Prior to joining the faculty at YSPH, Dr. Cameron was a member of the Global Health Cost Consortium, an initiative funded by the Bill and Melinda Gates Foundation to provide decision makers with improved resources to estimate the cost of HIV and tuberculosis programs, and to improve the availability, quality, timing, and policy relevance of cost information. He holds an MA in international development from American University and a PhD in health policy from the University of California Berkeley. The title of his talk is "Costing and Economic Evaluations in Implementation Science." He’ll speak for about 45 minutes, and then we’ll open the floor for questions and discussion. Thanks very much for that introduction, Debbie.
29 00:01:09.600 --> 00:01:12.600 this is a pretty sort of exciting opportunity
30 00:01:12.600 --> 00:01:14.280 to share some of the work
31 00:01:14.280 --> 00:01:16.440 that I’ve been involved with in the past.
32 00:01:16.440 --> 00:01:20.760 This talk though, I’m gonna focus largely on, you know,
33 00:01:20.760 --> 00:01:24.780 what might be for many of you a review of topics
34 00:01:24.780 --> 00:01:28.110 as they relate to economic evaluations and costing.
35 00:01:28.110 --> 00:01:30.870 So please do bear with me on that front.
36 00:01:30.870 --> 00:01:33.660 I’ll try to get to some novel research findings
37 00:01:33.660 --> 00:01:35.640 towards the end of the talk,
38 00:01:35.640 --> 00:01:39.900 but this is sort of designed as a, anyone can participate.
39 00:01:39.900 --> 00:01:41.970 You don’t have to have much of any background
40 00:01:41.970 --> 00:01:43.590 in economic evaluation or costing.
41 00:01:43.590 --> 00:01:46.770 So without much more,
42 00:01:46.770 --> 00:01:50.790 let me get into the topics here.
43 00:01:50.790 --> 00:01:52.740 Okay, so this talk is divided
44 00:01:52.740 --> 00:01:54.060 into three main sections.
45 00:01:54.060 --> 00:01:56.700 First, I’m gonna discuss some key economics concepts
46 00:01:56.700 --> 00:01:59.490 that kind of lay the groundwork for the rest of the talk.
47 00:01:59.490 --> 00:02:01.290 I’ll briefly cover some different types
48 00:02:01.290 --> 00:02:04.650 of economic evaluation and decision analyses
49 00:02:04.650 --> 00:02:06.840 and how costing
50 00:02:06.840 --> 00:02:08.400 in particular is an important
51 00:02:08.400 --> 00:02:12.150 and often overlooked component of implementation science.
52 00:02:12.150 --> 00:02:13.740 Second, we’ll get into the nitty gritty
53 00:02:13.740 --> 00:02:15.090 of costs and costing.
54 00:02:15.090 --> 00:02:17.340 So what are they, who uses them?
How do you do it?
And what are some of the key considerations that you have to make along the way when you are conducting a costing study?
If you have a great deal of experience with costing already, some of you may find some of this to be familiar, so I’ll apologize in advance, but I’m still eager for your feedback.
And then finally, I’m gonna briefly discuss the efforts of the Global Health Cost Consortium, which includes a website with a ton of great costing resources.
So if you’re more interested in costing and economic evaluation, I can direct you towards those at the end of the talk.
And as part of that effort, I’ll share some of the results of a somewhat recent publication, a systematic review of costing literature on HIV in Sub-Saharan Africa, and another study that’s in progress.
So let me move ahead here.
So there are four main takeaways.
You know, if you take nothing else from this talk, and I wouldn’t blame you if you didn’t.
Four things that I’d like you to walk away from this talk,
considering like number one is perspective.

I'll get into what perspective is, and timeframe.

These are two concepts that matter,

I think the absolute most in terms of economic evaluations.

and costing and how they’re conducted and the findings,

you were able to generalize

from these studies.

I wanna also leave you with the impression

that although expenditures are real,

they’re real things,

things you can quantify,

costs really aren’t.

They’re conceptual in nature,

and they depend on a lot of different assumptions.

So, you know, we’ll get into the nitty gritty of that.

I’d also like to leave you with the idea

that perfect is often the enemy of the good.

I think that’s a concept that’s very familiar

to anybody who’s ever published a paper, for example.

But on the flip side,

little details in your decision making and costing

and data collection can matter a lot.

So there’s a balance that we try to strike

when we do these types of studies.

And then finally,

reporting standards and quality are two areas
that have a lot of room to improve in this field.

And I’ll show you some examples of why.

So what is economic evaluation?

Economic evaluation is an often sort of misunderstood term.

You’ve probably heard of monitoring and evaluation,

which typically refers to monitoring processes for a program’s implementation and ongoing operation.

If you work in the social sciences, you’ve probably heard of impact evaluation,

which typically refers to evaluating, say, health, social,

or economic impacts of the program.

These are all separate but related fields and methods.

Economic evaluation is sort of an umbrella term.

This includes a broad range of comparative methods to help to evaluate

choices or trade-offs between costs and benefits.

Another familiar term might be decision analysis.

