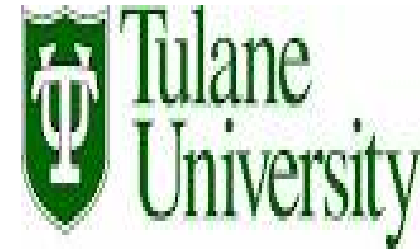


# Cost Effectiveness Analysis of PMTCT service delivery modalities in Addis Ababa (Using Decision Model)



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# Outline of Presentation



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# I. Statement of the Problem



## □ Globally (end of 2010):

- People living with HIV..... 34 million (31.6-35.2 million)
- New HIV Infection.....2.7 million (2.4-2.9 million)
- AIDS related deaths.....1.8 million (1.6-1.9 million)
- Children newly infected with HIV.. 390,000 (340,000-450,000)

## □ Sub Saharan countries (end of 2010)

- People Living with HIV.....22.9 million
  - ⇒ 5% Adult prevalence
- New HIV Infection .....1.9 million
  - ⇒ 91% of all new infections among children (2008 Estimate)
- AIDS related deaths.....1.2 million



(Global HIV and AIDS estimates, 2009 and 2010 )

# I. Statement of the Problem cont...



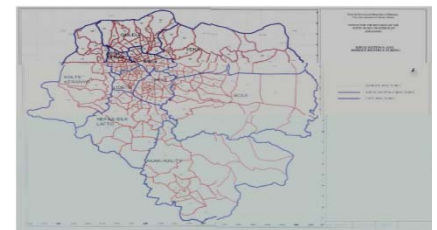
## □ Ethiopia

- HIV prevalence 2.4% in 2010 (Single point Estimate, 2007)
- HIV Prevalence 2.3 % in 2009(ANC Sentinel surveillance, 2009)
  - Highest regional HIV prevalence.....Gambella (5.4%)
  - Lowest regional HIV prevalence..... SNNPR (1.4%)
- HIV prevalence 1.5% in 2005(E-DHS, 2011)
  - Women have a higher HIV prevalence (1.9 percent) than men (1.0 percent).
  - 90,311 HIV positive pregnant women estimated in 2010.  
(Single point Estimate, 2007)
- Vertical virus transmission from mother to child accounts for more than 90% of paediatric AIDS (FMOH,2007)



## □ Addis Ababa

- HIV prevalence 9.2% in 2010
  - Male:7.3%
  - Female:11% (Single point Estimate, 2007)
- HIV prevalence among ANC attendances 5.3% in 2009(FMOH/NHAPCO, 2009)



# I. Statement of the Problem cont...



❑ Vertical Transmission of HIV from Mother to Child (MTCT) occurred during:

- Pregnancy,
- Childbirth &
- Breastfeeding

❑ In Addis Ababa, many children are infected through mother-to-child transmission (MTCT)

(HIV/AIDS in Addis Ababa, 1999)

❑ In the absence of any intervention, incidence of HIV vertical transmission:

- 15%-25% ...industrialized countries
- 25%-40%... developing countries. (Ades A.E, 2000)

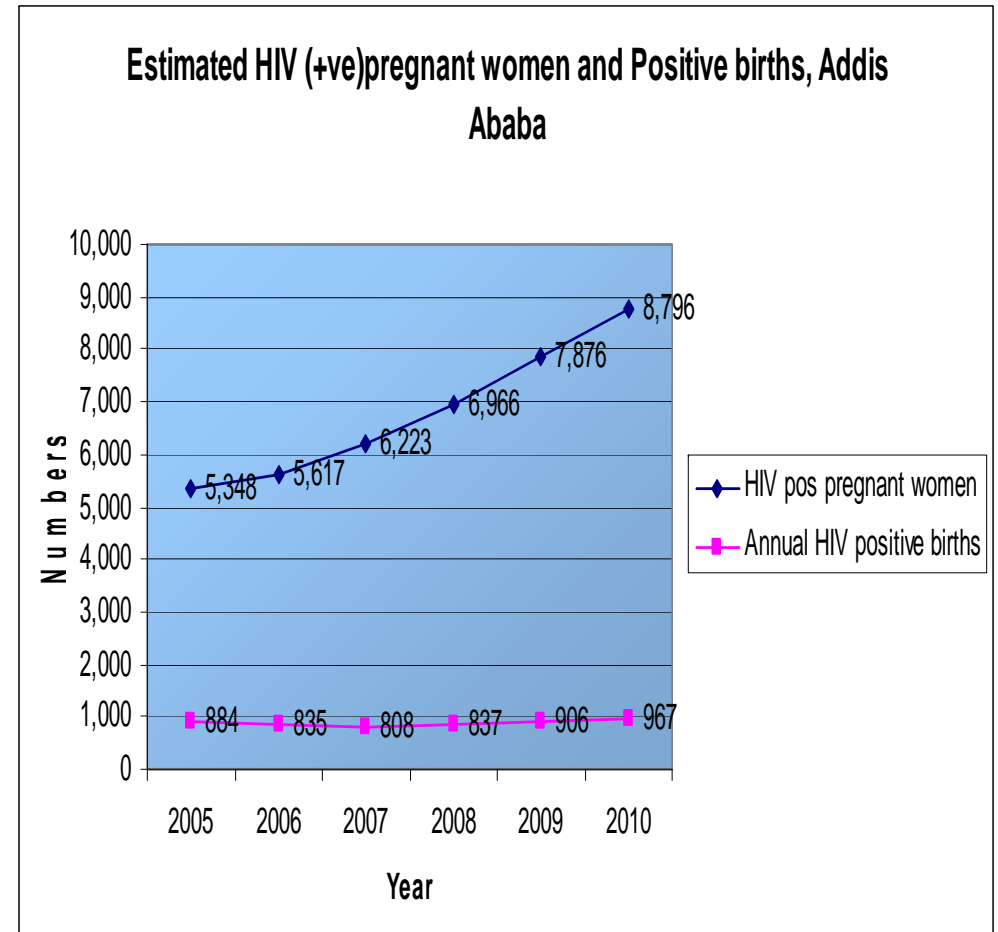


Figure 1: Estimated HIV (+ve) pregnant women and positive births in A.A from 2005-2010.

Source: Single point HIV prevalence Estimate, June 2007,

# II. PMTCT Program Description



## Program Logic Model for PMTCT service delivery modalities in the surveyed health facilities of Addis Ababa

**Problem:** Many children are infected through mother-to child transmission (MTCT) in Addis Ababa, This problem can be mitigated through identification of economical PMTCT service delivery modalities and informing different level of decision makers for the efficient allocation of health care resources.

