Getting Better: A View from Africa
Stanford University
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Transcript of speech and Q&A session with students

JOHN HENNESSY:
Good afternoon, I'm John Hennessy, President of Stanford University, and it's my pleasure today to introduce Bill Gates and to welcome him back to Stanford. Bill Gates truly is one of those few people on the earth who needs no introduction.

His founding of Microsoft, his leadership in technology, and the inspiring work that the Bill & Melinda Gates Foundation has undertaken, has inspired people and built a reputation around the world. This is not the first time Bill has stopped by Stanford to tell us about his activity and discuss his vision with Stanford students.

We're grateful that he's been able to stop by and put some time in his schedule after visiting Africa. About 15 years ago, when Bill was still leading Microsoft and he and I were still both approaching middle age, I asked Bill about his philanthropic plans. And I remember quite clearly what he told me. He said that he was too busy leading Microsoft and didn't have the time to be a thoughtful philanthropist. And he would have to consider that after Microsoft.

Well, since then, Bill has distinguished himself as a philanthropist who's clearly taken the time to dig in and learn about problems in depth, mastering new subjects along the way.

His interest in global health led him to spending a lot of time studying microbiology. Indeed, earlier today, Bill visited some of our Stanford faculty and students whose research is focused on areas of interest to the Gates Foundation. Bill and Melinda Gates study each problem relentlessly. They share what they learn. They invite others to join them in collaboration to figure out how we can make the best possible approach and the best possible success in improving the lives of disadvantaged people around the world.

And although many other organizations have given up in frustration over the challenges of improving health in Africa, the Gates Foundation has not only persisted, but has made progress and has inspired others to join them. Bill's message of innovation as key to improving the life of people around the world clearly resonates on this campus.

We're honored that he's chosen to visit Stanford today and share some of his work. He's just returned from a trip to Ethiopia and Zambia, working on issues like malaria, agricultural productivity, and community health outreach. Bill's going to talk for about 25 or 30 minutes, and then we'll have time to ask him some questions. So please join me in welcoming Bill Gates back to Stanford University.

BILL GATES:

Thank you. Well, thank you. It's great to be here and I think this should be a lot of fun. I always love coming to great places like Stanford-- meeting with the people doing the research that's not just going to improve the world, but it's going to improve the condition for those most in need.

Today I got to meet with some really brilliant people, working on tuberculosis drugs in one case, malaria in another case. And I'm always really thrilled to see that science is being focused on those needs. There's a real danger that science wouldn't focus on those needs; that it would just simply do what the richest need, because the market signals push us in that direction. Of course, I was a student at one point. I never did graduate. But at that time, you know, I was excited about the microprocessor. It had just been created.

In fact, the chips that were out at that time were very, very limited. And you had to extrapolate from what the 8008, the original chip was and look at the doubling that was going to take place, to realize that, eventually, it would be powerful enough to make a huge difference.

That's the thing that got me excited. I called up my dad and said, "Okay, I'm leaving Harvard." And he said, "Well, will you go back?" And I said, "Okay, at some point I'll go back." So I go back, a day at a time to various universities, to make up the couple years that I still owe in terms of time at universities.

That was a very exciting project. It was based on the idea that software was the magic that would bring that chip to life. And the idea that a tool to leverage human curiosity, to leverage human

understanding, to let people communicate in new ways, to create rich documents, that that would become something of importance.

And in a way, it was easier to do because we were creating products. Personal computers that were getting connected together, that we ourselves can understand why we wanted. That every new feature was something that was exciting for us to have and to use. And we had a full appreciation of those things.

And as I look back on my university experience, I wouldn't change anything but one thing, which is that I definitely got through school without having a sense of how the poorest in the world lived. I had no sense about disease, about nutrition, about what it means to have no infrastructure, what it means to have a government that doesn't work.

So it was much later that it was almost like a comeuppance when I was traveling initially on behalf of Microsoft and, later, on behalf of the foundation, that I got to see the real conditions out there. You know, it's great to pursue curiosity, but you also have to have this broad view of things. And I definitely missed that.

Now that we have these great tools, you can say, okay, well, how are they going to be used? What difference will they really make? And what metric should you apply to this? You know, should you just apply an economic metric? You know, is GDP going up? Well, that's a very indirect way of looking at things. A much more direct way of looking at things is to look at things like literacy, look at things like average life expectancy. To look at a number like how many children live past the age of five.

If you go back merely 150 years ago, it didn't matter whether you were a rich country or a poor country. Over 1/3 of the children died before the age of five. It didn't matter if your family was rich or poor. That was the way things were.

Through a series of inventions - antibiotics, vaccines - many of which are only within the last hundred years. That changed very dramatically. Now, in the very richest countries, out of a thousand children under the age of five, only five or six died. So it's a very rare event, it's a very tragic event.

But now we do have a gigantic differential at this point in time. Because, in the poorest countries, it has come down. It's no longer as high as it was, say, in the richest country 150 years ago. It's not up at 350. It's down around 200 in the poorest countries. But that's still an incredible tragedy. It's about 20% of the kids that should be alive at age five, have died of one cause or another. Malaria, respiratory disease, diarrhea, all of which you may know we have drugs to deal with those things. But the lack of access, the lack of infrastructure, the lack of understanding means that those are very fatal diseases.

Even more important, perhaps, but harder to measure, is the fact that about 40% of the kids, by the time they reach age five, have been in a situation where their brains don't develop fully. That is either through severe malarial episode, cerebral malaria; through lack of oxygen when they're being born, birth asphyxia; or just basic malnutrition. Where you don't get bulk protein or various key things like R and vitamin A, you don't develop fully. And so that's a huge drag.