At the heart though of economic evaluation and decision analysis is a concept that, you know,

we spoke about or that I’ll speak about a little further.

And that is opportunity costs.

So when we talk about economic evaluation,
what we typically wanna understand is what’s the best value for money? And in the most basic sense, cost is what you pay and value is what you get. It’s the benefit. So it won’t always indicate a clear choice, but it will help to evaluate options quantitatively based on a defined set of decisions. These processes, they aim to capture opportunity costs of doing one thing over another. So for example, do we invest in home visits or do we make mass media platforms to disseminate behavior change communication for improved, say infant and young child feeding practices, or do we promote home gardens or vitamin A capsule supplementations to address micronutrient deficiencies? So lastly, I’ll leave you with the thought that economic evaluations are comparative by nature. So not only do they compare costs and benefits, but a comprehensive evaluation will compare two or more different options. So let’s look at a couple of different types of economic evaluations.
So you may have come across these in the past.

There’s really a large family of economic evaluation methods, but it’s important to note that all of these different types of analyses and tools at their core are measuring costs in dollars. So that that column down the middle. And that’s the main focus of the rest of this talk.

But a key difference across these different types is gonna be whose costs it is that we’re taking into account as well as how we’re measuring benefits.

So all decision analyses are comparative, as I mentioned, we’re gonna compare one or more options in relation to another.

So that other option could just be what the current standard or what the status quo.

It could be doing nothing or it could be another active intervention.

So one of the first things that we need to do in any such analysis is to understand where a comparator is.

and the most basic type of economic evaluation is the one on the top there.

We’ll start with cost efficiency analysis.
which is sort of a partial form of economic appraisal 'cause it looks only at the costs of the program and it doesn’t really provide any information on let’s say agriculture, nutrition, or health outcome of interest. This typically reports out on the cost per output achieved. So another example of this might be like a budget impact analysis where you’re looking at the cost per output, per patient served, per vaccine administered. Now the more common type of economic evaluation for evaluating health interventions is cost effectiveness analysis. And CEAs, they compare the cost and outcomes of two or more alternatives or compare a new intervention or treatment with the status quo. CEAs relate the cost associated with the health outcome such as cost per disease avoided, cost per death avoided or additional expected life year for example. And then there’s some other types of analysis that we won’t get into too much. Cost utility analysis, you know, includes analyses with say disability or quality adjusted life years or other standardized measures of preference.
And then there’s cost benefit analysis, which is a method in which both the costs and the benefits of the intervention are expressed in monetary terms. So in agriculture for example, this might be the value of increased crop production. While in health it would be the dollar value associated with the life years that were gained because of an intervention. There’s several other types of decision analysis that I haven’t included in this table and they exist, so sorry. So those include return on investment analysis, cost of illness analysis and others. So as I’ve suggested, different sectors kind of use different of these approaches. So for example, global health and education disciplines have promoted the use of cost effectiveness analysis. Implementation science probably naturally falls under this category or in the cost efficiency analysis category with a little bit more emphasis on perhaps cost efficiency depending on the scope of the evaluation taking place. And I’ll get into that in a moment.
Meanwhile, you might see agriculture or large scale investment in infrastructure being evaluated using say a cost benefit analysis. So zooming out to sort of the level that we often interact with these types of evaluations, an aim three of your NIH proposal depending of course on your desired evaluation type, you’ll often wanna arrive at really a simple division problem. The cost of a program or policy or intervention divided by the outcome in question. For cost effectiveness analysis, the outcome is some measure of effectiveness, particularly a health outcome. For budget impact analysis and cost efficiency, this might be an intermediate outcome per person vaccinated or per patients served. But at its core, all the economic evaluations boil down to this simple division problem. And I wanna mention one more slightly more complicated but still simple division problem that you may have come across at some point, you know, in the process of of putting together a proposal.

And that is one that builds very simply on the previous,
and that’s for cost effectiveness analysis that compares the cost effectiveness of the intervention and question to some particular alternative. So that’s, that’s the ICER. And this stands for incremental cost effectiveness ratio. So usually the comparator here is a status quo or a standard of care, but it might be some new alternative you’re considering too. That is very useful for developers. I dunno if I’m getting a question here or not, but I’ll just continue about that. You can also use ICERs to compare between multiple different alternative interventions or configurations. You might end up with like a list of different interventions that you want to choose between using a process like a shopping spree scenario. I won’t get into the details of that, but there’s lots of different ways that you can use this tool. Lemme move on.

In this talk though, I’m mostly concerned with the numerator. How do we choose what counts and what doesn’t count? What goes into the process of collecting data
to inform these numbers and how might we begin to distinguish between studies that do that well or do that poorly?

