Training program costing example

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Learning objectives

Following this session, participants will:

1. Correctly explain how five principles of cost analysis can be applied to a training program

2. Interpret results of the cost-effectiveness analysis for the Integrated Infectious Disease Capacity-Building Evaluation (IDCAP)

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O'Malley et al. Human Resources for Health 2013, 11:20
http://www.human-resources-health.com/content/11/1/20

HUMAN RESOURCES FOR HEALTH

COMMENTARY Open Access

Cost-effectiveness analyses of training: a manager's guide

Gabrielle O'Malley[1*], Elliot Marseille[2] and Marcia R Weaver[1]

Abstract

The evidence on the cost and cost-effectiveness of global training programs is sparse. This manager's guide to cost-effectiveness analysis (CEA) is for professionals who want to recognize and support high quality CEA. It focuses on CEA of training in the context of program implementation or rapid program expansion. Cost analysis provides cost per output and CEA provides cost per outcome. The distinction between these two analyses is essential for making good decisions about value. A hypothetical example of a cost analysis compares the cost per trainee of a computer-based anti-retroviral therapy (ART) training to a more intensive ART training. In a CEA of the same example, cost per trainee who met ART clinical performance standards is compared. The cost analysis is misleading when the effectiveness differs across trainings. Two additional hypothetical examples progress from simple to more complex costs and from a narrow to a broader scope: 1) CEA of the cost per ART patient with 95% adherence that compares the performance of doctors to counselors who attend additional training, and 2) CEA of the cost per infant HIV infection averted for a Prevention of Mother to Child Transmission program that compares the current

1. Perspective

Perspective is the point of view from which the costs are calculated. It addresses the issue of which inputs or resources to include.

- Training program budget for your organization
- Donor, which includes other partners they support
- Societal, which includes opportunity costs

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Training program budget

	Cost per unit	5-day computer-based training plus 3-day workshop		10-day training plus on-site visits	
		Units	Cost	Units	Cost
Trainer	$100 per day	3	$300	10	$1,000
On-site	$1,000 per site	0		5	$5,000
[..]					
Training program budget			$7,350		$12,250

Donor perspective

	Cost per unit	5-day computer-based training plus 3-day workshop		10-day training plus on-site visits	
		Units	Cost	Units	Cost
Training program budget			$7,350		$12,250
Hotel contract	$225 per day	3	$675	10	$2,250
Donor cost			$8,025		$15,000

Societal perspective

	Cost per unit	5-day computer – based training plus 3-day workshop		10-day training plus on-site visits	
		Units	Cost	Units	Cost
Training pro-gram budget			$7,350		$12,250
Contract with venue	$225 per day	3	$675	10	$2,250
Trainees' time	$20 per day	200	$4,000	275	$5,500
Total cost			$12,025		$20,000

Societal perspective

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Training pro-gram budget			$7,350		$12,250
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Trainees' time	$20 per day	200	$4,000	275	$5,500
Total cost			$12,025		$20,000
Cost/trainee		25	$481	25	$800

2. Financial vs. economic cost

Financial cost – For goods and services that are traded on a competitive market, the opportunity cost is simply the price

where *opportunity cost* is the value of the most beneficial alternative use of the resources.

Economic cost – Value of goods and services that are not purchased such as volunteer time or for which the price is distorted

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3. Output vs. outcome

1. The cost per unit of output is valid when the two programs being compared are equally effective.

2. A cost per unit of outcome can address differences in effectiveness across programs.

3. The scope of the analysis is determined by the denominator. Only programs with a common denominator can be compared.

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Cost per unit of output

	5-day computer-based training plus 3-day workshop	10-day training plus on-site
Cost of transfer of learning		
Training	$12,025	$20,000
Supervision	$8,000	$2,000
Total cost	$20,025	$22,000

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Cost per unit of output

	5-day computer-based training plus 3-day workshop	10-day training plus on-site
Cost of transfer of learning		
Training	$12,025	$20,000
Supervision	$8,000	$2,000
Total cost	$20,025	$22,000
Cost per trainee	$20,025/25 = $801	$22,000/25 = $880

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Cost per unit of intermediate outcome

	5-day computer-based training plus 3-day workshop	10-day training plus on-site
Cost of transfer of learning		
Training	$12,025	$20,000
Supervision	8,000	$2,000
Total cost	20,025	$22,000
Trainees who meet standard	15	22
Cost per trainee who met standard	$20,025/15 = $1,335	$22,000/22 = $1,000

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3. Output vs. outcome

Cost analysis: Compares the cost per unit of output when to programs are equally effective

Cost-effectiveness analysis (CEA): Compares cost to effectiveness, e.g.

