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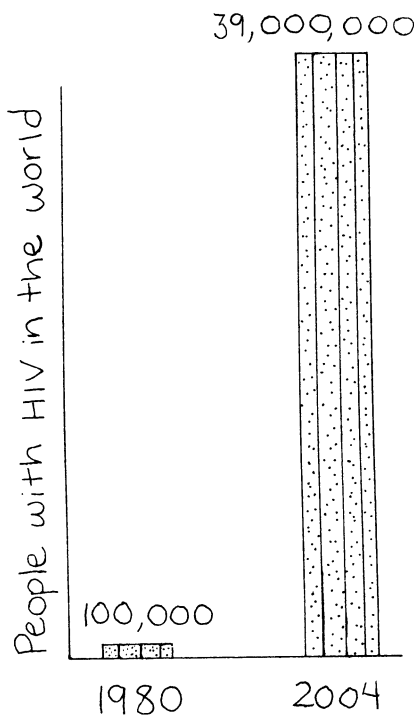
Min-Soo's story

Min-Soo is a student in your health training class. He comes from a village on the edge of a large town in South Korea. Recently a person in his community was diagnosed with AIDS. People are scared. Min-Soo is working with a project that teaches people about HIV. His friends have asked him many questions. They have asked where AIDS came from and which country has the most AIDS. They also want to know who gets HIV. Min-Soo knows these questions are about the “epidemiology” of HIV. He stays after your lesson to ask some more questions. “Where was AIDS first found? Which country has the most AIDS? How do we know that HIV is not spread by mosquitoes or sneezing? What does it really mean when they say that 15% of adults living in the capital of Rwanda have HIV?”

A short history of the HIV epidemic

HIV and AIDS have spread to almost all countries in the world. The virus is so common now that in some communities one of every 3 or 4 young adults are infected. When a disease becomes this widespread, it is called an epidemic. Epidemiology is the study of diseases in populations. It can be used to understand the spread of HIV. We must understand the spread of HIV if we are to stop the epidemic.

The first official case of AIDS was found in 1981 in the United States, but researchers believe that by that time many people all over the world had HIV. They think that in 1980, about 100,000 people worldwide had HIV. Most of the people who had the virus were not sick and did not realize they were infected. Today, over 39 million people, including 2 million children, have HIV. This is almost 400 times the number of people infected in 1980. You can see that HIV is spreading quickly to people all over the world.



The number of people with HIV in the world is growing.

HIV in the world

Over 39 million people with HIV

- around 22 million men
- around 17 million women

Of the 39 million

- around 80% got HIV during sex; of these, 80% got HIV during sex between men and women
- around 10% got HIV during injection drug use
- around 5% are children infected by mothers who have HIV
- around 5% got HIV through blood

Numbers of people with HIV in different parts of the world

- around 26 million in Africa
- around 1 million in North America
- around 2 million in Latin America
- around 8 million in Asia
- around 2 million in Europe and Central Asia

Because HIV is spreading so quickly, we cannot know exactly how many people have it. The HIV epidemic is like a fire that is spreading through a forest—by the time you have put out part of it, you find it has moved to a new area of the woods.

Global cooperation

Sometimes HIV seems like some other country's or community's problem. It is easy to find another community that has more infections than yours. But because we are all connected, HIV is a threat to everyone. A global view is needed to stop the spread of HIV.

In the beginning of the AIDS epidemic, people pointed fingers at other people or countries and blamed them for the problem. This happens with almost every new disease. Some people in the United States said HIV came from Africa and the Caribbean and that homosexual men (men who have sex only with men) were the cause. Now we know that this is not true, but countries in Africa and the Caribbean were insulted by the finger-pointing.

In the past, some countries were afraid to admit that they had people with AIDS for fear of losing money from tourists. Some of these countries are now openly saying that HIV is a problem for them. They are working with the international community to stop AIDS. Understanding that HIV and AIDS are a problem for every country and taking action to stop its spread are important for the world. Countries that ignored the epidemic have more HIV and AIDS now than many of those that worked toward stopping the spread of the virus early. In the end, it is not important to know where the virus started. It *is* important to know where it is going.



How HIV is spread worldwide

More than 300 million people cross international boundaries each year. Changes in transportation have made it easier for HIV to spread. Someone with the virus can travel from London, England to a small village in Asia in a day. If he has unsafe sex with a person in the village, HIV can spread across the world with him. The same can occur if someone from a village visits a city, becomes infected, and returns home. This is how the virus moves. It spreads from person to person, village to village, and city to city. For a virus like HIV there are no borders. Where people move, HIV moves.



