

Introduction to NCD Interventions

Lecturer: David Watkins, MD, MPH

In this lecture we're going to provide an introduction to interventions for NCDs with a particular focus on the idea of best buys, we'll come back to these later in the course, but this will serve as a broad overview to help you interpret the information we'll cover over the next few weeks, particularly on risk factors and health system issues.

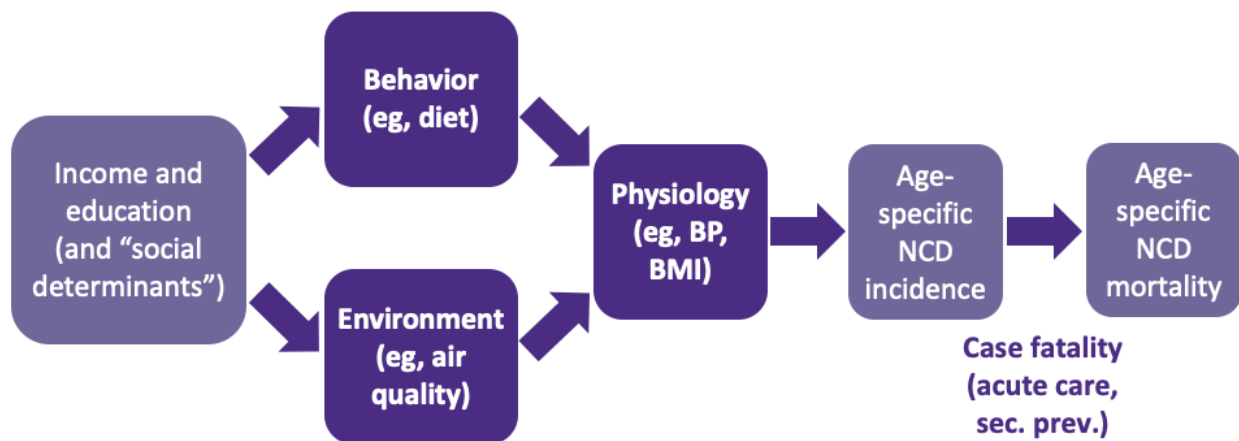
Now, when we think about dealing with NCDs and the growing problem of NCDs, there is a central challenge about there'll be what we're grappling with, and issues around how to choose which interventions to prioritize.

Demographic Drivers of the NCD Response

We know that NCD risk increases with age, and that's sort of an inherent property of most NCDs, which are diseases of adults and of older adults. And we also know that progress on family planning and on reducing child mortality around the world has been pretty astounding over the past couple of decades. A consequence of that is that populations around the world, as we discussed in previous lectures, have continued to grow larger, which has led to more deaths over time, and the age structure of the population has continued to shift to older ages. So, a greater share of deaths occurring nowadays are from NCDs. So, population growth and aging are really driving the NCD story, and those are demographic issues now those demographic headwinds create problems for thinking about how to design a response to NCDs across all sectors.

A Conceptual Model for the Intervention Mix

If we think about where we might intervene to address NCDs, there are really, in my view, a few different options, and I'm going to show you a conceptual model for how I think about the intervention mix and how it achieves reductions in NCD mortality, so if we think about the goal, primary goal here is reducing NCD mortality at different ages and reducing disability at different ages. You could start by thinking, okay, what are the broad drivers of NCDs, and so you could think about things like income and education, access to housing, stuff like that, you might call social determinants, very distal risk factors that have a relationship to what I would call more proximal risk factors, specifically health-related behaviors and environmental factors.



