Harvard School of Dental Med. | Global Health Starter Kit: Module 1 Student Video

Hello. And welcome to Module 1 of the Global Health Starter Kit-- Global Trends, co-authored with Christy Colburn. This module introduces global disease and demographic trends and considers the health implications, including oral health. It is designed to be thought-provoking and highly visual and encouraging you to think critically about population data and to draw inferences from data visualizations and graphics that I'm going to show you.

I want to remind you that while there are numerous resources and references available about the topics I'm going to cover, for the purpose of this module, we have curated a small sample of high-quality resources to support the learning outcomes. But we encourage you to explore the literature further, beyond what is contained in this module. I also encourage you to visit our project website so that you can see the full citations and graphics sources, as well as references and additional resources that support this module.

This module is related to the following competencies. And while all of these competencies won't be met by this module alone, this lays the groundwork, working toward competency-based best practices in global health for dental education. We aim to meet the following learning objectives with this module-- describe major population trends at the global level, discuss the relationship between the global burden of infectious, communicable, non-communicable, chronic, and oral diseases, predict how current global trends could be affecting oral health across the world, explain how the epidemiologic and demographic transition theories assist in understanding the disease patterns, including oral conditions, and their impact on communities, countries, and regions of the world.

So the first thing I want to talk about are global population trends. So take a look at this graphic. And think about what you see. Let's start with the size. What do the size of the bubbles show? So the first bubble is 1950. The third one is 2050. So we see 100 years here.

We see the size getting bigger-- a lot bigger. So here, this is representing the growth of the global population. And what do you notice happening over time with the colors? So look at the green. So we look at the green-- it's staying relatively stable. And so the green color-- that's ages 20 to 64.

Now look at the blue. That's ages 0 to 19. So the 0 to 19 age group-- we're actually seeing growth in that age group slowing down. And what about the yellow? This is a key message here. So the growth of the yellow group-- that's 65 plus. So older adults is where we're seeing a lot of the change.

So what does this mean? Well, for the first time in human history, the number of adults age 65 and older outnumber the number of children under age five, globally. That's a first. So overall, the global population is growing and aging. People are living longer and there are more of them. And a fun fact-- the global population

doubled in only 40 years, from about 3 billion in the 1960s to 6 billion by the new millennium.

So let's talk about the demographic transition theory. So this theory is a classic, general description of population trends over time as a society develops. And there are four stages. For the purpose of this exercise, we're going to focus on the relationship between population size, birth rates, and death rates. So let's start with stage 1, which is called the pre-transition stage.

What do you notice about the birth rates and the death rates here? And what about the total population? So you can see that the birth rate's relatively high. The death rate is also relatively high. And the population is lower. So we're seeing a lot of births and a lot of deaths. And because of that, we don't see a lot of population growth.

What's happening in stage 2? What's the big change? So stage 2 is the early transition phase. And what's really starting to drop? The red line-- death rates. Now, birth rates are just hinting at starting to drop, but still relatively high. So if we have high birth rates but death rates are falling-- so not as many people are dying-- but still a lot of people are being born, what's going to happen to the total population? We see population growth.

And then what happens in stage 3? Death rates continue to decline. We see birth rates then fall. But because birth rates remain high for so long, we see a sharp increase in the total population.

And then by stage 4, what's happened? Stage 4 is the post-transition phase. So here, this country or society has gone through these stages and has now settled with decreased birth rates, decreased death rates following population growth. And so the population growth also decelerates.

So now let's talk about global disease trends. So this is a graphic from the Global Burden of Disease study. So the first Global Burden of Disease data date back to 1990, which is what we're seeing here in this graphic. And I'll explain what we're looking at in just a minute. But first I want to provide a little background information about this study.

As I said, the first data date back to 1990 when data about the risks and determinants of morbidity and mortality were systematically collected across eight regions of the world through 1990. And this was the most comprehensive effort to date for collecting global-level disease burden data. And it introduced highly influential, new disease measurements, including the DALY, which you can read more about in our companion materials following this video. So this study allowed international comparisons-- really for the first time at this magnitude-- of morbidity and mortality rates and causes in ways that were never possible before.