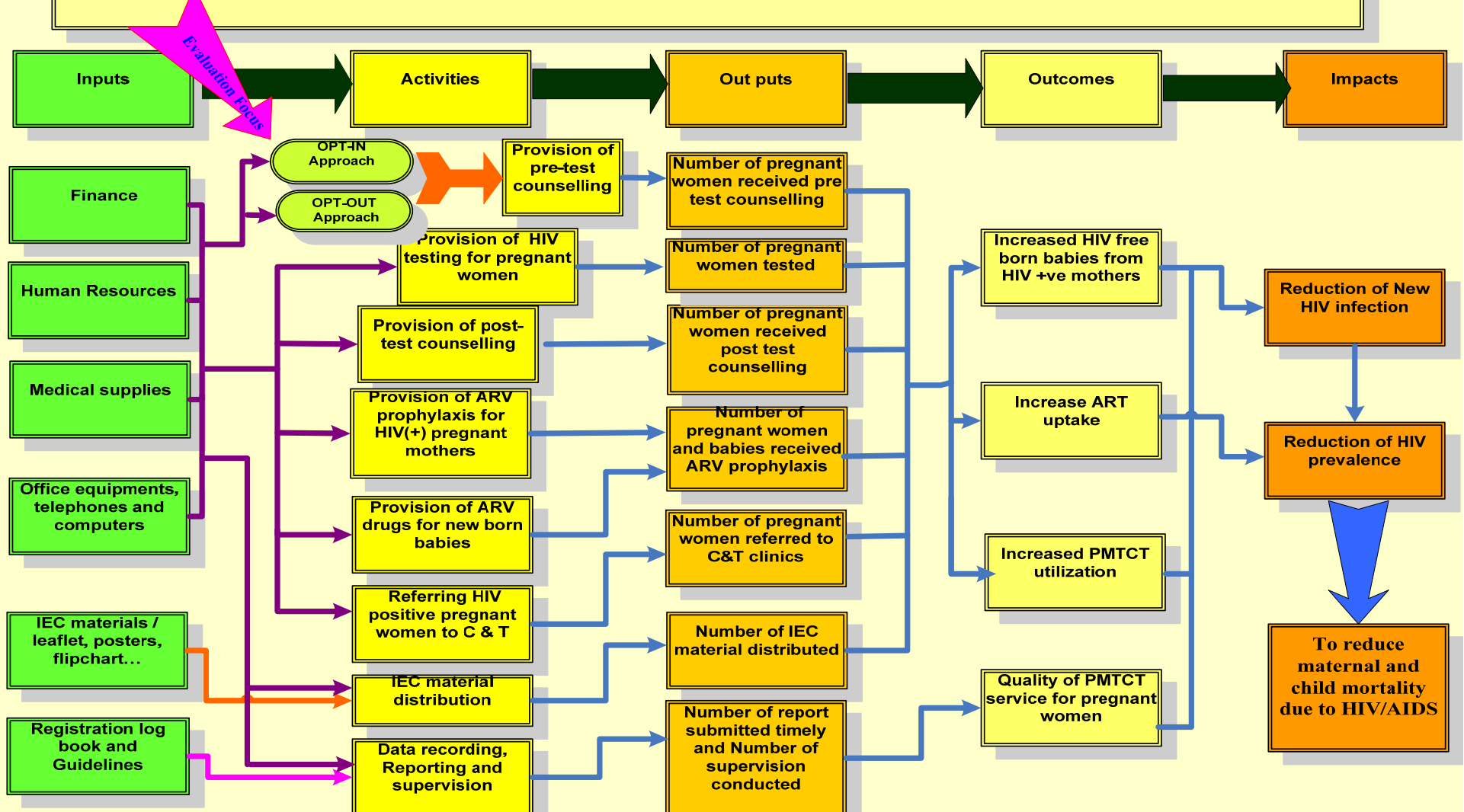
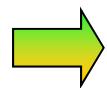


Figure 2: Logic Model of PMTCT service deliveries in Addis Ababa health facilities, 2009

# III. Rationale for Evaluation



- ❑ Scarcity is an inescapable feature of the world in which we live.
- ❑ There is a growing need on the different approaches of PMTCT service delivery in A.A for the attainment of nationally shared vision of a “HIV-free generation by the year 2020”



E.g. Opt-in Approach.....2001 and Opt-out Approach.....2007

How should a government / policy / program decision maker allocate health care resources among the different competing alternative modes/approaches of PMTCT service deliveries?

**Available  
PMTCT  
resources  
are finite...**

- ❑ Economic Evaluation (Cost Effectiveness Analysis) is the Answer.

➤ Finally, the study will be used for informing decision maker on the efficient allocation and relative value for PMTCT's resource use in Addis Ababa.

**... while  
limitless health  
care needs  
(PMTCT  
service)**

➤ This study will also contribute its part for digging on strategies (PMTCT) relevance to poverty reduction





# IV. Evaluation Question and Objective

## Evaluation Question:

 Which PMTCT service delivery modality is more cost effective from health care provider perspective in A.A?

 Specific Evaluation Question

1. Which of the current/ existing PMTCT service delivery modality is more cost-effective?

Alternatives: No intervention, Opt-in Approach and Opt-out approach

2. Is the current/existing PMTCT service delivery approach more cost effective as compared to the other?

Alternatives: No intervention, Opt-in Approach, Opt-out approach, Mandatory HIV testing and Universal treatment.



# IV. Evaluation Question and Objective cont...



## General Objective:

- 📖 To inform decisions on the cost effectiveness choice of PMTCT service delivery approaches currently in use or potentially can be used in the local resource set up.

## Specific Objectives:

- ❑ To compare the cost effectiveness of the currently in use (opt-in and opt-out) approaches/modes of PMTCT service deliveries.
- ❑ To compare the cost-effectiveness of the four alternative approaches (opt-in, opt-out, mandatory HIV testing and Universal treatment) of PMTCT service delivery for policy decisions, program management and further research.

# V. Models of Economic Evaluation



## Economic Evaluation Design

⇒ Full Economic Evaluation (Cost effectiveness Analysis) using Decision model

⇒ Developed based on framework of the study design by Anne C. Haddix et al, 2003

- ❑ Evaluation Focus: Cost-Effectiveness
- ❑ Evaluation Approach: Summative evaluation.
  - Because economic Evaluation focused on choices to provide **Judgment** on PMTCT service **delivery modalities'** worth both in terms of their cost and effectiveness.
- ❑ Approaches compared in the cost effectiveness analysis:
  1. No Intervention
  2. Opt-in approach of PMTCT service
  3. Opt-out approach of PMTCT service
  4. Mandatory HIV testing approach of PMTCT service
  5. Universal Treatment approach of PMTCT service

# V. Models of Economic Evaluation cont..



## Study Perspective

⇒ Health Care provider perspective

## Time Frame

- The time frame: 2000 Ethiopian Fiscal Year (July 1, 1999-June 30, 2000)  
2001 Ethiopian Fiscal Year (July 1, 2000-June 30, 2001)

## Discount Rate

- Costs and consequences (effectiveness) are not discounted to the present values in the context of this study.

- Because:

- All costs and effects relevant to the analysis, as framed by the comparison statement and viewpoint occur in the present.

⇒ Hence, no discounting rate was considered to convert the future cost to the present values.

# V. Models of Economic Evaluation cont...



- ❑ **Costs Measure:** Operating resources costs:
  - Labor cost (health professionals time spent) and medical supplies.
- ❑ **Effectiveness Measure:**
  - Number of HIV infant infections averted.
- ❑ **Summary Measure:**
  - Cost effectiveness ratio (CER)
    - ⇒ So called: Net cost per net HIV infection averted
- ❑ **Sensitivity Analysis:**
  - ⇒ Univariate sensitivity analysis and Scenario (worst and best) analysis was done for relevant model parameters.
  - ❑ Both epidemiological and economic parameters' plausible ranges was made based on published studies and experts' opinions.
- ❑ **Cut-off point for Judgment:** CER of providing PMTCT service in one modes of service strategy as compared to the other.

# V. Models of Economic Evaluation cont..



## □ Literature Review: Supporting the comparison

- In Chicago, the cost-effectiveness of universal compared with voluntary screening and no screening for HIV among pregnant women was done. (Lilly Cheng Immergluck et al, 2000)
- A decision analysis of mandatory compared with voluntary HIV testing in pregnant women was done in the USA. (Inaam A. Nakchbandi et al, 1998)
- Considering the 20,000 hypothetical cohort of pregnant women in SSA; comparison of CEA on two implementation strategies (targeted Vs universal treatment) and regimens (HIVNET 012 Vs short-course antiretroviral regimens) was done. (Elliot Marseille et al, 1999)
- In Zambia, Lusaka Prospective cohort study was done on universal treatment for women of HIV unknown serostatus. And it was found that, the treatment would be unlikely to add viral resistance concerns beyond those already extant. (Jeffrey S. A, 2004)
- From these studies, the above listed alternative could be considered in decision model to determine their importance under different scenarios.