I mean, it's a crisis, a much harder-to-measure crisis. You can see it a bit if you try and do IQ statistics, where you see average IQ's in some of these countries at about 80 or 85. Which is, you know, very, very dramatic, very, very different. You can see it in terms of what happens in terms of literacy learning and various social type behaviors.

But it's sort of an unseen tragedy. Fortunately, the things we need to do to relieve that sickness, that lack of development, those are very similar to the things we need to do to reduce the deaths. And so, these are the kinds of things I didn't have much awareness of until literally about 20 years ago.

So that's become, sort of, my second career now is the work at the foundation, building on these things. Now, these are kind of bleak statistics. But in everything I'm going to talk about today, I want to give you a sense of optimism and excitement about the progress we're making. And so, when you think about this, what is the trend line? How has it changed? And, here, we're going to look at the total number of deaths of children under five in the entire world.

And what you see is, if you go back in time, it was about 20 million per year. And now it's just at about 8 million per year. And the number of children under five during that time period has more than doubled. Today, every year, about 135 million people are born. And that's been flat for some time. And, actually, it'll stay flat for quite some time; for about another 25 years. Then it'll start to go down slightly.

We have this huge imbalance right now. You have about 135 million born a year, and about 60, 65 million dying per year. And that's why world population will be going up from about 7 billion to about 9.7 billion. If we do a good job on health, on family planning tools, perhaps as low as 9.2, mid-century.

So we see this very big increase. But, in any case, to get back to this diagram, what we see is that the rate of child death has gone down very dramatically. Because in absolute terms, we're down from 20 million to 8 million with twice as many kids. So that's huge progress and you can say, what is that? You know, is that GDP growth? Is that soap?

The answer is, by and large, it's a combination of the improved nutrition that comes with economic growth combined with interventions that even at a very low level of economic empowerment, even in impoverished conditions, the presence of vaccines have reduced disease very dramatically.

A good example of this is in the 1960s and the early '70s, smallpox was about 2 million of the deaths- that are on this chart. Then the world eradicated smallpox. In 1979 there was the last naturally-caused case of smallpox ever. It's the only human disease that we've ever eradicated. Many other diseases we brought down; measles deaths down very dramatically, lots and lots of things.

That's vaccines, and those vaccines have been invented. They're by and large funded by aid generosity coming from rich country governments and made available to these poor countries. So they've had this huge improvement.

We look at another measure, hunger, and here the progress is not quite as dramatic. We do have a miracle, sort of, invention, which are these improved seeds. These came from the green revolution, where better wheat, better corn were grown. But this is a percentage. And, because of population growth, which has been very high during this period, you're fighting a tough battle.

That is, you have to improve agriculture productivity to get ahead of hunger. You have to improve agriculture productivity even faster than you have population growth. And what you see here is that happening. In fact, it was not expected to happen. In the 1970s, Paul Ehrlich, Club of Rome, limits to growth, there were real views that there would be mass starvation, sort of, Malthusian shortage.

In fact, that led to some things that people regret in terms of forced sterilizations in India and really measuring things by coercive behaviors to try and reduce population growth. To people's surprise, two great things happened.

One is that, as you improved health, population growth came down far more than they expected. And these new varieties of seeds, so-called green revolution seeds, were made available throughout Asia and reduced the hunger amounts.

Now, I'll talk a little bit later, that didn't happen in Africa. There's the ecosystems, the typical crops are different enough, and the work, kind of stopped, so that Africa has, today, the lowest agricultural productivity by far of any place in the world. And that's one of the things we need to change in order to take this hunger number and bring it down even more.

Another measure, of course, is poverty. Here we can see that goes down quite a bit. One thing that's fascinating about this chart is that the contribution of China to this. You know, we're taking the Magic Period, post-1979 when China adopted policies that raised incomes at an average of over ten percent per year over a 20 year period. So the greatest improvement in the human condition, in terms of large numbers, ever compressed into a time period like that.

So about half of what you see in this poverty reduction is the contribution that China makes. Now, that's not totally surprising. You know, if you're over 20 percent of humanity and you have huge reductions, it makes a big difference.

If you take Africa as a whole, because of population growth, they have made very limited progress against their poverty percentage. And so, even though Sub-Saharan Africa's population is only about 800 million, these problems are more concentrated there today than they were in the past. It used to be Asia would dominate those figures, because of the large population. It's still meaningful. Pakistan, Northern India, Yemen, have incredible poverty. Afghanistan.

But it's really Africa that is an outlier in terms of the progress being made. Only in the last decade is that starting to change. So we can start to be optimistic that if we apply the right approaches, get health

right, get agriculture right, that things can start to change. And a lot of these things are very self-reinforcing. As you improve health, families choose to have less children. Because the surprise finding was that people are optimizing to have enough kids to have an 85% chance that two will survive to adulthood. So it's almost like an insurance effect that if you have lots of bad health, then you just need to have more kids.

Now, in some cases, a lot of your kids will survive. And, actually, population growth comes from that, that you're trying to hit a probability greater than 50%. That is what creates that growth. And so we've seen, in most parts of Africa, average family size come down quite substantially.

The only country where, when you interview people, they say they want, on average, more than six children now is Niger, which, not surprisingly, has the highest disease burden in all of Africa. So I'm very optimistic that we can make progress on these things. The thing that makes me impatient about this, though, is that the normal market signals of what should we work on, what's a priority, don't cause us to prioritize this work.

A good example of that is that substantially more money was spent on drugs to eliminate baldness than drugs to eliminate malaria. And baldness is a bad problem, but, you know, it takes a while to get it. You can buy a hat, hats aren't that expensive. Compared to malaria that's literally killing over 800,000 children a year, and is just a horrific burden, in terms of what goes on in Africa altogether.