- Clinician who meets standard
- $/life years saved from intervention

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4. Incremental analysis

Incremental cost effectiveness ratio (ICER)

$$\frac{\Delta \text{ Change in health care cost}}{\Delta \text{ Change in health outcomes}}$$

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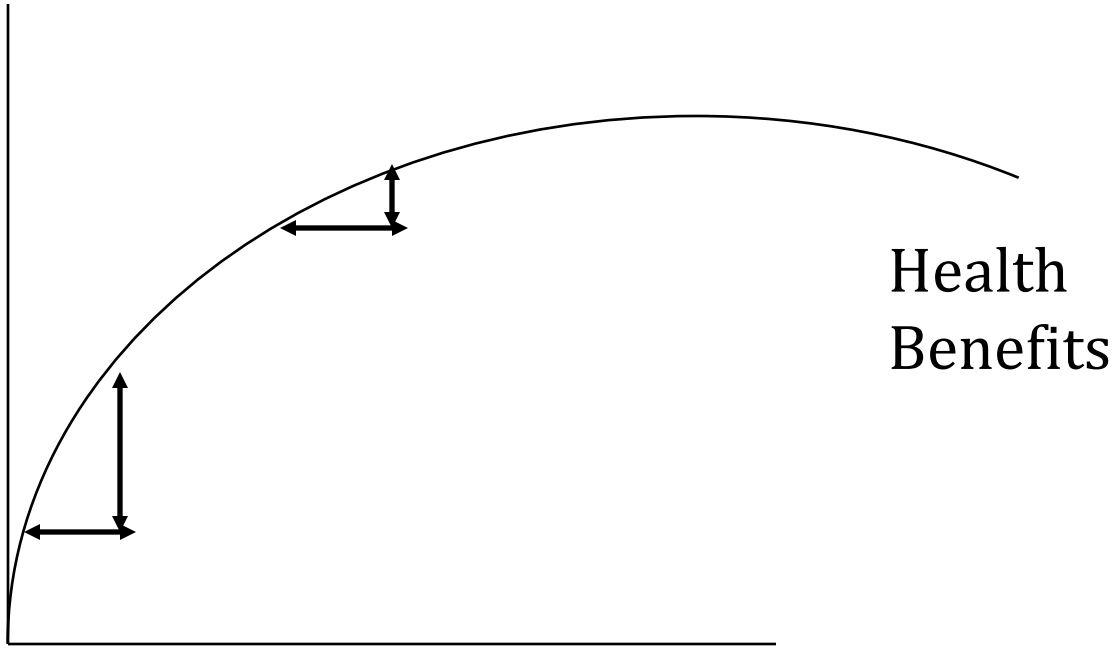
ICER is a slope