So you'll notice, in this module I keep saying, for the first time, or, it was never possible before. So having access to all this data is really exciting. This study was an important collaboration between economists and health experts. And it emphasized health as an economic investment, which was really key. And we're going to talk about

this more in module 2-- how influential this economic view of health really was and continues to be today.

So now let's talk about the graphic that we're looking at. So you'll notice that there are three primary colors that we are looking at-- an orange group, a blue group, and a green group. And this graphic shows diseases and conditions classified by DALYs into these three categories. So again, I don't want you to worry too much about the details of what you're seeing. I just want you to notice the relative size of each color. So the orange are [AUDIO OUT] infectious diseases like HIV/AIDS and diarrheal disease.

The blue group is non-communicable diseases or chronic illness like cancer, diabetes, heart disease. And the green group is violence and injuries like motor vehicle accidents. So just look at the relative size. And what do you see? Primarily, in 1990, the largest group was represented by communicable diseases. Here we see a change.

So I'm going to go back and forth a little bit. And I want you to look at the difference between 1990 and 2016. So 1990-- and now watch how the sizes of these boxes change. There's some change occurring, right? So in 2010, the Institute for Health Metrics and Evaluation and other academic partners collaborated on a follow-up Global Burden of Disease study.

And researchers could now compare disease rates over the years and measure trends, which is what this module is all about. And I think it is so exciting that really only until recently, we could make these kinds of comparisons and evaluate these trends at the global level. This is so important for us as health care providers. And data continue to be collected and updated. So here's the latest data we have, which is from 2016.

So how did the color categories change? I'm going to go back to 1990 one more time. So the biggest change that we see is a shrinking of the orange cluster of communicable diseases and growth in the blue, the non-communicable diseases. So now, today, the greatest burden, globally, of disease is with non-communicable diseases, where we've seen a decline in infectious disease rates. We've also seen an increase in injuries and violence.

So now we can start thinking, all right, we're seeing these trends. We're seeing the global demographics of the world change. We're now able to compare disease data across decades. And so now let's talk about the epidemiologic transition theory. This is a general description of disease trends over time as a society develops. And there are three classic stages.

Now you might be familiar with other models. And they sometimes will show four or even five stages. But for the purpose of this exercise, we're going to focus on the relationship between mortality rates-- communicable and non-communicable diseases over these three stages. So this is stage 1. What do you see in general? What do you notice about the mortality rates due to communicable versus non-communicable diseases?

So in stage 1, the mortality rate's much higher due to communicable diseases. And we see it much lower for non-communicable. So malnutrition and infections are high. In general, this stage life expectancy is low. And NCDs are more rare because people aren't living long enough to develop chronic conditions. And they're not exposed to the kinds of risk factors for non-communicable diseases. So we're still seeing risk factors like lack of clean water, for example, that lead to diarrheal disease in stage 1.

And now what's happening in stage 2? There is something pretty dramatic. What do you notice? So here we see a crossover. We're seeing, in stage 2, as we enter into the full transition, that the mortality rates due to communicable diseases are declining as a society develops. As we see infrastructure development and they have access to clean water and sanitation and other resources, infectious disease rates decline.

But we see non-communicable disease rates rising because people are now starting to live longer. They have risk factors and disease determinants that are changing. We're going to talk more about that in subsequent slides. And finally, stage 3-- what's happened? So we've seen a switch, where mortality rates due to communicable diseases are lower and more mortality rates due to non-communicable diseases are higher.

So it's important to note that what's going on in stage 3 is not only due-- these are often called man-made or lifestyle diseases-- non-communicable diseases. But it's important to note that there is a lot going on in society that determines these risks that are outside somebody's ability to make healthy decisions and their ability to control their health behaviors, including the social determinants of health. And we go into a lot more detail about this and why we see this switch happen at the end of the epidemiologic transition. We go into detail in module 4-- our social determinants and risk module. As a society develops, underlying these demographic and disease trends is a phenomenon that we refer to as the nutrition transition.