So we need a little bit of philanthropy, enlightened activism, to get these priorities. The people whose voice in the market place is unnaturally weak; to raise that up. I'm in no sense saying that the capitalistic system and how it works, at its core, that there's some alternative. But it has to be complemented by substantial amounts of enlightened governments, both in rich countries and in these countries themselves, and philanthropy. That can be incredibly catalytic.

So I'm quite optimistic that we can make progress on this. My full time work now is the foundation. As part of that I get to visit Africa quite a bit. I get to spend time with scientists talking about innovation. And I define that very broadly. You know, it doesn't necessarily mean a new piece of software. It can mean a bed net that doesn't tear apart after a couple of years, because they use some new fiber.

It can mean a new seed for somebody who's a farmer with a small piece of land where they're just growing food for their family. It takes many different forms. And some of the innovations are about delivering these products out into the developing world. That's often very difficult. You know, even just getting malaria medicines to always be available when people need them has been a real problem.

For example, taking AIDS drugs that you need to take on a daily basis. The compliance issues have been very difficult. And so an innovation where you would, say, take an injection every 30 or 90 days, would raise the survival rates of people on AIDS drug therapy, ARV therapy, quite substantially.

It's very different than what the rich world needs. The rich world doesn't care that its vaccines have to be in refrigerators. It doesn't care that they're fairly expensive. But in the developing world, those are often huge barriers to getting things out.

So really understanding the problem set and then being able to tap into all the brilliant thinkers to solve those problems - you know, there's real potential there. And it's moving pretty quickly.

I'm going to mention three particular innovations, because these have just recently been rolled out. And they're different each in their own way. You can see that in some ways it's deep science, in some ways it's pretty straightforward. As John mentioned, I get to Africa quite a bit. Last week was a really exciting trip, because both in terms of the health work and the agriculture work, I saw new examples of good progress.

The work we do is largely focused on health and agriculture. Those are the two, you could say, most basic elements of advancing a country. Getting a good education system, a good government, good infrastructure, those things are also very important. And all these things tend to be very interrelated to each other. Until you've gotten health to a certain level, no one's ever had significant economic develop. So there are no examples where you didn't improve health, reduce the massive population growth, and you were able to get things going.

Now, that alone is not enough. But it's one of those critical factors. So the first example I want to talk about is called the meningitis A vaccine. It's this little bottle right here. These vaccines, meningitis

vaccines, they're used in the U.S., even though the disease is not very prevalent. You get an infection in your brain. And typically, about 10% of people will die if they get this.

There's a part of Africa called the meningitis belt, where this happens on a fairly regular basis. Every two or three years, there'll be a season that it comes across. And it's horrific because people can see their kids getting it. By the time they get it, they're not able to treat them. 10% die, about 20% are permanently disabled in an extremely visible way. And some of the remainder are damaged in a way that is a little less evident.

When we came out with this vaccine it took about a decade of time, working with a variety of innovators in the United States. The actual manufacturer is a company in India called Serum, which is the highest volume vaccine manufacturer in the world. They're not the highest sales level vaccine manufacturer in the world, because they make mostly inexpensive vaccines, like, $0.12 measles vaccines.

But they're very involved in doing low cost things, so we created this large partnership. This became the first vaccine that was ever created specifically for Africa. It's just targeted to the meningitis that was taking place there. That allowed it to be very inexpensive, allowed it to be a single dose vaccine. What's happened now is, we made the vaccine available. And everybody in this band of countries we saw, the meningitis belt, will get the vaccine. So far, about 50 million people have gotten the vaccine. It's incredible, when we show up and say, okay, here's this meningitis vaccine.

That the demand is very clear, because people remember the years where this comes and they have children around who are permanently affected the rest of their lives. It's very cheap. The upfront R&D costs were only about $30 million. And now the marginal cost is very low. Properly applied, when we get it out across this entire belt, it actually should eradicate that meningitis, meningitis A, from that part of Africa.

At the very least, it will reduce the cases by over 90%. But if we do it really well and because people demand the vaccine, we're optimistic about that. It will get rid of that plague altogether. So it was very complicated. Some of the science of how you make this vaccine, make it cheap, and all that is very complex, very state-of-the-art.

But, in fact, at the end of the day, it's just keeping it cold. This has to be kept in a refrigerator. If it's out more than three days in the warm then it simply isn't active anymore. Having that cold chain, organizing the events, letting people know when to come, a lot of pieces have to come together. But in fact, they did.

The second thing I want to talk about is HIV and what's going on with that epidemic. HIV is a very tough epidemic. Even as you educate people about it, the amount of behavior change has been very, very modest. Particularly, in the southern part of Africa, South Africa, Botswana, Zambia, Zimbabwe, the disease has anywhere from a 15% to 20% prevalence. That is, about a fifth to a sixth of all adults have AIDS.

Of course, if you don't get treatment, lifelong treatment with drugs whose price has come down quite a bit, but still a fair degree of expense, then you will die from it. So what we need to do is somehow reduce the number of people who get infected. In the long run, what you want to get is an HIV vaccine. The foundation spends about $300 million a year on that.

We and the United States government, National Institute of Health, are the two big funders of AIDS vaccine activity. Unfortunately it's probably a decade away, before we get a construct like that. So you have to say, okay, what are the tools that we can use that will reduce the number of cases between now and then? There are still over 2 million people a year being infected with AIDS. The peak was about 3 million, and now we're down to about 2 million.

We're down but that's kind of a horrific number, which for these societies is a big problem. Well, one thing that was discovered is that, not to bring up an indelicate topic, if you're circumcised your chance of catching AIDS is reduced by over 60% than if you're uncircumcised. When that was discovered, people said, well, that's interesting, but what are we going to do about it? I mean, that's kind of a very culturally distinct thing. And are people even willing to talk about it? Is there any way that you could do it?

