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**Put Your Money Where the Future Is: The Cost of Treating
Children
Kaiser Family Foundation
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LULU MUHE: Good morning. I think we probably need to start so that we will have enough time to discuss the very important issue. I think if you ask any program manager regarding implementation of HIV care prevention and treatment, whether it is in children or adults, one of the most important issue for him is the cost that it requires. So this is a very important, very relevant issue to discuss and we have five experts who have done some studies who were looking at various aspects of costing.

For pediatric ART it's even more important as you probably have heard so many times in this conference that coverage of pediatric ARTs only 28 percent, just about half of what for adult ARTs, so really way behind. And obviously it's not only cost but also other factors for the delay in coverage of pediatric ART.

I think – well maybe I should introduce myself. I'm Lulu Muhe, replacing Nigel Rollins. We work in the same department, Maternal Child and Adult [inaudible] Department in WHO Geneva. Nigel had to go back to the office yesterday so I'm coming here in his place. Andrea.

ANDREA CIARANELLO: Thank you. My name is Andrea Ciaranello. I am an infectious disease physician and I work in cost effectiveness analysis. So I'm very pleased to be participating in this panel today. And our first speaker is

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Dr. Stephen Forsyth. Dr. Forsythe has an MBA and a Ph.D. in Health Economics. And he is a health economist with more than 20 years of experience working in the field of AIDS and economics. He's also the co-founder and president of the International Aids and Economics Network and the Senior Health Economist at the Futures Institute.

He will be presenting to us this morning on behalf of his co-authors Daniel Telake and Constance Formson and his talk is entitled What Does it Cost to Raise an Orphan: A Comparison of OBC Costs in Ethiopia and Botswana. Thank you.

STEPHEN FORSYTHE: Good morning. I'd like to focus this particular analysis both on the cost and why the costs seem to be quite different from Ethiopia and Botswana for raising a child. The analysis – the reason why we do costing of OBC programs can be various. One is for budgeting for both current budgets and future budgets resource allocation for the purpose of understanding the cost drivers and doing cost effectiveness analysis

For this particular analysis we were not focused on doing a comparison between the two countries. We were actually trying to develop some budgetary information that would be useful for donors in terms of understanding what resources were going into the care and support of orphans and vulnerable children.

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A little bit of background information about these two countries, Ethiopia and Botswana. Ethiopia, of course, is much a larger population about 40 times larger. Botswana with a per capital income of \$7,400 is quite a bit wealthier country. The prevalence of HIV is much higher in Botswana. Ethiopia is a much more dense population. Seventy-two people per square kilometer, as compared to only three for Botswana. The cost of living is about twice as high in Botswana as it is in Ethiopia. In terms of the total number of children orphaned by AIDS it's quite a bit higher in Ethiopia.

But on a per capita basis it's actually quite comparable at 6.6 percent of the population are orphans in Ethiopia and 6.3 percent in Botswana. And the adult literacy rate is much higher in Botswana than it is in Ethiopia. So the approach that we took for costing programs for orphans and vulnerable children was to look at 19 sites in each of the two countries, Ethiopia and Botswana. And then we proceeded to do a cost analysis.

Here is a list of the sites where we were actually able to cost programs in both of these two countries in Ethiopia and in Botswana. The approach that we took was an economic costing, which means that all resources were assigned a value, even if they were unpaid for. So if there was a donation of food or volunteer labor, we still assigned a value to those items. Importantly we didn't design this initial study to

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assess effectiveness or cost effectiveness, but our focus was really on looking at the cost and unit cost of OBC programs.

For both programs we divided the cost into seven areas. These were essentially the services which were being offered by these programs. They were economic strengthening and income generation food and nutrition, shelter and care, education, healthcare, psychosocial support and child protection and legal services. So we did a costing for each of those services as well as for a cost per orphan reached as well.

What were the results? One of the first results we came up with was that the cost was significantly higher in Botswana relative to Ethiopia. But \$946 per orphan reached in Botswana as compared to only \$80 per orphan reached in Ethiopia. So we then wanted to better understand why the costs were so significantly different across these two countries.

One of the reasons was that the number of people reached by each of these programs was significantly different. In the case of Ethiopia the average program was reaching about 2400 orphans and vulnerable children per year where as in Botswana the average program was reaching only 138 orphans and vulnerable children. So Ethiopia was able to benefit from economies of scale.

Another look at this is how scale does affect the relationship with cost on the left hand side you can see the cost per OBC reached and across the bottom is the number of OBC

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reached per year. So the downward sloping curve shows that as you reach more orphans your cost per orphan reached is significantly less. However, if you also notice in this graph, most of the blue dots, which are programs in Botswana are above the curve and most of the red dots, which were for Ethiopia were below the curve.

So in other words the scale issue can't fully explain why the cost differences were so large between these two countries. We then asked what percentage of these children were receiving services. Perhaps expecting that Botswana was more expensive because they were actually offering more services than children were being offered in Ethiopia.

Instead what we found was, for most of these services, there were actually more services being offered in Ethiopia than in Botswana. So again, that doesn't explain why the unit cost would be so significantly different given that each child in Ethiopia, on average, would be receiving more services. And each child in Botswana was actually receiving fewer.

I would like to point out, however, that this analysis did not focus on the intensity of those services. So for example if it was a food program, it might be that children were being – the same number of children were being reached in both cases but perhaps in one country they were being offered three meals a day and others they were just being offered one.

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In terms of looking at the unit cost per service offered, what we found was again, not only the cost for OBC reach was higher in Botswana but also the cost per OBC reach with each individual service was quite a bit higher in Botswana. So with the possible exception of income generating activities and economic strengthening which were fairly close to each other in these two countries, for the most part for these services the cost per child reached was significantly higher in Botswana than in Ethiopia.

Next we looked at what were the components of these unit costs. The largest component in Botswana were for labor and this is not surprising given the fact that labor costs are significantly higher in Botswana than they are in Ethiopia. In Ethiopia the largest share of costs were associated with the materials. So these were particular things like food and other materials that were being offered to the children.

Also I would like to point out that in the case of Botswana they had significantly higher overhead costs than they do in the Ethiopia. So in conclusion, the costs of the OBC programs in these two countries is significantly different. \$946 per orphan reached in Botswana compared to only \$80 in Ethiopia.

Despite the fact there is a lower cost in Ethiopia that the number of services being delivered in Ethiopia per child was actually higher. Although again the issue of intensity

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might explain that difference. It's important to look at the issue of scale.

