Micro-costing health interventions: Advice from the field

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Why are economic evaluations necessary?

- We have a limited budget for health interventions.
- For the amount of money we have available, we want to maximize health benefits.
- We can evaluate different ways of combating a health problem to assist in policy decisions.

Eg. What is the most efficient intervention to identify HIV+ persons in the community?

- We can evaluate different health interventions to determine which ones maximize health benefits.

Eg. Should the Kenyan government fund rotavirus vaccination or HPV vaccination?

Accurate economic evaluations depend on good cost data

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Outline

- Go through steps of micro-costing a health intervention using the Active Partner Notification in Kenya as example.

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Formulate research question

Example:

Is active partner notification for HIV cost-effective in Kenya?

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Background: Partner Services

- **Partner services (PS) interventions:** identify sex partners of persons diagnosed with HIV, notify them of potential exposure, provide HIV testing and referral to treatment/prevention
- Types of partner services:
  - 1) **passive referral**—newly diagnosed person (index case) is asked to notify their sexual partners of potential exposure and encourage them to seek HIV testing (standard of care in sub-Saharan Africa)
  - 2**) provider notification or assisted partner services (aPS)**—healthcare providers contact sexual partners directly and provide HIV test

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Background cont'd

- Assisted Partner Services (aPS) are widely implemented in high income countries. Growing evidence from sub-Saharan Africa shows aPS is effective.
- APS Interventions in Malawi and Cameroon have been successful
  - High HIV positivity in partners (>50%)
  - High CD4 count at diagnosis
  - Over 80% of HIV+ partners tested were enrolled in care
- APS requires significant economic investment and its cost-effectiveness is not well evaluated.

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Determine costing perspective

- How will these costs be used? Who are the stakeholders?
- In this case, the Ministry of Health would be responsible for implementing APS so we conducted the analysis from their perspective.

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Research plan

- Conduct micro-costing of aPS randomized community randomized trial in Kenya (ongoing at the time of costing)
- Use costs collected and effectiveness results from APS in a mathematical model to assess cost-effectiveness.

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Ongoing study:

- **Randomized clinical trial**
  - APS Study—2 arms: Active Partner Notification (intervention) and passive referral (standard of care)
  - Trial will be used to estimate HIV testing uptake (efficacy) and incremental costs intervention
- **Advantages of using a prospective trial:**
  - Detailed costs—not normally recorded
  - Time and motion studies—capture staff time spent on different aspects of intervention
  - Identify areas of inefficiency (wasted resources or time) & modify protocol
  - First-hand assessment of trial quality
  - Quick turnaround of CEA for policymakers
- **Disadvantages**
  - Efficacy from an RCT may not indicate real world intervention effectiveness
  - Can spend time micro-costing a trial that turns out to be ineffective.

Micro-costing aPS intervention

- Estimated costs for a **program scenario** using health advisors to conduct the intervention and a **task-shifting scenario** which replaces health advisors with community health workers.
- Estimate **incremental** costs of intervention, i.e. costs of adding APS to standard of care

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Costing assumptions

- Using standard assumptions will make your analysis directly comparable with other costing studies in the field.
- Assumed 5 years of useful life for capital costs (vehicles, furniture, equipment) and staff hiring and training 10 years of useful for building renovations, 50 years for new buildings. Alls discounted at 3% annually.
- 5% wastage of supplies (gloves, HIV test kits, etc).
- Joint costs (shared across multiple interventions) will be allocated by percentage of time used for APS.

Read costing literature

- **Books**
  - Methods for the Economic Evaluation of Health Care Programmes (Michael Drummond)
  - Cost-Effectiveness in Health and Medicine (Martha Gold)
- **Guidelines**
  - WHO Guide to Cost-Effectiveness Analysis
  - UNAIDS: Costing Guidelines for HIV Prevention Strategies
- **Consensus statements**
  - Recommendations of the Panel on Cost-Effectiveness in Health and Medicine (Weinstein)
- **Example costing studies**
  - Search pubmed by research area

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Don’t reinvent the wheel

Read the costing literature to see what relevant costs have already been collected related to your intervention.