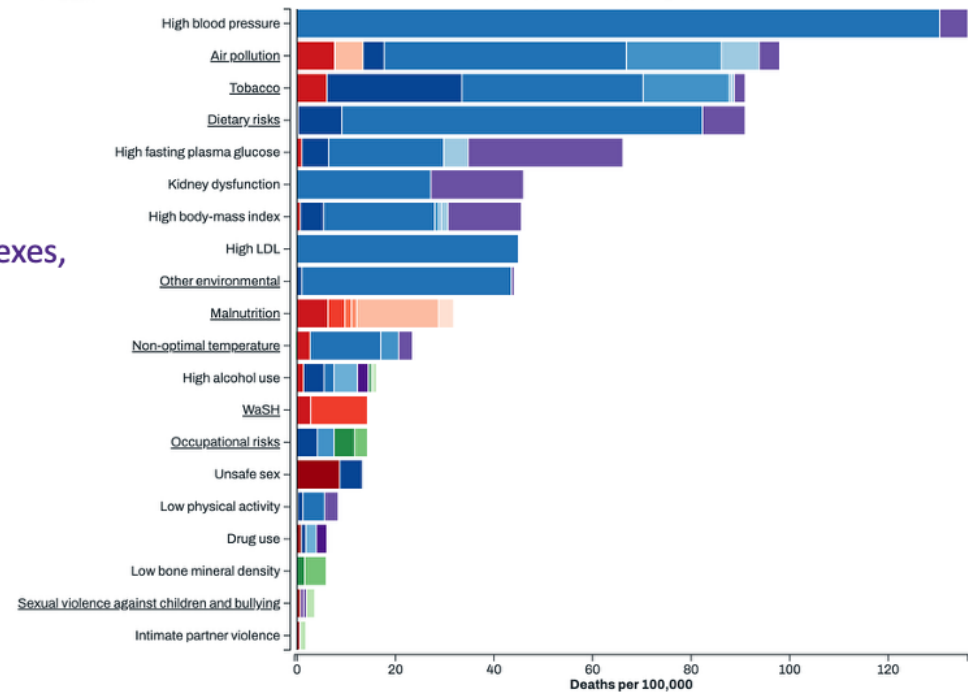
Distal risk factors --- Proximal risk factors

So, health-related behaviors include things like diet, choice to smoke, and so on and so forth. Environmental factors include things like air quality, carcinogens in the water, and other sorts of factors that are not within people's capacity to choose, but do shape NCD risk. Those factors variably influence what you might call physiological or metabolic risk factors, and those include things like high blood pressure, diabetes, fasting plasma glucose elevated elevated body mass index and other sorts of things that then themselves go on to influence the risk of NCDs at different ages or NCD incidents.

You see here that I've sketched out these sort of into more distal versus proximal risk factors, and part of the reason I do this is because it's a little bit confusing conceptually, when you look at, for example, the global burden of disease estimates, where you have high blood pressure, like right next to salt, right next to air pollution, and thinking about how these things are causally related can be challenging,

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which is why I think it's important to think about which risk factors influence which other outcomes, and in particular, separating out physiologic risk factors, which tend to be more addressable by medical interventions than behavioral and environmental risk factors, which typically are addressed by interventions outside the health sector, and if we think about addressing NCDs amongst people who already have them, you could also think about addressing the risk of dying of NCDs conditional on having that disease, so case fatality rates, and you know, here's where we really get into the medical system.