In this case Ethiopia was able to reach on average about 17 times more orphans and vulnerable children than the program in Botswana. And part of the reason for that is because the number of people in the Katchman area would be much higher in Ethiopia than in Botswana. It's not necessarily an issue of efficiency, it's just an issue of the fact that the population density is different in the two countries.

So because Ethiopia can benefit from economies of scale that in part explains the difference in cost. The cost components are relatively similar across the two programs although Botswana tends to be more labor intensive. More money being spent on labor and Ethiopia tends to spend more money on materials and to have lower overhead costs.

Some of the differences, again, are not due to issues of efficiency. Some are due to the higher cost of living, which I mentioned in the beginning, the higher cost of living is about twice as high in Botswana as it is in Ethiopia, but also their geographic and demographic factors that need to be taken into consideration, which in part can explain the differences in the unit costs.

Finally, this analysis was, as I mentioned in the beginning not intended for the purpose of doing cost effectiveness analysis but I think based on a lot of the

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feedback I got, there is a huge interest in answering the question, which program is more effective in terms of the amount of money spent in terms of improving the quality of the children who are being reached. And that was not addressed in this particular study, but I think it is important to note that this would be the first step.

The first step is to get the cost information, the second step is to agree how we're going to actually evaluate the effectiveness of OBC programs. Thank you very much.

ANDREA CIARANELLO: Thank you very much Stephen. This paper is now open for questions. And if anyone has a question there are mikes all around the room if you could just briefly introduce yourself. Thanks.

EMBRY HOWELL: My name is Embry Howell [misspelled?] and I work for the Urban Institute here in Washington. And I had the opportunity to work on a program for orphans and vulnerable children PEPFAR funded. And I wondered whether your data are the PEPFAR generated data because I became aware that there is a lot of variability in how an individual program generates the data and how therefore I think summarized at country level.

For example, in one of the programs if a child was being linked to the healthcare insurance or program that would be considered checked off as a healthcares service. But there

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would be no cost to the program for that. So did you collect your own data or was it PEPFAR generated data?

STEPHEN FORSYTHE: The analyses was an economic analysis as opposed to an expenditure analysis. So in our case what we did is we actually went out to each of those 19 sites and tried to collect all the information. It was interesting when we did provide this information back to PEPFAR they had said well the amount of money that we're spending per orphan reach is quite a bit different than the numbers you're getting. And what we tried to explain was we were trying to collect all the resources used. Son in Ethiopia for example they were getting donated food from the World Food Program, at which PEPFAR was not supporting. So we were trying to actually capture that information even though it wasn't a PEPFAR cost.

NOREEN WYNNE: My name is Noreen Wynne [misspelled?] from Repsy [misspelled?] and we're working in certain countries in Eastern and Southern Africa. The focus area being social and emotional supports. From experience we know that much of the care in our region is provided for by the Community care [inaudible]. I must apologize I missed part of your presentation, but the costing analysis cost the time of the caregivers.

STEPHEN FORSYTHE: Does the cost include the cost of the time for the caregiver?

NOREEN WYNNE: Yes.

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STEPHEN FORSYTHE: Yeah, okay. Actually the cost of the program we were looking at were the program costs themselves. So for example if a child came in to a program perhaps they got education during the day, they got some food, but then they went home to their caregiver. So our analysis did not focus on the cost of the caregiver only on the cost of the program itself.

PRISCILLA: Thank you for a very brief and clear presentation. I'm Priscilla from UNICEF New York. I have two questions. One is just how you collected your data, given the difficulty of collecting data on care and support services. A child could receive multiple services from different, you know, NGOs or different community based organizations and I wondered how where you got the data from.

Secondly I wonder what the cost to the first two because you entitled those the cost of raising an orphan and I wondered what time period did you look at? Is it just one time point or is it the life cycle of a child and the fact that the child may, you know, may need different types of services according to what stage of life they are in, so how did you arrive at the cost in relation to the life cycle of the orphan, thank you.

STEPHEN FORSYTHE: That's an excellent question. We really looked at one point in time to see what the organization was paying at that point in time. The way that we did the

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costing is we would go out to the facility whether it was a school, whether it was a feeding program, whether it was an outreach program, and we basically looked at all the information that they provided us in terms of, you know, the resources being used and the cost of those resources.

I would like, if I may, I'd like to point out the fact that in some cases we found some very expensive programs. I can think of Botswana program where people were actually spending money to send their kids all the way through college and that was a very expensive program. Are we saying because it's expensive necessarily it's bad. I don't think that's the point. I think the point is there is differences, but we also need to be able to measure the quality of life and the benefits being provided for this, which was not the intention of this study.

ANDREA CIARANELLO: I think we have time for just two more questions. Thank you.

ROSA MARLOW: Okay, I was just wondering – my name is Rosa Marlow and I was just wondering why did you choose Ethiopia and Botswana. And why view in terms of economic abilities that's such a difference and it doesn't really tell me much. I want to choose countries that are equal economic status so that I can see what are they doing better than the other one. Of course in Botswana they have their resources and

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they should spend it on their children, but I was just wondering what was the rationale behind choosing the two.

STEPHEN FORSYTHE: We were asked by PEPFAR to look at these two example and it certainly is true that they are completely different. The original objective wasn't to do a comparison across the two countries, but when we did the analysis and we got these very different results we were very interested in researching more about why these costed different.

SHERRY KANE: Just very quickly Sherry Kane [misspelled?] from USAID Washington. Could you just clarify I think the representative was just wondering, and I'm wondering too, did you cost out the cost for the health worker or the caregiver for each of these programs? Was it whoever administering the program.

STEPHEN FORSYTHE: The person administering the program would be included, as long as they were within the program. But again if the child was going back to a caregiver at their own home then the costs for that were not included. So that may explain part of the – is that not your question?

SHERRY KANE: [Inaudible].

STEPHEN FORSYTHE: Right. It was whoever was providing the services within that organization and the child may have been getting multiple services from multiple organizations so that maybe one of the reasons that we're seeing some of the

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skewing of the data. Food baskets for example were not included because the food baskets in Botswana were included as part of the government program and not part of the NGO program. So they weren't included. If we were including the food basket, the cost difference would have actually been even much larger.

CHRISTY ALLEGEME: This is Christy Allegeme [misspelled] from Washington D.C. When I saw the name, the title of your presentation I was – for me it was interesting I wanted to know exactly how much to raise an orphan. But it doesn't look like I have that idea. Because it's just one point in time so that might be a year or six months, but to raise an orphan I'm looking at a long term, two, three, four, five maybe to 18 years.