So I wanna get through a couple of key concepts here before we get started. And those are scarcity, opportunity costs, types of efficiency and perspective. Scarcity is one of the most important concepts in economics and that’s simply stated, resources are limited. So whether we have relatively more resources as within the US or say other OECD countries, or relatively fewer resources as many low and middle income countries find, there’s always trade offs to be made in terms of investments and competing programs and activities. So it’s a major consideration. The most powerful implication of the concept of scarcity is of course opportunity costs. So this refers to the simple truth that the use of resources precludes their use for another. And I have to say that opportunity cost is is a really great concept for focusing the mind by counteracting our own personal tendencies towards inertia,
which is to say the tendency to say unthinkingly continue this year, what worked or what we did last year, or for that matter, what didn’t work particularly well last year. So thinking about opportunity costs stimulates some creativity about the best use of resources given the needs and alternatives that exist. And the problem of resource allocation then becomes where can we get the greatest benefit for a given expenditure. And cost effectiveness analysis provides the sort of conceptual framework and methods to help make that determination. Efficiency. I’ll just touch on briefly, there’s two major types. Allocative efficiency, which concerns the division of funds among different interventions. So HIV prevention versus treatment. This often involves complex choices, even if the health gains achievable in one area are greater than in another because costs also differ. And then there’s technical efficiency, which is about how we implement an intervention that we’ve decided upon. So for example,
339 00:14:11.280 --> 00:14:13.710 what’s the best program designed
340 00:14:13.710 --> 00:14:16.530 to deliver ARV therapy?
341 00:14:16.530 --> 00:14:19.530 Both kinds of efficiency require good cost data
342 00:14:19.530 --> 00:14:21.600 in order to properly assess them.
343 00:14:21.600 --> 00:14:24.210 However, technical efficiency is only about costs,
344 00:14:24.210 --> 00:14:25.530 whereas allocative efficiency
345 00:14:25.530 --> 00:14:28.293 concerns health impacts as well.
346 00:14:29.280 --> 00:14:30.357 And then finally, perspective,
347 00:14:30.357 --> 00:14:31.487 and I’ll spend a little more time here
348 00:14:31.487 --> 00:14:33.900 ’cause I think this is a really key thing
349 00:14:33.900 --> 00:14:37.230 that we all need to be on the same level with.
350 00:14:37.230 --> 00:14:39.993 This is perhaps the most important concept.
351 00:14:40.890 --> 00:14:42.180 So different stakeholders
352 00:14:42.180 --> 00:14:44.610 have different experiences of cost.
353 00:14:44.610 --> 00:14:46.170 There’s the societal perspective,
354 00:14:46.170 --> 00:14:48.960 which is what we consider the most inclusive
355 00:14:48.960 --> 00:14:53.670 and is often recommended for most policy analyses
356 00:14:53.670 --> 00:14:55.420 in low and middle income countries.
357 00:14:56.610 --> 00:14:57.600 In this case,
358 00:14:57.600 --> 00:15:00.550 all costs are considered regardless of who incurs them
359 00:15:01.470 --> 00:15:02.940 within a society.
360 00:15:02.940 --> 00:15:05.790 However, considering the perspective
361 00:15:05.790 --> 00:15:09.270 of specific stakeholders is particularly useful
362 00:15:09.270 --> 00:15:12.810 in helping to address those stakeholder concerns.
363 00:15:12.810 --> 00:15:16.710 So will a payer or an insurance provider lose money
364 00:15:16.710 --> 00:15:19.980 even though a society gains in net savings?
365 00:15:19.980 --> 00:15:22.320 Or should we align financial incentives
and how do we go about accomplishing that? So here’s another sort of useful graphic for thinking about perspectives, and in the context of a cost effectiveness analysis, these are the areas in which you might consider your choice of inputs for costs and benefits for a programmer intervention. So you’ll see that in the rows of the table here. So many decision analyses are gonna be taking a societal perspective to start, but let’s drill down a little bit more where we’re talking about the hospital perspective or a payer perspective. They’ll have their own particular interests and we can also think about this being done from the perspective of an employer, how we might think about the healthcare system as a whole. The next level out would be the payer perspective, and that captures the insurer and that may be a government entity. So Medicare, Medicaid, and then zooming out even further the societal perspective. And that captures, you know, this broader range of costs. Okay?
I wanna mention then the question arises, which of these perspectives should we choose? So in implementation science, it often depends on the priorities of the ground partners and the institutions that you’re working with when you roll out one of these studies. So in low and middle income country settings, the guidance from traditional reference case examples, tend to encourage including this broader set of perspectives. However, narrower perspectives are usually more directed at the interests of key stakeholders, and that may be the number one priority in any of these examples. So it really, you know, in short it really depends on the priorities of your partner agencies and those who are rolling out whatever this intervention happens to be. You know, there’s a really great quote from this paper by Eisman and colleagues that just came out last year, and really it’s a pragmatic answer.
The perspective of the stakeholder and the decision makers who will be informed by the analysis should probably be prioritized. But you can also conduct analysis at multiple levels, you know, as long as you’re able to distinguish between those different levels when you write things up. So just keep in mind in this process, the organizations that are adopting evidence-based policies, they really need to know what it’s gonna cost them in their setting, given their resources. But then there’s a trade off and that is whose reality counts and whose being missed by these types of analyses? I don’t know if those on the call have ever read anything by Robert Chambers, but you know, I think a lot about one of his early books, "Whose Reality Counts," when it comes to development interventions when I think about this idea of perspective. Another consideration that’s closely related to perspective is timeframe. And so that is not just what costs and benefits should we collect, but like when and where in the project life cycle itself is it appropriate to collect ’em?
So one option, you know, and we’ll start with the first in that list there is to focus solely on the short term healthcare costs, which could include the costs of the intervention, costs of downstream stream healthcare. This approach is consistent with, I think, you know, most budget impact analyses, frameworks, particularly those mentioned in the CHEERS guidelines, which I’ll provide some resources for later. And in the context of costing, this is usually on the order of about six months after a program’s been implemented. So it’s once that program is reached maturity, you know, what does it cost to continue to implement? But that ignores another set of questions, which is, you know, number two here, the intervention startup. And it might be extremely valuable, the organizations and key stakeholders who are carrying out that evidence-based program to include these costs in order to capture some sense of what it would take for a system to start to integrate new practices, how long it might take for those systems to reach maturity.
Another option, the third in that list is to include additional research costs, research costs included in the design and development of implementing a new evidence-based practice. So that might be adapting that evidence-based practice to a local setting or an intervention. And it could also include some of the costs of monitoring and getting feedback from participants in order to adapt and to improve, I guess the implementation of that process. And then finally, there’s this question of future downstream costs and benefits. And that’s particularly to patients and to program beneficiaries. So that’s number four in the image that you see. And this is often included, you know, as I mentioned before, in perspectives that are taken from the societal level, but all too often they fall outside of the scope of interest for implementing partners and particularly for payers.
that this is one of the main major downsides to many, if not most economic evaluations that are conducted domestically. So when it, you know, this is a setting where the payer is often a private health insurer who has no monetary stake in the future health state of their clients because in most cases those customers might age out and move into a new health insurer, so Medicare, for example, when you turn 65. So I’ll just mention that an analyst may choose to include any number of these different components of an intervention or these different parts of the timeframe. But in any case, it’s really essential to be able to distinguish between these different sets of costs and benefits and to be explicit about the scope, particularly for generalizability and understanding limitations. So lemme go into costs and costing, I’ve kinda droned on for a long time here, but let’s talk about what costs are. There’s definitely many different sources of costs from donors and government providers, international and local NGOs,
participant costs from households and individuals.