You'd need a lot of surgeons. And surgeons could make mistakes and people are sensitive about mistakes. And, you know, this just may not work. Well, there was a French scientist, Bertran Auvert, in South Africa who took an area called Orange Farm. He went and proved that if you provided the

service, if you promoted it, the young men who you want to come in, say ages twelve to twenty, would come in.

He got over 80% coverage of this township area. And so the question was how to scale this up. Well, again, we ran into the problem of surgeons. I'm going to show you something. I don't know how strange this stuff is, because I'm so used to working on male circumcision that I forget, you know, if you haven't been talking about it recently, it might seem a little strange.

Anyway, the question was what do you do to avoid the need for lots of surgical time. Typically, surgeon would need on the order of 30 minutes per procedure. What was invented is this thing called the Shang Ring. There's actually another one that's very similar called the PrePex ring. But I'll just talk about this one, and what this does is it reduces the time that the surgeon has to be involved to a few minutes.

Basically, this ring is applied-- and I'll leave it to your imagination. There are videos online. If you have your pornography filter on, you probably you can't access them. But in any case, it is a fantastic development, because it's just plastic. It's very cheap. When you have the procedure, that stays with you for seven days.

Then you go back in and it's removed. And it reduces the pain involved. It reduces the cost involved. Very straightforward. One thing that was fascinating to find out is, even in the groups that do get circumcision, it's often done as a tribal exercise and done in a fairly unsanitary way.

So this is very popular now, even in the areas where circumcision was normal. This can be done at any age, this tool used. So that's a positive thing as well. Now we're trying to scale it up. The benefit over time of getting a lot of males circumcised accrues, because the less males that get infected, the less females get infected. The less females that get infected, the less males get infected. The benefit is exponential over time, if you're able to target the people at the right age.

So, by getting large numbers, we can definitely change the scale of the epidemic very dramatically. Now, in no way does it substitute for the fact that we want a vaccine. We want a perfect preventative tool and we're going to keep investing in that. But, in the meantime, for not too much money, maybe

$1 billion in total to cover all of the heavily affected areas, we can promote, roll out, and deliver, these circumcisions.

This piece of plastic completely changes the training required and the complexity. Now, that roll out takes time.

I'm very impatient. It's taken a little longer than it should've. Last year, we delivered only a million. And we need to scale that up to over 15 million a year.

The belief is that we can do that by 2015, so everybody in the field is working on that. When I was in Zambia we went through their plans. Where are they going to put centers? How are they going to promote them? It looks like this'll be the primary intervention applied over the next four or five years.

People want to ask questions about microbicides, daily pills, other things we've invested in. But none of those, so far, have panned out in terms of significant impact. So we're really trying to scale up the one that we have, male circumcision, until we get our truly powerful tool, which would be the AIDS vaccine.

Let me move to the last innovation, which is an agricultural thing. As I mentioned, most of the poor people in the world are farmers; about 80%. And they have very small land areas. They grow food. A little bit of it to sell, to get variety in their diet and buy other things, but most of it to consume themselves.

When you grow crops, there are all sorts of problems you can have in terms of pests. And even once you've grown the crop, if you're going to store it, that is a very attractive food source for insects or birds, or a variety of things other than humans. You have to worry about that post-harvest loss. What we're showing here is cowpeas, and these are a protein rich crop that's grown a lot in West Africa. I went out and met lots and lots of farmers who grow this.

The reason that they weren't growing it in the past is because these insects would come in, they're small insects called weevils. They would come in and eat all this. And, once they eat it, not only do you have less beans, but the beans you have taste bad. And you can't sell them to anybody, because people don't want to have weevil remains as part of their diet, which makes perfect sense.

So it was only grown in a few places. And they tried single bagging and that didn't work. Finally, the breakthrough that they came up with is this triple layer bag, which is actually quite inexpensive. But it's got two layers of polyethylene and one layer of plastic, canvas mesh type.

The farmers are given this. And if you stick your cowpea in here, and seal it at the top, the weevil can get through this outer layer, but then it suffocates. It's not going to be able to get in. You can certify your crop as being weevil-free because it's in one of these bags that are branded and very high quality.

Now, there are over 1.7 million households that will increase their income by $150 a year, which is a lot. That's, like, 30% increase for them. That's a pretty dramatic thing. When you think about a variety of these innovations, you might say, okay, how hopeful should we be?

Well, I would say quite hopeful. If we can get innovators to care about these problems, we can get broad awareness so that rich governments continue to stay generous. That's very much under threat right now. As all the budgets in rich countries are in deficit and people are trying to cut back, the first thing people talk about cutting back is foreign aid. And, in the U.S., there are people, I won't say whom, who have suggested completely slashing the foreign aid budget.

We have a number of countries in Europe--Spain cut their budget recently quite a bit. Even the Netherlands that doesn't have a very big budget, there's a group that's proposed virtually eliminating their development budget. And they've been one of the most generous in the world. Generosity is defined as aid as a percentage of your economy.

And the figure everybody promised to get to is 0.7%. And only four countries actually do that: Netherlands, Denmark, Norway, and Sweden.

To have one of those back off would be a huge blow. The U.K. will get there next year, so in the face of deficits even worse than the U.S., they increased their aid budget. This idea that you can improve the human condition and more dramatically, even, than pure economic growth. Pure economic growth is very, very important.

In fact, Stanford business school just got an amazing gift from the Kings that is about using entrepreneurship and economic development to foster livelihoods in these developing countries. It's a phenomenal thing. When you've done health, when you've done agricultural, then you do, absolutely, have to get the other piece going. Because, as you get agricultural productivity, people move to the cities. What are they going to do?