So do you think you can look at it and sort of check what will it be to really raise an orphan. Another comment is about your shelter, you know, were these orphans given shelter and the \$947 is shelter part of it does they live in a shelter the cost of the rent and all that? I just want to have more information thanks.

STEPHEN FORSYTHE: I think it's a very fair comment and saying were looking at the costs in one particular time not the entire lifetime of the child. I would – I think it would be very interesting to do a perspective analysis where we did that and also do some measure of changes in quality over time. The

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shelter question, in a few cases shelter was included, most of the cases it as not.

There were a few cases I know at least one of the facilities in Ethiopia was offering shelter and at least one of the programs in Botswana was also offering shelter. So in that case we included the overhead cost, the food, everything that was incurred by those organizations in order to try to come up this comprehensive a unit cost as possible.

ANDREA CIARANELLO: Thank you very much Stephen.

LULU MEHME: Thank you Stephen we'll go to our second speaker. Dr. Revill is a research fellow at the Center for Health Economics at the University of York in the UK. He has previously worked as an economist for the Ministry of Health in Malawi and for Trinity College Dublin.

Throughout his time he has conducted methodologic and applied research on the use of economic evaluation to guide the choice of healthcare interventions in a resource related setting. He'll be presenting his paper on behalf of his co-authors and the title of his presentation is The Cost-Effectiveness of Maternal and Infant Antiretroviral Regimens to Prevent Vertical HIV Transmission in Malawi. Dr. Revill.

PAUL REVILL: Thank you Lulu. Good morning everybody. Around 390,000 infants become infected with HIV annually and 90 percent of whom are in Africa. There is many of you surely

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know in 2010 the WHO released new PMTCT guidelines for pregnant women not requiring treatment for their own health.

Option A requires a maternal component of zidovudine provided antenatally during pregnancy. A single dose of zidovudine during labor and 3TC until seven days post partum and an infant component of nevirapine from delivery to one week after breast feeding.

Option B requires Triple ARVs for the mother during pregnancy and continued until one week after cessation of breast feeding. As it has been highlighted during this conference, in 2010 the Ministry of Health in Malawi begun to follow a new option, Option B+ providing mothers with ARVs for life. So in effect test and treat approach for pregnant woman.

The decision problem about this work is intended to address is using Malawi as a case study. How can a resource poor country, struggling to [inaudible] to its population in need best use its available resources to prevent mother to child transmission amongst mothers not in need of treatment for their own health. So focusing very much on the prevention vaginal transmission.

We constructed a probabilistic decision model structured as a decision tree. And two population subgroups identified firstly mothers presenting at delivery and secondly mothers presenting antenatally. For mothers presenting at

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delivery there were three peri/postnatal alternatives available.

The first of all the standard of care of perinatal single dose nevirapine and zidovudine 3TC until one week after delivery. Secondly, maternal treatment alternative of maternal triple ARVs provided through breast feeding and this is in addition to the standard of care and thirdly an infant alternative to infant nevirapine continued through breast feeding and again this is addition to standard of care.

The effectiveness and cost effectiveness of these peri/postnatal interventions was a value [inaudible] using data from the BAN trial. For mothers presenting antenatally these three peri and postnatal alternatives were – could be proceeded by one of three alternatives during delivery – during pregnancy.

First of all maternal triple ARVs provided during pregnancy, secondly maternal zidovudine provided through pregnancy and thirdly nothing initiated for mothers presenting antenatally. These three antenatal alternatives could be combined with any three peri/postnatal alternatives results [inaudible] for mothers presenting antenatally.

And the effectiveness and cost effectiveness of the antenatal alternatives was evaluated using data in the best case from the Kesho Bora trial and we were also interested in looking up the effectiveness and cost effectiveness of earlier

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initiation during pregnancy for which we incorporated data from their Mma Bana trial.

In the best case a maternal triple ARVs regimen which was evaluated was zidovudine 3tC and lopinavir both [inaudible] analysis we investigated the use of much less costly alternatives. The main outcomes which I will present related to HIV transmission averted onto [inaudible] which are called [inaudible] life years gained.

The interventions were costed, taking a health sector perspective with drugs and healthcare visits costed according to Malawian national standards. And also [inaudible] downstream costs were incorporated particularly the costs of treating infants who are infected with HIV. In the best case upon current levels of pediatric ART coverage in Malawi.

Results are presented in terms of incremental cost effectiveness ratios which is a measure of the cost per unit of health gain of one intervention compared to a less costly and less effective alternative. The results are subjected to sampling uncertainty since the model is probabilistic and the robustness which actually according to alternative model assumptions.

So in particular changes in drug regimen and prices as I mentioned, for which we evaluated how results were changed using much less costly [inaudible] regimen. With [inaudible]

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antenatal initiation for which we use the desk from [inaudible] and also the model parameters were varied.

So here are the best case results. For mothers presenting at delivery infant nevirapine was associated with ICERS paired transmission averted of \$264 compared to standard of care impair quality gained of just over \$15. The use of maternal ARVs for mothers presenting at delivery, so ARVs during post natal period was dominated being both more costly and less effective than the use of infant nevirapine.

For mothers presenting antenatally, the least costly strategy was use of antenatal zidovudine followed by the standard of care. Use of antenatal zidovudine followed by infant nevirapine which approximates WHO Option A was associated with ICES transmission averted of \$667 and quality gained of just under \$40.

And only other non-dominated strategy was the use of maternal ARVs during pregnancy followed by infant nevirapine, remember with the standard of care which was associated with ICES paired transmission averted of \$172,000 and quality gained of \$10,000. The results were consisted through the scenario analyses.

That became more attractive with alternative model assumptions was the use of maternal triple ARVs during pregnancy, followed by infant nevirapine postnatally. With the most favorable combination of model assumptions using low-cost

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faberence [misspelled?] based regimen and with earlier antenatal initiation. The QALYs ICER associated with this strategy came down to 603 dollars.

Now this is important. To determine cost effectiveness, we need to know whether these ICERs represent a good value. This requires some knowledge of the opportunity costs of the resources require to fund interventions in terms of the health gains that could be generated if these funds were used for alternative purposes.

WHO advised any intervention offering a unitive health gain, in which they use dollars, at less than three times GDP we recommend it is "relatively cost effective." One less than one times GDP, we recommend it is "very cost effective." Based upon Malawian GDP in 2009 this would result in an upper threshold of 870 dollars. However, it's really not clear whether these thresholds really do represent opportunity cost. The evidenced based behind this is weak, some people would think they're too high, so caution is really required when interpreting results of cost effectiveness analyses.