# VI. Methodology



- ❑ Study Area..... Addis Ababa
- ❑ Study Period..... September up to March 2009.
- ❑ Study Design..... Cross-sectional Survey Design
- ❑ Target Population.....56 health facilities providing PMTCT service in Addis Ababa
- ❑ Study Population.....
  - PMTCT Experts working in the surveyed health facilities
  - Pregnant Women that attend the ANC/ PMTCT sites for the last two years
- ❑ Study Site Selection.....Predetermination to cover 30 % of the HF's providing PMTCT service in Addis Ababa.
  - ❑ Stratified sampling method was applied to classify 56 PMTCT sites in Addis Ababa in to four strata.
    - ⇒ 16 Sampled Health Facilities (Proportionally allocated)
      - ↳ Nine..... Governmental Health Facilities
      - ↳ Seven..... Private Health Facilities

# VII. Data collection methods and Quality Assurance



- ❑ Data Collectors and Supervisor were recruited and trained.
- ❑ In one Hospital (St. Paul Hospital), out of the study sites, pre-test of questionnaires was done.
- ❑ Data coding, double entry of data, data cleaning and editing were done.
- ❑ Proper follow up of data collection process was done in 16 health facilities (dividing the study sites in to three) by the principal evaluator and supervisor.
- ❑ Secondary Data: Published studies were collected from FMOH national publications and WHO/HINARI medical data base.

# VII. Data collection methods and Quality Assurance cont



## □ Data Collection Instrument

### 1. Primary Data collection Instrument

- Expert Interview Guide, Financial Record Review, Review of Reports and Medical Records

### 2. Secondary Data Collection Instrument

- Published studies from FMOH national publications and a well known medical data base: WHO/HINARI using search terms:
  - Cost effectiveness analysis, mother to child transmission, Zidovudine, Nevirapine and Lamivudine.

## Data Analysis

- The data was entered, analysed using (SPSS V. 15, Microsoft office Excel 2003, Microsoft Office Visio 2003)

⇒ The cost was presented in percentages and average figures.

⇒ Excel based decision model was developed for averaging out and folding back analysis of the cost and effectiveness of each alternative



# IX. Ethical Clearance



- ❑ Ethical clearance letter was obtained from Jimma University.
- ❑ A supportive letter written by the AACAHB for selected health facilities.
- ❑ Informed consent was obtained with the PMTCT Experts.
- ❑ Confidentiality and anonymous was assured.
- ❑ Utility, Feasibility, Propriety and Accuracy evaluation standards (Daniel L. Stufflebeam, 1999) were have been followed implicitly and explicitly.
- ❑ The study was also strives to follow the Ten elements of check-list for sound economic evaluation (Drummond et al, 2005. P 28-29).

# X. Results and Discussion



## Cost Analysis

### Background Information

- Cost and Effectiveness data were collected from:
  - 16 health facilities
  - Three higher agencies/institutions (Pharmaceutical Funds and Supply Agency (the former PHARMID), EHNRI and FMOH) and
  - Two training provider organizations (ESOG and FHI)

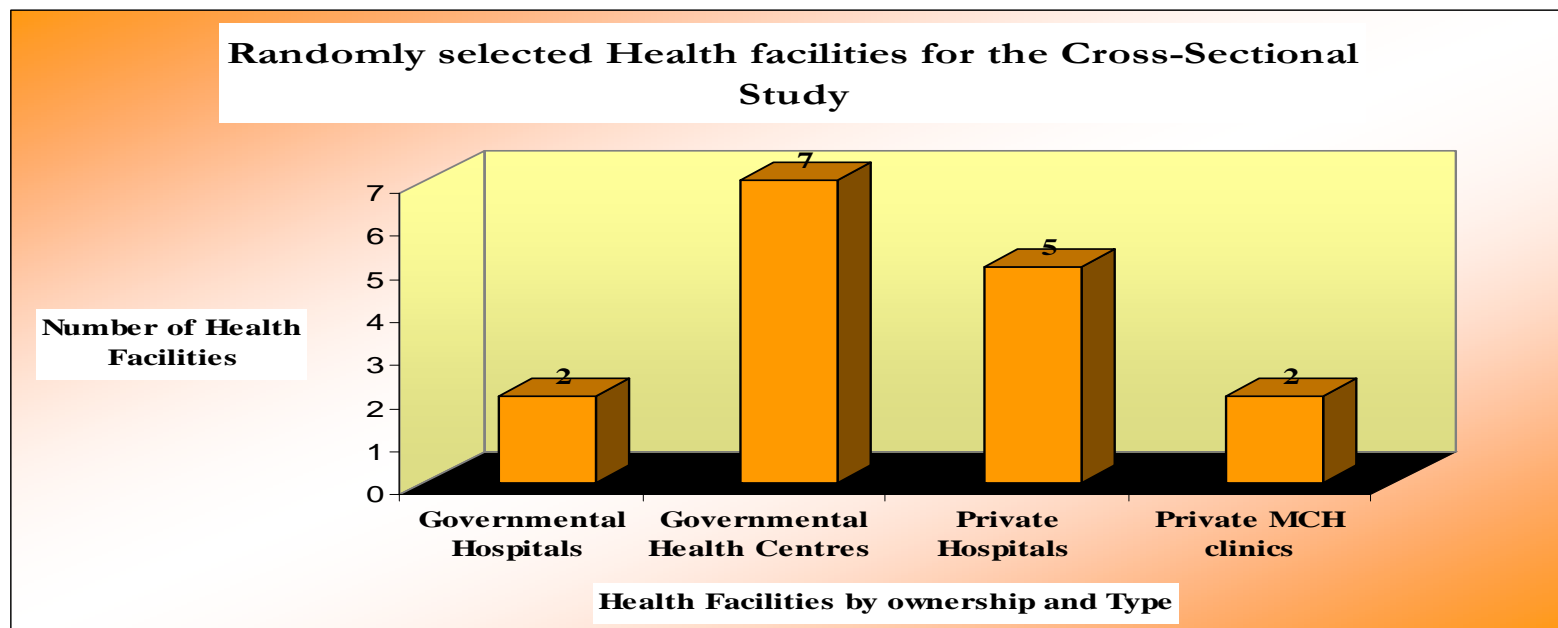


Figure 3: The surveyed health facilities by owner and type, 2009

# X. Results & Discussion cont...



## Expert Interview

- A total of 79 health professionals, consists of Medical directors, Medical doctors (gynaecologists, obstetrician and paediatricians), Clinical nurses (senior, junior, chief and experts), Mid-wives (junior, senior, chief and expert), Laboratory technicians, Laboratory technologists and Druggist/pharmacists were interviewed in the 16 surveyed health facilities.
- Micro-costing/Bottom-up approach was applied for estimating average cost. [1USD ~ 9.8740 birr]

<b>Health Professional Interviewed</b>						
	<b>Medical Director</b>	<b>Medical Doctors</b>	<b>Clinical Nurses</b>	<b>Midwives</b>	<b>Laboratory Technicians</b>	<b>Druggist/ Pharmacists</b>
<i>No of Health Professional interviewed in the HF's</i>	7	4	24	22	8	14
<i>Mean Years of Experience in the Health Facility</i>	2	2	7	4	3	4
<i>Mean Years of experience in related to PMTCT service</i>	..	2	3	3	3	..