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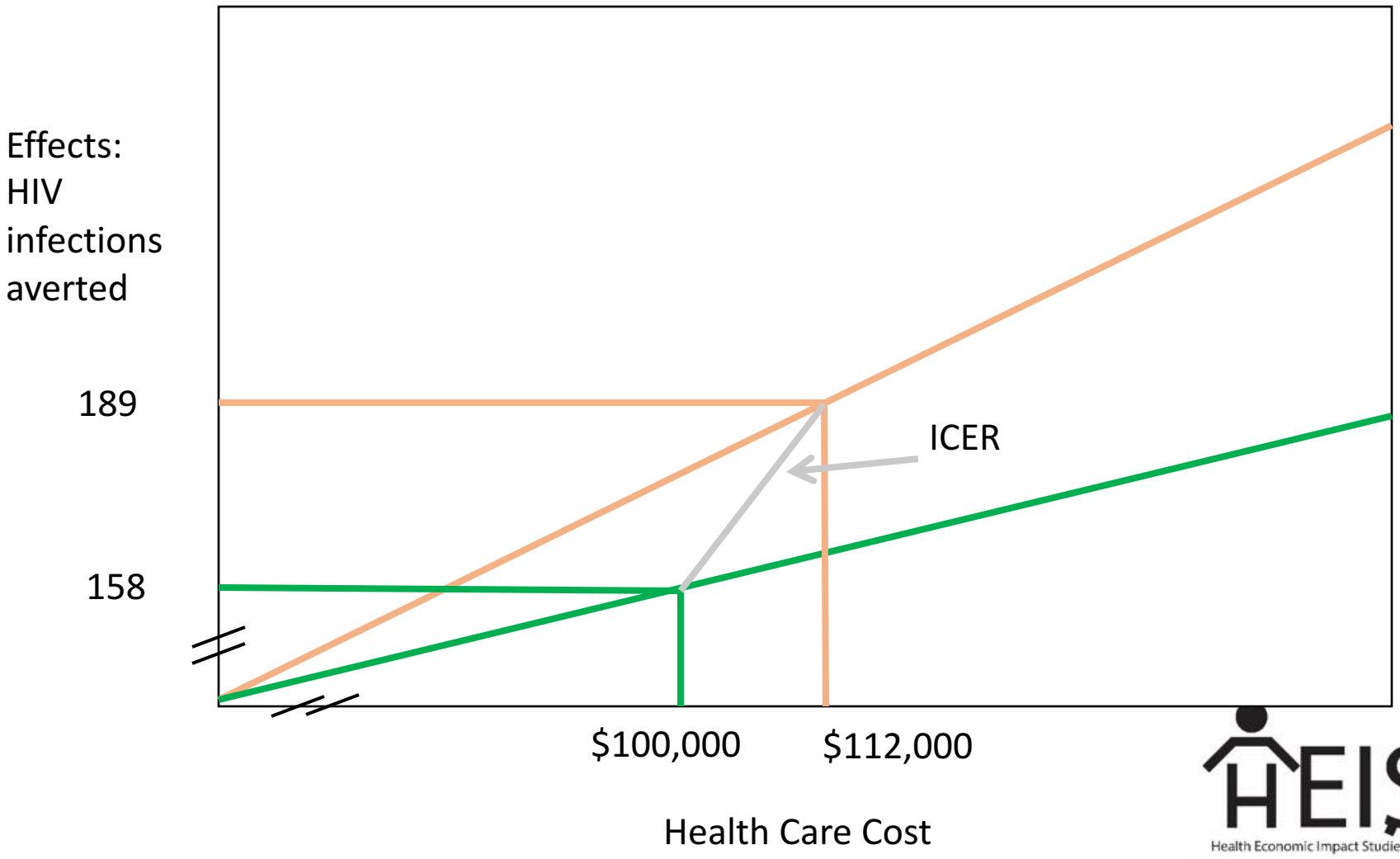
PMTCT Cost/HIV infection averted

	Pre-training	Post-training
Program cost		
Remuneration	$80,000	$84,000
Supplies	15,000	18,000
Capital	5,000	10,000
Total Cost	$100,000	$112,000
Number of mother-infant pairs	1,000	1,200
Base case-vertical transmission	25%	25%
Number of HIV infections averted	1,000*.25*.63=158	1,200*.25*.63=189
Incremental cost	$112,000 - $100,000 = $12,000	
Incremental effectiveness		189 – 158 = 31
ICER		$12,000/31 = $381

4. Incremental analysis



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5. Sensitivity analysis

- Calculation of alternative cost-effectiveness results when there is uncertainty about one or more parameters.

- It shows the extent to which uncertainty about a parameter would substantially affect the estimate.

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PMTCT CEA with uncertainty

	Pre-training	Post-training
Total Cost	$100,000	$112,000
Number of mother-infant pairs	1,000	1,200
Base case-vertical transmission	25%	25%
Lower bound	19%	19%
Upper bound	30%	30%
Incremental cost	$112,000 - $100,000 = $12,000	
ICER – base case		$12,000/31 = $381
Lower bound		$12,000/24 = $501
Upper bound		$12,000/38 = $317

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Summary – 5 principles

1. Perspective
2. Financial vs. economic cost
3. Output vs. outcome
4. Incremental analysis
5. Sensitivity analysis

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Improving Facility Performance in Infectious Disease Care in Uganda: A Mixed Design Study with Pre/Post and Cluster Randomized Trial Components