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Published sources:

- **Costs of HIV/AIDS treatment, and opportunistic infections**

Multi-Country Analysis of Treatment Costs for HIV/AIDS (MATCH): Facility-Level ART Unit Cost Analysis in Ethiopia, Malawi, Rwanda, South Africa and Zambia

Elya Tagar[1*], Maaya Sundaram[1¤], Kate Condliffe[1], Blackson Matatiyo[2], Frank Chimbwandira[3],

HIV prevention costs and program scale: data from the PANCEA project in five low and middle-income countries

Elliot Marseille*[1], Lalit Dandona[2], Nell Marshall[1], Paul Gaist[3],

The cost of providing comprehensive HIV treatment in PEPFAR-supported programs

Nicolas A. Menzies[a,b], Andres A. Berruti[a,b], Richard Berzon[c], Scott Filler[a], Robert Ferris[c], Tedd V. Ellerbrock[a] and John M. Blandford[a]

- **HIV testing costs**

WHO/HIV/2015.24

Annex 5. Systematic review of HIV testing costs in high and low income settings

Authors: Johnson C[1], Dalal S[1], Baggaley R[1]

The costs and effectiveness of four HIV counseling and testing strategies in Uganda

Nick Menzies[a,b,c], Betty Abang[d], Rhoda Wanyenze[e], Fred Nuwaha[f],

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Talk to the experts

- Meet with health economist that have conducted micro-costings in the field
  - E.g. Carol Levin
- Talk to students that with micro-costing experience

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Create costing plan/templates

- Essential to think through cost components that make up intervention
- Costing templates will likely change once you're in the field
- Can create costing protocol (identify important costs, how they will be valued, which sites you will visit in the field, persons to talk to, i.e. experts, stakeholders, etc.
- May be easier to take notes on paper and then transfer costing to template once they are in the correct format

Building costs and utilities

Item	Total monthly cost	Total in USD	months used	Total Annual Cost	Currency (1=US, 2=local)	Total in USD	Adjusted for inflation	% for Intervention	Total for Intervention
APS office	34,299	391	12	411,584	2	4,693	4,693	100%	4,693
water	600	82	12	985	1	985		100%	82
internet	116	116	12	1,389	1	1,389	1,389	50%	694
Electricity	1,950	267	12	3,202	1	3,202	267	100%	267
									5,736

Methods overview

- Examine expense reports, travel logs, interviewed staff about resource & time use
- Conduct time in motion observation of staff to assess time spent on intervention activities and remove research time costs (eg administering informed consent).

Interviewing staff

- Get to know staff. Let them know you're observing them to learn about the intervention and are not evaluate their work or report efficiency to supervisors.
- Ask open ended questions to determine if there are any costs you are missing.
- Can ask the same question to all staff to assess variations in activities.
- Ask how intervention activities it would be different if implemented as a government intervention?
  - Eg In RCT, staff conduct home visits according to randomized order. In an intervention, staff would batch visits according to location.

Interviewing staff—estimating efficiency

- Ask about average and maximum number of participants that can be seen in one day
  - If one HIV test can be completed in 30 min, doesn't mean that 14 patients can be seen in 1 day (7 hrs)
  - Burnout
  - Demand
  - Ask each staff member about average number of patients that can be seen per day—get average and min/max
- Seasonal variations in efficiency
  - Rainy season—roads are worse so fewer patients in clinic or travel time for home visits is longer

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Start up costs: Staff hiring

- Interview HR and managers (and others involved in hiring)
- Ask about time and money spent advertising positions, interviewing, shortlisting, and offering positions.
- Assess time spent by each staff member
- How would this process be different in government intervention? Would staff structure be different?