**Table 1: The Profile of the Health Professionals interviewed during the Survey, 2009**

# X. Results on Cost Analysis & Discussion cont...



- ❑ The study finding showed that the average cost of PMTCT service per pregnant women receiving pre-test counselling, testing and HIV negative or positive post-test counselling ranges from 2.14 birr (\$0.22) to 133.75 birr (\$13.55).
  - ❑ In Zambia, Lusaka.....\$4.0 per pregnant women  
(Elliot Marseille et al, 1998)
  - ❑ In Uganda, Kampala .....\$5.02 per pregnant women  
(Elliot Marseille et al, 1999)
  - ❑ In South Africa.....\$7.30 per pregnant women  
(Kingham A, 1998)
  - ❑ In the free standing clinic in Kampala....\$13.39- \$18.50  
(Elliot Marseille et al, 1999)
- ❑ While this study finding on average cost estimation was lower than AC estimated in General clinics (with out being focus on ANC) in Tanzania(\$29/client) and Kenya(\$27 per client) (Sweat M, 2000)
  - The difference is the cost ingredients identified and labor cost estimated for counsellors (paid salary)

# X. Results on Decision Model Analysis & Discussion



➤ Adopting the 5 steps recommended by (Weinstein and Fineberg, 1980) in decision Analysis, two decision model was built.

✧ The first was built for comparison between no intervention, opt-in approach and opt-out approach

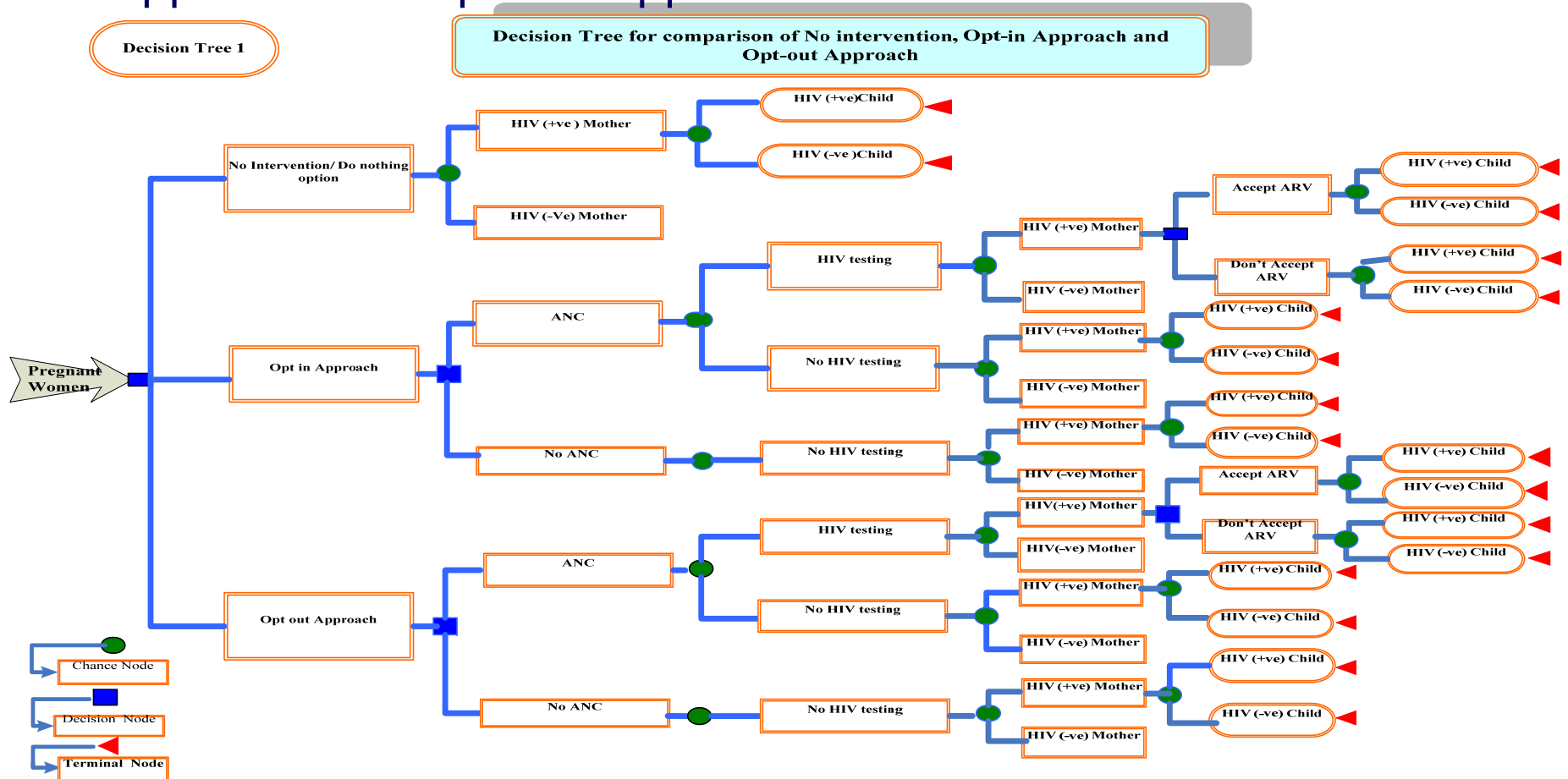


Figure 4: Decision Tree for the comparison between no intervention, Opt-in and Opt-out approach, 2009



# X. Results on Decision Model Analysis & Discussion cont..

□ The second decision tree was built for comparison of no intervention, opt-in approach, opt-out approach, mandatory HIV testing and universal treatment.