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Abstract

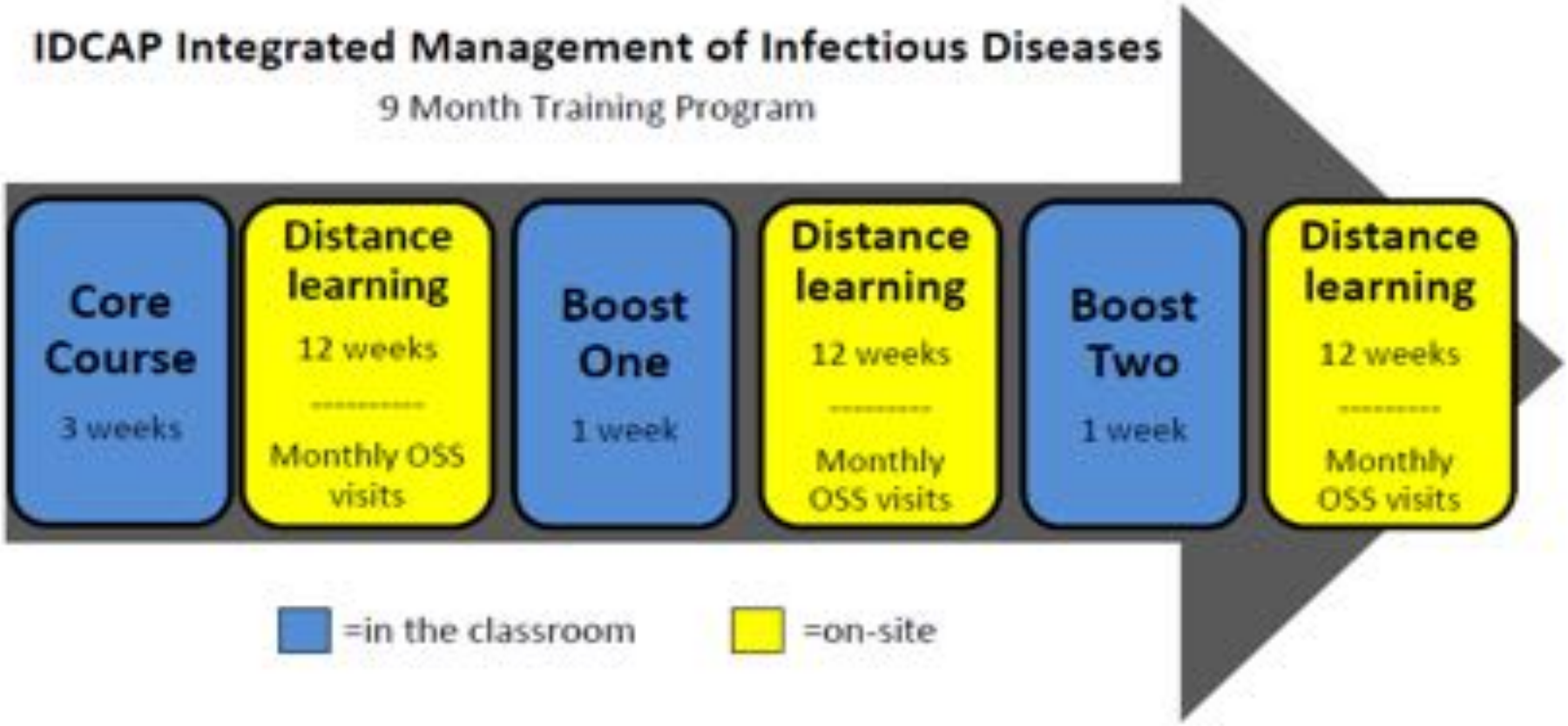
Background: The effects of two interventions, Integrated Management of Infectious Disease (IMID) training program and On-Site Support (OSS), were tested on 23 facility performance indicators for emergency triage assessment and treatment (ETAT), malaria, pneumonia, tuberculosis, and HIV.

Methods: The trial was implemented in 36 primary care facilities in Uganda. From April 2010, two mid-level practitioners per facility participated in IMID training. Eighteen of 36 facilities were randomly assigned to Arm A, and received OSS in 2010 (nine monthly two-day sessions); 18 facilities assigned to Arm B did not receive OSS in 2010. Data were collected from Nov 2009 to Dec 2010 using a revised Ministry of Health outpatient medical form and nine registers. We analyzed the effect of IMID training alone by measuring changes before and during IMID training in Arm B, the combined effect of IMID training

Aim: Create & evaluate an innovative capacity-building program

- Develop an Integrated Management of Infectious Disease (IMID) curriculum for midlevel practitioners
- Complement the training program with On-Site Support (OSS)
- Measure their effect on the quality of care and health outcomes
- Estimate the cost-effectiveness of the interventions

Photo by Charles Steinberg, MD


IDCAP Integrated Management of Infectious Diseases
9 Month Training Program
Core Course
3 weeks
Distance learning
12 weeks
Monthly OSS visits
Boost One
1 week
Distance learning
12 weeks
Monthly OSS visits
Boost Two
1 week
Distance learning
12 weeks
Monthly OSS visits
=in the classroom
=on-site

Integrated Management of Infectious Disease (IMID)

•WHO curricula such as IMCI, ETAT, and IMAI

•Advances in health professional education (Miceli, et al. IJID 2012)