Interviewing		Panel interviews		Time costs (Kenyan Shillings)				
Position	Time for interviews (hours)	Staff responsible	# positions	field coordinator	HR	Upper management	total cost	cost/position hired
Health advisors	28	HR, field coordinator, senior nurse	12	290,326	$34,838	$20,709	$84,580	$7,048
field coordinator	7	HR, upper management	1	7,258	$8,709	$5,177	$21,145	$21,145
data manager	7	HR, field coordinator, upper management	1	7,258	$8,709	$5,177	$21,145	$21,145
office assistant	7	HR, field coordinator, upper management, accountant	1	7,258			$7,258	$7,258

Start up costs: Staff training

- How many staff were trained? Assess time costs of staff responsible for training
- Supplies
- Per diem
- External speakers
- Remove research costs
  - Training on human subjects, research practices

TRAINING	(assuming 5 years of useful life)					Time costs: Kenyan shillings				
Position	Training type	Staff responsible	# days	# hours	# new staff trained	Employee salaries	Project manager	field coordinator	Employee cost	total cost
Health Advisor	In office	field coordinator	10	80	12	744,000	$44,239	$69,124	$411,428	$524,792
Health Advisor	In field	senior health advisor	1	8	12	744,000			$41,142	$41,142
Health Advisor	Observation		4	32	12	744,000			$164,571	$164,571
Field coordinator	In office	senior admin	10	80	1	1,464,000	$99,539		$67,465	$167,004
Office assistant	In office	field coordinator	5	40	1	1,044,000		$49,769	$24,055	$73,824

Start up costs: Community mobilization

- Advertising intervention to community
- Meeting with community leaders, obtaining buy-in
- Can be one time (start up) and ongoing (recurring meetings and yearly advertising of intervention)

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Supplies

- Supplies (eg HIV test kits, gloves, office stationary)
- List supplies, unit cost, and number of units used annually
- Governments sometimes have purchasing agreements with vendors so supply costs would be different than a private program (or RCT). Can obtain government tendor price lists.

Supplies (Kenyan Schillings)								
Item	Number	Total Cost	Unit Cost	Fraction used / visit	Wastage	Currency (1=US, 2=local)	Total in USD	Total per person tested
Dual Safe powdered gloves	100	$464.00	$4.64	1.00	$0.46	2	0.05	$0.06
KHB screening test	576	$71,037	$123	1.00	$6.17	2	1.48	$1.48

Conducting time and motion studies

- Assess variation
  - Follow each staff member if possible to evaluate differences in how intervention is administered
  - Watch intervention on different days of week, time of day, eg. Some clinics are most busy in the mornings
- Seasonal variation—decreased client flow and increased travel time in rainy season.
  - Time and motion will likely only see the intervention in a single time point—can assess variation using staff interviews
- Remove research time from intervention time

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APS: efficiency assumptions

- Based on time and motion, we estimated administering aPS takes ~40 min per partner.
- After accounting for staff time for index partner screening, sexual partner tracing, travel to partner's home, & other duties (meetings, paperwork), we estimated each staff member can test 2 partners per day. Assumed 25% lower efficiency with task-shifting.

Cost per couple tested=total annual cost of aPS intervention/Total number of partners tested (annual)

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Assessing societal costs

- Conduct time and motion studies to estimate participant time waiting for and receiving intervention
- Ask participants about travel time to get to intervention, travel costs (e.g. bus far, car), child care.
- Multiply time participant time spent in intervention by daily wage rate in country to estimate societal opportunity cost.

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Annualize start up and capital costs

- Assume vehicles & equipment are used for 5 years before they are replaced
- Assume staff hiring and training happens every 5 years b/c of staff turn over

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Example: Annualizing motorcycle cost

- Total motorcycle cost/#years of useful life
- But what about discounting? In this case you're paying for the motorcycle now but getting benefits over 5 years.
- So we divide cost by annuity factor—which estimates present value of a good