As we said in Chapter 1, HIV can only be spread through sex, blood, dirty needles or other instruments, and from a mother to her baby. HIV does not necessarily affect the same people first in every community. For example, in India most people with HIV got the virus from having heterosexual sex—sex between a man and a woman. In Russia most people with HIV got the virus from sharing used needles while injecting drugs. There are a few reasons why people who take part in a particular risky behavior may be affected first or affected more by HIV:

- Certain behaviors (like injecting drugs) may be more common in some countries or regions.
- The first people to contract HIV in a certain region will pass the virus on within their own communities. So if a gay man (a man who only has sex with other men) is the first to be infected in a certain town, he will pass the virus on to other men who have sex with men in that town first.

Cities and disease

Half of the world's population lives in cities. Diseases like tuberculosis and the flu spread more quickly in the city because people are crowded together. HIV also spreads faster in cities, for many reasons. For example, people in cities tend to have sex with a greater number of partners. More people move to cities every year. As more people move to cities it is likely that HIV will spread even faster than it already does.

Because a certain group of people may be the first to get HIV, others in the community may see HIV as only affecting people who are members of that group. But unless the whole community works to stop HIV right away, it will quickly spread and infect people from many different parts of the community. HIV may be seen as a disease of gay men, or of drug users, of prostitutes, or of unfaithful husbands. But HIV will infect anyone who is exposed, including faithful wives, newborn babies, and people who have never taken illegal drugs.

Effects of HIV on the community

Most people with HIV are adults from 20 to 40 years of age. This means people are dying at an age when they are vital members of their communities. Illness and death at these ages affect the strength and productivity of a community. In most places, women and men between the ages of 20 and 40 take care of their own children and sometimes even their parents, grandparents, or grandchildren. When these men and women die, children and the elderly are often left without support. AIDS has killed either one or both parents of millions of children around the world. In most countries there are not enough orphanages to support all of the children whose parents die from AIDS. This is just one way AIDS changes families and communities.

The spread of HIV has also changed health care. More hospital beds are needed for people who are sick with AIDS. Because hospitals and clinics are so busy, less attention can be given to everyone who is sick. In one African country, three top officials of the ministry of health died of AIDS in one year. There was no one in the country who was qualified to replace them. This affected the health of the entire country.



Because of HIV, hospitals and clinics have become even more crowded.

War and HIV

War can increase the spread of HIV in many ways. During wartime soldiers move from place to place. Soldiers with HIV or other sexually transmitted diseases spread them to new communities.

Soldiers also often attack clinics and hospitals. This means that services such as HIV counseling, testing, and medical care may stop. Sometimes hospitals and clinics are forced to close.

During war, parents are killed and families broken apart. Because men in particular may be killed or sent away to fight, the meaning of social customs such as marriage and sex also changes. Husbands and wives may have more sex partners when they are separated.

As people lose their homes and animals, fear and hunger make them leave the countryside for the protection of cities. War often brings poverty and despair, driving people into drug use or prostitution. These changes make it easier for HIV to spread to people who before might have been safe from the virus.

War changes people's ideas about life. When people are surrounded by so much upheaval and death, they do not worry about catching HIV because it does not kill for years, whereas bullets or bombs may kill them tomorrow.

In the late 1970s, a war occurred in southern and western Uganda. This war made it easier for HIV to spread. It left many people homeless, poor, or living as refugees in the capital. With the movement of troops, the arrival of truck drivers from the coast, and the new refugees, HIV spread rapidly. By the mid-1990s, 10% to 25% of the younger people in some areas of Uganda had HIV, and over a million children were orphaned by HIV.



HIV and other diseases

People with HIV are more likely than people without HIV to get certain cancers like Kaposi's sarcoma and lymphoma, and opportunistic infections like cryptococcal meningitis and thrush. Some people have worried that these diseases would spread to people without HIV. But these cancers and infections do not spread to other people. So far the only disease that people with HIV are likely to spread to other people is tuberculosis (TB).

The epidemiology of tuberculosis and HIV

People with HIV live many years before they become ill. People infected with tuberculosis (TB) can also live many years without becoming ill, because the bacteria that cause TB can live quietly in a person. Unfortunately, people who have HIV and TB infection become ill with TB much more often than people who do not have HIV.

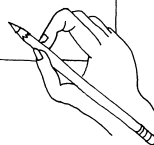
Most of the diseases that people with HIV get are not passed to others. TB is different in that it can be spread to other people. About 5% of people with HIV and TB infection will become sick from TB each year. It is believed that in some areas of the world, around 50% of the people are already infected with TB. The spread of HIV is especially dangerous for these people.