• HIV, TB, malaria, and pneumonia

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On-Site Support (OSS) Mobile Team

- Medical officer
- Clinical Officer
- Laboratory Technologist
- District contact person/nurse officer

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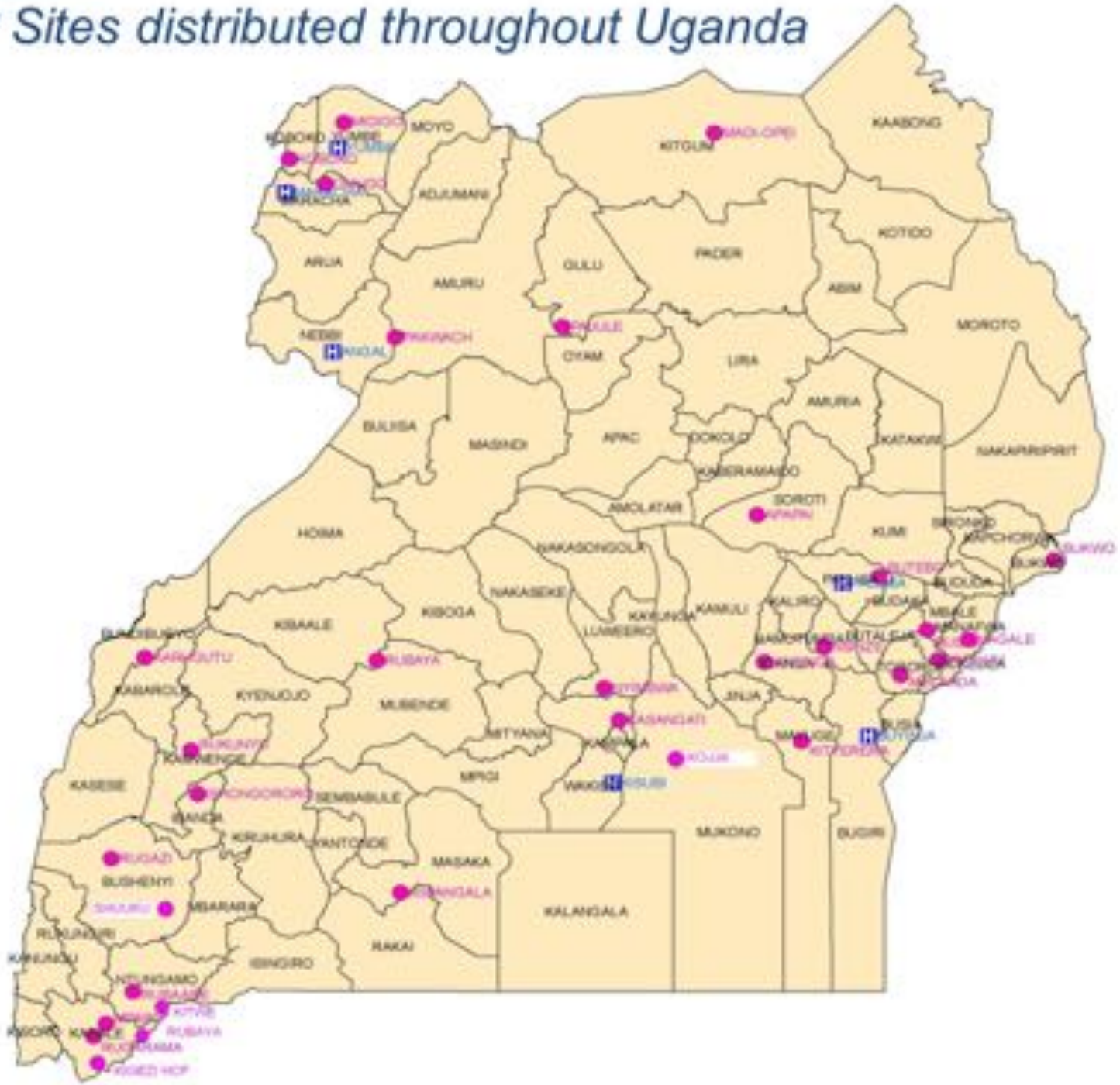
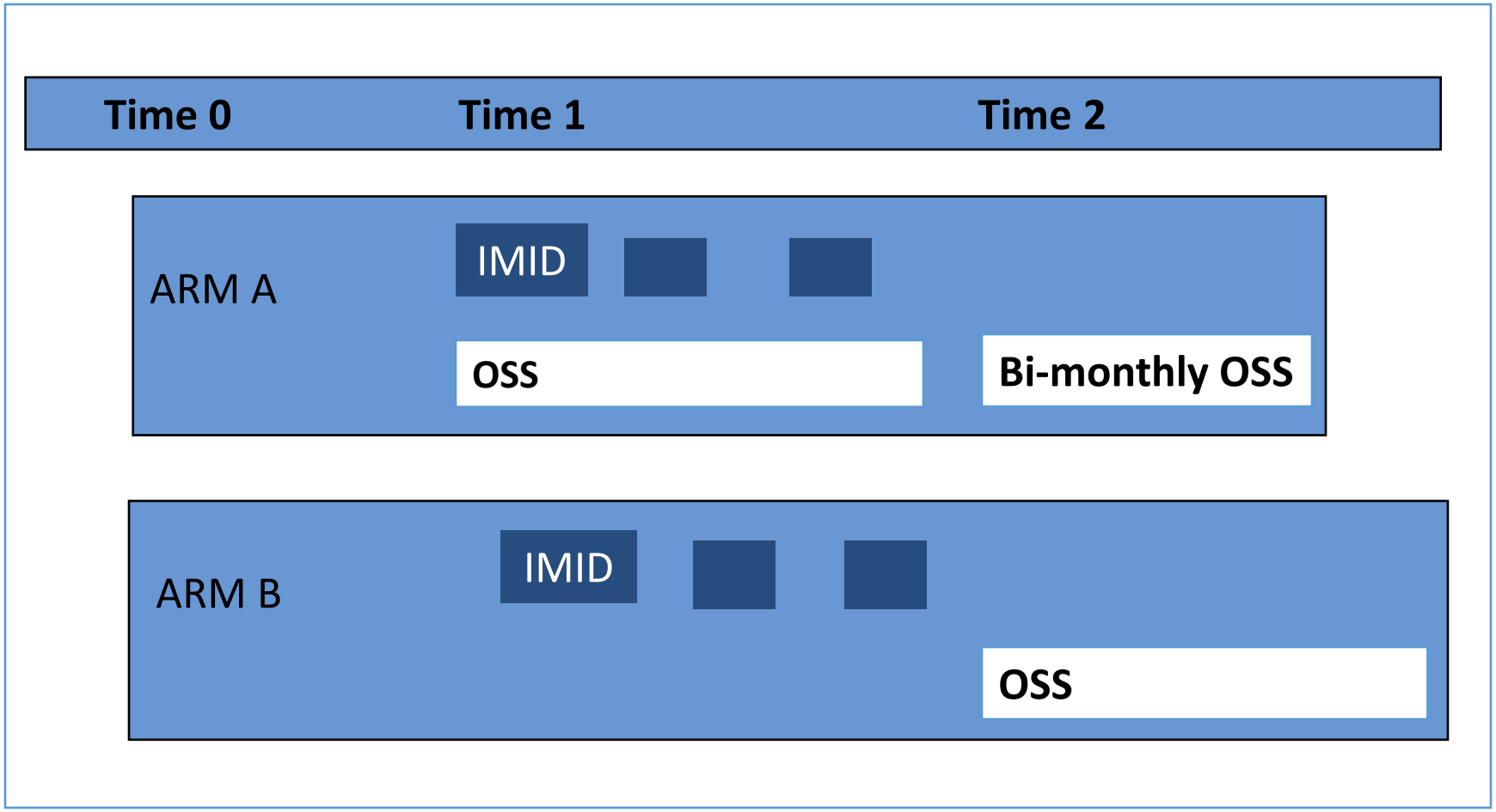
IDCAP Sites distributed throughout Uganda