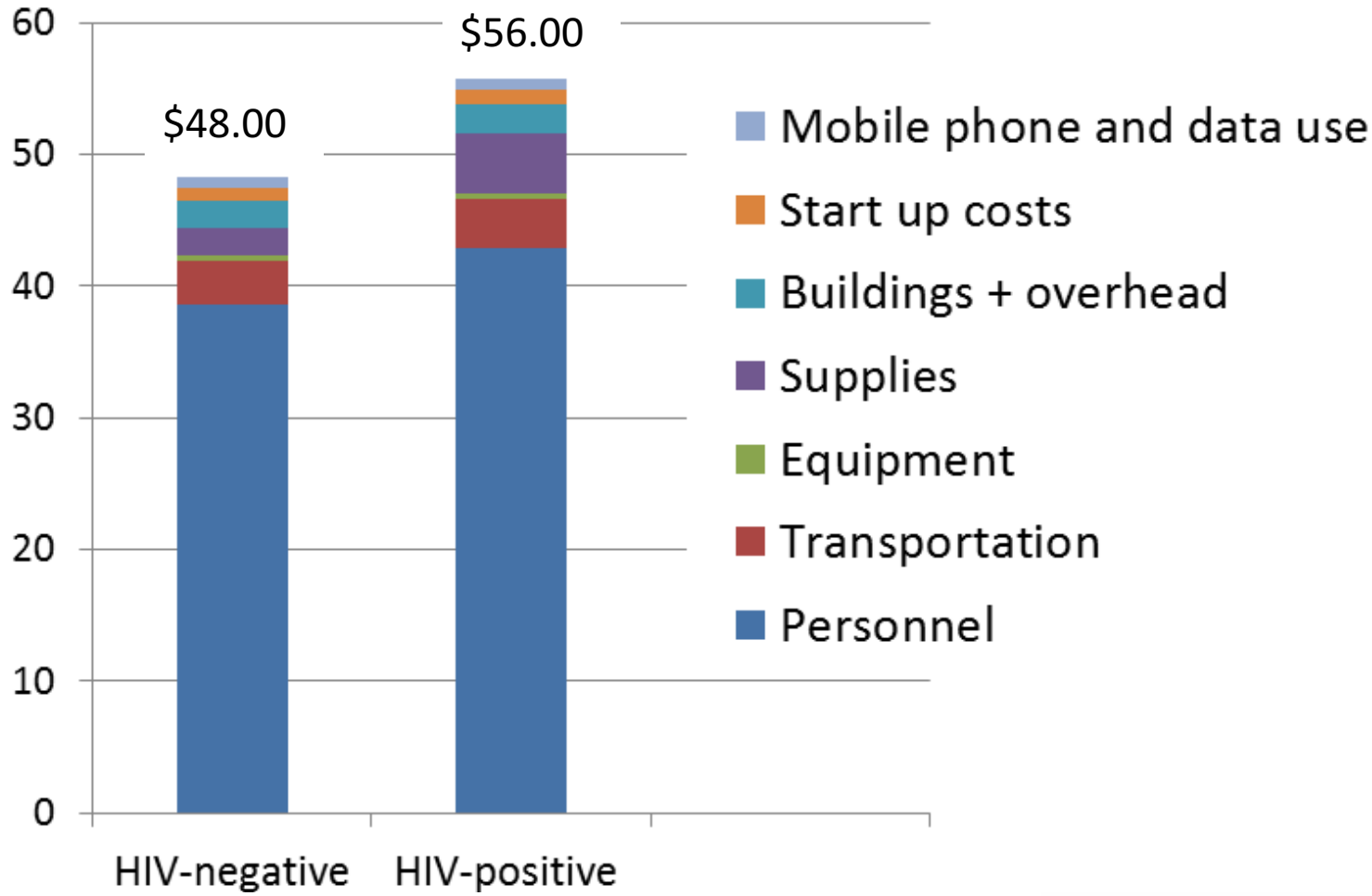
$r = discount\ rate$
$n = yrs\ of\ useful\ life$