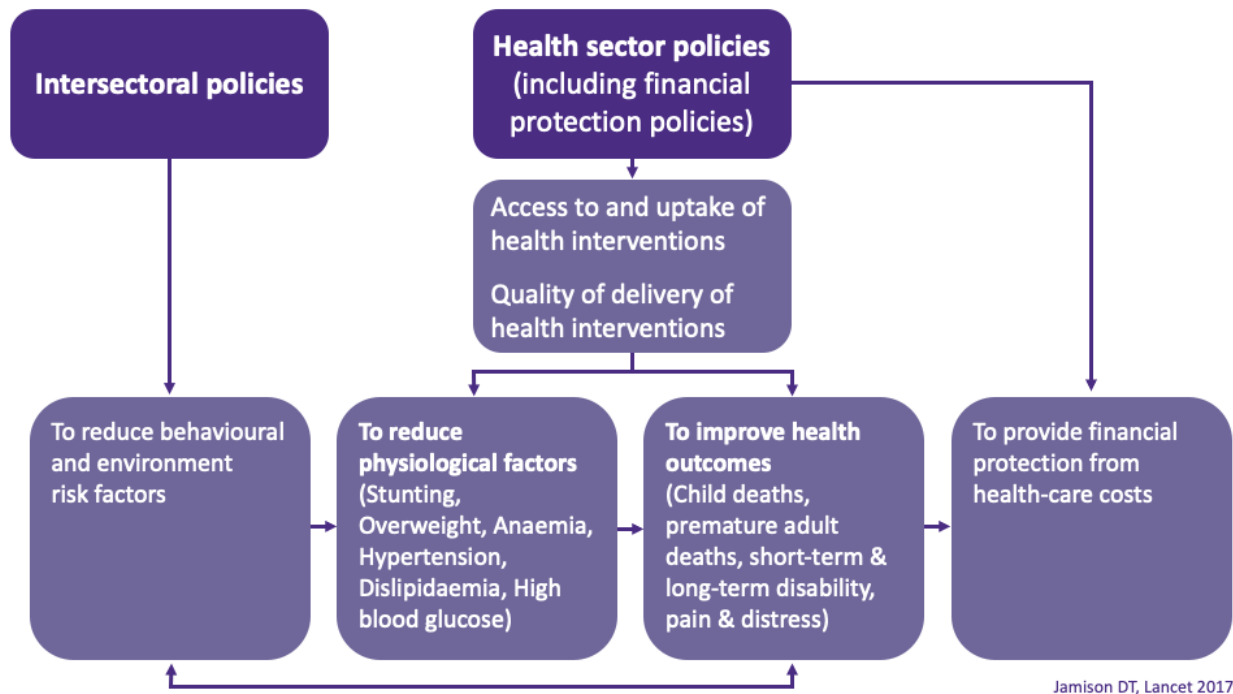
There's really very little role for multi-sectoral and public health approaches. Once you have a disease, that's really the job of the medical system to take care of, and so acute care, like treatment of MIs and strokes, or heart attacks and strokes, for example, giving people medicines to prevent worsening of cardiovascular disease, those would be examples of interventions to reduce case fatality, whereas these other things, more on the risk factor side, are about addressing preventing disease from happening in the first place.

So, this is how I think about the sort of basket of interventions, and these oftentimes are synergistic and complementary you could think about for example, the huge reduction in ischemic heart disease mortality we've seen in the United States over the past 30 years or so, and in many Western countries has been largely because of a combination of factor addressing risk factors like tobacco through population health and clinical approaches, to a lesser extent, efforts to control high blood pressure, diabetes, we've done a pretty good job on that, and also giving people access to more advanced treatments, like treating heart attacks and strokes. So, the combination of these factors really has been key in many countries, and it is true that prevention plays a large role, but we shouldn't discount the role of health systems in helping to clean up the mess when prevention has not succeeded fully.

Interventions vs. Implementation Strategies

Now another thing I want to point out is that you know it's really important to distinguish conceptually between interventions and implementation strategies, because oftentimes we talk about intervention implementation strategies as unique interventions.

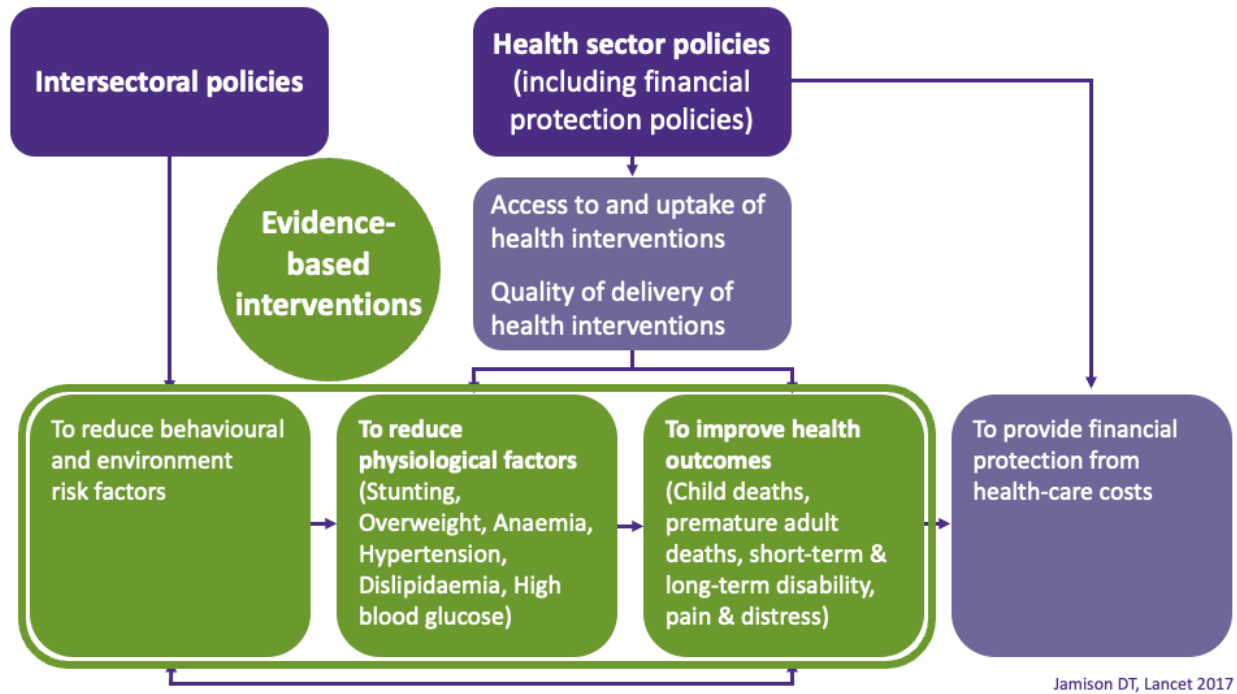
This schematic here is a framework that we developed a few years ago to think about how you might intervene on disease, and where what sorts of interventions might target various parts of the disease process,