Well, some form of commerce. There's an amazing book called *Getting Better* by Charles Kenny. I think we actually have some to hand out here, because it's a fairly short book, but it actually explains this paradigm of why innovation has changed things, why countries in Africa had literacy rates that were 20% and are now 75%. Why life expectancy that was, even in non-AIDS countries, about, 35 or 40 now, in the non-AIDS countries is up to over 60. And why that's happened. Amazingly, not many of the activities that have driven this, like getting vaccines out, have not been covered in the mainstream.

I never heard of a guy named Jim Grant who ran UNICEF in the 1970s. He's the one who got vaccines out, broadly, to everyone. He probably saved more lives than anyone who's ever lived. You know, I'd never heard of the guy. When I finally did hear of the guy, I said, oh, I want to read a book about him. The book was out of print. Not too many people were demanding that book. But there are a lot of heroes in this game. And that's why it's fun to work on. And it’s certainly, something that I'm very optimistic about. Thank you.

JOHN HENNESSY:
Okay, we have time for some questions. We have microphones on both sides. Just line up and let's start on the right side here.

STUDENT:
Hi, thank you so much for your remarks today. I actually was lucky enough to work on a related project at the Agricultural Transformation Agency in Ethiopia this summer. I had a question about that. Basically, I was wondering if you could talk a little bit more about how you solve some of the big coordination problems in some of these economies where you want to increase agricultural crop productivity first. But then you have nowhere to store it. Then there's no reason to build more storage if you have no more crops. How do you get that started? Thank you.

BILL GATES:

Yeah, Ethiopia's a very interesting case. Because it has more food-insecure people who need food aid than any country in the world. They're up in an area where the rains often fail, up in the Sahel. And, fortunately, their leader, President Meles, decided that he needed to raise agricultural productivity.

The way their system worked, in terms of getting new seeds introduced, how those seeds were priced, how you would buy fertilizer, how you would educate farmers; their agriculture system was not working. He was very nice, and turned to our foundation, and said, okay, what should we be doing differently? We went in, looked at it, and recommended the creation of a group called the Agriculture Transformation Agency.

One of our people, who happened to be originally from Ethiopia, moved to run that. Now we have a team of people, mostly expats from Ethiopia, that are over there on an ongoing basis. And it's really exciting, because the things they had messed up, in terms of fertilizer distribution, farmer education, not using the latest varieties of the crops; those things, you get those out there and, for the food you eat yourself, it's a lot better.

Then you have people come in to do the post-harvest things. Now, they have some regulatory things that have made people coming in to do those things a little harder than they should be. And so that's their next chapter, allowing private seed companies in a more open way, and letting the post-processing investors come in in a better way.

There are a few examples where that's worked. He and I met for a couple hours last week. He's always interested and open-minded. So that's the next chapter. But it's a very exciting thing. Agriculture productivity will go up faster in Ethiopia from a very low level than in almost any country over the next three or four years as they fix these key bottlenecks.

JOHN HENNESSY:

How 'bout over here?

STUDENT:

I was wondering, with international donations shrinking and the obvious need to make more efficient use of available funds, what role does the foundation see for economic evaluation of programs? And how do you choose between all the different options available, to make sure that you get the most benefits for the populations that you're interested in helping?

BILL GATES:

For us, because a lot of what we do is global health, there is a pretty clear metric that is the number of kids who die and the number of kids who, when they reach age five, have had their brain development severely damaged. And although the first figure has been easier to measure how, we're actually getting a really good handle on the second figure, as well.

We go in and say, hey, if for every $2,000 we spend, we can't save a life, it's not a good project for us. Because we know how to save lives for $2,000 per life, either getting new vaccines in, or educating mothers, and that's our threshold. So we get a lot of nice suggestions about programs, and in the rich world, you cannot spend $2,000 and save a life.

I mean, if you can find a project to spend $2 million and save a life, that's considered a really good thing. So these lives are being viewed as being worth less than 1% of a life in the rich world. That's why, when you say all lives have equal value, you could say how far is the world along towards being willing to expend, for lives in poor countries, this type of money?

And, of course, it's catalytic for other things. When you get outside of health, then the metrics get tougher. Like, we do digital money in Kenya. We help this thing called M-Pesa. We're doing that in other countries. The view is that that kind of support, income support programs, can make the government way more efficient.

But the actual proof of that isn't there, because we don't have a case where we did a country with it, and a country without it. We're spending hundreds of millions of dollars on what we call reinventing the toilet. So we're going to create toilets that don't require flush water, that are as good, in terms of appearance and smell, as the gold standard, which is a flush toilet.

I can't prove to you that we haven't done a great comparison. But, when fixed R&D dollars just aren't there, nobody was spending money on that. Toilets are if you want to go into that field, wow, it's wide open.

And it needs to be done even for middle income. So we have some things that we're not numeric on, in terms of what we pick at the top level. Then, within those programs, we try to be very numeric. So when we do crop improvement, coffee, dairy, maize, you know, we look.

We have a goal to triple productivity in Africa. Over 20 years, African farmer productivity will triple. And, unless we're on a path to do that, built up from each crop, each country, each plan, you know, then we're going to change our strategy. So we tend to be the most numeric in the field. And the field is becoming more numeric.

JOHN HENNESSY:
Let me ask a question that's come in on the web, we're streaming this, Bill. Do you think that's what's really changed? You gave an optimistic picture of progress here, after many years of lack of progress. Is that the thing that's changed, more quantitative? You think the NGO's are operating differently? What do you think are the key factors?

BILL GATES:
Well, I wouldn't say that there's been no progress. In fact, because the appeal to people of, "Oh, please give your money," or, "Please have governments give money." It's often the worst conditions in Africa are held up.

So the fact that nutrition, literacy, life expectancy has improved - AIDS being a footnote where, in some countries, those things have gone down. But, other than that, Africa's improved a lot. So people were doing some reasonable things.