Mixed Design With Pre/Post and Cluster Randomized Trial Components



23 Facility performance indicators spanned seven areas

- Emergency triage, assessment and treatment (ETAT)
- Case management of fever
- HIV prevention
- HIV Care
- ART
- Respiratory illness
- TB/HIV

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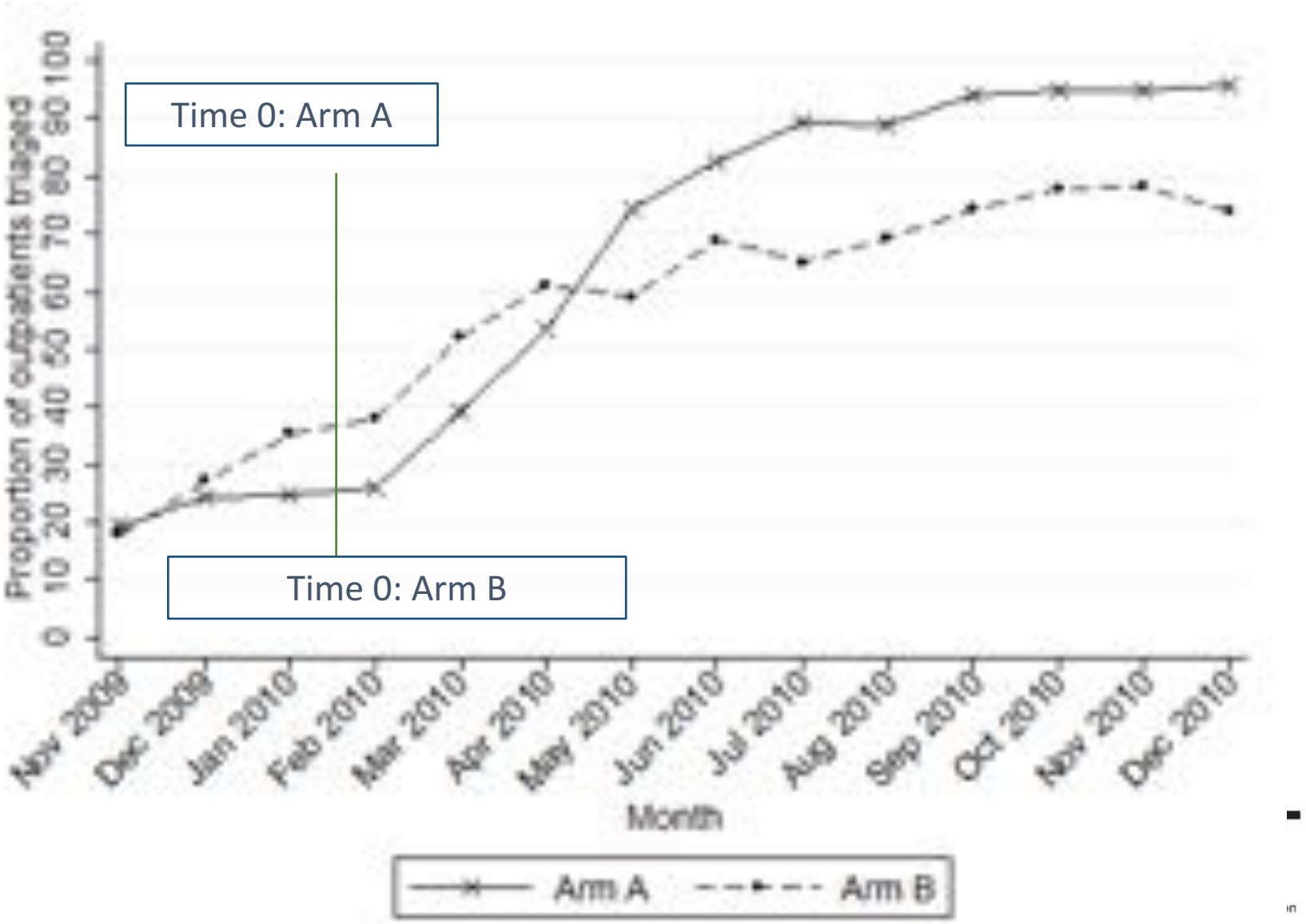
Example of results: Percentage of outpatients triaged



OSS significantly increased the % of outpatients triaged

	% of Outpatients Triaged RR (CI)
Arm A	
Time 1 – Time 0	2.03 (1.13, 3.64)*
Arm B	
Time 1 – Time 0	1.29 (1.01, 1.64)*
Arm A vs. Arm B: Time 1 – Time 0	1.58 (0.82, 3.01)

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Analysis for 23 indicators showed impact on 6 indicators

- Outpatients triaged
- Emergency & priority patients admitted, detained or referred
- Malaria suspects received appropriate treatment
- Smear negative malaria suspects treated w/ anti-malarials
- U5 pneumonia suspects assessed for pneumonia
- HIV infected patients enrolled in care

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Cost Analysis

Intervention

- Curriculum Development
- IMID
- On-site Support

Treatment

- Drugs

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Preliminary cost analysis in $US

	IMID + OSS (Arm A)	IMID (Arm B)	Incremental cost of OSS
Grant			
Curriculum	$ 16,994	$12,610	
IMID	22,047	22,047	
0SS	49,230		
Total	$88,271	$34,656	
MOH Salaries			
IMID	$ 464	$ 456	
OSS	533		
Total	$ 997	$ 456	
Malaria drug savings	(523)	(77)	
Net cost	$88,745	$35,036	$53,709

