of the areas in which disparities are most evident.

Slide 26: Cardiovascular Disease

This chart shows that the occurrence of heart disease is the highest for individuals with an income of less than $35,000, decreasing sharply for individuals who have an income of $100,000 or more.
The Whitehall I Study, a long-term follow-up study of male civil servants, was set up in 1967 to investigate the causes of heart disease and other chronic illnesses. Researchers expected to find the highest risk of heart disease among men in the highest status jobs; instead, they found a strong inverse association between position in the civil service hierarchy and death rates.

Wilkinson 2009

Men in the lowest grade (messengers, doorkeepers, etc.) had a death rate three times higher than that of men in the highest grade (administrators). Further studies in Whitehall I, and a later study of civil servants, Whitehall II, which included women, have shown that low job status is not only related to a higher risk of heart disease: it is also related to some cancers, chronic lung disease, gastrointestinal disease, depression, suicide, sickness absence from work, back pain and self-reported health.

Wilkinson 2009

What they found was the opposite. Men in the lowest grade such as messengers had a death rate three times higher than that of men in the highest grade. Further studies, which have included women, have shown that low job status is not only related to a higher risk of heart disease; it is also related to some cancers, chronic lung disease, gastrointestinal disease, depression, suicide, sickness absence from work, back pain, and self-reported health.

Slide 27: Whitehall Study

Slide 28: Death Rates Among Men

Slide 29: Cardiovascular Death Rates

This chart shows the relative rates of death from cardiovascular disease among British Civil Servants according to the classification of employment. So, the lowest rate is found in the administrative classification. Next lowest is the professional or executive and it increases for clerical and other workers.
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Slide 30: Regional Convergence of Social Issues

This map is of North Carolina. It shows a regional convergence of social issues. Let’s look at the bottom of the map. Those counties with the highest premature mortality are shown in brown. Now let’s go one up, look at the middle map. This shows the percentage of uninsured, the highest percentages are shown in dark brown. These counties look very similar in pattern to the first map we looked at of premature mortality. Then, let’s go to the top map, which is percent poverty. The highest counties with percent poverty are shown in dark blue, so what we are essentially seeing here, is we are seeing the same maps that we are seeing the premature mortality and percent poverty are occurring in the same locations. And a partial explanation of this is the percent uninsured.

Slide 31: Education and Health

In the United States, individuals without a high-school diploma as compared with college graduates are three times as likely to smoke and nearly three times as likely not to engage in leisure-time physical exercise.

• In the United States, individuals without a high-school diploma as compared with college graduates are 3X as likely to smoke and nearly 3X as likely not to engage in leisure-time physical exercise

Pratt et al. 1999
As a result of a sedentary life-style and unhealthy eating habits (often as a result of conditions in which wholesome food is unavailable or exorbitantly priced, public recreation is non-existent, and exercising outdoors is dangerous), obesity and the diseases it fosters now characterize lower-class life.

Poor neighborhoods
- often dangerous
- high crime rates
- substandard housing
- few or no decent medical services nearby
- low-quality schools
- little recreation
- almost no stores selling wholesome food
- Offer residents, no matter what their race, income or education, little chance to improve their lives and engage in health-promoting behaviors.

People of lower socioeconomic status are more likely to die prematurely than are people of higher socioeconomic status, even when behavior is held as constant as possible.
Inequitable distribution of income and wealth may itself cause poor health. Daniels et al. 2000

Life expectancy appears to be more related to income inequalities than to average income or wealth. In a study of the relationship between total and cause-specific mortality with income distribution for households of the United States, a Robin Hood index measuring inequality was calculated and found to be strongly associated with infant mortality, coronary heart disease, malignant neoplasms, and homicide. Wilkinson 1989, Kennedy et al. 1996

Despite decreases in mortality, widening disparities by education and income level are occurring in mortality rates. Mortality rates for children and adults are related both to poverty and to the distribution of income inequality.

Growing inequalities in income and wealth will likely continue to be a significant determinant of disparities of health in the near future.

Despite decreases in mortality, widening disparities by education and income level are occurring in mortality rates. Growing inequalities in income and wealth will likely continue to be a significant determinant of disparities of health in the near future.
Slide 37: Effect of Income Inequality

This graph shows the effect of income inequality in relationship to health. Look at the upper right hand corner of the graph—United States of America appears. It has a high income inequality and it also has the worst health and the relationship between income inequality and health increases: the more inequality the worse the health, the less inequality, the better the health. We can see countries such as Finland, Norway, and Sweden, in which there is less income inequality; have a better index of health.

Slide 38: Income Inequality

It’s also interesting that we can see the same relationship between income inequality and health in various states throughout our nation. So, states with high income inequality have worse health and social problems. Mississippi, Louisiana, Alabama, and New York on the right side of the graph have high income inequality and also have poor health indices.

Slide 39: Material Gap

The problems in rich countries are not caused by the society not being rich enough, but by the scale of material differences between people within each society being too big. What matters is where we stand in relation to others in our own society.
In and around Washington DC, the gap is bigger still—a 20 year gap between poor Blacks in downtown Washington and well-off Whites in Montgomery County, Maryland, a short metro ride away.