The field is a lot smarter today, and we have the leverage of the genomics revolution, the mobile phone revolution. Aid is much higher today than it has been. Now, there's a risk it's going to go down, but, you know, the United States aid for AIDS drugs is over $6 been a year. Until the Bush presidency, that was absolutely zero.

It's the biggest increase in U.S. aid that there's ever been. It's under attack right now. We would hope it's pretty important that that be preserved. So, yes, I think the field is a lot smarter today, but the science also gives us much better tools.

JOHN HENNESSY:
Yeah, okay, how about over here?

STUDENT:
Going back to the question before President Hennessy's, if you have a bunch of interventions that do hit your threshold of $2,000 per life saved, how would you prioritize between them? So, you had mentioned with HIV, circumcision 60% effective at preventing HIV acquisition.

But pre-exposure prophylaxis in discordant heterosexual couples is also more than 60% effective is being shown in studies now. So if you have these different interventions, do you just look at cost effectiveness? Or do you look at feasibility of scale up? Or what are the factors that you consider?

BILL GATES:
You touched on a thing that's fairly controversial in the field, which is called treatment for prevention. Unfortunately, that is not economic, compared to other interventions. That is, most people have AIDS, over 90% in Africa, do not know they have AIDS.

So they're not seeking treatment. In fact, they're not willing to even go get a test. And so, unless you're willing to put coercive means in place to force people to be tested, then you're not going to get a high enough enrollment to have treatment for prevention make a difference.

But we have models and there are tons of people who get to weigh in on these things. We put our AIDS strategy out, and we present it. Why are we spending this much on male circumcision, this much on new drug treatments, this much on prophylaxis, this much on vaccines?

And we get a lot of good feedback. We have an expert panel, we have people who can look at it. Every grant we do, of course, is completely public. And we write down the criteria and the goals we have for

that grant. Basically, the internal system that we use. And then we score the grants in the three to five year time frame.

However long that grant is, we have a lot of failed grants. Some failed because we were dumb when we wrote the grant. Some failed because we, essentially, dug a dry hole. That is, everybody did hard work, but that particular drug didn't work. And, you know, in the AIDS field, the amount of analytic thinking about optimizing treatment cost per year has been weaker than it needs to be.

That's partly because they didn't expect the funding to be plateaued. They actually thought funding would keep going up. Now, best case, the dream is that we get flat funding. So we have to get way more efficient, because, unfortunately, AIDS is the hardest of them all. You have to treat people lifelong. With malaria, TB, you know, vaccines, once you've got your three shots, you're golden for the rest of your life. You don't have that yearly cost. So AIDS is the hardest area we work in, in terms of the financial choices and the financial costs.

JOHN HENNESSY:
Okay.

STUDENT:
Thank you so much, my name is Malena Pledes, I'm a graduate student in political science. My question is related to your foundation's thinking about social science research. A lot of what you've mentioned here are technical solutions. And then thinking about how the natural sciences, how innovations in terms of medical technology can solve some of these major problems we have.

But you also mentioned that lack of access, infrastructure and understanding, you know, people's knowledge of health, for example, affects the uptake of a lot of these technologies. I'm wondering how things look behavioral economics, political science, health policy, how those feature in your long term strategy at the foundation, how you think about incorporating those into your work.

BILL GATES:

Yeah, those are super important things. And, you know, even when you have a new vaccine, sometimes you don't get much demand for it. And it's sometimes very hard to get country adoption. India hasn't adopted a new vaccine for a long time.

We finally, a few years ago, made a breakthrough on that. A lot of our interventions relate to women. That is, if you're pregnant, you need to be counseled about certain things. In many countries, you're encouraged to go to a facility where they can take care of you to give birth.

Even if you're using a traditional birth attendant, there's certain things about how you keep the baby warm, there are certain symptoms that you should seek care. One of the greatest areas of social science we're involved in is creating women's groups around the world.

It's been a very successful tactic in parts of Africa. It's been very successful in parts of India. And we're constantly trying to scale that up. These groups both spread knowledge in a very efficient way, and they give a voice to the women in terms of whether the resources are really being properly allocated. Is the nurse showing up, are the drugs being stocked? And it's really social scientists working with the medical doctors. We're funding field pilots for a lot of these things.

You know, it's been interesting with ARVs, ARVs have a reputation that when you start to go on AIDS drugs you actually get sicker. And there is some truth to that. Now we're thinking, okay, how can we get people to understand it's good in the long run? Very tough problem, behavior change. Most efforts to cause significant behavior change relative to AIDS did not work.

We spent a lot of money on that. So, absolutely, these things are a mixture of the cool, great tool and the social behavior. Part of the reason we're making so much progress on malaria is that people in the community know that if they don't use a bed net then it can cause their neighbor to get malaria. And so there's good community enforcement.

When we go into a community and insist on what's called total sanitation, that there's no outdoor defecation, that's all social science. There's no technology in that one at all, except a shovel to dig a hole. But that one has been successful in some settings and not successful in other settings. So we have a lot of social scientists and many of the innovations are coming from them.

JOHN HENNESSY:

Over here.

STUDENT:

I was wondering if you could extrapolate a little bit on the role of the internet as a development tool. You look, a lot of times it can be used as a great tool to unite people in donor countries. And then a lot of times the Peace Corp volunteers spend most of their time bringing the internet to various places in the developing world. So what do you think is the most effective way to use the internet as a tool for sustainable development? Thank you.

BILL GATES:

The internet is not present in most locations where poor people are present. You know, there is no internet there. There is voice phone calls in about 30% of the areas where the poorest live. And in about 10%, you have text messaging. Now, those numbers will go up over time.