Integrated Epidemiological Model

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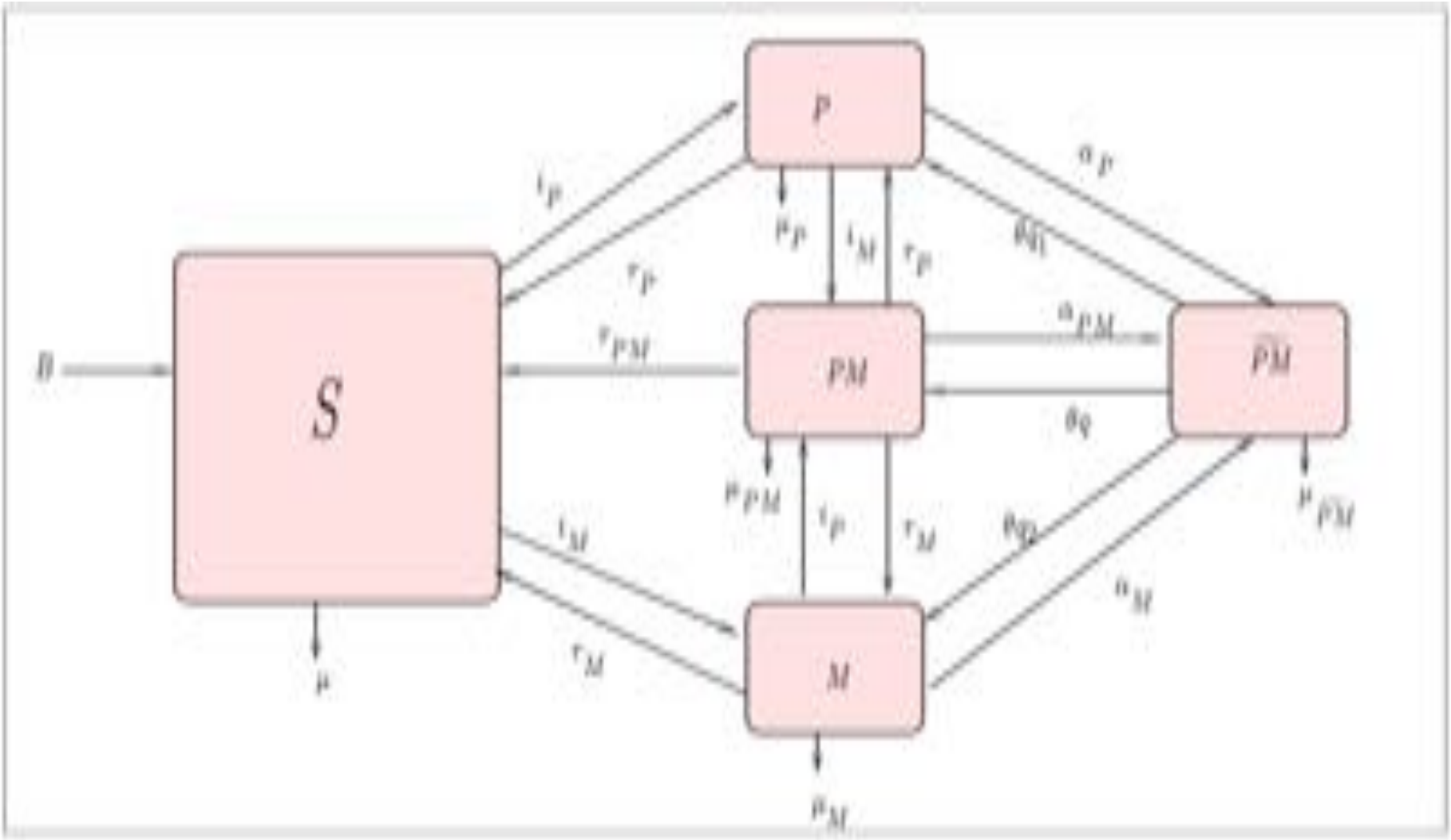
Malaria & Pneumonia Model



	IMID + OSS	IMID	Incre-mental
Net cost	$88,745	$35,035	$53,710
Lives saved	23	15	8
$/Life	$3,875	$2,336	$6,799
DALYs Saved	729	484	245
$/DALY	$122	$72	$219

Summary - IDCAP

- Integrated epidemiological model combines most indicators to provide one aggregate measure of the effect IMID and OSS across three age groups.

- Uganda's GDP in 2011 was roughly US$ 487 per capita, suggesting IMID and OSS were highly cost-effective interventions both individually and in combination by WHO standards.

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Thank you!

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