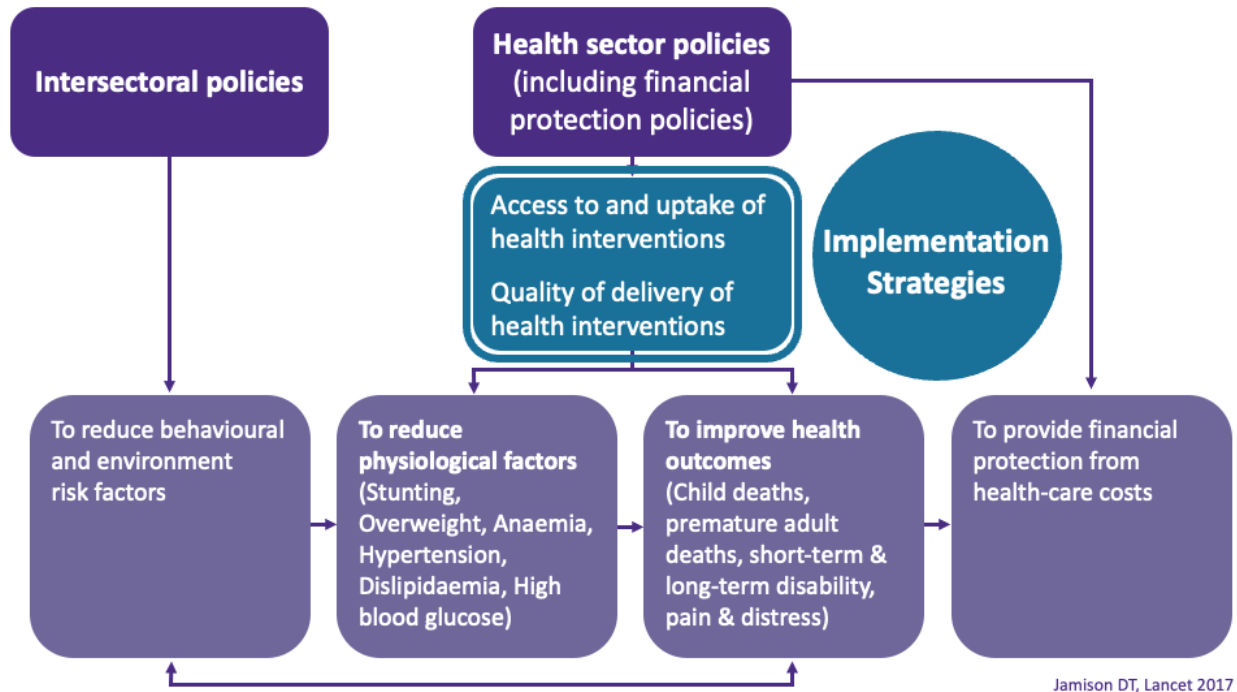
and so you know you can think about evidence-based practices being things that actually affect health outcomes or risk factors themselves.