There's also many different ways to describe and categorize costs, say by the type of costs. Are they real world costs or are they costs of a randomized control trial? Are they full or incremental? Or by cost categories, so different types of inputs or organized by activities. Or, you know, as I mentioned even by the timing of costs.

If you remember my first major takeaway from the presentation, you should be starting to get an idea of why I say that there was my second takeaway, rather, that expenditures exist, but that costs, they're a little bit fuzzier. They're frequently abstract and they depend on a lot of different factors. So two different kinds of costs to be able to distinguish between are economic and financial costs.

So financial costs are those appearing potentially in the program expenditures documents. Meanwhile, economic costs are costs that are included or that include
the value of all resources, regardless of who’s paying. So the difference here is resources contributed by other entities. So for example, the local hospital, the clinical staff, volunteers or subsidized costs, such as from an international agency paying for commodities. So note that when you see an economic costing exercise referred to in the literature, it typically subsumes financial costing when it’s, you know, thought of in this Venn diagram. So we have a sense of what costs are and why they’re important, but what exactly is costing. So we use this term costing as a shorthand to describe the estimation of the costs of producing health services, for example. So costing places of value on the total resources used to produce a good or service. It requires measurement of the amount of each resource as well as information about the price of each of those resources. So costs can vary by context. So when one is costing, it’s important to gather information about location,
Some of the different types of resources that are used to produce health services might include human resources, drugs and supplies, medical or other non-medical equipment or even patient costs.

So what exactly do we use costing for?

Well, costing is used in a range of research evaluations, programs, and in planning, primarily it’s in the areas of financial planning and budgeting and priority setting.

So for example, cost data are used to evaluate the effectiveness of an intervention or to understand the efficiency of health delivery, but what are the cost drivers and how do these vary over time?

