**TEXT SNIPPETS 1 - 30**

TEXT SNIPPET 1

We know now that [influenza](https://www.who.int/health-topics/influenza-seasonal), or flu, is caused by a virus – but for many years it was thought to be caused by a bacterial infection. In 1892, German scientist Richard Pfeiffer isolated a small bacterium from the noses of patients with flu, naming it ‘bacillus influenzae’.

Early attempts at a vaccine during the 1918 influenza pandemic were based on this understanding, and it was not until the 1930s, when the influenza virus was identified, that progress towards an effective vaccine could really begin.

TEXT SNIPPET 2

Influenza – also known as the ‘flu’ – is a highly contagious respiratory illness, which spreads easily through the air or when people touch contaminated surfaces. In many cases the disease is mild, with symptoms such as chills, fever and fatigue, and it can also be spread through asymptomatic infections in people who do not even know they are sick.

But the flu can also result in serious complications, particularly in vulnerable people like young children, older persons, pregnant women and people with medical conditions such as asthma, diabetes or heart disease. The most common complication is pneumonia, typically caused by a secondary bacterial infection.

Flu viruses mutate very rapidly, and uncontrolled spread gives rise to many different strains, which fall into 2 main types affecting humans – influenza A and influenza B.

TEXT SNIPPET 3

The H1N1 influenza pandemic that swept across the world from 1918 to 1919, sometimes called “the mother of all pandemics”, involved a particularly virulent new strain of the influenza A virus. The first wave of infections in early 1918 resulted in mild illness, but a second wave later that year was more deadly.

The 1918 pandemic is estimated to have infected 500 million people worldwide, killing between 20 and 50 million. The resulting death rates were so high that life expectancy rates around the world dropped by several years, and more people are thought to have died as a result of the flu pandemic than over the course of the entire First World War.

TEXT SNIPPET 4

Researchers in the United States and Europe raced to find an effective vaccine against influenza during the pandemic years, and their efforts produced hundreds of thousands of doses – but they were targeting the wrong pathogen.

  In 1933, British researchers Wilson Smith, C.H. Andrewes and P.P. Laidlaw at London’s National Institute for Medical Research (NIMR) made a breakthrough when they isolated and identified the influenza virus. They found no bacteria in throat washings from patients with influenza and discovered that the disease was caused by a virus.

With support from the US Army, the first inactivated flu vaccine was developed by Thomas Francis and Jonas Salk at the University of Michigan. The vaccine was tested for safety and efficacy on the US military, before being licensed for wider use in 1945.

TEXT SNIPPET 5

Influenza viruses with pandemic potential regularly emerge, but not all go on to cause a pandemic. WHO works to monitor influenza viruses with pandemic potential and to prepare for future influenza pandemics.

A live attenuated vaccine delivered in the form of a nasal spray was first licensed in 2003, a vaccine using recombinant DNA technology was approved in 2013, and additional influenza vaccines based on newer technologies are being tested in clinical trials.

Despite these efforts, seasonal influenza still kills up to 650 000 people a year globally. Influenza is a constantly evolving virus, and immunity to a single strain through infection or vaccination does not necessarily protect against new strains that develop.

TEXT SNIPPET 6

Researchers had long suspected that different types of influenza viruses existed, as the blood of some influenza patients did not develop antibodies to the strain isolated in 1933. During the testing period, scientists also discovered the existence of another strain of the virus: influenza B.

In 1942, a new bivalent vaccine was developed that protected against both the H1N1 strain of influenza A and the newly discovered influenza B virus.

During the 1947 flu season, researchers discovered that existing vaccines were ineffective against the flu viruses circulating at the time. To investigate the viruses in circulation, the World Health Organization (WHO) established the [Worldwide Influenza Centre](https://www.crick.ac.uk/partnerships/worldwide-influenza-centre) in 1948 and the [Global Influenza Surveillance and Response System](https://www.who.int/initiatives/global-influenza-surveillance-and-response-system) (GISRS) in 1952.

TEXT SNIPPET 7

Efforts to track the evolution and emergence of flu viruses continue today, and scientists monitor both seasonal and potentially pandemic flu strains. Because new strains appear frequently, the seasonal flu vaccine usually changes each year, as scientists determine how the virus has mutated and spread.

We don’t have direct evidence that climate change is influencing the spread of COVID-19, but we do know that climate change alters how we relate to other species on Earth and that matters to our health and our risk for infections.