And that's a very hopeful thing, because when we look at giving people health reminders or we look at farmers knowing information they ought to know, or even just taking a nice photo of their diseased plant and getting advice on it, the idea that we'll have that digital infrastructure that over time can revolutionize things. What we're often doing is we're taking lower-middle income countries, and piloting cell phone driven activities. Knowing that we can't yet do it in our primary target areas, but that time is on our side.

You know, we've worked closely with the mobile companies on these digital money projects, on these health access projects. We have, in some cases, like in Ghana, this thing called MoTeCH, where we actually do go in and create cell phone coverage, encourage the wireless guy to put cell phone coverage into the primary health centers.

We're registering all the births, we're keeping track of things, we're doing supply chain through the cell phone there. It's a promising thing, mostly the mobile network. Not the classic internet-- that we might think of.

But, of course, you're absolutely right. The internet is a wonderful tool, in terms of the scientists working on these problems together to raise awareness of these problems. After all, if you walked off the Stanford campus and there were people dying of malaria, you'd probably get them a bed mat. The fact that they live far away is the big problem. It's that the rich people are all clustered together. And so our sense of humanity doesn't operate because it's so out of sight.

The internet is a tool that can reduce that distance, have us feel a common sense both of the problem and of the success. I don't want it just to be, "Hey, we've got some sob stories on the internet. Could you click on our URL and feel bad?" That's not going to create the right thing.

In fact, we actually have a $100,000 prize that we're going to give out to about ten people who come up with the best ideas for talking about why foreign aid is valuable, and doing it in a way that's kind of appealing.

We really feel like our messaging has been weak. We feel like we've been lazy about it because we kind of expected that aid wouldn't get cut. Anyway, you should go up to the website and see. If you have ideas about communication, we're dying to get them, so to speak.

JOHN HENNESSY:
So to speak.

STUDENT:
Hi, I really liked what you said about thinking broadly. My question is about agricultural, actually. So given that livestock production takes up - higher estimates are 45% of land and 51% of greenhouse gas emissions - what are your thoughts about moving away from animal agriculture as a way to move Africa's land towards more productivity, but also moving the world towards sustainability?

BILL GATES:
Livestock is pretty important in terms of diversifying diets in Africa. If you look at where there's malnutrition, it's often that you're not getting enough meat. And when you do get meat, a lot of these nutrition problems go away.

Africa's greenhouse gas emissions are kind of a rounding error in the whole picture. That is where the suffering from climate change will take place. That is, tropical agriculture, which is dependent on the timing of rains and the rains not being too light or too intense, is the most fragile. Because they don't have storage, their subsistence, the fact they make twice as much in one year and nothing in the next year, doesn't work for them.

It's really unjust and so creating crops or livestock genetics that can withstand these shocks is fairly important. In the long run, there are a couple of startups that are kind of in an early stage, a few brilliant people working on synthetic meat.

In, say, a 20-year time frame, the world should be able to make something that can fool you in terms of, it tastes like meat and the energy intensity, that is the net amount of grain. To make beef, you take about five calories worth of grain to make one calorie worth of beef. Beef is particularly inefficient, beef and pork. Chicken's a little better, fish is a little better, but direct grain is, of course, one to one. We ought to be able to change these ratios through innovation. Until then, we work on animal genetics, animal vaccines to help the Africans for whom a lot of value comes through that livestock piece.

It's up to us to do the innovations to get them off of that. In the meantime, it's something they really need for their diet. So we can't really discourage them and make them bear that part of the burden.

JOHN HENNESSY:
Okay.

STUDENT:
Thank you very much, Mr. Gates. My name is Greg Bybee, I'm a graduate student at the business school and the school of education. And a few classmates and I just landed a few hours ago from South Africa, where we met with a company called AllLife which is, essentially, a private, for profit insurance company that insures HIV and AIDS victims or patients. And I was wondering if you know anything about this in particular or if you can speak to other for-profits. It's actually a single bottom line initiative, that are having a big impact in the HIV space.

BILL GATES:

Well, I don't know that for-profit entities are having a big impact. You know, there are two countries with big HIV epidemics that are quite a bit wealthier than others. That is, South Africa and Botswana are over $10,000 GDP per person. Now, they're highly inequitable in terms of the people live in townships where the average income is more like $1,500 per person.

Then you have first world living conditions nearby. And, you know, we're always interested in creative ideas. It's been a disappointment so far that the private sector doctors in South Africa have not been organized. And I largely blame the government for this to create capacity.

For example, on male circumcision, the slowest country in the world that we've targeted is South Africa. That they just haven't gotten going; even though it was piloted there, that hasn't developed. I'd be interested to understand the economics of, if somebody needs AIDS drugs and they don't have enough money to buy those drugs, typically you need aid money to come in. Now, South Africa because they're richer than the other countries, because the poor countries have increased burdens, more people they have on drugs.

South Africa's been told that their aid is going to be ramped down over a period of years. So they have a huge challenge. Now, they have more economic resources locally to deal with that, but whether the government steps in, of course, the government of South Africa was the worst under Mbeki.

Now, under Zuma, they've been somewhat better, much better by comparison. Whether they keep that up to the point where, even if aid stays flat, they will not be getting the same share they've been getting. It's interesting. And drawing on the private sector skill sets, for efficiency and things, could be part of that. So I'd be interested in learning about it. But, as yet, the private sector in Africa is not a meaningful part of AIDS treatment activity.

STUDENT:

Thank you for all the work that you've been doing. I'm a fourth year medical student here, and I'm here with a couple of my classmates. And, like you, we recently returned from a trip. But we came back from Pine Ridge and Rosebud reservations in South Dakota.

The stark realities there are that these reservations lay in the second poorest county in the U.S., with approximately 80% of the population being unemployed. And health inequity is at two to three times the national average, including infant mortality and rates of suicide.