So in ART, which is the example in the slide here, this figure is from a systematic review of the costing literature. This is one that I’ll touch on later for antiretroviral treatment in low and middle income countries, it shows the different drivers of the average unit costs across five different settings.
And this helps to show which cost inputs contribute most to the overall unit cost. So this figure I think does a really great job of showing the absolute difference in unit costs between settings. And in this case it’s by country and it includes a lot of different settings within countries and doing so over time. Oops, excuse me. So cost data are also used, you know, as I mentioned in efficiency analyses. So for example, this might be to examine how costs vary with different levels of service delivery. So understanding unit costs at different coverage levels is really important to predicting costs as programs tend to scale up or to grow. So scale is a really important component here. Now these dynamics can be explored through the use of cost functions. So here the figure shows this sort of interesting dynamic relationship between scale and unit cost for antiretroviral treatments across a large number of sites in sub-Saharan African countries. So you’ll note that the relationship here isn’t linear. It’s a little noisy,
but that makes it important to estimate cost functions and then to utilize different costs for different levels of coverage. So in this case we can see some suggestive evidence of economies of scale, which is to say that per patient ART services within facilities with larger numbers of annual patients tend to be slightly cheaper than facilities with fewer annual patients. So one thing to remember here is that although there’s a wide range of different analyses that need cost data, they don’t always use or need the same types of data. The purpose of the analysis in this case sort of dictates the type of cost that is required. And so it’s really important that the purpose be identified at the outset. So, you know, we have to consider budgeting, forecasting, efficiency analysis, priority setting, among others. Move forward. So before we go into costs further, I think it’s also important to get some terminology right. In addition to the types of costs, there’s also different measures of cost. So being clear about what each means, I think,
is pretty central to understanding and interpreting cost information better as a field. So here are four different types of costing terms that you’re probably familiar with or, you may have encountered some, but what do they mean? So the first is total cost, which is as you’d imagine the total cost of producing a service. And in healthcare this is often presented as an annual cost. For example, the total annual cost of VMMC services at a clinic in a particular setting. The second term is average unit cost. And so this is the total cost per unit of output. And you’ll notice that the units of output can be measured in different ways, even within the same service. So for example, there’s a cost per person contacted or a cost per person treated. And I’ll return to this a little later. The third term is marginal cost, which is a concept that’s frequently used in economics and it’s really critical to efficiency analysis. And this is the additional cost of producing just one more unit of output. So for example,
the cost of testing one more person or vaccinating one additional patient. And then the final term here is incremental cost, which also examines change. In this case, however, the focus is on the cost of adding a completely new level or type of service rather than adding one more unit of output to an existing service. So for example, the additional cost of adding counseling and linkage to care to current HIV testing. Most costing exercises though that you’ll encounter tend to refer to either average or to unit costs. I wanna give you just a quick example here of what a program costing table might look like. So this slide comes from a presentation by Dr. Jim Kahn, who is a mentor of mine at Cal. The example here is a small rural HIV clinic that was set up by a colleague of Dr. Khan at UCSF, which I’ll have to say is where he spent most of his career. And the two in this case conducted a costing analysis of this facility. So as you can see, the summary divides costs
into four different categories. There’s personnel at the top, antiretroviral medications, which are the dominant supply that were used by the program, lab tests, which is the main service that was provided by the program, and then there’s this fourth sort of residual category of less expensive items. So administration, general supplies, vehicles, storage, utilities. You might find pencils in here. So the standard input categories here were adapted to conform to how clinicians think about major components of antiretroviral treatment. In this case, the columns show the units that were tested, the costs per unit, the resulting monthly cost for the entire activity and the entire costs per patient for each line item. So in this case, for example, the full-time doctor costs $1083 per month and $52 per patient year. So one interesting takeaway here is that the authors found
that once the clinic had reached fully operational capacity,
it was able to deliver an ART at it looks like about $550 per patient per year.
And they also found, which isn’t shown here, that the cost could drop by about a third with less expensive medications as well as lower wage scales and modest increases in patient load.
So just an interesting example to kind of put some of this into context. A couple of key costing principles here. And these are major takeaways I think from Jim as well. But in theory you can do some really solid costing work if you adhere to really these three main principles.
So the most important is that your goal is to quantify the resources required for program operation and the associated cost, and that means developing an inventory of resources and assigning appropriate costs. So this task is quite different than simply accepting a program’s budget or their expenditure report because that report might include costs that aren’t required for routine program operations, like special evaluation needs of a funder. Also, even if the costs are accurate,
you’ve likely learned nothing about how the program operates. So specifically, what types of inputs might be available? The number two point, you know, that Jim makes often is that you should be systematic and thoughtfully thorough. And by systematic, you know, we mean that the search for resources should include all of the usual input categories like personnel and equipment, the range of activities, such as marketing and service delivery. But, by being thoughtfully thorough, you know, what Jim refers to is that all of the significant resources should be included, quantified and costed. But minor costs, truly minor things like routine stationary supplies or routine services, pencils and erasers, they can often be safely ignored if the data collection in order to obtain those is too onerous. So of course that’s like a judgment call. And one suggestion, you know, that Jim makes is to use a table and kind of order resources from the most to the least expensive so that you can empirically identify, say a cutoff for each of the resources.
that are considered maybe too minor or that may not play into the overall costs as much as you might be concerned about.

So, you know, this is really getting into fine, fine detail.

Do you really need to cost that last pencil?

And then finally, you know, as we mentioned before,

adopt the appropriate perspective.

So I’ve talked about, you know, this at some length,

but it’s worth reiterating.

I’ll go over, I think I might skip past some of the typical cost and categories except to say, you know,

these are some examples they may often go as far as to include patient costs.

They may also vary by program and over time.

The timeframe, you know, which I mentioned earlier,

typically when we think about a costing exercise,

it’s about 12 months or it’s multiples thereof. And you know, the reason for this for annual costing is that it has the hallmark of, you know,

conforming to our pervasive and programmatic record keeping,

which is really nice,

but it can also help to deal with distortions,

seasonal effects and shocks.

