Factors That Influence Life Expectancy

HOW LONG do you think the average person lives? In the United States, life expectancy is about 78 years. Of course, some infants die, and some adults live past the age of 100. A variety of factors affect how long any one individual will live. In this unit, you will learn about the factors that influence life expectancy.

Objective:

Identify factors that influence life expectancy.

Key Terms:

- cell regeneration
- clostridium difficile (C. diff)
- cryosurgery
- gene therapy
- genome project
- human cryogenics
- hypothermic theory
- metabolic syndrome
- MRL mice
- nanotechnology
- staphylococcus aureus (MRSA)
- stem cells
- T-cells

Understanding Life Expectancy

Many factors affect how long an individual will live. Some are controllable, such as access to medical care and proper nutrition. But other factors are uncontrollable, such as genetic disorders. Technology, including advances in the treatment of many diseases, has had a major impact on life expectancy.

CONTROLLABLE FACTORS

Certain steps can be taken to increase life expectancy, such as improving prenatal care, treating mental health issues, educating people on the dangers of smoking and of being overweight, promoting healthy eating and exercise habits, and more.

Infant Mortality

Life expectancy is related to infant mortality. In the United States, an average of seven of every 1,000 babies will die before one year of age. This infant mortality rate is worse than the rates of Cuba and Singapore. Infant mortality is related to a lack of prenatal care due to low-income levels and a lack of easy access to health care. Yet high infant mortality may be controlled by limiting reproductive technology for high-risk patients to prevent multiple and premature births.

Mental Health

Mental health is essential. One in 20 Americans over the age of 12 is depressed, and 80 percent of American workers say depression interferes with their ability to work. As a result, it is imperative to know and practice a healthy lifestyle, which includes stress reduction techniques and mental health care, if needed. Stress can weaken the heart muscles and increase the formation of clots from plaque. In addition, excessive stress is related to stomach ulcers.

No Smoking

One of the most important healthy habits a person can have is to not smoke. Statistically, smoking is related to a person's level of education. One-half of the men with a GED smoke. In contrast, only 6 percent of people with graduate degrees smoke. Smoking also is related to ethnic groups and economic levels. It is highest in Native Americans and those below the poverty

BROADENING AWARENESS...

AMAZING ASPECTS: Secondhand Smoke

According to the Centers for Disease Control and Prevention, secondhand smoke contains at least 250 toxic chemicals. Secondhand smoke has been linked to heart disease and lung cancer in nonsmoking adults. A report by the Surgeon General stated that there is no risk-free level of exposure. Secondhand smoke has "immediate adverse effects on the cardiovascular system and causes coronary heart disease and lung cancer." The report estimated that exposure to secondhand smoke kills at least 65,000 people in the United States each year. In addition, the report determined that simply separating the smokers from the nonsmokers within the same space does not provide protection.

While people may choose not to smoke, it may be difficult to avoid secondhand smoke. For example, a bartender may never smoke a cigarette, but he or she is exposed to secondhand smoke 5 days a week while at work. Legislators in some states wanted to protect workers and other citizens who were being exposed to the smoke. For example, the Smoke-free Illinois Act went into effect in 2008 and prohibits smoking in public places. The law made it illegal to smoke in restaurants, bars, schools, office buildings, bowling alleys, concert halls, and many other locations. In addition, smoking is not permitted within 15 feet of the entrance or exit to public buildings. Businesses that do not comply with the no-smoking law may face fines of at least $250.

level. Regardless of who uses cigarettes, smoking is related to respiratory diseases, heart disease, macular degeneration, and 60 percent of cancers. Secondhand smoke also causes health problems.

Weight

Another important habit is maintaining a healthy body weight. Being overweight or obese is related to several chronic diseases. From 1980 to 2004, obesity has doubled in the United States for adults. Two-thirds of adults and 17 percent of children are overweight. Abdominal obesity is a factor in **metabolic syndrome**, also known as insulin resistance. This can increase the risk of heart disease and diabetes. Men should have a waist measurement of less than 40 inches, and women should have a waist measurement of less than 35 inches.

Exercise

Exercise is critical. One-half of all people at the poverty level get no exercise. About 40 percent of the total U.S. population gets no exercise, contributing to various health issues. Yet exercise burns calories and reduces the swelling and stiffness of arthritis.