Find a pencil and paper and follow the numbers in this imaginary example:


The town of Mycolandia in East Africa has 500,000 people and 50% of them are infected with TB. This means that 250,000 people have TB in their body. Most are not sick from TB. The TB bacteria are just living quietly.

In Mycolandia, 25% of the people have HIV. This means 25% of the 250,000 people infected with TB also have HIV. In other words, 62,500 people have both infections.

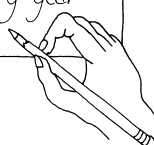
If 5% of people with both TB and HIV infection become sick with tuberculosis in one year, that means that 3,125 people with HIV will become ill with TB disease each year. Each person who becomes ill with TB can spread it to other people. If a person with TB is treated with the right antibiotics, he will no longer spread the TB bacteria and he will feel better.


$$500,000 \times 50\% = 250,000$$

with TB


$$250,000 \times 25\% = 62,500$$

with TB and HIV


$$62,500 \times 5\% = 3,125$$

with HIV who become ill
with TB every year

How do we study the HIV epidemic?

The HIV epidemic can be divided into two parts: people with HIV and people with AIDS. People with HIV who do not have AIDS are difficult to count because they usually are not ill. You need a test to know if someone has HIV. It is easier to count how many people have AIDS because they are sick from HIV disease and usually go to a health worker for treatment. The World Health Organization (WHO) has a definition of AIDS that uses the presence of certain diseases and does not require a blood test (see the first box in the appendix, and the second and third boxes from the end of the appendix). It takes many years for people with HIV to get AIDS. If we only count people with AIDS, we will think that many fewer people have HIV than really do.

It is too expensive to test everyone for HIV. This is where the tools of epidemiology, such as screening (testing groups of people) and surveillance (regularly monitoring the rates of a disease), come in handy. By testing certain groups of people and using math, it is possible to come up with an idea of how many people have HIV, who they are, and where they are living.

Let us imagine you want to know how many women giving birth in your city have HIV. One way is to test every woman giving birth. But this would cost too much if you live in a big city where many women give birth each year. Another way would be to choose two or three hospitals from different parts of the city and spend one month testing every woman giving birth. The results of this study could be used to get a general idea of how many women giving birth in the city have HIV. If 500 women gave birth at the hospitals where you did testing and 50 had HIV, then 10% of all women giving birth at the hospitals in a one-month period had HIV. If you already know that in the entire city, about 1,000 women give birth to babies in a one-month period, then you could multiply 10% by 1,000 and estimate that about 100 women with HIV give birth to children every month in the city. This means that in a year, about 1,200 women with HIV give birth to children in the city. This number is an estimate.

An estimate is a best guess. Sometimes estimates are not correct. You can get an idea of how good an estimate is by thinking about where your calculations might be wrong. For example, if the hospitals where you did your testing were in parts of the city where many people with HIV live, then the number of women with HIV giving birth would be higher there than in other hospitals in the city. This would mean 1,200 is an overestimate and the true number is less. Good estimates provide information that can be used to focus resources without having to test everyone, but be careful: bad estimates can lead to bad decisions and wasted resources.

In New York City in the United States, studies of drug injectors showed that sharing needles spread HIV. Around 70% of the people injecting illegal drugs had HIV. Less than 1% of the rest of the population had HIV. Studies like this one helped people plan special programs to try to stop the spread of HIV among drug injectors. If in your community only a small percentage of drug injectors have HIV, then it would be especially useful to set up a program to talk with drug users about the dangers of sharing used needles, to show them how to sterilize needles, and, if possible, to provide them with new, clean needles. This could keep the rate of HIV infection low. Do not wait until most drug injectors are already infected to start your work.



Question the experts and their studies

How do we know the number of people with HIV in a country? It would be very difficult to test all of the people living in any country. Instead, people test different groups and estimate what percentage of the entire population is infected. When someone says that 10% of people in an area have HIV, a few questions should come to mind. The first question to ask is, "Who is saying this?" Is it someone who is actually testing people and who would know about how many people are positive, or is it someone who is just guessing? Ask how the study was done. Who was tested? Was it only people in a big city? If so, the estimated number is likely to be higher than the true number for the whole region, because in most parts of the world, people in cities are more likely to have HIV. Were only sex workers tested? If so, the estimate will be higher than the true number in the general population, because sex workers are more likely to have HIV. Were the people who were tested over 60 years old? If so, the estimate is likely to be lower than it should be, because people over 60 are less likely to have HIV than people in their twenties. Most of epidemiology is based on estimates, so be careful and ask questions!