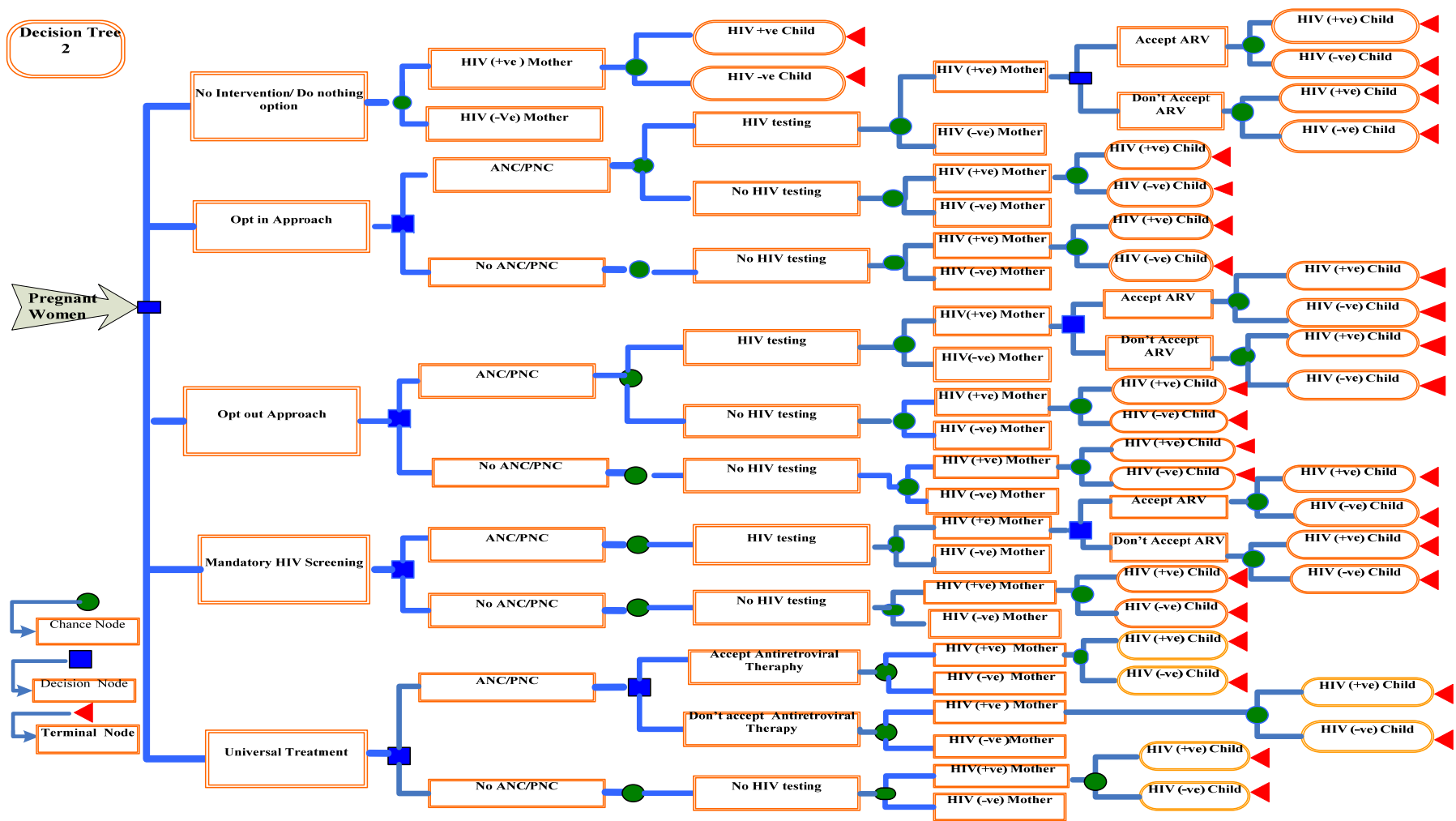


Figure 5: Decision Tree for the comparison of the five alternative PMTCT service delivery approaches, 2009

# X. Results on Decision Model Analysis & Discussion cont.



## Model Parameters and their Estimates

- 13 Model parameters were estimated from the primary and secondary data sources

Model Parameters	Base case Estimates	Range of Values	Data Source
General Demography ( <i>Expected Pregnancy at the Base year</i> )	75,758	..	Health and Health related Indicator, 2000
ANC coverage	91%	10.9%-91%	Health and Health related Indicator, 2000; E-DHS 2005; FMOH Preliminary report, 2009
Prevalence of HIV among pregnant women	12.1%	0.0%-24.8%	FMOH, AIDS in Ethiopia 6 <sup>th</sup> report; Technical document for the 6 <sup>th</sup> AIDS report
Vertical Transmission rate (with out ARV)	24.8%	30-45%	J Brooks Jackson et al, 2003; De Cock et al, 2004
Vertical Transmission rate (with ARV drug prophylaxis)	4.7%	2.4-7%	ANRS, DITRAME PLUS study group, 2005

# X. Results on Decision Model Analysis & Discussion cont.



Model Parameters	Base case Estimates	Range of Values	Data Source
Acceptance of VCT via Opt-in approach	29.15%	..	Survey, 2009
Acceptance of VCT via opt-out approach	47.01%	42%-92%	Survey, 2009; Health and Health related Indicator 2000
Acceptance of Mandatory HIV testing	60%	50%-100%	...
Acceptance of Universal Treatment	71%	..	Lori Bollinger et al, 2002
Acceptance of ARV drug	77.3%	...	Survey, 2009
Adherence to the regimen	100%	50-100%	Survey, 2009
Intervention costs (Average cost estimation)	Survey, 2009, the detail average cost estimation on the previous section was also considered in the decision model		
Medical costs of treating HIV infected infants	\$ 356.5	\$281-\$432	Elliot Marseille et al, 1998; Stringer, 2000; Manserg G et al, 1996

Table 2: Model Parameters and their estimate for the Decision Model Analysis, 2009



# X. Results on Decision Model Analysis & Discussion cont.



## □ Base Case (Best guess) Estimates

### □ Comparison between No intervention, Opt-in Approach and Opt-out Approach

#### □ Effectiveness:

- The Opt-out approach would avert **640** HIV infant infection while the opt-in approach would avert **397** infections.
- Adopting the opt-out approach would result into **243 more infection** aversion as compared to opt-in approach.

#### □ Cost:

- Adopting the opt-out approach costs 9,597,906.62 birr (\$972,038.34); while opt-in approach costs 9,318,723.73 birr (\$943,763.80).
- Adopting the routine ANC HIV testing has resulted in to an **additional cost of 279,182.88 birr (\$28,274.55).**

# X. Results on Decision Model Analysis & Discussion cont...



## ❑ Cost-effectiveness Analysis

### ❑ Cost effectiveness ratio (CER)

- Opt-in Approach ..... 2,504.52 birr/\$253.52
- Opt-out Approach..... 1,989.76 birr/\$201.51

$$\text{CER}_{\text{oo}} < \text{CER}_{\text{oi}}$$

❑ At the base case estimate; adopting the opt-out approach would be the preferred cost-effective approach of PMTCT service delivery as compared to the opt-in approach.

- This study has similar finding with the study in Canada, Ukraine and Zimbabwe (Sharon Walmsley, 2003; Ruslan Malyuta et al, 2006; Freddy Perez et al, 2006; Winfreda Chandisarewa et al, 2007)
  - ⇒ These studies concluded that, an increased acceptance of HIV testing under the opt-out approach contributed for the reduction of HIV infection among newborn babies born from HIV positive mothers.
- Furthermore, other professionals De Cock and colleagues argue that adopting opt-out approach as the relevant strategy for preventing MTCT (Joanne Csete et al, 2004)

# X. Results on Decision Model Analysis & Discussion cont.



## □ Base Case (Best guess) Estimate

□ Comparison between No interventions, Opt-in approach, Opt-out Approach, Mandatory HIV testing and Universal Treatment

	<i>No Intervention</i>	<i>Opt-in Approach</i>	<i>Opt-out Approach</i>	<i>Mandatory HIV testing</i>	<i>Universal treatment</i>
Total Programme costs	8,325,038.18 (\$843,127.22)	9,318,723.73 (\$943,763.80)	9,597,906.62 (\$972,038.34)	9,803,513.31 (\$992,861.38)	8,264,831.92 (\$837,029.77)
No of infected children	2,365	1,968	1,725	1,548	1,737
No of infection averted	NA	397	640	817	628
Net cost	NA	993,685.55 (\$100,636.58)	1,272,868.43 (\$ 128,911.12)	1,478,475.13 (\$149734.16)	Cost-Saving (60,206.27) (\$6097.45)
Net cost per net HIV infection averted	NA	<b>2,504.52</b> (\$253.65)	<b>1,989.76</b> (\$201.51)	<b>1810.41</b> (\$183.35)	<b>95.90</b> (\$9.71)

Table 3: Comparison of cost and effectiveness between the five alternatives PMTCT service approaches, 2009

# X. Results on Decision Model Analysis & Discussion cont...



## □ Cost-effectiveness Analysis

- At the base case analysis, adopting the universal treatment alternative would be the preferred cost effective alternatives as compared to the others.

$$\Rightarrow CER_{UT} < \{CER_{OI}, CER_{OO}, CER_{MT}\}$$

$$\Rightarrow 95.90 < \{2504.52; 1,989.76; 1810.41\} \text{ [ETB]}$$

$$\Rightarrow 9.71 < \{253.65; 201.51; 183.35\} \text{ [USD]}$$

- This finding was similar with cost effectiveness analysis studies done in Sub Saharan Countries (Elliot Marseille et al, 1999; Elliot Marseille et al, 1998; Jeffrey S.A. Stringer et al, 2000)
- Similar result was also estimated in the cost effectiveness analysis of PMTCT on case-study about Ethiopia.
  - ⇒ The study recommended that offering universal treatment would significantly decrease the number of HIV infected infants and saves money. (Birna Abdosh, 2004)