It's useful therefore, to present results across a range of cost effectiveness threshold. Cost effectiveness acceptability curves show the probability that particular strategies are cost effective at given thresholds based upon sampling uncertainty that's incorporated into the model so not

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all in certainty about that which relates to the sampling based upon the trial data particularly. Also cost outcomes data.

In this slide we see cost effectiveness acceptability curves for alternatives when mothers present antenatally which shows even that very low cost effectiveness rationality use of nevirapine appears to be cost effectiveness.

Here we see four CIAC plots. The left-hand side of the slide shows CIACS for interventions where mothers present at delivery. The right-hand side when they present antenatally. The top two plots show CIACS associated with the use of lopinavir based regimen. The bottom two with the use of faberins based regimen. We can see that there is only really other any decision uncertainty, if I draw your attention to the bottom right-hand plot, where mothers present antenatally and there is the option of lower cost faberins based regimen.

The use of zidovudine followed by infant nevirapine is still likely to be cost effective which in better resourced health systems or the price of triple ARVs was to fall further, maternal triple ARVs during pregnancy followed by infant nevirapine postdelivery for mothers not in need of treatment for their own health may be a cost effective strategy.

Another way to examine what is likely to be the most cost effective strategy, particularly when there's a large treatment gap, is to ask what would be the total healthcare in a given spend, in this case 1 million dollars, on any one of

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interventions compared to standard of care. Because zidovudine followed by infant nevirapine is such low cost, particularly when downstream treatment costs are incorporated, it can be delivered to a high number of mother/infant pairs and these results in a far greater aggregate health gains.

For instance, in terms of QALYs of 284,000 compared to the use of ante and postnatal maternal triple ARVs that result in aggregate QALY gains around 10,000 using the most favorable combination of model assumptions.

The study findings therefore are when mothers present at delivery, infant nevirapine during breastfeeding is very likely to be cost effective. When mothers present antenatally, receipts of zidovudine during pregnancy followed by infant nevirapine throughout breastfeeding, is likely to be cost effective. On the basis of future clinical evidence, triple ARVs during pregnancy followed by postnatal nevirapine may be cost effective if supported with sufficient resources and lower ARV prices.

We also found strong results, as you would expect, at the earlier interventions are commenced in pregnancy, the more effective the more cost effective they are. There are a number of limitations with this study as there are with all modeling exercises. I don't have time to go through all these but I'll draw your attention to these here.

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Finally, I'd just like to say you may ask about option B+. Due to a lack of data related to the long-term effectiveness of option B+, we did not formally evaluate this in the model but based total fertility in Malawi of around six and mean birth spacing at 37 months.

If we're looking at PMTCT, particularly when there are large treatment gaps with many mothers receiving no more than most basic interventions, we believe it's unlikely to be cost effective because of the cost of ARVs between births when no vertical transmissions are averted even if it was a strong effect on reduced transmission of the next pregnancy.

Here are the co-authors who I wish thank. I also thank you for your [inaudible]. [applause]

LULU MUHE: It's for you to ask and comment on the presentation. Go ahead.

FEMALE SPEAKER: Good morning. [inaudible] USAID. A question about comparing option A versus option B, are you assuming that uptake is equivalent? My question refers to the fact that a lot of people, one of the positive things about option B+ is that's it's much more simplified so there will be more likely to have more women initiated on PMTCT compared with option A. In your data, it seems like option A is more cost effective and I was just wondering if that was factored in? Thank you.

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PAUL REVILL: Basically we're examining the results are based upon how many mother/infant pairs can receive the interventions given limited resources. Two things with your question; in terms of the simplified approach, which option B+ represents this wasn't incorporated.

It's difficult to incorporate this within a cost effectiveness [inaudible] but it may well be important. It needs to be balanced against the generation of health gains in terms of reduced transmissions from available resources. Related to that, uptake wait it's based upon mothers presenting. Yes, there's no difference in uptake.

FEMALE SPEAKER: Yes, thank you. One thing when we talk about cost of PMTCT and especially when we want to compare option B or B+. The issue of CD47 count and access to CD47 count is very important because when we want to move to B+, let us say even during only pregnancy it is because CD47 count merged as important. Actually access [interposing] to treatment. I don't know if in your model you integrated the issue of access to CD47 and the cost also?

PAUL REVILL: Thank you, it's very good question. We used, it's clearly a problem the access to CD4 is limited in many settings and a decision needs to be made then around the appropriate strategy. We, due to time limitations, we didn't have a chance to present here but we used the results of this modeling access to examine the value of the health system

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investing in CD4 to determine initiation onto the most appropriate and most cost effective regimen.

I believe estimates of a CD4 count read somewhere between 10 and 15, maybe 20 dollars. Based upon the model results we consider that is a very high value to CD4s counts as to determine mothers' access and the most appropriate treatment pathway.

A quite strong result we have is that, although presently access to CD4 counts is limited, investing in CD4 using these results is likely to be an appropriate and a valuable use of resources because that then provides access to mothers following alternative appropriate treatment path.

I think this [inaudible] clearly were the difficulty of time delays between the CD4 test and with those receiving the test results. I think the use of point of care CD4 tests could be—results in presentation of actually lists in this session—so I don't see too much with the use of point of care CD4 tests could be particularly valuable here.

FEMALE SPEAKER: Hi, I'm [inaudible] from NCGM Japan's— I have one question for the transmission about it. In your tables, I think that you had quite a big disparity between maternal [inaudible] and the postnatal [inaudible] compared to the maternal triple ARVs and followed by postnatal treatment ARV. What is the reason behind this disparity?

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PAUL REVILL: The results which were presented were cost effectiveness results so incorporating costs and reduced transmission. The BAN Trial showed that infant nevirapine was slightly more effective than maternal ARVs postpregnancy whereas deaths from the Kasha [misspelled?] and Balram Trial showed that the use of maternal triple ARVs compared to zidovudine during pregnancy was slightly more effective so we incorporated the transmission data from both trials.

Also onto sensitivity analyses to investigate whether there was the use triple ARVs during pregnancy, if that reduced the risks of transmission significantly more for mother/infant pairs in which they continued along the option B line compared to option A.

I think to answer your question, the results were cost effectiveness, incorporated costs and reduced transmissions. Best trial data shows a slight benefit of triple ARVs during pregnancies for mothers but it appears that the use of infant nevirapine postpregnancy is slightly more effective.

LULU MUHE: Just last question, please.