As the planet heats up, animals big and small, on land and in the sea, are headed to the poles to get out of the heat. That means animals are coming into contact with other animals they normally wouldn’t, and that creates an opportunity for pathogens to get into new hosts.

TEXT SNIPPET 8

Influenza pandemics have occurred throughout history: records document at least 3 well before the 1918–19 pandemic, and another 3 have taken hold after, in 1957–58, 1968–69 and 2009–10.

Researchers are constantly working to develop new vaccine technologies to keep a step ahead of the viruses.

Scientists could now manufacture vaccines based on the monitoring of virus strains in circulation around the world, updating the strains targeted by the vaccine in response.

We don’t yet have a sense of what the changing weather will mean for COVID-19 and so we shouldn’t rely upon warmer weather to curtail transmissions. We need to do everything we can right now to slow the spread of this disease, and that means we need to follow the advice that public health experts are telling us and practice [social distancing and good hand hygiene, among other actions.](https://www.cdc.gov/coronavirus/2019-ncov/prepare/prevention.html)

TEXT SNIPPET 9

Many of the root causes of climate change also increase the risk of pandemics. Deforestation, which occurs mostly for agricultural purposes, is the largest cause of habitat loss worldwide. Loss of habitat forces animals to migrate and potentially contact other animals or people and share germs. Large livestock farms can also serve as a source for spillover of infections from animals to people. Less demand for animal meat and more sustainable animal husbandry could decrease emerging infectious disease risk and lower greenhouse gas emissions.

Recent research from Rachel Nethery, Xiauo Wu, Francesca Dominici and other colleagues at Harvard Chan has found that people who live in places with poor air quality are [more likely to die from COVID-19](https://www.hsph.harvard.edu/biostatistics/2020/04/linking-air-pollution-to-higher-coronavirus-death-rates/) even when accounting for other factors that may influence risk of death such as pre-existing medical conditions, socioeconomic status, and access to healthcare.

[This finding is consistent with prior research](https://www.hsph.harvard.edu/c-change/news/air-pollution-and-coronavirus/) that has shown that people who are exposed to more air pollution and who smoke fare worse with respiratory infections than those who are breathing cleaner air, and who don’t smoke.

TEXT SNIPPET 10

In places where air pollution is a routine problem, we have to pay particular attention to individuals who may be more exposed or vulnerable than others to polluted air, such as the homeless, those who don’t have air filtration in their homes, or those whose health is already compromised. These individuals may need more attention and support than they did even before coronavirus came along.

For those interested in research papers on air pollution and virus transmission:

* + - [Exposure to air pollution and COVID-19 mortality in the United States](https://projects.iq.harvard.edu/covid-pm) (Harvard University, preprint, 2019). This study found that a small increase in long-term exposure to PM2.5 leads to a large increase in COVID-19 death rate.
    - [Measuring the impact of air pollution on respiratory infection risk in China](https://www.sciencedirect.com/science/article/pii/S0269749117326623?via=ihub) (*Environmental Pollution*, *2018*). This study found that worse air quality in China may increase transmission of infections that cause influenza-like illnesses.

TEXT SNIPPET 11

For those interested in research papers on air pollution and virus transmission:

* + - [The association between respiratory infection and air pollution in the setting of air quality policy and economic change](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6394122/) (*Annals of the American Thoracic Society, 2019*). A study of nearly 500,000 New York residents found that higher particulate matter air pollution levels increased the chances of hospitalization for pneumonia and emergency deparment visits, especially for influenza.
    - [Airborne transmission may have played a role in the spread of 2015 highly pathogenic avian influenza outbreaks in the United States](https://www.nature.com/articles/s41598-019-47788-z) (*Scientific Reports, 2019).* Researchers have found that several viruses, including adenovirus and influenza virus, can be carried on air particles. This recent paper finds that particulate matter likely contributed to the spread of the 2015 avian influenza.

TEXT SNIPPET 12

During the SARS epidemic in 2003, this study found that increases in particulate matter air pollution increased risks of dying from the disease. SARS is a coronavirus, like COVID-19.

Climate change has already made conditions more favorable to the spread of some infectious diseases, including Lyme disease, waterborne diseases such as Vibrio parahaemolyticus which causes vomiting and diarrhea, and mosquito-borne diseases such as malaria and dengue fever. Future risks are not easy to foretell, but climate change hits hard on several fronts that matter to when and where pathogens appear, including temperature and rainfall patterns. To help limit the risk of infectious diseases, we should do all we can to vastly reduce greenhouse gas emissions and limit global warming to 1.5 degrees.