This graph gives a possible clue to the influence of income inequality on health. Again, the USA appears in the upper right-hand corner. This graph shows that the percent of the population that is obese increases with increasing income inequality and again, on the left side of the graph with lower income inequality, countries such as Norway, Sweden, Denmark, and Finland have lower percentages of individuals who are obese.

Above a level where material deprivation is no longer the main issue, absolute income is less important than how much one has relative to others. Relative income is important because, it translates into capabilities. What is important is not so much what you have but what you can do with what you have. Hence control and social engagement are thought to be important to health status.
Slide 43: Environmental Factors

Returning to our diagram, we will briefly examine environmental factors.

Slide 44: Environmental Quality

These include hazardous wastes, air pollution, water pollution, noise, crowding, housing quality, work environments and neighborhood quality. All of these are important to the health of the individual.

Slide 45: Biological Influences

Returning back to our diagram, we will now look at some biological influences on health.
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Slide 46: Behavior

Modifiable behavioral risk factors are leading causes of mortality in the United States.

Slide 47: Underlying Causes

Important underlying causes, in addition to smoking, are microbial agents, toxic agents, motor vehicles, firearms, sexual behavior, and illicit use of drugs.

Slide 48: McGinnis and Foege Study

This chart comes from a study by McGinnis and Foege and it shows the actual causes of death—causes related to our behaviors, to risk factors, not the diagnosis that appear on the death certificate. As we look at this chart, we see the prominent role of tobacco, now closely followed by poor diet and physical activity and then a host of other behavioral factors from substance abuse to motor vehicle use and sexual behavior.
The burden of chronic diseases is compounded by the aging effects of the baby boomer generation and the concomitant increased cost of illness at a time when health care spending continues to outstrip growth in the gross domestic product of the United States. Mokdad et al. 2004

Although there is still much to do in tobacco control, it is nevertheless touted as a model for combating obesity, the other major, potentially preventable cause of death and disability in the United States. Smoking and obesity share many characteristics. Schroeder 2007

They are highly prevalent, they start early in life, they are major risk factors for chronic disease, they involve intensively marketed products, they are more common in lower socioeconomic classes, they carry a stigma, and they are difficult to treat.
Lifestyle

- Personal behaviors play critical roles in the development of many serious diseases and injuries.
- Behavioral factors largely determine the patterns of disease and mortality of the twentieth-century populations of the United States.

Fifth Phase of the Epidemiologic Transition

- The Age of Obesity and Inactivity

Fifth Phase of the Epidemiologic Transition

- The steady gains made in both quality of life and longevity by addressing risk factors such as smoking, hypertension, and dyslipidemia are threatened by the obesity epidemic.
- The latest prevalence and trends in obesity data from the National Health and Nutrition Examination Survey (NHANES), reported by Flegal and colleagues, show that in 2007-2008, 68.0% of US adults were overweight, of whom 33.8% were obese.

Slide 52: Lifestyle

Personal behaviors, as we've been discussing, play critical roles in the development of many serious diseases and injuries. Behavioral factors largely determine the patterns of disease and mortality of the 20th century and now 21st century populations of the United States.

Slide 53: Fifth Phase of Epidemiologic Transition

We can be said to be in the fifth phase of the epidemiologic transition. The first stage, we discussed was seen in the early 20th century and in the 19th century. It was characterized by infectious disease. Further stages were characterized by chronic disease. We are now in the fifth phase, characterized by obesity and inactivity.

Slide 54: Obesity Epidemic

And this obesity epidemic is threatening the steady gains we have made in quality of life and longevity by addressing risk factors such as smoking, hypertension, and dyslipidemia. The latest prevalence and trends in obesity data, reported by Flegal and colleagues, show that in 2007-2008, 68% of US adults were overweight, of whom 33.8% were obese.
Early obesity strongly predicts later cardiovascular disease, and excess weight may explain the dramatic increase in type 2 diabetes, a major risk factor for cardiovascular disease. The longer the delay in taking aggressive action, the higher the likelihood that the significant progress achieved in decreasing chronic disease rates during the last 40 years will be negated, possibly even with a decrease in life expectancy.

Gaziano 2010

More men than women were overweight or obese, 72.3% compared with 64.1%. If left unchecked, overweight and obesity have the potential to rival smoking as a public health problem, potentially reversing the net benefit that declining smoking rates have had on the US population over the last 50 years.

Gaziano 2010

Inadequate health care may account for 10% of premature death. Health care receives by far the greatest share of our resources and attention.

Slide 55: Early Obesity

Slide 56: Men V. Women

Slide 57: Medical Care as a Determinant
Slide 58: Health Care Services

Let’s look at this graph; it shows those who did not receive needed health services in the past year due to cost. The largest age group that did not receive needed health services was those that were 18 to 44 years of age, probably because of the fact that this group is more likely to be uninsured. The group that is the smallest in not receiving needed health services is the group 65 years and over, shown by the brown bars on the graph. This is probably related to the fact that this group is covered by Medicare.