It’s smooths as a lot of random variation.
So that can be for like the calendar year or the fiscal year, typically.
Portraying costs by month, if it’s easier, might indicate how costs vary over the course of a year.
So that’s another consideration.
And you know, again, if we’re talking about fully operational programs, we wanna make sure that the program is actually matured, but again, that might ignore some of the startup costs.
One other little piece of terminology that I want to cover is gross versus macro, and top down versus bottom up.
So you might have come across this a number of times, you know, in proposals or mentioned sort of casually in the literature.
Micro-costing focuses on really granular accounting of inputs as opposed to macro-costing, which is, or sorry, gross costing.
A gross costing approach that might simply estimate all of the relevant costs, typically from program expenditure data, and then dividing the associated outputs. So like patient episodes.
In contrast, we’ve got the bottom up or top down, which refers to the way in which each resource is allocated to the total unit cost being estimated. So top down costing divides overall program costs or expenditures, often including those, which are above the service delivery level by the number of outputs in order to calculate the unit cost, whereas bottom up costing measures input quantities at the client or activity level. Gross costing, for example, is commonly done top down, for example. And then micro-costing kind of has a bottom up.

I wanna mention pricing and valuation very briefly before moving into some of our other findings simply because I think there’s one example in the popular press right now that’s really worth consideration, particularly if you’re operating in low and middle income countries. And I’ll just point to the fourth bullet here, inflation. So inflation comes up a lot in the popular press because we’re experiencing rapid inflation.
in the US right now, but I wanna linger on it for a second, simply to say, so the operation that you use in order to account for inflation in different country settings matters a great deal. So the example here is, let’s say that you’ve collected a piece of critical cost data from a program in Tanzania, the unit cost of a service in the year 2000 to say a $100. So, you know, the typical strategy is to use a US price inflation tool, so typically the GDP price deflator and convert that into US dollars in order to inflate over time. There’s some recommendations in the literature that this should be done in a different order of operations, and that would be to actually inflate in local inflation before converting into US dollars. And the implications for that. So in the next slide here are pretty substantial. So, you know, in Tanzania over that same period, inflation was quite rampant and so it really changes the overall dollar amount that you’re looking at.
in the last period of the cycle there. And it’s even more volatile when you include other countries in sub-Saharan Africa, period. So, your choice of inflating first before exchanging into US dollars or exchanging into US dollars and then using a US inflation process can have some really substantial implications. I just wanted to highlight that.

I’m gonna push through some of these final notes here because I’d like to get to some of our findings. I do wanna leave you with three key resources at the end, those are the consolidated health economics evaluation reporting standards, or CHEERS standards. There’s a new update to those standards that was published in 2022. And then for those working in low and middle income country settings, Vasal and colleagues reference case for estimating the cost of global health services and interventions. And I’m happy to share those resources after the talk, but let me get into costing and practice here because I am running quite low on time.
So the Global Health Cost Consortium, as Debbie mentioned at the top of the hour was funded by the Bill and Melinda Gates Foundation. I was involved with this project for about four years, and two of the outputs from the project were our unit cost study repository, which I'd invite you to visit. And that's really a one-stop shop for all of the published cost data from HIV and TB interventions in low and middle income countries settings, really over the last 20 years or so. So we went through a pretty long painstaking process of extracting primary cost data, that is costs that were not modeled from the published literature, standardizing them across several hundred different variables, and then making them sort of available to the public at large in a pretty easy to use dropdown type of database. So if you’re ever doing any program planning for HIV or TB interventions, I’d invite you to visit that site and see if you can get any utility from some of the efforts that we put forward. Another big output was the reference case.
that I mentioned before, guidelines for estimating costs for Global Health Interventions. And again, happy to share those after the talk. Another major output here was we were able to produce several different publications. So I'll present a little bit of the findings from that. So over several years, our team conducted the systematic search and screening of peer reviewed and grey literature. We had a few different goals here. We wanted to describe the quantity and characteristics of public published costing data to identify production patterns over time, so geographic location, publication venues like journals and authorship and to look into key methods and reporting standards to try to identify gaps in the costing literature. So I'll go over some of those findings. So figure one here shows the results of that search and screening process. So we covered articles that were published starting in January, 2006 through October, 2017. So it's a couple years old now. We use six databases, PubMed, M Base, Web Science, Cochrane,
and a number of others. I'm gonna give you high level content here. So searching also included grey literature, which you see on the right hand side. And we identified over 23,000 possible titles, including nearly 500 known costing studies that we had started with. So from these we were able to screen down to 217 relevant titles that got included in that unit cost study repository.