# X. Results on Decision Model Analysis & Discussion cont.



## □ Sensitivity Analysis: Prevalence of HIV among pregnant women

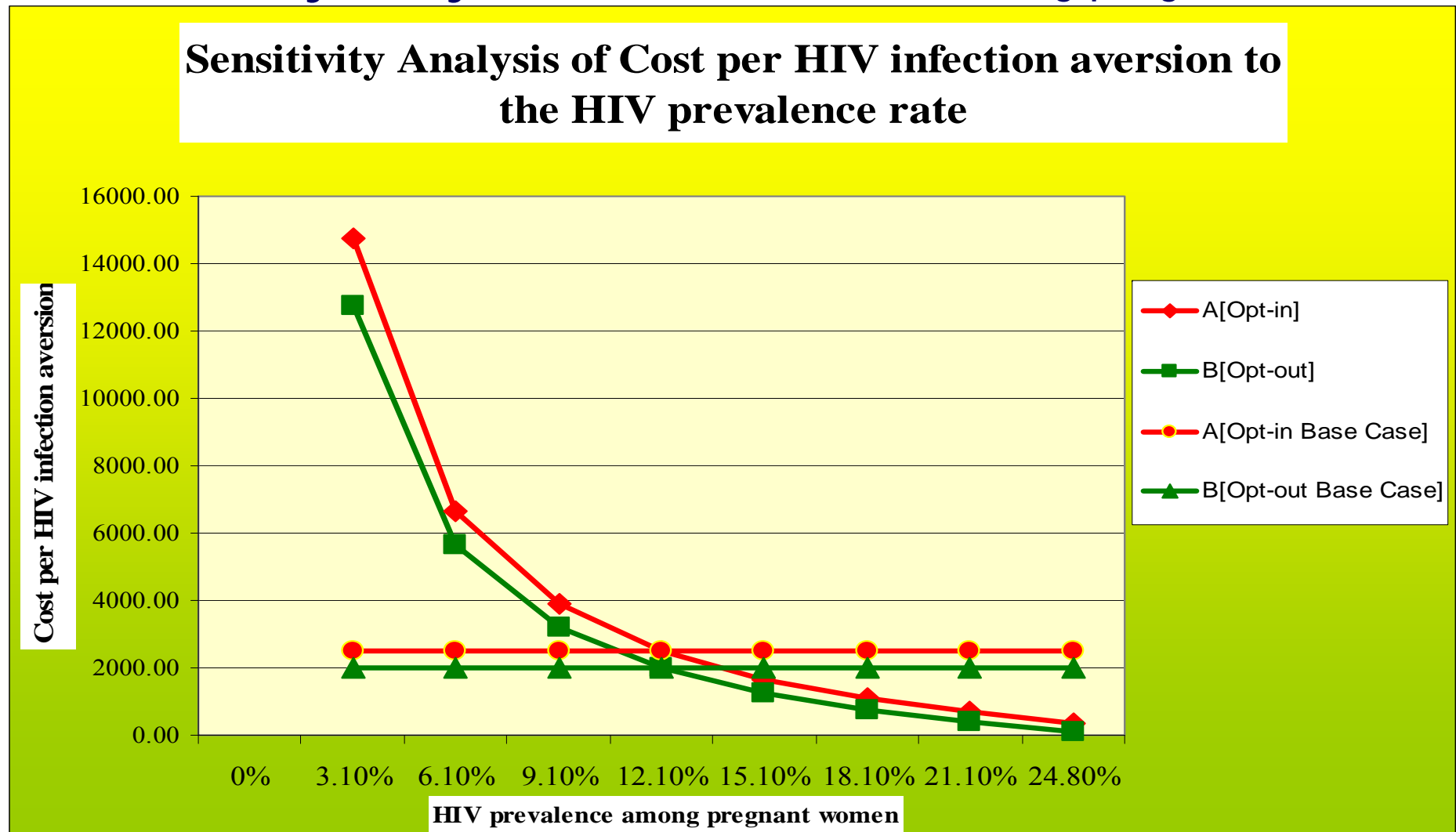


Figure 6: Sensitivity Analysis of cost per HIV infection averted to the HIV prevalence rate under opt-in and opt-out approach, 2009 29

# X. Results on Decision Model Analysis & Discussion cont.



## Sensitivity Analysis of cost per HIV infection aversion to the HIV prevalence rate

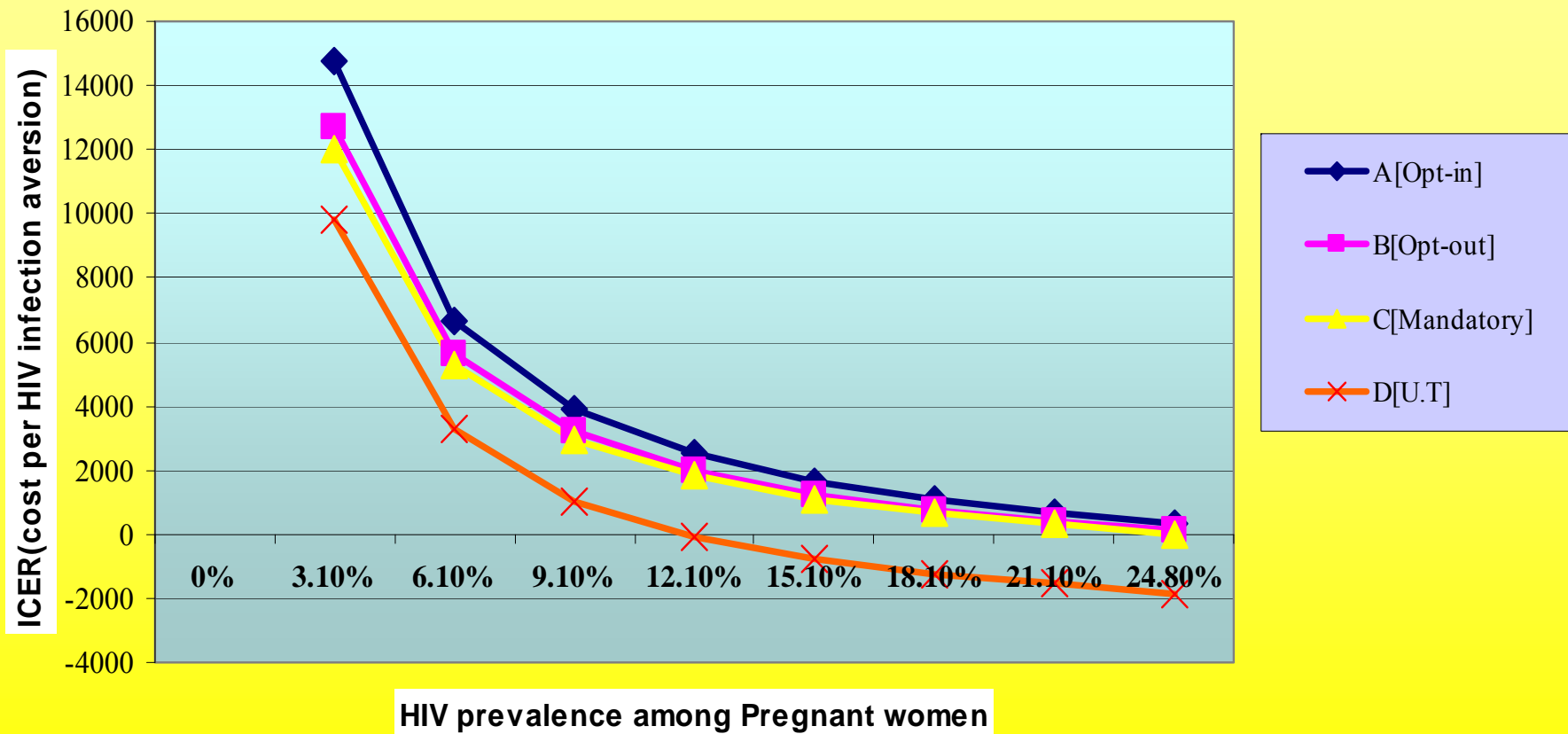


Figure 7: Sensitivity Analysis of cost per HIV infection aversion to the HIV prevalence rate under<sup>30</sup> opt-in, opt-out, mandatory HIV testing and universal treatment alternatives, 2009

