[MUSIC PLAYING]

HELENA NORDENSTEDT: Hi again. This subsection that we'll talk about today is about non-communicable diseases. As you just heard, it is a clumsy, clumsy name for a big group of diseases, and it is extremely difficult to find a clear-cut name for this diverse category of diseases. We used to think, as the name implies, that these are diseases that are not caused by germs such as viruses, bacteria, parasites. But research has shown that quite a few of the so-called non-communicable diseases are indeed caused by long-term infections. So for example, we now know that stomach cancer is often caused by chronic infection with Helicobacter pylori bacteria.

In this subsection, we will look closer at the most common non-communicable diseases in the world. First, we have cardiovascular diseases, which is diseases of the heart and blood vessels or basically heart attacks and strokes. The others are cancers, lung diseases like asthma and chronic obstructive pulmonary disease, and finally diabetes. Let's see what these four types of disease categories actually have in common.

The world used to be simple. There were poor countries with infectious diseases and rich countries with non-communicable diseases. Things have changed. Both the world and our understanding of the world.

I already told you that, on one hand, quite a few of the non-communicable diseases are caused by infections, but actually, on the other hand, cardiovascular diseases and cancers are also common in the poorest countries. Very often, they're just not recognized because of lack of diagnostic tools. Just as important, today there is a big middle in between the richest and poorest countries. And the middle is where most people live, 5 billions.

In the lower end of the middle-- the so-called lower-middle-income countries-- infectious diseases still make up a large part of the disease burden, but the general trend is that as a country gets richer, non-communicable diseases become more and more common. Is that because people, as soon as their country graduates from the low-income group to become a middle-income country, start eating unhealthy, deep-fried Western fast food? Nope. The main explanation is much simpler than that.

As you know, health and wealth go together. The richer country means less deadly infections. Less deadly infections, in turn, means more children surviving to become adults and fewer

babies born per woman, which in turn will result in an older population. And the risk of getting most non-communicable diseases increase with age. Maybe you think it's a bit counter-intuitive, but that means that the increase in non-communicable diseases when countries become richer is to a great deal of the result of much better child health.

Let's take a look at this burden of disease snapshot from the Democratic Republic of Congo, a big country in Africa with a very low-income per person. This box represents the total burden of disease in Congo. As you can see, the blue box here stands for non-communicable diseases. It's about 1/4 of the total disease burden.

The disease burden for injuries-- that's the small green box down in the corner, and the major part of the disease burden in Congo is made up of the big red box containing infections, maternal, and nutritious diseases. As we move along the income axis from Congo to India, a lower-middle-income country, and then onwards to China, an upper-middle-income country, and finally the US, a high-income country.

As these countries become richer, there is a shift from infections to non-communicable diseases. The red box becomes smaller and smaller, while the blue box increases. The green injuries box remains more or less the same size here in the corner.

But as you can see, the greatest shift in the disease pattern is here between Congo and India, and between India and China. The last step between China, the upper-middle-income country, and the US, a high-income country, the difference is really not that big between those two countries, even though the US still has an income per capita that is almost 10 times as high as that of China. That's for now, at least.

So what is the percent of deaths caused by non-communicable diseases? Actually, the most common cause of death overall in the world is cardiovascular diseases. Heart attacks and strokes. They are responsible for about 1/3 of all deaths in the world.

Cancers stand for about 15%. Lung disease is 10%. Diabetes just causes 2% of the deaths, but it is a number on the rise, and many patients with diabetes are still thought to be undiagnosed. In 2030, it has been estimated that it will be the seventh leading cause of death in the world. In total, main non-communicable diseases caused about 60% of all deaths in the world. And that is when you take all the countries from low-income to high-income in total 60%.

The first two things non-communicable diseases have in common is that their occurrence

increase with the age of a person, and the wealth of a country. Another thing that many non-communicable diseases have in common is that they're chronic diseases. A chronic disease means that once you have the disease, you will live with it for the rest of your life, like diabetes.

Diabetes cannot be cured, but it can be treated with daily insulin injections or pills so that the person with diabetes can live an almost normal life. But chronic treatment-- chronic diseases with lifelong treatments mean that treatment is quite complex. Just imagine the logistics to provide the right medicine, the right drug at the right time for whole life treatment of diabetes in rural Malawi.