The first study focused on that evidence from Sub-Saharan Africa. This gave us a really nice picture of where costing data is and isn’t collected. And the first was that 2019 study that I just described. And the second is a study that’s in progress where we’re reviewing findings from detailed extraction of the 243 studies that we started with in the lines above. So I might jump a little bit between findings in these two different venues. This gave us a really nice picture of where costing data is and isn’t collected.
The studies we identified took place in 25 countries, so mostly East Africa and Southern Africa. And although this sort of geographic variation is broad, you know, we found that the quality of evidence within many of these countries is, or the quantity rather of evidence within these countries is quite sparse. So west Africa doesn’t have a great deal of primary cost data. A lot of it, you know, is often modeled. In terms of who is publishing studies that report on HIV intervention costs, there’s a few notable peer-reviewed journals. So PLoS One, J AIDS and AIDS are kind of our leaders. But I think the big takeaway here is that there’s an awful lot of potential destinations for published primary cost data and more than I think we realized when we set out in this exercise. So you can see the large list of different published studies on the left and the table in the right.
These are grey literature resources. So these are the sources of grey lit, a few key players here, USAID, PEPFAR, the Futures Group, Health Policy Project and PANGEA and Bill and Melinda Gates had their fingers in a lot of these different published studies. But these are the destinations. One thing that I do wanna mention here is that although we’re examining this subset of primary cost data that was collected from studies in Sub-Saharan Africa, there’s a little bit of a disconnect here in terms of where we find that primary cost evidence is being published and where leaders in the field, at least nine years ago when the first CHEERS guidelines paper was published, that there’s, you know, in that paper there was an explicit effort to identify leading journals as landing places for health economic evaluations. But what we find is that of the 10 that they identified in that CHEERS statement paper, only three were we able to find in our larger systematic search of the HIV literature. And this is, you know, beyond Sub-Saharan Africa.
This is that paper too that I mentioned. So this isn’t necessarily an indictment of the list that was generated by the CHEERS authors, but it does highlight, I think a large and varied number of journal sources where these data are published. And it emphasizes the need to be sure that these standards, like the ones laid out by the CHEERS document are being upheld across different publications. So, you know, a large growth in publications over time, a difference in the time to publication. So peer reviewed studies tended to take 2.8 years on average to get published, whereas those in the grey literature 1.4 years. So this is much more quickly disseminated into the zeitgeist, you know, the ability for folks to actually start using these data for their own program planning purposes. This is probably our most substantial finding and you don’t need to spend a lot of time pouring over this table, but this was actually quite damning. If you don’t take anything else away from this presentation,
I think, I hope that this resonates, that reporting of scale is, you know, it’s a really critical, important component of any costing exercise. But what we found is that in the six of the intervention types of all the studies through which we were able to collect data, the average number of unit costs in those published studies, scale was reported below 50% of the time. And in some areas as low as 35 or 26% of the time. So in total, I think the average, you know, that we found was something like 44% of unit costs have explicit measurement of scale associated with those reports. So that’s a problem, that’s something that needs to improve in the field. And then I’ll also mention perspectives. So despite I think recommendations and urging from say, the Gates Foundation’s reference case, which I cited earlier, which emphasizes that authors should focus on societal perspectives as much as possible, we actually find here in terms of what folks in these articles report as their given perspective
and when we clean it up and we, you know, figure out among those who didn’t report what their perspective was, by the way, 15.6% of studies don’t report a perspective, which is again, a problem for reporting standards, only seven or about 2.9% of the studies that we identified take a societal perspective. So, you know, most of this is done at the level of the provider. So, you know, it gives you a little bit of context, I think for where there’s room for growth. So in conclusion, on these points, you know, there’s, I wanna say that there’s, you know, a few final recommendations. We recommend that future costing and cost effectiveness studies closely follow the Gates and the GHCC reference case. And you know, that there needs to be more detailed reporting on a number of different items I wasn’t able to touch on in this talk. But, you know, most of all, I think scale is something that’s really missing in the literature. So I won’t touch on this too much other than to say there’s some future research we’re working on.
to determine the quality of some of these cost data.

So be on the lookout for publication on that in the future.

And now that I've ran through all of our Q and A time,

I do wanna thank you for attending

and I'm happy to take any questions.

Yeah.

Thank you for the great talk.

So I had a question,

comment about, you know, the societal perspective.

I think in certain scenarios or situation,

this could be a little bit tricky.

For example, if you take vaccine

for some infectious disease in low income countries,

usually the price is heavily negotiated

between the pharmaceutical companies and donors and NGOs.

And if you take the societal perspective,

when you are doing the cost effectiveness analysis,

including, you know, the productivity loss,

the income loss, the vaccine becomes extremely,

you know, cost effective or even cost saving.

So even if they price the vaccine

to $50, $100,

still it becomes cost saving, which is, you know,

it becomes an excuse in hands of, you know,
the pharmaceutical companies to jump up the price of vaccine because such a cost effective strategy. So I dunno if you have thought about that. I usually, I have purposefully avoided taking societal perspective in those contexts because I just don’t want to put these numbers out, but I don’t know if you have comments, thoughts. Yeah, no, I mean that’s a great point.