Epidemiology can also be used to find out what happens to people once they have HIV. Questions such as "How long do people with AIDS live? With what diseases do people with HIV become sick? How do they die? What medicines help?" can be answered by closely watching people with HIV and carrying out studies.

A very short dictionary of epidemiology

The words that people use to talk about the spread of disease can be confusing. Here are some definitions:

Rate. Rate is one of the most important ideas in epidemiology. Rate is the amount of something in relation to something else. It is usually shown as a proportion or percentage. Often it contains the idea of time. For example, imagine that 10,000 cases of AIDS have been reported to the ministry of health over the past ten years. You could tell someone this information alone, or you could say that the country only has a population of 100,000 people, and the rate of AIDS is 0.1, or 10% (10,000 cases divided by 100,000 people).

Ten thousand cases is more serious in this country than in a country where 10,000,000 people live. In the second country, the rate of AIDS is 0.001, or 0.1% (10,000 cases divided by 10,000,000 people). You can see how the number of cases of AIDS or HIV infection is often less important than the rate of disease or infection. When someone tells you the number of people with AIDS in an area, always ask for the number of people living there. This will give you an idea of the rate of disease.

Incidence. The incidence of a disease is how often new cases of it appear in a population during a set period of time, usually one year. For example, if you wanted to know the incidence of HIV in a village, you could test all the people in the village and record that information as your baseline. Then test all of the same people one year later. Count the number of people who did not have HIV during the first test but did have the virus during the second test. Divide this number by the total number of uninfected people in the village. The result is the incidence of HIV in this village (the number of new infections per person per year).

Imagine that 1,000 people live in the village. One hundred of them had HIV the first time you tested them. One year later, 150 people had HIV. This means 50 new people were infected. Fifty new infections among the 900 people who were not originally infected means the incidence of HIV infections was 0.055, or 5.5%.

Prevalence. Prevalence is the proportion of people who have a disease in a community at any one point in time. In the example above, the prevalence of HIV would be 10% the first year (100 cases among 1,000 people living in the village) and 15% the second year (150 cases among 1,000 people living in the village).

Bias. Bias occurs when an unexpected factor affects the results of a study. For example, imagine you want to find out how many pregnant women in your town have HIV. You test all the pregnant women who come to your medical clinic over a three-month period. Since people with HIV are more likely to be sick and come to the clinic, and you tested all pregnant women who came to the clinic, you will find more women with HIV than if you tested every pregnant woman in the town. Testing only sick pregnant women influenced your results. Your study was affected by bias. Bias can happen even when you are trying to avoid it. If you ask questions with a tone that tells people that you want them to answer in a certain way, you can bias your results. For example, if you want to know how many people inject drugs but ask, "You do not use those illegal, deadly drugs do you?" then fewer people will answer yes than really do use drugs. Your results will be biased.

AIDS can be seen as the footprints that HIV has left as it spreads from person to person. Epidemiology is used to examine these footprints in order to understand where the virus is going and how to stop its spread. Knowing the size of the HIV problem in your community helps you prepare for the future. Education and prevention programs can involve the people who need them most. By continuing to gather information about HIV you will know whether or not you are slowing the spread of HIV.

Answering Min-Soo's questions

“Where was AIDS first found? Which country has the most AIDS? How do we know that HIV is not spread by mosquitoes or sneezing? What does it really mean when they say that 15% of adults living in the capital of Rwanda have HIV?”

AIDS was first described in 1981 in Los Angeles in the United States, when five patients became sick with an unusual pneumonia that occurred in people with weak immune systems. The virus causing AIDS was found by a group in France a few years later.

From studying the epidemiology of AIDS, we know that HIV is not spread by mosquitoes or sneezing. Almost all people with HIV can trace their infection back to sex, blood, dirty needles or instruments, or from mother to baby at birth. If mosquitoes could spread HIV, then AIDS would be seen in the same people who have malaria. We would see more children and old people with HIV. This is not the case. Similarly, HIV is not spread through sneezing or other “casual contact” with people who have HIV. Health care workers do not get the virus through casual contact, even though they spend many hours caring for people who have HIV. Within families, HIV is spread only through sex or from a mother to her baby; people do not get ill from living with and caring for family members who have HIV.

No one has tested all of the adults living in the capital of Rwanda for HIV. What people have done is tested a group of people and estimated what percentage of the entire population is infected. Thus, 15% is a statistical guess. You can explain to Min-Soo that the idea that 15% of the adults in the capital of Rwanda have HIV is an estimate made from several different studies.