Nutrition and food patterns are changing. And with increasing urbanization comes increasing access to low-quality, high-calorie foods, access to a lot of sugar. And at the same time, many still don't have access to enough calories. So the nutrition is really a constant underlying factor whenever we talk about these demographic and disease trends. And that leads me to the final trend that I want to talk about-- urbanization.

And here's another first. So the world is becoming more urbanized overall. And by 2009, for the first time, more people were living in urban areas than rural areas, globally. So I want you to just take a minute and think about what that means. So again, this is really recently that for the first time, people are living in urbanized areas more than rural.

So what does this mean for their health-- their access to services, their exposure to certain risk factors that come along with urbanization like these processed, low-quality foods, perhaps higher access to alcohol and tobacco

products, et cetera? So there's a lot that can be learned from this switch that we've seen, globally, from rural living to urban lifestyles. Let's put this all together. What does this mean?

So here, this looks like just a bunch of lines. But there's so much data and so much to think about when we really look at how these lines fit together. So as a reminder, you see the red and green birth rates and death rates dropping over time but not at the same rate, which means there's a period of time where we see a population explosion, which helps to explain-- if you remember that graphic with the three bubbles-- why in only 100 years, we went from a relatively small bubble to a huge bubble that we are expecting to see by 2050. We also are seeing a change-- quite a drastic change-- in the disease burden worldwide, which has major implications for health systems and health system planning and development, even still today for every country.

And so overall, the risk factors and determinants of health and disease are evolving as societies are progressing through these transitions. And so we see the following trends, which are not all-inclusive. But in general, we're seeing more industrialized and more urbanized societies. We're seeing changing access to health services, access to housing, sanitation, nutrition, and food sources that are, overall, leading to this reduction in communicable and infectious disease rates. We're seeing mortality rates beginning to decline, largely due to things like water and sanitation systems and access to preventive measures like childhood vaccinations.

And we're seeing people beginning to live longer. We're seeing longer lifespans. The global population is aging. And we're seeing increasing risk factors developing for non-communicable or chronic illness. We're seeing changing lifestyles with industrialization and urbanization, increased consumption of high-calorie, low-quality foods that are high in fat, sugar, and salt.

We're also seeing increasing risk factors like alcohol and tobacco use and sedentary lifestyles that can lead to non-communicable diseases. So the question is, what does this all mean for oral health and disease? Why do we want to think about, at the global level, these trends and transitions we're seeing? And how do they impact us as dental professionals? Do you think that, in general, when you're looking at this that we've put together, considering all these trends-- think about the underlying reasons.

Why are we seeing these trends and transitions occurring? What's happening at each stage over time? And what might this mean for oral health and disease? Do you think oral disease rates are rising or falling? And how do you think that the disease burden trend in general is impacting oral health? And what about changing demographics? We're seeing more people and more older people. What does this mean for oral health?

So we really want to think about how a growing aging population who are experiencing more chronic diseases impacts the dental workforce and what this means for oral health professionals like you and me. Let's look at some data first before we answer that question. So you remember this graphic. This is the 1990 Global Burden of

Disease study graphic. Oral diseases here are part of the blue.

And you can see I've highlighted this. They're part of the blue category, the non-communicable disease category. So that's the oral disease box, labeled generally, oral disorders. And these include caries, periodontal disease, edentulism, and severe tooth loss, as well as some other oral disorders. So I'm going to switch from 1990 to 2016 again.

And I want you to watch the size of this box. OK, ready? So here's 1990. And here is 2016. I'm going to go back. Watch it again. So it's a subtle change, but noticeable that the box has, in fact, grown, along with the blue category in general. So this is demonstrating that oral disorders are on the rise, globally.

And here we can break it down a little further. So these are some examples of specific oral disorders that I've underlined here. So this is a ranking of the comparison or the ranking of non-communicable diseases by their rank and DALYs. And so on the left you see 1990. And on the right you see 2016.