Nutrition

Healthy eating and drinking are essential components to maintaining a healthy weight. It is necessary to reduce a high-fat diet. People should limit "junk food" and fast foods. In addition, charred meats are associated with colon cancer and alcohol intake increases the risk of breast, laryngeal, and pancreatic cancer. Also, alcohol use is linked to heartburn and liver damage. A British study of 20,000 people found that those who ate at least five fruits and vegetables daily, limited alcohol, exercised, and did not smoke gained a potential of 14 extra years of life.

FIGURE 1. A nutrient-rich diet helps maintain a healthy weight and increase life expectancy.

Mind

It is important for older adults to stimulate their minds. This can be done, for example, by reading and doing crossword puzzles. Socializing has benefits, too. A 10-year study of people age 70 or older in Australia found that people who do not have a large network of close friends were 22 percent more likely to die during that 10-year period.

Prevention

In the past, health care in the United States has responded to the illness rather than focusing on prevention. However, prevention techniques are increasing. Cancer screening (e.g., cervical, skin, and colon) has reduced the mortality of patients because it is diagnosed in earlier stages. In addition, blood pressure and diabetes checks allow patients to begin treatments that reduce medical problems. Regular medical check-ups are recommended as well as recommended immunizations. Vaccinations have nearly ended smallpox, tuberculosis, typhoid, polio, and other diseases in the United States. Also, the appropriate use of antibiotics has cured many diseases.

Sanitation

Sanitation practices help prevent health problems. Sanitary food processes and storage techniques prevent contamination that can make people extremely sick. Unclean hands are the number one cause of food-borne illnesses.

Education

Education may play a part in a person's health. Statistics strongly suggest that a person with a higher education level has a healthier lifestyle. Education on healthy habits, medical care, and sanitation improves family health.

Legislation

Several pieces of legislation aim to keep people healthy. The Clean Air Act of 1970 set up standards for clean air because a study analyzed how lowering the levels of particulates in cities changes life expectancies. Reduced air pollution has increased life expectancy by 2.72 years. Safe water is another law to protect citizens. The Safe Drinking Water Act (SDWA) is a federal law that sets standards for drinking water, keeping more people safe from illness caused by contamination.

UNCONTROLLABLE FACTORS

Some factors that influence life expectancy are outside of your control, such as genetics, the environment, your country of origin, gender, economic level, ethnicity, and age.

Genetics

Genetics can be an important factor. Genetic disorders, including some types of cancer and diabetes, can be passed to the next generation. Also, genetic problems, such as Down syndrome, speed up the aging process.

Environment

It is not always possible to control the environment. Air pollution from highways, industrial waste, and wood fires can cause lung disease. The *New England Journal of Medicine* found that decreased air pollution in cities increased inhabitants' lives for 5 to 10 months. Unsafe water also lowers the life expectancy.

Country of Origin

Even the country where a person was born affects life expectancy. According to *The World Factbook* by the CIA (found at https://www.cia.gov/library/publications/the-world-factbook/rankorder/2102rank.html), the life expectancy at birth in Angola was just under 39 years, whereas the life expectancy at birth in Monaco is almost 90 years. Unsanitary conditions, malnutrition, and lack of immunizations in some countries result in a higher infant mortality rate. The percentage of AIDS infections in a country also impacts the life expectancy of its residents. In the Soviet Union, an economic depression lowered the life expectancy.

Gender

In some cultures boys are prized over girls, so boys receive more food and attention, leaving girls with a higher mortality rate. Statistically though, boys have a higher mortality rate, unless the country has a cultural bias against girls. There are 124 males for every 100 females conceived. By birth, only 105 males survive. Female premature infants have a higher survival rate than premature males.

Economic Level

Economic level also affects life expectancy. High-income countries have a higher life expectancy due to health and living conditions. In contrast, poverty has a major impact on lowering the life expectancy. However, even though the United States spends more on health care than any other nation, residents have a shorter life expectancy and higher infant mortality rate than many other developed nations.

Ethnicity

Even within the United States, people of different ethnicities have different life expectancies. Caucasians are expected to live 5.2 years longer than African-Americans. American women with Asian and Hispanic heritage have the longest life expectancies in the United States.