TEXT SNIPPET 13

We have seen a trend of greater emergence of infectious diseases in recent decades. Most of these diseases have entered into people from animals, especially wild animals. This trend has many causes. We have massive concentrations of domesticated animals around the world, some of which can be home to pathogens, like the flu, that can make people sick. We also have massive concentrations of people in cities where diseases transmitted by sneezing may find fertile ground. And we have the ability to travel around the globe in less than a day and share germs widely.

But a look at the origins of COVID reveals that other forces may be in play. In the past century we have escalated our demands upon nature, such that today, we are losing species at a rate unknown since the dinosaurs, along with half of life on earth, went extinct 65 million years ago. This rapid dismantling of life on earth owes primarily to habitat loss, which occurs mostly from growing crops and raising livestock for people. With fewer places to live and fewer food sources to feed on, animals find food and shelter where people are, and that can lead to disease spread.

TEXT SNIPPET 14

Another major cause of species loss is climate change, which can also change where animals and plants live and affect where diseases may occur. Historically, we have grown as a species in partnership with the plants and animals we live with. So, when we change the rules of the game by drastically changing the climate and life on earth, we have to expect that it will affect our health.

We can make many smart investments to avert another outbreak. Federal, state, and local agencies can support public health leadership and science, we can provide more funding for needed research, early response to outbreaks, and supplies for testing. And we can do much more to control the illegal wildlife trade.

Reducing air pollution caused by burning fossil fuels like coal, oil and natural gas also helps keep our lungs healthy, which can protect us from respiratory infections like coronavirus.

TEXT SNIPPET 15

We also need to take climate action to prevent the next pandemic. For example, preventing deforestation—a root cause of climate change—can help stem biodiversity loss as well as slow animal migrations that can increase risk of infectious disease spread. The recent Ebola epidemic in West Africa probably occurred in part because bats, which carried the disease, had been forced to move into new habitats because the forests they used to live in had been cut down to grow palm oil trees.

Rethinking our agricultural practices, including those that rely on raising tens of millions of animals in close quarters, can prevent transmissions between animals and spillover into human populations.

To combat climate change, we need to drastically decrease greenhouse gas emissions. Generating electricity from low-carbon energy sources like wind and solar decreases harmful air pollutants such as nitrogen oxides, sulfur dioxide, and carbon dioxide that lead to more heart attacks and stroke as well as obesity, diabetes, and premature deaths that put further strains on our health care systems.

TEXT SNIPPET 16

Preparation for pandemics is also about keeping people healthy at baseline. If we have a population in the U.S. where a third of our population are obese, and 5-10% of people have diabetes, we’re going to be immensely more vulnerable. And if you look at why people in the U.S. are not healthy at baseline, it has to do with our diets, pollution, and climate change. We have an opportunity here to recognize that prevention is by far the best approach to protecting health.

People with chronic health conditions, lower-income, and communities of color are disproportionately impacted by both COVID-19 and climate change, and pollution is at the heart of both problems as a new Harvard T.H. Chan School of Public health [study](https://projects.iq.harvard.edu/covid-pm)confirms. We know that African American communities are disproportionately [exposed to air pollution](https://www.washingtonpost.com/nation/2019/03/12/whites-are-mainly-blame-air-pollution-blacks-hispanics-bear-burden-says-new-study/) and we’re now seeing this pollution driving [higher mortality rates](https://www.nytimes.com/2020/04/07/climate/air-pollution-coronavirus-covid.html) from COVID-19. We owe it to everyone to improve health, and we do that by reducing the sources of pollution that drive a large burden of disease both in the United States and around the world.

TEXT SNIPPET 17

Having taken care of children and families who are deeply concerned about how they can protect their children from this disease, I can tell you that we need to wash our hands and we need to socially distance. But if we really care about preventing this kind of problem in the future, we need to think hard about climate change and the biodiversity crisis. I was actually in a room with a child and a family when I first thought that this is exactly the time that we need to think more about the broader issues that we face. We simply cannot afford to deal with a crisis like this pandemic on top of another climate-related crisis—like a hurricane, tornado, wildfire, or heatwave—when we absolutely know how to implement climate solutions, and can put them into action right now. Doing so will make us healthier today and protect our future.