Slide 59: Without Healthcare Services

The next graph shows individuals without a usual source of care. Adults aged 45-64 years. We see here that minorities dominate in not having a usual source of care, and this is true for those diagnosed with chronic diseases, diabetes, serious heart conditions and hypertension, as well as those not diagnosed with chronic heart disease.

Slide 60: Persons Under 65 Years

And finally, this graph shows persons under 65 years who did not get needed medical care due to cost, and as we would expect, the group that is largest in this regard is the group that is uninsured and the group that is below the poverty line.
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Slide 61: Missing Routine Medical Visits

Missing routine or preventive medical care can lead to the need for emergency care or even to preventable hospitalizations. Lack of access to transportation due to not owning a vehicle, not having a vehicle available via a friend or family member, or not having access to public transportation can lead to difficulty in seeking medical care.

Slide 62: Population Health Challenges

The population health challenges we face include preventable chronic illnesses, an obesity epidemic, an unsustainable health care delivery system because of its escalating cost and its limited impact on the health status of populations.

Slide 63: Fundamental Principle

The fundamental principle of population based prevention is that the health of the community is dependent on many factors affecting an entire population. Thus, the target for public health interventions should be a geographic or otherwise defined population.
Because of the broad distribution of most diseases and health determinants, using a population as an organizing principle for preventive action has the potential to have a great impact on the entire population’s health. It takes partnering at all levels to fully realize the impact of any health intervention.

Population-based and individual-targeted preventive strategies must be considered to be complementary, not exclusive. Comprehensive population-based prevention strategies may involve screening programs for individuals, for example, newborn screening for metabolic diseases, childhood lead testing, colorectal cancer screening, mammography, and pap smears.

In 1979, Healthy People marked a turning point in the approach and strategy for public health in the United States. The key to Healthy People was the premise that the personal habits and behaviors of individuals determined “whether a person will be healthy or sick, live a long life or die prematurely.”
Slide 67: Healthy People, 1979

This is the cover of the 1979 edition of Healthy People, the Surgeon General’s report on health promotion and disease prevention.

Slide 68: Jimmy Carter

This is the letter from Jimmy Carter that accompanied the 1979 Healthy People document. While the slide may be difficult to read, I want to read some excerpts from this letter. “We Americans are healthier today than we have ever been. Our understanding of the causes of health problems has grown enormously, and with it our ability to prevent and treat illness and injury. I have long advocated a greater emphasis on preventing illnesses and injury by reducing environmental and occupational hazards and by urging people to choose to lead healthier lives. So I welcome this Surgeon General’s Report on Health Promotion and Disease Prevention. It sets out a national program for improving the health of our people—a program that relies on prevention along with cure.”
Slide 69: Healthy People

Healthy People set forth a national agenda with two specific goals—improving the population’s health and achieving health equity or reducing health disparities.

Slide 70: Simple Measures

The report urged Americans to adopt simple measures to enhance health including: elimination of cigarette smoking, reduction of alcohol misuse, improving diet, increasing exercise, periodic screening at intervals to be determined by age and sex, and adherence to speed laws and use of seat belts.

Slide 71: Age-related Risk

A major thrust of the report was a focus on age-related risk. The health problems that affect children change in adolescence and early adulthood and again in old age. At each stage in life, there are different problems and different preventive actions.
Slide 72: Adolescents

Accidents and violence predominate in adolescence; chronic disease is the major problem in later adulthood and old age. Healthy People set out five age-specific goals in 1979.

Slide 73: Healthy People Goals

These goals with specific objectives were reformulated in a second report issued by the Surgeon General in the fall of 1980.

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*39 Topic areas with objectives

Slade-Sawyer, P, HHS Office of Disease Prevention and Health Promotion

Slide 74: Healthy People Document

And for each successive decade, we have had a Healthy People document, spelling out the nation’s agenda to improve health. And the number of objectives has grown with each document, so there were 226 in 1990 and in Healthy People 2020, nearly 600.

Slide 75: Healthy People 2020

The overarching goal of Healthy People 2020 is to attain high quality, long lives free of preventable disease, with a reduction in premature death and the second goal to achieve health equity, eliminating disparities and improving the health of all groups.
Healthy People 2020 strive to identify nationwide health improvement priorities. Healthy People 2020 strive to identify nationwide health improvement priorities and to provide measurable objectives and goals that are applicable to national, state, and local levels. This will require a partnership engaging multiple sectors to take actions to proceed along this agenda, improving practices that are driven by the best available evidence and knowledge.

Let’s summarize what we have been discussing in this presentation. Successful health promotion depends on a population-based strategy of prevention. Common diseases have roots in lifestyle, social factors, and environmental determinants. Determinants which have the most influence on health are environment, social factors, and biology. Americans live longer with less ill health or premature death, but these gains are not shared equally by all members of society.
Elevated death rates for the poor are evident in almost all causes of death. Modifiable behavioral risk factors are leading causes of mortality in the United States. Most important, because of the broad distribution of determinants and their impact on health, addressing populations will have the greatest impact in the future in improving the health of our population, our communities, and also the health of individuals.