Or just imagine the difficulties with compliance. That is how difficult it can be to motivate people to take a drug for the rest of their lives. Especially if the disease is high blood pressure, which might not even cause symptoms, then it's even more difficult.

Finally, some of the treatments for non-communicable diseases are quite good but also extremely costly, like specialized cancer drugs, organ transplants, or bypass surgery for ischemic heart disease. Another thing that most non-communicable diseases do have in common is the risk factors. Unhealthy diet, smoking, indoor air pollution, alcohol use, obesity, lack of physical activity. All of these will inevitably increase the risk of having a non-communicable disease and even early death from that disease.

All these risk factors are modifiable and preventable. That means they can be changed. Either on the individual level, like when a doctor helps the patient to quit smoking. I know it happens rarely, but it does happen.

A doctor can sometimes-- or skilled nurse, or another health care professionals can help the patient to stop smoking. You can also have public health regulations some things like putting high taxes on cigarettes. Or the quite recent innovation of prohibiting smoking in public places, which actually has proved to be quite effective to reduce smoking in society.

Then all over the world, of course, genetics play a big role. That means that even if you live in low-income country, you don't smoke, you're not overweight, and so on, you can still have hypertension. You can still die too early from a stroke just because you have the wrong genes. Hypertension can be counted as both a disease in itself and as a risk factor for heart attacks and strokes. It's estimated to be the biggest cause of death in the world for both men and women, and it is on the rise.

So what choices do countries at different income and resource level have to prevent and treat non-communicable diseases? Sometimes a cancer can be cured by radiation and chemotherapy. Tumors can be removed by surgery, and other quite new ways to prevent some cancers from developing in the first place with vaccination. And examples of successful vaccination against cancer is hepatitis B vaccine that can prevent liver cancer, and the human papillomavirus vaccine that can prevent cervical cancer.

Stomach cancer can in some cases even be prevented with antibiotics if you combine it with a simple proton-pump inhibitor. That's cool, isn't it? Finally, by promoting change in people's behavior-- that is making people smoke less, for example, eat more vegetables-- there will be less cancer.

Let's go to the million-dollar question. What type of treatment can be offered on which income level? Let's again take a look at the Gapminder world map. In the far left bottom corner-- where we have the low-income countries with short lifespans-- what strategies do you think are most feasible to reduce the number of deaths from cancer? By now, you know that more than 80% of the children in the world receive the main vaccines, so vaccination is therefore feasible in almost all parts of the world. It might not be the first priority in the poorest rural areas to vaccinate against cancer, but it is the first action against cancer that becomes economically feasible in those type of countries.

The majority of the world's population also has access to some form of surgery, but the chance of curing cancer by surgery-- meaning to remove all the cancer cells-- increases dramatically if the cancer tumor is detected early. To detect the tumor early, the patient needs to seek treatment early, and have access to advanced diagnostics, or maybe even be covered by a regular screening program. Such good health services and screening are costly though. It's therefore difficult to achieve in low-income countries, but surgery for cancer is therefore more common to be provided from middle-income countries and upwards.

Finally, chemotherapy, radiation, and maybe most of all the new fantastic cancer-specific drugs can be extremely costly and require advanced expense and expensive equipment. So those, with some exceptions, you will find them mostly in the upper-right corner. The wealthy and the healthy corner.

And again, you can change people's behaviors all over the different income groups. On the individual level, it is tricky in all countries. So at Karolinska Institutet, we even have a whole

online course on the subject called Behavioral Medicines.

So with this spectrum of treatments for non-communicable diseases, if it is heart transplants, it's pills, cataract surgery to avoid blindness, hip replacement surgery, or behavior change. It is important to understand where these treatments or prevention strategies are feasible, and then prioritize between them when resources are scarce. These are tough realities, as so many people in the world today suffer and die from non-communicable diseases that could have been prevented and cured if they had lived in a country with better economy or with the health system that made better use of existing economic resources.

That's it for today. I have a strong feeling that you will all go home now, have more vegetables for dinner, take a long nice walk to work tomorrow instead of the bus, and quit smoking. And of course, you will always use a bike helmet when biking, right? Bye.