And so I've highlighted in red, edentulism. And you see it went from rank 9 to rank 7, as far as the burden. So it's increasing in burden. Periodontal disease is green. And you can also see it's moving up. It's on the rise, moving from ranks 17 to 13.

And we're seeing this with other oral disorders, including caries and oral cancers. So even when we break it down more at the individual disease level, we're seeing all of these diseases and conditions are on the rise on average, globally. So let's break it down. Some fast facts-- 3 and 1/2 billion people today have untreated oral diseases. So that's basically half the world's population.

That's a tremendous burden that our profession is working to address. And of the over 300 diseases and conditions studied in the global burden of disease study, dental cavities continue to be the most prevalent disease in the world. So not according to the measure of DALYs. They're still high, but prevalence-- sheer numbers-- dental cavities are the most prevalent disease in the world. And many people, even within the dental profession, don't really realize the magnitude of cavities, globally.

We know that the oral disease burden negatively impacts outcomes due to other NCDs, such as the ability to control hemoglobin A1c levels for a person living with diabetes. If they have periodontal disease, it makes control of their diabetes more difficult. We also know, if they have diabetes, they're at higher risk for periodontal disease. So these associations compound each other and make the disease burden even more challenging to contain. So the bottom line is that oral diseases negatively affect speech, nutrition, mental state, self-confidence, quality of life, ability to attend work and school, and overall well-being.

It's OK if you feel a little bit overwhelmed. I do, too, every time I teach this module. And I want to remind you that we have four other modules where we're going to talk about solutions and work underway to address this challenge. So bear with me.

So do you remember this? We talked about these trends and transitions. And we put all this together in a graph. Think about-- if you are going to place-- now knowing what you know, if you were going to place an oral disease burden line into this graph, what would it look like? Would the oral disease rates be rising or falling? What would the shape of the line look like?

So here's where I would place it. In general, for visual purposes only, I would demonstrate that oral diseases are on the rise along with other non-communicable diseases because they share a lot of the same risk factors-- diet, alcohol, tobacco. I would also show it mirroring the shape and that, in general, I anticipate that the oral disease burden will kind of mirror the growth of the population because more people mean more teeth, as well as the non-communicable disease rates because of those direct associations between other NCDs and oral diseases.

So here are the take home messages-- what I really want you to think about and understand when you look at, all right, globally, all of these things are happening. We're seeing all of these firsts and all of these trends that we know have direct implications for oral health and for the dental and oral health profession like you and me. So overall, there are more people in the world than ever before. And as people are living longer and experiencing higher rates of chronic diseases, we're seeing the following.

We're seeing more people, which means more teeth. With increasing lifespan come more teeth that need care as people age. With rising NCD rates come rising oral disease rates due to the association of oral diseases and other diseases such as diabetes, respiratory diseases, and cancers. The burden of oral diseases is expected to continue to rise as populations grow, as people age, and as diets are increasingly poor, as well as we continue to see NCD rates rise.

And vulnerable and disadvantaged populations experience the greatest burden of oral diseases and have the fewest resources available for prevention and management of that disease burden. They also have other compounding challenges that impact their health, including lack of adequate sanitation and poverty. So there is a lot to really consider and that we really want to think about and even continue to evolve and reinvent ourselves as a profession. How can we address this burden? What does this mean for the world's most vulnerable communities in all countries?

Thank you so much. I hope you enjoyed Module 1-- Global Trends. I don't want you to feel too overwhelmed. This was kind of our-- we're laying the groundwork. We're diagnosing the problem. We're introducing you to what we know.

And we're going to spend the next series of modules talking about the global goals and programs and policies that are in place to really address all these challenges I introduced you to today. We're going to continue in module 3 going back to the basics and the important role that primary care can play in addressing these challenges. We're going to talk about social determinants and risks in module 4. Finally, we're going to conclude this series with ethics and sustainability. I look forward to seeing you next time. Thanks.