Despite these multifactoral challenges, though, there are individuals and organizations who are working to strengthen and empower the communities. And, for this reason, our group has been returning for the past four years. So what is the Gates Foundation doing to help with the some of the domestic health disparities, and will this be an increased focus in the future? And how can we, or groups like us, interact with or engage in meaningful conversation with your foundation on rural domestic health and development?

BILL GATES:
Our focus in the United States is education. In our education strategy we have things like getting internet access in schools and libraries. And so we actually went onto the reservation to do internet access.

And the conditions there, as you describe, are really quite quite bleak. We have a scholarship, Gates Millennium scholarship, and Native Americans are amongst the groups that are eligible for that. So hopefully that's a helpful thing.

In terms of health, we're focused on infectious disease in the poorest countries. I'm sorry to hear of those health disparities. But it's not our particular focus. You know, getting philanthropists involved in that, I think, is a fantastic thing.

The strength in philanthropy in America is the diversity. I do a lot of encouraging people to get involved in philanthropy. And not the specific things that I've chosen, the Gates Foundation's chosen to do, but just very broadly.

As you say, those inequities are also not that visible. Because people don't go there very often. If you do, you feel drawn in. You feel like, oh, God, I'd better come back next year. It's wonderful you do that. But that's not a particular area, other than the scholarship and the internet access piece, that we've focused on.

JOHN HENNESSY:

Okay, thank you. Okay, this'll have to be our question.

STUDENT:

Okay, thank you very much, Mr. Gates, for coming here and for all the work that the foundation is doing. Because of the size of the foundation and the prominence that it has, I think it's taken a very central role in terms of tackling a lot of the problems that you've decided to focus on.

One of my concerns, and I think you've touched upon this a little bit, is the concern you have about countries dropping the amount of aid that they're doing or keeping it stable. And I'm wondering what you think, how is it that you're trying to mitigate, the government having a way out, and being able to say, "Well, the foundations are taking care of these problems?" How is it that you're trying to address the issue of giving governments a cop out of saying these problems are being taken care of by somebody else from non-governmental roles.

BILL GATES:

Since the year 2000, when we got involved in global health, giving by governments has gone from about $8 billion to about $40 billion a year. And, you know, some part of that is the partnership we've had in terms of proving the effectiveness of these interventions and the AIDS crisis.

We created a thing called Global Fund. And we are only about 5% of the funding of Global Fund. The United States is 25% of the funding of Global Fund. So 95%-- is coming from rich world governments that weren't giving in that area before.

The Global Alliance for Vaccines we created -- we're about 15% of the giving to Global Alliance for Vaccines. Just last June, I led a pledging conference where we got $4 billion in additional commitments. If we weren't able to increase the aid coming into Global Health, we'd be in deep trouble.

We can't eradicate malaria, get these vaccines out, get these death rates down, without the governments like the United States, the U.K., Japan. You know, polio eradication is something I spend more time on than anything. Because with any luck, we'll be done next three or four years.

But unless we raise a billion a year, that one 30% comes from us, but for the other 70%, I have to go out and, you know, say, "Hey, please keep spending on this." So money has gone up a lot. And foreign aid actually went up a lot, primarily because of the health piece. The agriculture piece went up somewhat.

It's only now that we face this problem that it may get cut. As the European countries are trying to balance their budgets and they say, "Okay, what do we have in our budgets that's non-stimulative to our economy?" Well, anything that leaves the country. And that's their foreign aid budget.

If you ask their populations, they think the foreign aid budget is 5% or 6% of the government, the same in United States. In this country, it is about 0.7% of the budget and 0.2% of the economy is foreign aid, broadly. Only some of which is really going to the poorest countries. You have a lot of money that's Israel, Egypt; a lot of different things get grouped into that category. So the U.S. is not by many measures, by those percentage measures, as strong as others. So our view is we need to unleash these other dollars.

Our total giving is about $4 billion a year. Of that, about a billion is given in the United States for U.S. education. So that's about $3 billion targeted to help the poorest in the world. And so that compares to total foreign aid of about $130 billion, of which I'd say about $70 billion should really count.

So we're pretty small in that overall picture. And if that is reduced in any meaningful way, then it's definitely bad news. We're doing our best and any help we can get to avoid that is very important.

JOHN HENNESSY:
So, Bill, I think you see we have lots students that are passionate about making a difference on this global health problem. Any last words of advice you'd give them?

BILL GATES:
Well, I think having an awareness of the story. This book, *Getting Better,* we're giving out; I found that very enlightening, myself. Eventually you've got to pick. You pick a country, and it doesn't have to be areas that we work in.

But, if you pick something that you know in depth, then that really, kind of animates you. Because then you get down to the level where you actually meet the people. And that's when you really can't give it up. So whether it's a part time thing for the rest of your life, or you actually find a way to get engaged in it full time, I think it is very satisfying beyond normal economic measures, to be contributing to these things. And, particularly, if you think of yourself as having been lucky, which, you know, maybe anybody who goes to Stanford fits that category. I hope you look at it that way. But getting in depth on a particular thing would be my main suggestion.

JOHN HENNESSY:

Well, you're giving our audience here a present. So we wanted to give you something to commemorate this visit. So we've got a little innovation that comes from a course we teach called Entrepreneurial Design for Extreme Affordability, that focuses on trying to design innovations for the other half of the world.

This is a solar lantern, which they built for rural areas that don't have electrification. And then, of course, in the Stanford tradition, they went out and started a company that's now manufacturing these. Not for you, for other parts of the world.

You see it's got solar power here. And we try to get down to a price that's affordable in these parts of the world. And I think it's a good example of what technology can do to make things better. So thank you for coming today, please join me in thanking Bill for his visit.

BILL GATES:

Thank you.

JOHN HENNESSY:

Thank you.