Those are sort of the interventions, and so you know in this picture you have like interventions that reduce behavioral and environmental risks, like tobacco taxes, or you know, bans on pollution in certain settings, those are policies or interventions that actually directly change risk, and therefore they might call them interventions.

Similarly, over here on the medical side, you might have interventions that target high blood pressure, or interventions that provide treatments for people who have a heart attack, or a stroke, or cancer, and interventions that are about relieving pain and suffering, as well, palliation.



Now, there are a lot of things we do to improve the uptake of those interventions that address health outcomes, and those are what I would call implementation strategies,



or I should say, well, we typically call implementation strategies, and those are things that typically affect access to health care, quality of health care, and they don't have direct health effects. They depend on evidence-based practices themselves.

And so, for example, you might think about a digital health solution to help patients self-manage their high blood pressure or diabetes. That's not an intervention per se, that's just an approach to help you better take your pills and do the things that actually influence health. Similarly, building new health clinics in remote areas, that's not really an intervention, it's a sort of structural approach to improving access to care.

Surgical checklist to make sure that you don't leave sutures and sponges in the wrong place at the wrong time. Those are interventions in some people's terminology, but we think of them as implementation strategies, because they're really about making sure that surgery is done safely and with high quality. Now, I distinguish these things because it's important in your final project to really be focusing on whether you're trying to define an NCD intervention you want to advocate for in your setting, or you're trying to design implementation approaches to improve uptake of evidence-based interventions, such as treatment of high blood pressure or screening for cervical cancer.

Balancing Prevention and Treatment

Sorry, the animations are not important. The other thing I would say is that, and this is just a note to me, so I'm riffing here when we think about the balancing of prevention and treatment of NCDs, and certainly in the public health community, we really advocate for prevention, as you know, the most efficient approach to doing things, and that's partially true. I think prevention is more true for communicable diseases, like it's more effective.

The reality is, for NCDs, there is a role for prevention, and some disease can be prevented. We can prevent some cancers, but we can't prevent all cancers, and we can't prevent all the majority of all cases of all cancer. And so when we think about the response to NCDs, we have to balance the idea of prevention and the idea of treatment.

We do have effective interventions for most of the major NCDs and so with on the medical side, and so for example, we have treatments for most cancers. They're not terribly effective in some cases, they're very effective in others, but we do have options for most cases of cancer. Similarly, diabetes has treatments, you can get people insulin for type one diabetes, and they can live a long time.

These treatments do require substantial health system capacity and help healthcare cost, and so the reason we like prevention is because you can reduce the burden on the health system, provide this kind of care, and address what you might call the root causes of NCDs, but the reality is that there will be people who will escape the prevention sort of scheme and go on to develop disease, and we need to provide care for them, and so this idea of balancing the sort of upstream interventions to address disease risk with people who actually have disease right now and need care, and palliation, and rehabilitation is a really important part of how you think about a comprehensive response to NCDs. So, the long and short of this is we need all all the above interventions across the whole spectrum, from prevention to palliation, to really do a good job of responding to the growing burden of NCDs. Now, I mentioned earlier on that there

are, in that previous schematic, that there are non-medical approaches to addressing NCDs, prevention, and things like that, and so I'll briefly provide a framework for thinking about those things, or a taxonomy for thinking about those things.

A Framework for Non-Medical Policy Interventions

Roughly speaking, there are probably four broad categories of policies of interventions that largely exist outside the health sector that you can use to think about preventing NCDs.

POLICY TYPE	EXAMPLE
Legal and Regulatory Policies	
Limitations and restrictions on private activity	Prohibitions on marketing junk food to children, graphic warning labels for cigarette packages
Standards and other quality and safety requirements	bans on trans fats
Fiscal Policies	
Taxes	SSB and tobacco taxes to raise prices
Subsidies	Food stamps for farmers markets, subsidies to farmers
Infrastructure and Public Service Policies	
Public spending on built environment	Dedicated bike lanes, public transport, retrofitting diesel trucks to control pollution
Public Health and Informational Policies	
Health promotion	Education, information campaigns to stop drunk driving
Outreach services	HPV, Hep B vaccination

You can think about legal and regulatory policies, which basically do two types of things: one, they can. And limit or restrict private activities that might be harmful, and two, they can address or provide standards, or a minimum set of quality and safety requirements.