ANDREAS: Yes, Andreas [inaudible] of New York. We've done a very similar analysis in the context of Uganda where we find that triple therapy is highly cost effective, both for option B as well as B+. I suspect the discrepancy in our findings may be due to the transmission probabilities you use. We find that triple therapies really associated with

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transmission probabilities as low as 2 to 6-percent. With me, it was 4-percent in our model, where single dose nevirapine over the course of gestation and breastfeeding as high as 25-percent or something like that. Do you recall the actual transmission probabilities used in your model?

PAUL REVILL: There were transmission probabilities from the BAN and Kasha Balram Trials who had a preference in using data from around the [inaudible] trials which were deemed to be most comparable and were well respected trials. A lot on this paper here but if I can refer you to the papers and particularly if you've done similar piece of work, I would be very interested to discuss it. It sounds like, on the basis of what you've said, the risk of transmission is key in driving results.

LULU MUHE: Thank you very much, Paul. I think hopefully we will have some time also to continue this discussion after all sessions are done.

ANDREA CIARANELLO: Thank you. Our next speaker is Dr. Angela El-Adas. Dr. El-Adas is a medical doctor who also holds a Master's degree in Public Health. She has served in academic positions at Penn State, Johns Hopkins and the University of Ghana and is now the Director General of the Ghana AIDS Commission where she is responsible for the coordination and management of HIV prevention, treatment, and care and support programs.

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She will be presenting on behalf of her co-authors. Her presentation is entitled, "Economic Evaluation of the National Program to Prevent Mother-To-Child Transmission of HIV in Ghana." Dr. El-Adas, thank you.

ANGELA EL-ADAS: Thank you Andrea. Good afternoon everybody. Let me begin, on behalf of the government of Ghana to register my sincere appreciation to all delegates who have shown their support during this very trying time when our president has passed away. Many of you have been by our booth and have shared your condolences and we are truly grateful, thank you.

Again, I'd to appreciate the support given by PEPFAR providing funding for this study and through U.S. A.I.D. Ghana, also for the technical support that has been provided by the Health Policy Project Futures Group. I'm presenting on behalf of the study team, partners from the Ghana AIDS Commission Futures Group, the Ghana Health Service National AIDS Control Program, the University of Ghana and U.S. A.I.D. Ghana.

Basically in 2009, 2010, Ghana developed new national strategic plan to guide implementation of our HIV response. Around about that time we also developed a PMTCT scale up plan to enable us to reach virtual elimination of mother to child transmission. At the same time, we had just adopted as a country new National PMTCT Guidelines based on the WHO guidelines and we had chosen to go with option B.

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We were at a crossroads in costing our national strategic plan. We were also as a country considering submitting transitional funding mechanism proposal. We absolutely needed relevant data to support us with the costing of PMTCT in Ghana.

We did not have studies at that time that had examined the cost of delivering these services in particular and there were few international studies to refer to at the time. We asked ourselves the question, what does it cost to provide PMTCT services for one woman and child from pregnancy through the recommended period of postpartum care according to the National Guidelines that we had just adopted?

In looking at this, we were considering the cost of providing PMTCT services to an HIV negative woman. We were looking at providing services to an HIV positive woman. In that regard, there were a number of services that we were looking at in particular, HIV testing and counseling. We were looking at basic antenatal care services that are offered to women when they come into our clinics pregnant.

We were also looking at providing prophylaxis during pregnancy for HIV positive women who didn't need it for treatment as well as women who needed antiretroviral therapy for themselves. We also looked at the cost of providing PMTCT services to an HIV exposed infant.

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The methodology adopted mixed methods. We looked first at a series of documents and we looked carefully at the information that existed at the time in the country. Our scale up plan per the WHO guidelines option B. Then also looking at previous ART costing studies that we had done in addition to pontification studies, et cetera.

Then there were interviews of key informants using a structured questionnaire. This took place at various levels, at the central level we interviewed experts at the National AIDS Control Program, Ghana Health Service, Ministry of Health, et cetera. We conducted interviews with providers at various facilities.

In this case we were limited in time and resource and we worked with 14 facilities. We tried to have these facilities represent the scope of health services that were being provided for maternal to prevention of maternal to child transmission in the country. The scope of these facilities ranged from tertiary or teaching hospitals through original district hospitals to maternity homes and to trips compounds or what we call community health planning services compounds at the level of the community. We looked at public and private facilities. We looked at rural/urban mix and we also considered prevalence in determining the facilities at which costing was done.

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A representative care schedule was developed based on our national guidelines that we had agreed on and of course, as the study progressed we had to refine the template gathering data.

For the purposes of this study we defined PMTCT The cost of providing PMTCT services to one woman from intake in the PMTCT program during the 1st trimester through the recommended period of postpartum care the cost of providing PMTCT services to one woman from intake in the antenatal program during the first trimester through the recommended period of postpartum care.

The cost of providing PMTCT services to one HIV-exposed infant from delivery through the recommended period of postpartum care. For our purposes the maximum period here is 21 months. We are trying to catch the women as early as possible so we're aiming to get them engaged with antenatal care even in taking in reproductive health decisions and through 12 months of breastfeeding.

What are some of the key results that we found through our study? The cost of providing services to sero-negative mother, basically routine antenatal care and HIV testing and counseling at least twice during the period of pregnancy and routine postnatal care, came out to about \$56 U.S.

Then for mothers who needed prophylaxis, they didn't need ARVs for treatment, but mothers who need prophylaxis

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because they were HIV positive. We also cost-ed the amount of money that it would take to provide services for them. You notice that the infant costs vary a bit even though the mothers' costs remained constant by the three bars and for each of the scenarios. That is because depending on when an infant is diagnosed HIV positive or not the services that are provided vary slightly. The ultimate of course, is that we get to a 12 month period without having that child diagnosed positive.

Then also for the last three bars that you see, that is the situation in which a mother needs ARVs for her own treatment. Of course, that is not restricted to the 14 week gestational period through to term and one week post breastfeeding period. We tried to compare or just take at a glance to see how the cost for PMTCT distributed between the mother/baby pair. It was clear to us that the bulk of the cost is actually attributable to the services provided to HIV positive mothers.

You notice that there's not much disparity between the costs for HIV positive mothers ranging from 91-percent through 97-percent. The bulk of these costs that is attributable to the mother's care were actually for providing antiretroviral therapy. That is why in the previous slide you will notice that was cost considerably significantly less to provide services for an HIV negative mother. The bulk of these

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services are going to antiretroviral therapy and also to provide time.