# X. Results on Decision Model Analysis & Discussion cont.



## Sensitivity Analysis: Acceptance of Pre-test counselling through “opt-out approach”

### Sensitivity of cost per HIV infection averted to the Acceptance of opt-out

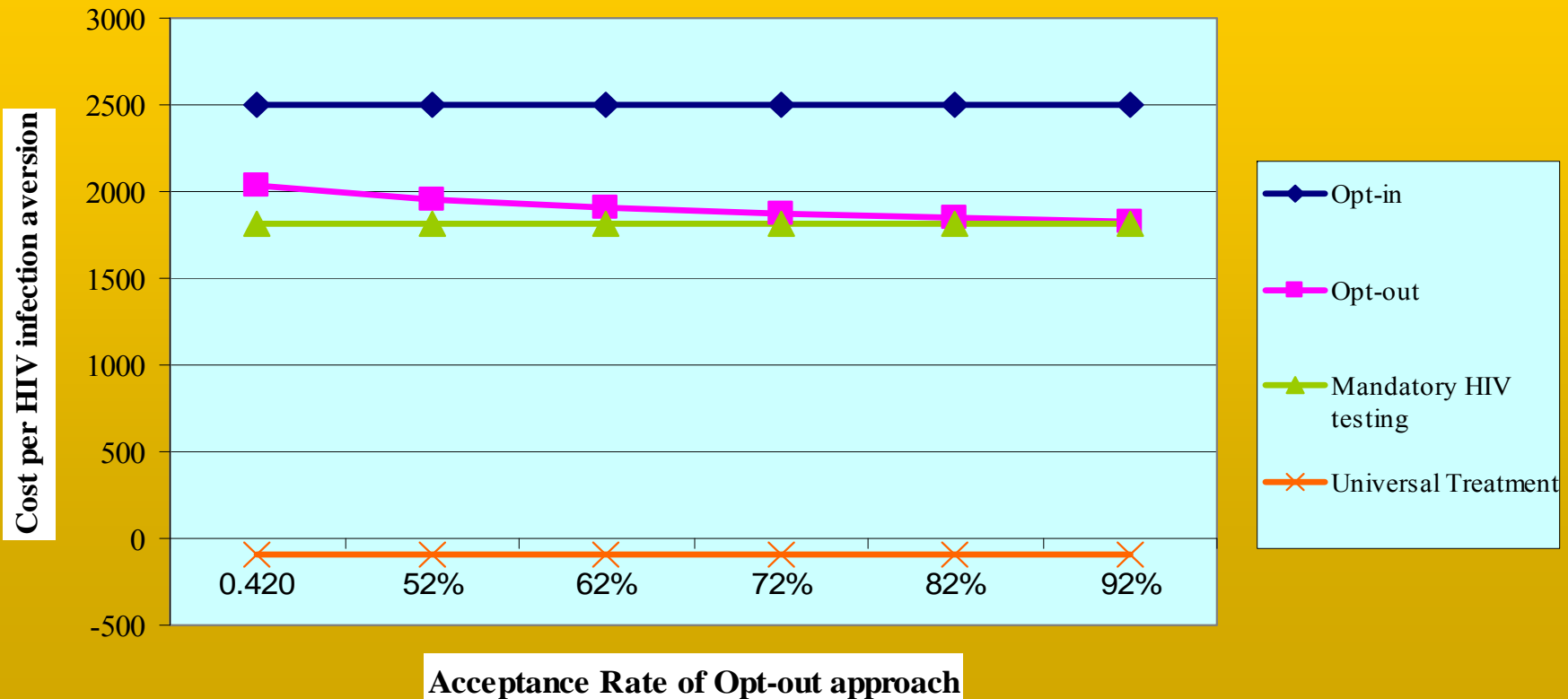


Figure 8: Sensitivity Analysis of cost per HIV infection averted to the acceptance of “opt-out approach” under opt-in, opt-out, mandatory HIV testing and universal treatment alternatives, 2009