Infectious diseases are scary because they are immediate and personal. They radically and rapidly change how we lead our lives, and they are an immediate threat to our friends and families. They hit all of our “go” buttons.

TEXT SNIPPET 18

Climate change seems to many an armageddon in slow motion and its dangers can feel impersonal and its causes diffuse. It’s easy to think “I didn’t cause this” or that “it doesn’t directly affect me.” But there’s another way to look at it. Like COVID-19, if you’re concerned about climate change, you can take actions right now to improve your health and the health of your friends and loved ones.

We can learn from this pandemic that people are motivated by the personal and the actionable. At Harvard Chan C-CHANGE, [our research](https://www.hsph.harvard.edu/c-change/issues/) shows that the actions we need to combat climate change are the same actions we need to make people healthier right now, especially for diseases causing huge burdens on our health like obesity, heart disease, and cancer. We need to do much more to talk about the “burden of disease” that’s preventable, and the things we can do now to prevent it.

TEXT SNIPPET 19

We spend just [over $3 trillion every year](https://morningconsult.com/2019/12/05/u-s-health-spending-rose-to-3-6-trillion-in-2018-propelled-by-health-insurance-tax/) in the United States on health care. And by some estimates, more than half the deaths in the United States are preventable, largely because of pollution, diet, exercise, and lifestyle habits like smoking. So think about the money we could save simply by reducing air pollution, eating less meat, and building exercise into our day by walking or biking more often. We could use the savings to invest in preventing climate change, among other things like education, and paying fair wages.

When you look at this question purely from a financial standpoint, air pollution is a drag on economic growth and solutions to address have been enormously cost-effective in the United States. In 2011, a study by the Environmental Protection Agency that looked at the costs and benefits of the Clean Air act found that every $1 invested to reduce air pollution returns up to $30 in benefits. The only thing our health and our economy can’t afford is climate inaction.

TEXT SNIPPET 20

Psychologists recognize four primary temperament types. The names of the types were originally [names of humor in more distant times](https://psychologia.co/four-temperaments/). In this case, humor does not mean what you find funny! This is the basis for an antiquated concept of medical science.

Humorism refers to the fluids believed to be present within an individual’s body. Since different people have different amounts of fluids, people thought that a dominant presence of one fluid defined a person’s temperament.

 Although modern medicine rejects humor’s role in temperament, the names of the four temperament types stuck.

TEXT SNIPPET 21

The way you perceive the world around you has a direct impact on how you interact with it. Armed with more knowledge about [your temperament](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3319036/), you can cultivate more awareness around this personality and what it means for you in your daily life. Awareness is always the first step in cultivating change.

People with sanguine temperaments are people-oriented, exhibiting traits such as outgoing and extroverted.

Moreover, they emphasize people are working together and trying to do good for one another,  generally being helpful overall. It is the most common type of temperament and typically either a primary type or secondary type.

This temperament type is just as likely to be found in men as it is in women. Some people are considered "super sanguine" because they are so overly talkative and active that it can be overwhelming to be around them.

TEXT SNIPPET 22

The melancholy temperament may show symptoms of being anxious. They might worry about the future and what others think. They may also worry about how things might have been done differently in the past. As such, they may seem like they resist living in the present.

This temperament is generally well organized, even if they become cluttered. They are usually on time for appointments and expect others to be as well. Before making decisions, they will gather as much information as possible and ask specific questions to make sure they are making the right decision.

People of the melancholy temperament are also suspicious and conscientious. They are slow to trust others until they are sure of their intentions. It is difficult for them to form relationships, and they have high standards for their relationships.

TEXT SNIPPET 23

People with the choleric temperament are creative. They never seem to run out of ideas or plans, all of which tend to be practical. They are steadfast in their ideas, however, and will not give in to peer pressure.

While they can be compassionate and rally for social causes, they are slow to build relationships in their personal life. They likely only have a few close friends, even though they are not afraid to meet and talk to new people. They don't tend to empathize with others. However, they are also very slow to anger, though their domineering personality and direct manner of speaking can be misconstrued as anger.

The different temperament types don't always mesh well. It is possible that two people of very different temperaments could experience related relationship issues. You can learn to understand each other and learn ways to cope with each other's needs. Here are a few tips to get you started.

TEXT SNIPPET 24

Trying to be more positive can give you the ability to thrive without fear holding you back from fully experiencing or enjoying the world. Also, it’s important to set goals that you can realistically achieve and give yourself whatever time you need to achieve them. Think of living a more positive life as a journey more than a destination.