Just at a glance, we're looking at the distribution of direct and indirect costs by mother and baby pair. Let me say that when we considered direct cost, that is the brown part of the bars, these are mainly attributable to the drugs and to retroviral drugs and also two drugs that are used for opportunistic infections, et cetera. A very small proportion of that provides routine prophylaxis for malaria and folic deficiencies, iron deficiency, et cetera. The bulk of it is for antiretroviral therapy and drugs for opportunistic infection.

Also significantly lower the next significant expense is to two words, tough time. This varied from facility to facility. The indirect facility cause basically is going to things like administration, transportation, public utilities, et cetera. Let me go back and say that direct cost also covered laboratory services.

In summary, PMTCT costs are driven by our direct costs and direct costs are associated significantly with antiretrovirals, associated lab facilities that constitute the largest cost components for both direct costs and overall, of course. The data also suggests that the unit cost of delivery of PMTCT services will not vary significantly over time or depending on the facility, unless the cost of ARVs are driven

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down. If as a country, we are going to scale up and sustain our PMTCT program then we have to look at ways of finding more less costly antiretrovirals.

Staff time, like I referred to earlier, was also a relatively large contributor to overall cost and specifically to direct costs. Highest of costs were associated with higher level facilities where we had specialists, doctors, better trained staff as compared to the lower level facilities where we had less staff with less expertise and providing services for PMTCT.

The observation that we made also was that if we continue as we are as country in shifting PMTCT services from higher skill to lower skill staff we could achieve some cost savings in the longterm. Of course, we have to ensure that quality of delivery of service is maintained.

In conclusion, the study provided insights into what is driving up PMTCT costs, it's the drugs, it's staff time, and what we can do to achieve cost effective efficiencies in driving down some of these costs. Let me conclude by saying that this data has been very useful for us in taking decisions in programing and we expect that it will also be helpful to other countries that share the same social demographic characteristics as ours. Thank you. [applause]

ANDREA CIARANELLO: We have time for just a few quick questions please.

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FEMALE SPEAKER: Thank you for that presentation. Very quickly, what we experience in- [inaudible] thank you. What we experience primarily in a lot of the countries that I've worked with is yes, we look at task shifting but I'm wondering if you were able to explore at all the issue attrition and losing staff and how that might impact the cost? Or is that a future study? Thank you.

ANGELA EL-ADAS: Thank you very much, that is a very interesting question but is actually outside the scope of this particular study. It is a problem that we encounter also in our country and there are other studies that are looking into the issue of cost attrition, staff attrition and associated costs.

FEMALE SPEAKER: Yes, my question is just because PMTCT usually for [inaudible] and it seems you're just concentrated on the [inaudible], in fact on the [inaudible] which is a user [inaudible] because even in Pronfee [misspelled?] you have also the issue of the [inaudible]. My question was to know is PMTCT in Ghana as integrated within a [inaudible] because usually issue of creating demand involving community PMTCT; to create demand must be also taken into consideration when you try to make costing.

Lastly, my question is when I see the costs per mother and infant, it seems very, very high. I don't know what were the resources of your prices for costing first? Have you

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compared it to the mother and baby pack, which is a pack provided by UNICEF and the [inaudible] for option A, which covered at least HIV infected women up to 12 months of breastfeeding?

DR ANGELA EL-ADAS: Thank you, let me start from the last question and to say that no, as a country we have agreed on option B and that is what this study sought to do was to cost what it would take to provide and scale up services for option B. Then talking about the cost per mother/baby pack, I believe it has to do with decimal points. Basically decimal points instead of the use of comma perhaps you have decimal point. It wasn't in thousandths in as much as it's in a 50 or 100 and something or a thousand. It wasn't in multiples of thousands. The first question, if you don't mind going back to that first question?

FEMALE SPEAKER: The different—

ANGELA EL-ADAS: Yes, we considered the different prongs. I think it was just a matter of time and perhaps missing out on these and then placing emphasis on what was driving the costs for PMTCT in my country but definitely all four prongs were considered.

Let me say, however that the scope of this study was restricted to health facility provision of services and provision of services in the community by health personnel. We didn't quite look at the community mobilization for PMTCT, et

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cetera. That would have expanded the scope considerably. We did not have the luxury of time and we were focusing on what was being provided by health personnel, irrespective of whether it was at the facility level or in the community, and yes, we tried to cut across all four prompts.

ANDREA CIARANELLO: Thank you very much.

ANGELA EL-ADAS: Thank you [applause].

MALE SPEAKER: Our next speaker is Dr. Scott Dryden-Peterson. He is a Clinical Researcher in the Division of Infection Diseases at Brigham and Women's Hospital, and Harvard Medical School in Boston. He's also a research associate at the Botswana Harvard AIDS Institute in Gaborone, where he's working for the past five years. On behalf of his co-authors, Scott is presenting on automated platform for delivery of CD4 results to SMS-enabled antenatal clinic printers, Botswana. Scott?

SCOTT DRYDEN-PETERSON: Very well. Thank you all for being here and it's my pleasure to present this work on behalf of my co-investigator team. We have background, CD4 staging is a key step in the prevention of mother to child transmission cascade. It directs ARV choice and option A, it directs the duration of therapy in option B, it directs maternal care related prophylaxis and other things, and it informs choice related to which regimen to start.

Unfortunately it was mentioned earlier by the audience that it remains an important bottleneck in the PMZ

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[misspelled?] cascade. It's estimated that 51-percent of women in low/middle income countries are successfully complete staging during pregnancy, and this number is very similar in Botswana from data that we have. Despite good availability of analyzers, delays and unpredictability of CD4 result return has been identified in key informa [misspelled?] interview as an important block to the cascade in Botswana.

The Tokafatso Project and Tokafatso means improvement in Setswana, was an issue to try to address a question of whether a low cost improvement intervention can improve antilo [misspelled?] access to CD4 numeration and HAART initiation. This is a randomized control trial that includes several different interventions, including education related to phlebotomy, securing test kits during periodic outages, and contact tracing for low CD4 women.

The focus of today is a novel platform that we developed to expedite CD4 result return. The results of the trial will be available later this year.

I think in order to understand I need to explain a little bit about how CD4 results are currently delivered in greater Gaborone area, and there's three different models. Model A, results are obtained directly from an electronic medical record, this is a proprietary system called MediCheck. This is present in three clinics, here shown in red. There's some challenges related to periodic outages of the network or

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workstation outages. The clinicians estimate that they get the results back somewhere between three and 14 days.