I often don’t think far enough along the causal chain to consider sort of the potential negative externalities of price gouging, you know, in those contexts. I guess I’ll say, you know, at least in the context of what we found, you know, there were a few of those different intervention types that dealt with pharmaceuticals, you know, and the costs of those being, you know, not insignificant drivers of overall program and unit costs, you know, for HIV care that most of the studies that we identified, you know, really do focus in, you know, don’t tend to focus in on the societal level. So it’s not, you know, perhaps that that type of crisis hasn’t borne out necessarily.
as a result of some of this in the literature, but it’s definitely not something that’s discussed as often as I think it should be. So you raise an excellent point and, you know, and one that I hope, you know, gets added to further discussions in published literature and forums like this. So I don’t have a good anecdotal example to share, but I really, yeah, I like the point. Yeah. Jeremy.

Yeah, Drew, thanks so much.

This was really informative. I actually wonder maybe building on the previous question, if you could go back to the slide with the table from that rural Uganda study, because my question was about sort of was this a financial or economic perspective that was being presented or economic perspective that was being presented through PEPFAR from the programs perspective, ART should have been without cost and also without cost to the patient. So then, so which made me think, well maybe this is an economic perspective,
but then there are other, all those other pieces of deliver of getting the medicine to the patient, the whole supply chain and whatnot. And so I was just wondering if you have a sense of like, was this trying to describe programmatic or economic perspectives and, you know, when, if this is economic, should we truly be thinking about like that whole process? Like where in the supply chain do you start counting? Yeah, you know, I wasn’t involved. Yeah, you know, I wasn’t involved in this particular study and so I’m happy to field that question to Jim. ’cause he uses this example in his talks. My sense is that this is programmatic, you know. It does seem fairly narrow in scope, but you do, you raise a really good point I think, you know, that Reza raised as well, which is, you know, it depends on who’s providing that, where the supply chain is coming from and you know, and that obviously has downstream implications for, you know, how you deal with the costing procedures in, you know, these different income country settings,
You'd inflate and how you'd adjust. And so supply chains don’t often make it into the discussion in these write-ups, but they need to, right? Because that’s a really critical component. I don’t know if that answers your underlying question.

Yeah, I think it gets to it for sure.

Okay.

Yeah.

And you know, like I said, I'm happy to reach out and find out a little this particular example, but it’s question.

Great, thanks.

Yeah.

I do realize we’re at the top of the hour. I’m not able to see the chat very well. So if there’s anyone that would like to raise anything from there that I’m missing, I’m happy to field those.

Drew.

I would just say that before David Palteo ran away, he said that for what it’s worth, his concern is the mirror opposite of Reza’s. When we abandon the societal perspective, interventions that have broad public benefit can be greatly undervalued because they’re not germane to the narrow
decision maker and real economic resource use
such as volunteer time and effort
can be ignored because it looks free
to the narrow stakeholder.
So he’s, and I would also say
my question, and this is one not as an economist
for a couple of years,
is that from an equity perspective,
I actually wonder about the household level perspective
as opposed to the individual level perspective.
I’ve never seen one of these presentations
that looks at the household level
and yet it’s at the household level
that cushioning of resources
and equity balances often happen
not at the individual level.
And so I’m just curious from your experience,
have you ever seen work done at the household cost level?
And what do you think
about those as an equity perspective?
Yeah, I mean I think there’s, that, you know,
in theory would get
some subsumed into a societal perspective.
But I struggle to think of specific examples
that kind of cast the umbrella wide enough
or cast a net wide enough to include other individuals within the household. So I think that’s a really great point. You know, and it speaks to the demand side part of this question in a way that’s really, you know, potentially quite meaningful. And I would tend to think that as you suspect, you know, we’d be moving towards even greater downstream benefits at the household level. So I am working on one study right now with Jeremy who I think might have jumped off where we are investigating patient costs as a component of that intervention and we do tend to ask in the scope of collecting patient costs data about opportunity costs that are germane to the rest of the household. So we’ll often ask questions about household expenditures and household income generating activities as well as durable assets of the household and ways that households can sort of deal with shocks over time. ’Cause those are all really important questions I think that play into, you know,
what the experience of a patient is like, particularly in a lower middle income country setting where one of these interventions might have a really meaningful downstream impact on the rest of the household. So it’s something that I spend a lot of time thinking about ‘cause I kind of started in that world I think before coming into the economic evaluation world. And it’s one that I think doesn’t currently receive a great deal of attention, but ought to. But again, to, you know, to Reza’s warning, how much generalizability you pull, and try to tout from different studies like this because, right, they have different implications for different parties And so, you know, I’d like to see a standard, not where one perspective is chosen over another ad nauseum, but where they’re both incorporated and where there’s a societal and a financial or a programmatic perspective presented within the same paper, you know. And readers of those pieces of evidence
can then decide for themselves, like which is the perspective that’s the most meaningful? What are the trade-offs, you know, along the way? 'Cause it, you know, the value add of that is substantial, to add in a societal perspective piece to a publish economic evaluation. So I think we do need to wrap up. But thank you Drew. I think that’s very helpful and we will have the video available for people. And really appreciate your time in preparing all of this material and sharing it with all of us. Appreciate the invitation and thanks to those attended today. It’s nice to see some faces. Okay.