So, for example, a limitation on activity might be prohibiting companies from marketing junk food to children, or providing graphic warning labels for cigarettes, and so you're trying to change behavior that way, whereas standards and safety requirements would be things like banning or severely limiting the amount of trans fats in industrially processed food. Both are legal and regulatory sort of policy instruments that achieve risk factor reductions, but through slightly different mechanisms. One is more a hard kind of policy instrument, and the other is they'll sort of try to shift behavior.

Flip those two, by the way. The first is sort of like trying to shift behavior through behavior change, largely, and the second is like a sort of hard policy instrument to shape the food system or other other sort of risk system. The second category is fiscal policies, in other words, the government's ability to tax or to provide subsidies for particular products, and so you know there are easy examples here.

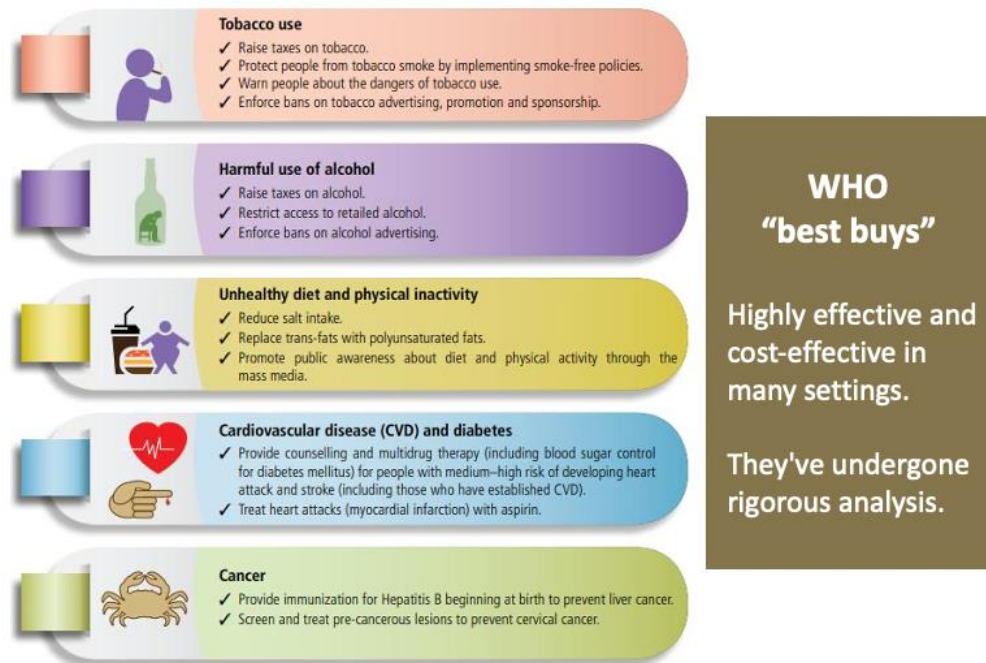
Taxes on tobacco and sugar sweetened beverages and other things raise prices, which then sort of compel consumers to reduce consumption. On the other hand, subsidies can be important both for promoting healthy behavior, but also in some cases those subsidies promote bad behavior, and so you could think about good examples being providing food stamps, provide access to healthy food, providing subsidies to farmers for producing healthy food, but oftentimes subsidies are used to ill effect in NCDs. For example, fossil fuel subsidies are probably one of the largest government outlays in many countries to basically subsidize energy for the population, but those dirty energy sources, which we'll talk about in a later lecture, are a major driver of NCDs and climate change, and so subsidies and taxes can be used for ill or for good.

A third category is infrastructure and public health policies. So, how do you spend on creating an environment that's acceptable to people? And so, in NCDs, the easiest examples here are around physical activity promotions, so dedicated bike lanes, public transportation, but also things like mandating or kind of spending to retrofit commercial trucks, government vehicles, etc. so to produce cleaner emissions or reduced emissions to control pollution, and so you can have built environment policies that promote activity, reduce environmental risks, and so on the final category of policies are kind of the softest instrument, they're really about changing behavior through education, but it uses the authority of government to provide messaging that you know helps to shift behavior, so for example, you could think about education campaigns around drunk driving or alcohol use, you could think about promotion of education on the harms of tobacco use. You could think about encouraging people to get screening or vaccinations for go to seek health care, but there's also direct public health outreach services that you can use as extensions of the healthcare system.