Model B is a protobation of Model A where this next ring of clinics shown here in blue go every two weeks to a clinic that has an electronic medical records system, and obtains the results, and transcribes them then returns to their clinic. One of the challenges obviously related to this is transportation availability, the potential for transcription errors, and then the other limitations of Model A. The counselors estimated it takes 14 to 28 days for them to get the results back to the clinic in this setting.

The final one is Model C, and kind of the more outer rim clinics shown in green, where results are delivered on paper via shared clinic vehicles, and often times this is the clinic ambulance that goes into town and picks up the results. Again the same issues related to transportation availability, there's a lot of reports of lost or mishandled results going to the wrong place, and intermixing between PMTCT and ARV programs. The typical timing of result return is somewhere between 14 and 35 days.

In summary the Tokafatso automated SMS platform transmits validated CD4 results directly from the analyzer to the anti-data clinics in the Gaborone area. It is a push notification that prints directly to the midwife or counselor. There's a confirmation of the printing. There's central

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monitoring of clinic activity, and that continues to function even during periods of down time in the electronic medical record and power outages.

Briefly, how the system works is the first step is requisition entry, and on the right you can see a screen shot of the entry screen for clinical and tracing details. The second step is parsing data, so the data file, the CSV file from the fax caliber machine is integrated together with the requisition information, and then it waits for the results to be validated in the electronic medical record, and then once those results are validated the message is sent by SMS.

On the right here is an example of what that result looks like at the clinic side with the clinical details or the demographic details at the top and the results in the middle. Then tracing details, the patients phone number towards the bottom.

What has turned out to be also important in this system has been a couple monitoring screens. This is a screen shot of the requisition interface. I understand it's probably hard to see, but each row is an individual patient and it has the clinic name, and then the time that the specimen was drawn, and whether the result was confirmed, received at the clinic, and then what the results were. The first column being the one that's raw result right off the fax caliber, and the second one being the result that's validated.

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The ones highlighted in red are the low CD4 women that are prioritized for tracing. If you click on any one of these records you pull up – their tracing information comes up. About the seventh or eighth result down, it says SMS message was sent, but it doesn't say confirmed. This is for Gwiapudic Link [misspelled?] and we called them yesterday and learned that they had inadvertently turned off their printer, and so now that result is confirmed, but this screen also helps you monitor those sorts of things.

There's a second screen, looking at the clinics, and it allows you to monitor printer status, and then on the second to farthest right column, there's a graph of historical data and current data about how many requisitions have come in from that particular clinic, and it allows us to be able to react in semi real time to periods of outages when all of a sudden they don't get any CD4 specimens, and we contact the clinic and we find out they don't have blood tubes or HIV test kits, and allows near real time intervention.

Some of the technical specifications, this was authored by Adrian Vera's in Python [misspelled?] over a [inaudible] database using Jango [misspelled?]. It uses a canal SMS gateway [misspelled?]. The application has been posted and it's freely available to anybody who's interested, and it can be downloaded from this web address. It is hosted on a [inaudible] server, which has a GPRS modem, and then these messages go to these

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mobile printers shown here in the picture that are manufactured by Ibextell [misspelled?], it's a U.K. company predominately markets these for takeout delivery purposes, but it's a thermal GPRS enabled printer with a 24 hour back up, and they cost approximately \$200 each.

The program has been implemented in 19 clinics in greater Gaborone, and have facilitated the transfer of almost 1,000 CD4 results with about a quarter of them being for women with low CD4 count, who have been identified for tracing and expedited HAART initiation.

One of the unexpected byproducts has been that the ability to monitor centrally has allowed us to intervene at the clinic and support the clinic on an ongoing basis, and two to three clinics per week have been identified as requiring assistance, either needing test supplies, help with tracing a particular result, or printer maintenance.

In this picture you can see where this particular anti data clinic has decided to place their printer on the shelf in the back, and the system has been very well received by clinic staff. Initially there were some concerns about excess workload, but those have not born out.

In terms of the turnaround time it has improved significantly with this system. On the left side of this graph there is the baseline estimates for models A, B, and C in terms of the days from specimen draw to getting the result back. Then

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the rest of the graph shows what's happened over the time since the program has been initiated with the green line being the time to the specimen being received in the lab.

Then the difference between the green line and the red line, being the time that it takes the lab to produce a validated result. Then from the red line to the blue line is the time that it takes the validated result to be confirmed at the clinic level. This has improved over time and over the past six months it has been a median of six days, with inter quartile range of three to seven days.

Surprising to us has been that the system has also seemed to have really associated with a reduction in the turnaround time within the laboratory, and this is likely due to our ability to monitor in real time, and the clinics to be able to push for improved turnaround time from the lab and be able to have real access to what this should be. The time for the lab to process a CD4 specimen with a valid result has substantially declined, almost in half over the period of the study.

There are a number of continued challenges, and these are illustrated somewhat in the graph on the right, that there continues to be delayed laboratory validation. Compared to the baseline, the current system under Tokafatso has dramatically reduced this validation period, but it should be close to instantaneous, and it still takes on the order of two and a

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half days to have a validated result, even though the fax result is available.

Additionally, although the period here highlighted in light blue where the result delivery has declined dramatically using the SMS systems is not gunned down to zero, which is what we had hope of our being instantaneous, and this is due to the printers running out of air time or the validity period on their SIM card, or issues like what happened in [inaudible] last night where they accidentally turned the printer off, and so those are continued challenges.

Because of the theme of this particular session we performed an analysis looking at operational costs, and these are shown here in this table for models A, B, and C. It's important to note that models A and B do not include the cost of maintaining or license fees for the Meditech, electronic medical records system which are substantial, but we were unable to estimate. The overall cost from the current system is \$3.11, and the Tokafatso platform is estimated to cost \$2.08 for every CD4 result delivered.

In summary an automated SMS platform sharply improves CD4 result turnaround time, even in an urban setting. The platform enables central real time monitoring of clinic and laboratory performance. I think this is important, particularly in Botswana which is moved to option B in a somewhat CD4 independent process, and also in the setting of emerging point

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of care CD4 test devices, that this central monitoring has been crucial in this and I think would be crucial in that context as well.

Low CD4 individuals can be identified and given priority interventions, and the SMS platform does not appear to be more costly to operate than the currently used methods for result delivery and may in fact be cheaper.

I'd like to thank the entire Tokafatso team, and especially [inaudible] and Matthew Boy [misspelled?] who've kept this system running over the past year, and Rosina Probaganada [misspelled?] who performed the cost analysis. I'd also like to thank the clinic staff and the general support financially from PEPFAR, NICHD, and the American Society of Tropical Medicine and Hygiene. Thank you [applause].