Age

Aging affects the immune system. The number of white blood cells stays the same, but their effectiveness decreases with age. **T-cells** are a group of white blood cells from the thymus gland that attack foreign substances directly. T-cells do not identify and remove cancer-causing cells as people age, allowing the bad cells to multiply and spread.

Superbugs

The excessive use of antibiotics causes drug-resistant "superbugs" in hospitals. **Clostridium difficile (C. diff)** is an intestinal bug not killed by alcohol hand cleaners. To destroy C. diff, wash hands with soap and water, and wash surfaces with a bleach solution. **Staphylococcus aureus (MRSA)** is a bacteria spread by personal contact. In 1970, MRSA was very seldom seen. By 2004, two out of three staph infections were MRSA. About 90,000 Americans each year obtain an infection that kills them while in the hospital.

TECHNOLOGIES

Various technologies influence life expectancy.

- **Gene therapy** may be used to improve infant mortality and the aging process. Multiple possibilities exist. Medications could alter the effect of genes. Genes could be transplanted to lower cholesterol. Gene therapy could be used to treat immune functions, heart disease, arthritis, diabetes, Alzheimer's disease, and Parkinson's disease.
- The **genome project** is a project formed to identify protective genes. The DNA sequence of each chromosome will be mapped.
- **Nanotechnology** is the development of a small microscopic machine that will be used to travel through the body to cut away and replace cells. DNA will determine the code for the heart cell machine and the skin cell machine.
- **Cryosurgery** uses low temperatures to bring down the body's tissue temperature during surgery. It is often used to repair hearts, stop leaking blood vessels, and seal detached retinas. It also is used to freeze and kill abnormal cells in cervical, liver, skin, and prostate cancers by using liquid nitrogen.
- **Hypothermic theory** is used for heart surgery to reduce the body temperature to slow down the patient's metabolism.
- **Human cryogenics** is a study of physics to find the effect of extreme low temperatures on humans. The theory allows the frozen body or the head to be warmed when a cure for a disease is found. The hope is to grow healthy human body parts to go with the head in the future.
- **Cell regeneration** is the capacity to grow cells. Some organisms possess this ability. For example, the salamander can regenerate a limb in 12 hours, and goldfish can regenerate kidneys. Humans are able to regenerate liver tissues. **MRL mice** have been lab bred. They can regenerate holes in ears and grow back toes and tails. They also can heal heart, liver, and kidney problems.
- **Stem cells** have the ability to repair and regenerate any tissue in the body. Stem cells found in umbilical cord blood and bone marrow are used in medical therapies. Stem cells could be used to research possible cures for cancer, Parkinson's disease, spinal cord injuries, and multiple sclerosis. Controversy on stem cells includes embryo genetic diagnosis, reproductive cloning, and prolife issues with the use of embryonic stem cells.

Summary:

Healthy habits affect life expectancy. It is important to exercise, avoid smoking, maintain a proper body weight, stimulate the mind, and get preventive medical care. Some factors that influence life expectancy are outside of your control. For instance, genetics may determine whether you develop certain conditions such as diabetes or cancer. Environmental factors and economic level affect life expectancy, too. Gene therapy is one example of a technology that may be used to improve infant mortality and the aging process.

Checking Your Knowledge:

1. How is life expectancy related to infant mortality?
2. What are some controllable factors that influence life expectancy?
3. What are some uncontrollable factors that influence life expectancy?
4. What are two examples of drug-resistant "superbugs?"
5. How has technology affected life expectancy?

Expanding Your Knowledge:

Many factors that affect life expectancy, controllable and uncontrollable, were listed in this unit. Create a poster detailing the five factors that you think are the most important for a long, healthy life. Compare your poster to those of your classmates. What factors did you have in common, and what factors were unique to your list? Discuss why you chose the five factors on your list and why you think they are the most important.

Web Links:

Growing Disparities in Life Expectancy
http://www.cbo.gov/ftpdocs/91xx/doc9104/04-17-LifeExpectancy_Brief.pdf

Simple Steps to Increase Your Life Expectancy
http://longevity.about.com/od/liveto100/ss/life-expectancy.htm

Secrets to Longevity
http://www.npr.org/2011/03/24/134827587/secrets-to-longevity-its-not-all-about-broccoli

Healthy Aging
http://www.forbes.com/2008/07/02/health-longevity-secrets-forbeslife-cx_avd_0702health.html