For example, if you want to move out of your house, make small subgoals to lead you to that point, such as saving up a certain amount of money each month or buying useful miscellaneous items for the future home.

The way you perceive the world around you has a direct impact on how you interact with it. Armed with more knowledge about [your temperament](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3319036/), you can cultivate more awareness around this personality and what it means for you in your daily life. Awareness is always the first step in cultivating change.

TEXT SNIPPET 25

Phlegmatic temperaments are also common, but they can be seen as almost the opposite of sanguine temperaments.

People with this temperament type are service-oriented, exhibiting introverted personality traits, but will work with others to achieve a common goal. These people may seem passive and lack general ambition or specifically to accomplish a goal or milestone.

However, it is also possible to have a sanguine type primarily and a secondary type of phlegmatic, or the other way around.

You can better manage your temperaments by finding ways to help you create a [positive outlook](https://www.apa.org/monitor/2011/04/positive-psychology) on your life, including being grateful for your friends and loved ones.

TEXT SNIPPET 26

People with a choleric temperament are extroverted and exude self-confidence. They are independent and strong-willed. They have quick minds and are generally active and practical in their activities. Their communication style is assertive and direct, often brief, almost to the point of rudeness.

This temperament type enjoys taking risks and gets bored easily. They can be domineering and opinionated. They find it easy to make decisions, not only for themselves but for others as well. They can be somewhat controlling in relationships. Choleric types also tend to require less sleep than other temperament types.

The different temperament types don't always mesh well. It is possible that two people of very different temperaments could experience related relationship issues. You can learn to understand each other and learn ways to cope with each other's needs. Here are a few tips to get you started.

TEXT SNIPPET 27

The passiveness of the phlegmatic temperament type leads to a distinct set of characteristics. They are easy-going, calm, and unemotional. They can be indecisive and agreeable and are usually happy to allow others to make decisions for them.

Phlegmatic temperament people are slow to warm up to others but will make friends fairly easily. They are one of the easiest temperament types to get along with because they are so agreeable and patient. However, they stick closely to their routines and resist change.

The different temperament types don't always mesh well. It is possible that two people of very different temperaments could experience related relationship issues. You can learn to understand each other and learn ways to cope with each other's needs. Here are a few tips to get you started.

TEXT SNIPPET 28

When most people hear the word melancholy, they think of depression. However, the melancholy temperament type is not necessarily depressed so much as they are cautious. Those with melancholy temperaments are detail and quality-oriented, obsessing with understanding what is right.  Also, they might be seen as paying strict attention to detail, which could make them out as perfectionists. This is another common temperament type.

The melancholy temperament is a rule follower. They can be cautious and tentative in unfamiliar environments, but they can also become aggressive when faced with an unfavorable situation. They are private and introverted.

This temperament is factual, logical, and analytical. To function without anxiety, these people need to have a solid action plan and follow it to the letter.

TEXT SNIPPET 29

The choleric temperament is the rarest of the four primary types.

Those with a choleric temperament are results-driven by making goals and sticking with them until they are completed. Thus, they exhibit a positive demeanor and are constantly moving forward. Despite any opposition, they face everything with the mindset of getting results and achieving their desires.

It is more common for choleric to be a secondary temperament, although this is not as common as other combinations.

You can better manage your temperaments by finding ways to help you create a [positive outlook](https://www.apa.org/monitor/2011/04/positive-psychology) on your life, including being grateful for your friends and loved ones.

Trying to be more positive can give you the ability to thrive without fear holding you back from fully experiencing or enjoying the world. Also, it’s important to set goals that you can realistically achieve and give yourself whatever time you need to achieve them. Think of living a more positive life as a journey more than a destination.

TEXT SNIPPET 30

When you first meet someone with a sanguine temperament, you're likely to feel you've known them for a long time. They are comfortable to talk to and get to know. They are extremely friendly, talkative, and social. They will frequently get caught up in conversations and lose track of time. However, if they get bored, they can lose attention quickly. Their attention span is directly related to how much they enjoy the conversation or what they are doing.

Sanguine temperaments are also highly dynamic. If they think it or feel it, they will say it. They have no filter. Their hyperactivity often leads to forgetfulness and being disorganized. This temperament type is extremely competitive. They dominate sports, politics, and the business world. They also fear making a bad impression and rejection. They want most to be accepted but also to be the best they can be.