# X. Results on Decision Model Analysis & Discussion cont.



Acceptance Rate effect on Cases averted

Acceptance Rate effect on Program Cost

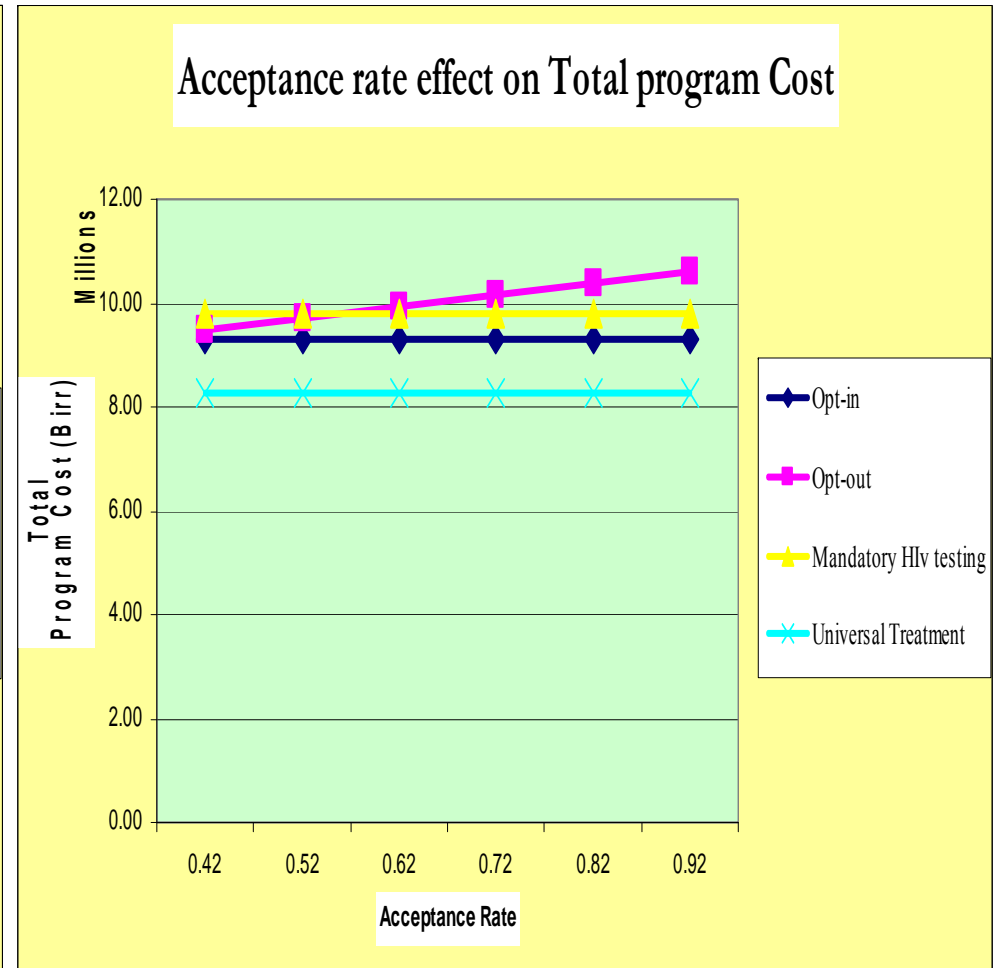
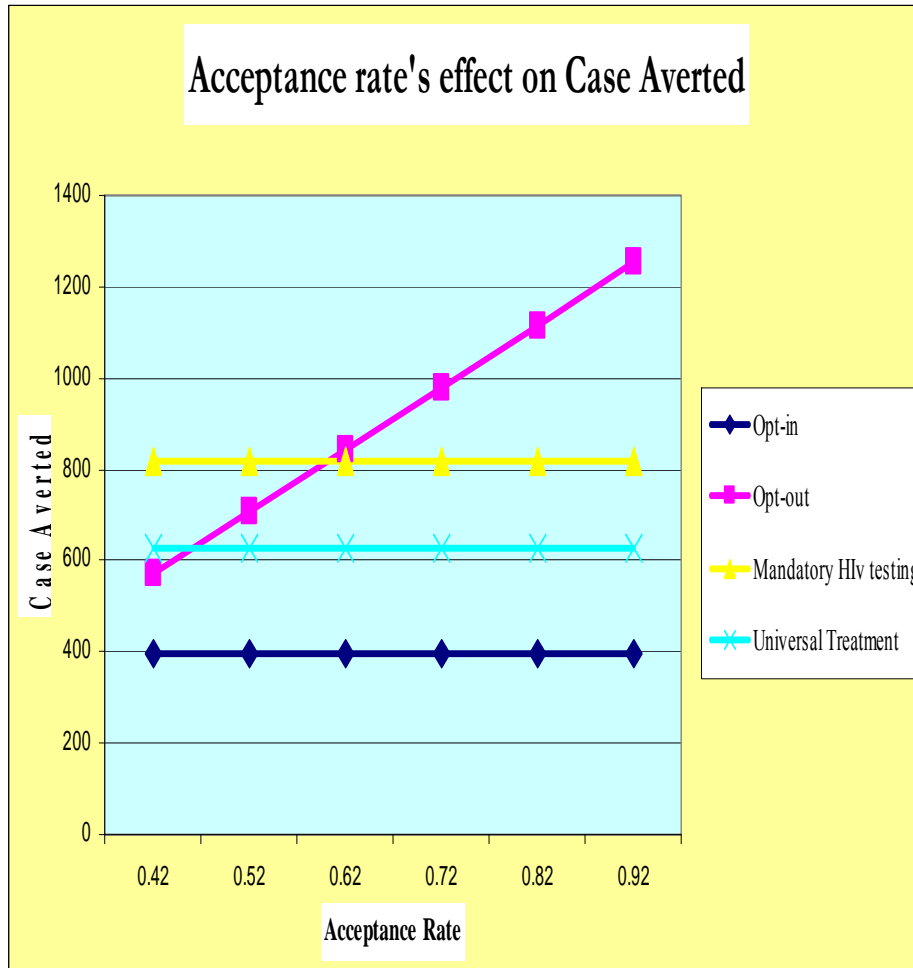


Figure 9: Sensitivity of the number of infection averted and program costs to the uptake of VCT through "opt-out approach", 2009



# X. Results on Decision Model Analysis & Discussion cont.



## Scenario (Worst and Best) Analysis

□ Model parameters such as:

□ HIV prevalence among “don’t accept groups”,  
Medical cost of treating HIV infected infants, cost  
of ARV drug, cost of VCT and Vertical transmission  
rate

▶ Opt-out approach was the preferred cost effective option (lowest CER) as compared to the opt-in approach over all ranges of model parameters analysed in the model.

▶ Extending the comparison to other comparatives; leads the universal treatment a cost-saving and cost-effective options over wide range of model parameters.

# XI. Conclusion



- ❑ The average cost of voluntary counselling and testing per pregnant women was estimated with the range of 2.14 birr(\$0.22) to 133.75 birr(\$ 13.55) varied based on the modes of service deliveries (opt-in/opt-out) and the amount of service received.
- ❑ Adopting opt-out approach would be the preferred cost-effective strategy as compared to opt-in approach over all range of model parameters.
- ❑ As the comparison was extended to the five alternatives; the universal provision of prophylaxis would be the cost-saving and cost-effective approaches over many model parameters.

# XII. Recommendation



- ❑ Provision of pre-test counselling through opt-out approach (as compared to opt-in) should be expanded in Addis Ababa HF's.
- ❑ In settings where the voluntary counselling and testing service cost is lower (i.e not matured PMTCT service available) and highest HIV prevalence areas (>12.1%), provision of universal treatment should be a favourable economical strategy for PMTCT service delivery.
- ❑ Concerned bodies should be committed to increase the uptake of the HIV testing (through health education and other social mobilizations) through opt-out approach to 72% and more, so that a huge number of HIV infections could be averted with a lower cost for HIV infection aversion.
- ❑ If the government and other decision maker's objective focused on "averting more HIV infection", then increasing the acceptance rate of "opt-out approach" to 62% and more should be the economical preferred strategy as compared to the other alternatives.
- ❑ But, if the interest of the decision makers lay on the achieving the HIV infection at the 'least cost', then provision of the universal treatment would be the preferred cost-saving strategy.

# XII. Recommendation cont...



- ❑ In the highest HIV prevalence ( $P \geq 24.8\%$ ) setting, adopting the mandatory HIV testing policy should be considered as a competing alternative cost-effective mode of PMTCT service delivery with the universal treatment.
- ❑ In setting where HIV prevalence among “don’t accept groups” is the highest, provision of “opt-in approach” of PMTCT service would become the recommended cost-effective options, next to universal treatment.
- ❑ In lower HIV prevalence among “don’t accept groups” (highest tendency of accepting HIV testing among those individuals who are at risk of acquiring a disease) settings, all PMTCT service delivery modalities (opt-in, opt-out, mandatory HIV testing and universal treatment) should be considered for the better allocation of resources.

# XIII. Limitation of the study



- ❑ Average cost estimation was highly relayed on the PMTCT expert opinion and financial document review.
  - This may have a negative consequence on the average cost estimation for PMTCT service deliveries.
- ❑ Decision model combined the published medical literatures with the local data source.
  - This may question the combination of the wide variety of data from diverse sources and varying degree of bias due to confounding variables, patient selection and method of analysis.
- ❑ Only univariate (one way) and scenario sensitivity analysis was done for estimating the robustness of the study result.
  - While in reality, the interdependent nature of the model parameters may lead to different conclusion of the study results and recommendations.
- ❑ **BIBLIOGRAPHY: [BIBLIOGRAPHY.doc](#)**

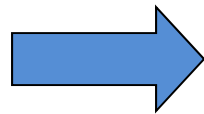
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- Co-Investigators (Kora, Birna and Pedro)
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- EHNRI
- Jimma University
- Tulane University
- My Family

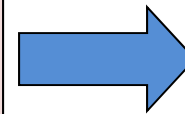
# God Bless Ethiopia God Bless Africa God Bless the World



Investing a lot on  
"Application of  
Health Economics"  
on HIV/AIDS



Wisely informed  
decisions by  
Decision makers



Getting maximum Health  
Gains (by PLHIV lives,... )  
from the limited resource  
available in the world