So, for example, vaccination campaigns and other public health approaches probably would fit in here. And so, these sort of non-medical, non-clinical approaches are really important for thinking about NCD response, and I provide this framework to help you think through what sorts of public health and preventive policies might be relevant when you work on your final project. As I mentioned before, there are a number of highly effective interventions for NCDs, and it turns out that we can do a good job through prevention and early treatment in many cases, particularly for cardiovascular disease.

And so, what we know is that approximately 80% of heart disease and stroke are preventable. About 80% of type two diabetes is preventable through lifestyle change, behavior change, and early treatment, and a large proportion of some types of cancers, cervical cancer, breast cancer, colorectal cancer, being kind of classic examples, are preventable or treatable at early stage, and so if you think about it these sort of investments and proven interventions are probably a low hanging fruit for many countries who are designing an NCD response, and so this effort to sort of provide, or to create, or I should say, implement interventions to reduce risk of these diseases and provide early treatments are really kind of the of the cornerstone of an NCD response, and so to this end, the WHO has been working for probably a couple of decades now to synthesize and promote a sort of set of best practice interventions that they call the best buys, and they call them the best buys because they go into some economic analysis of the

return on investment from these interventions. I won't go into detail on the methods of that here. We'll talk about investment cases later in the course, but just to summarize, that these interventions that are highly effective and highly cost-effective in many settings, and they've undergone rigorous analysis and are promoted by WHO, is really the foundation of response to NCDs.



And so you can see they cover these broad categories here, tobacco use, particularly through raising taxes and banning tobacco in public places, and tobacco advertising, dealing with harmful use of alcohol with similar mechanisms, taxes and bans and regulations of other sorts, healthy unhealthy diet and physical activity is a little trickier, because there's a lot of things that happen when it comes to diets, and with who's recommendations, they focused on a few dietary risk factors that are important and amenable to interventions. So they talk about policies to reduce salt intake, dealing with trans fats, which are the worst forms of fats for the diet, and then promoting awareness about diet and physical activity, which itself is more of an enhancer of effect rather than a primary intervention on the cardiovascular disease and cancer side. These are two big NCD areas where there's at least a few medical interventions that are pretty feasible for all countries at all levels of income.

So, for cardiovascular disease, we're typically talking about providing multi-drug therapy for people at high risk of disease, including people who have established cardiovascular disease, and this oftentimes uses a package of medicines, blood pressure medicines, cholesterol medicines, and sometimes aspirin. And then, for people who have diabetes, blood sugar control with pills, and that cocktail of medicines essentially can do a lot to prevent people from developing disease and/or dying from cardiovascular disease, and another simple intervention here is treating heart attacks with aspirin. Seems very obvious, there's a lot of sophisticated

things you can do for heart attacks, but this is probably the most cost-effective thing you can do, and it's not being done in many countries, and so this is why it's highlighted as a best buy.

Cancer is a trickier area, because you know there's a lot of cancer interventions out there that are very expensive and require a lot of health systems, logistically radiotherapy, specialized surgical techniques, access to very expensive chemotherapy regimens, and so for cancer, who recommends starting with doing a good job on vaccination and prevention of cervical cancer, and so the vaccines really for hepatitis B, and now in the latest iteration of the best spies for human papillomavirus, or HPV, are really about cancer prevention through vaccination platforms, which most countries have, and they're very effective at scaling on the treatment side. They really emphasize cervical cancer screening and treatment of pre-cancer as lesions, which, of course, many countries are already doing through HIV systems, but need to be expanded out and scaled out to people who are not living with HIV. In other words, people who are of average risk, who are seronegative.

So, these things you can see really focus on risk factors and prevention, but also have a limited role, the limited but important role for medical interventions for managing risk factors for cardiovascular disease or cancer, the important thing, of course, as we'll talk about later, is that these interventions are all feasible to implement in countries at all levels of income and can be done at reasonably low cost, and so costing studies done by WHO and others have suggested that these interventions are manageable within the budgets of pretty much every country, but they do require political commitment, particularly on things like tobacco and alcohol, where there is strong industry vested interest in resisting these sorts of policies.