MALE SPEAKER: Thank you. Any questions, comments or sharing of experience? As we wait for people, I think the turnaround time is reduced significantly so well, and then you have the possibility of central monitoring and validation. I just wondered if this approach or [inaudible] could be extended to other tests, like I mean, for example, for kids one of the problems is the PCR DNA test, the turnaround time takes so much you lose them in between. Is there a possibility of using similar? What's your kind of general speculation?

SCOTT DRYDEN-PETERSON: Yeah, I think definitely and there was an initiative on Botswana to do that, and that system

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has been working in a couple different countries as well. I think there's also the potential to send the SMS directly to the patient to say your results are ready, you can come get them, and in terms of the cost of it, the cost of the SMS are such a small fraction of the cost of the system that I don't think the additional messages would significantly increase the cost.

MALE SPEAKER: Okay.

MALE SPEAKER: I'll go there.

MALE SPEAKER: Okay.

SYED AHMED: Now, okay, great. Thanks. Syed Ahmed, I work for Baylor in Malawi. Scott, are you going to carry this out in terms of looking at time to delivery of results to mothers, times to initiation for women to get on ART? The kind of next steps in the cascade.

SCOTT DRYDEN-PETERSON: Yeah, thank you. That is the intent, and the overall project looks to the end points of CD4 before 26 weeks gestation and HAART initiation between 30 weeks gestation and whether this intervention helps meet those goals, and so we'll have that data later on this year.

SYED AHMED: Thank you.

MALE SPEAKER: Thank you.

ANDREA CIARANELLO: Thank you very much. Our next speaker is Mr. Nicholas Purification. Mr. Purification is an HIV positive person serving as an activist to establish the

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equal health and human rights of HIV affected peoples living in Bangladesh for the past 12 years. He has dedicated his work to serving the underprivileged, marginalized, and socially discriminated people living with HIV and AIDS in Bangladesh. His presentation is entitled Small Scale Income Generating Initiatives Mitigate the Socio-Economic Vulnerability of HIV Households in Bangladesh. Thank you.

NICHOLAS PURIFICATION: Thank you. Thank you, everybody. I'm Nicholas from [inaudible], Bangladesh. My countries [inaudible] of Bangladesh, this is the current population [inaudible] 15.2 million. Only 26-percent of total populations are living in the urban area, so per capita gross national income is \$1,230 only, so per capita [inaudible] \$57. [Inaudible] in our countries, the total estimate number is pure HIV, is 7,500, but total [inaudible] 2,533 only, so total AIDS case is 1,101, and total AIDS cases 32.

Our prevalence still then lays only one. The objective of our programs, that not only [inaudible] program, so we knows this income generating ownership for the village in Bangladesh, so since March 2010. To address this [inaudible] HIV of Bangladesh.

It's actually our regions of launching income generating ownership for the [inaudible] Bangladesh, the HIV and AIDS has [inaudible] an impact of our livelihood of people living with HIV and AIDS in a developing company like

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Bangladesh. Stigma and discrimination in the local society makes the social economic conditions more [inaudible], so moreover [inaudible] program. [Inaudible] are still facing the stigma and discriminations in their job please, and sometimes they even lost their jobs also.

The target populations, there's our [inaudible] who lost their jobs, they're getting infected, and people living with HIV in rural area [inaudible], and older and separate [inaudible] HIV. Actually our discoveries now is to date this program has covered 2,046 HIV families having the [inaudible].

After our December 2011 we [inaudible] that total village numbers is 143 only, so our male is 43 persons and female is 33, and children are 34-percent.

Now, I [inaudible] program of following the service we are providing. The professional training for the female, we are 100-percent [inaudible], and the adult assistance for the female, we can try to train persons, and male was five or seven person, and [inaudible] services only five persons, and help alone we still [inaudible], and allocations alone [inaudible] who can try.

Our [inaudible] were some activities we're doing in [inaudible] country, so \$45 dollars per year per childrens we can service to this, 35 HIV affected childrens, I guess 25-percent, 24 persons of the total [inaudible], they face a

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problem to continue their medications, so the medication grant program we are donated from [inaudible] Bangladesh.

Some comments from the [inaudible] parents. Without the help of the program we could not bear the education expense that childrens, we could not even maintain our even cost, how can we bear our childrens educations cost, so we hope our childrens won't face any stigma and discriminations, as if they are well educated.

[Inaudible] the program, after affected with HIV the house whole income average is 33-percent [inaudible] by 110-percent, which is mainly medical purpose, so now [inaudible] we gave them training, and give them something [inaudible], so they are now is [inaudible] the 35 persons, and now after one year the [inaudible] is the programs.

Some working for the organizations, [inaudible] acceptable society of childrens, there is some [inaudible] many problems in this stigma, so we are being some [inaudible] of the small scale program [inaudible] economic discoveries in terms of [inaudible] in Bangladesh, long term, the large scale comprehensive program in the [inaudible], in spirit of limited funding [inaudible], especially for the HIV childrens and positively the other [inaudible] group as well.

Thank you, [inaudible], so I'm working in [inaudible] this is a [inaudible] effort in HIV prevention, the UNAIDS, and our government, [inaudible], and especially thanks to the AIDS

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2012 [inaudible] community scholarship for attending this conference. Thank you [applause].

ANDREA CIARANELLO: Thank you very much. While we wait to see if anybody has additional questions, I wondered if you could tell us more about how this has been received by the local and national governments in Bangladesh. Do you sense that there's support for scaling up this kind of program or what do you think your next steps will be?

NICHOLAS PURIFICATION: Now we are actually working with government and [inaudible] levels, so the Global Fund also supported with us and we are working with other organizations. They gave us [inaudible] peoples and household also, the childrens, education supported for them.

ANDREA CIARANELLO: Yeah. I would like to thank everyone for coming this afternoon. I think we've seen some really excellent presentations describing what the nature and the casts of services for HIV infected and affected families in a wide variety of settings. I'd really like to applause the presenters for taking on these projects. I think many of us know that these data are not frequently reported. I think this really speaks to the dedication and hard work of all of you for putting them together.

As was mentioned, I think they will probably be critical for program planning and also for efforts to evaluated the cost effectiveness and sustainability of these programs,

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particularly in the time of global, economic recession. Please
join me in thanking all of our presenters and thank you for
your attention this afternoon [applause].

[END RECORDING]

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