$$\text{Annuity Present Value factor} = \frac{1-(1+r)^{-n}}{r}$$

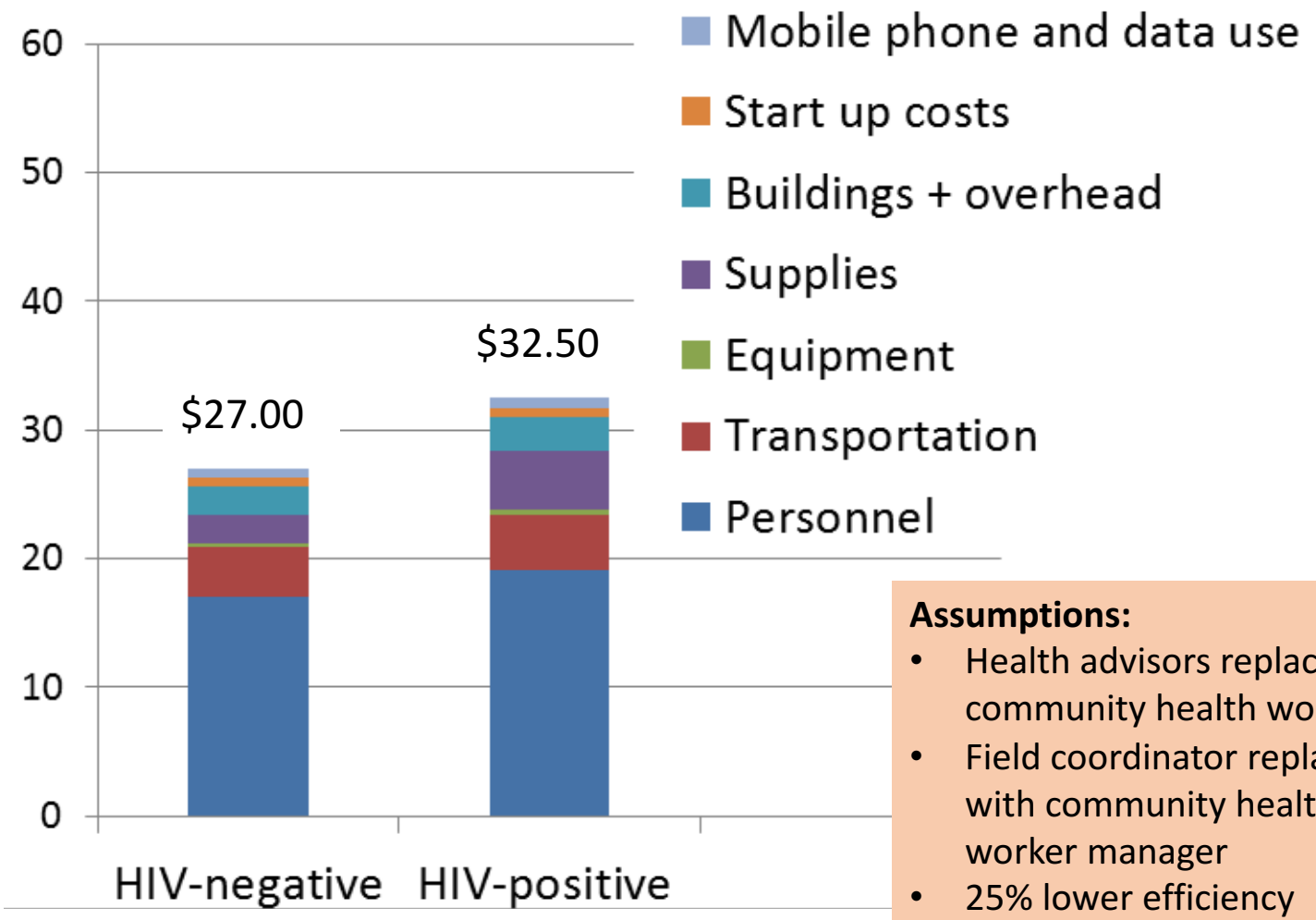
$$\text{Annuity for 5 yrs useful life} = \frac{1-(1+0.03)^{-5}}{0.03} = 4.58$$

$$\text{Annual cost for \$10,000 motorcycle} = \frac{10{,}000}{4.58} = \$2{,}183$$

Costs per partner tested: Program scenario



Costs per partner tested: Task shifting scenario



Assumptions:

- Health advisors replaced with community health workers
- Field coordinator replaced with community health worker manager
- 25% lower efficiency

Sensitivity analyses

- Vary costs, number of participants seen per day, intervention effectiveness, etc in sensitivity analyses.
- Identify and report assumptions with the largest influence on results.

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Concluding thoughts

- More than one way to conduct a micro-costing
- The method you chose will depend on the intervention.
- Costing plans may change once you are in the field
- Costing is messy. Many aspects of the intervention cannot be precisely measured or vary by site or staff member.
- Spend most of your time the largest/most influential costs.
  - Eg. Can get caught up estimating costs of cotton balls for intervention—minor cost.

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Thank You!

Email: msharma1@uw.edu

- Kenya Research Program
- International Clinical Research Center
- In country research staff
- Study participants

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