

Cost Analysis

Review and Preview

- Last lecture:
Modeling the health impact of a program: Does it have a meaningful health impact?
- This lecture:
Can you afford the intervention?
- Next lecture:
Cost-effectiveness analyses: If you can afford it, is it worth it?

Learning objectives

At the end of this module, you will be able to:

- Define program cost analysis and costs of illness analysis
 - And distinguish between them
- Calculate the costs of your proposed intervention



Three questions decision makers ask:

1. How big is the problem?

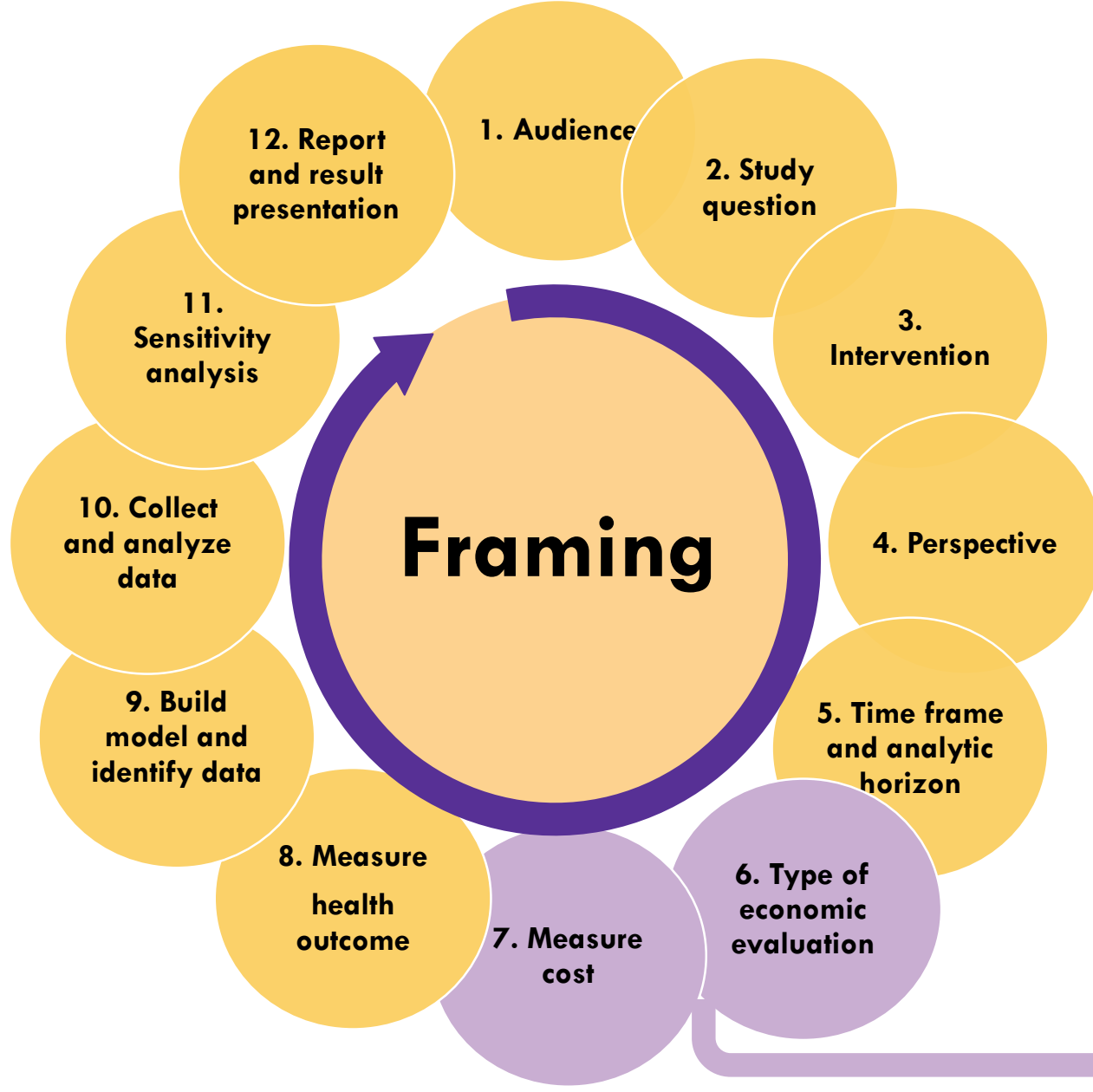
2. What can we do about it?

- What interventions do we have to address the problem?
- Which intervention has the most impact?

3. How much will it cost?

- What resources are required to address the problem?
- Do we have enough resources (ex: people, supplies, equipment, time)?

Requires a budget or political will to raise funds.

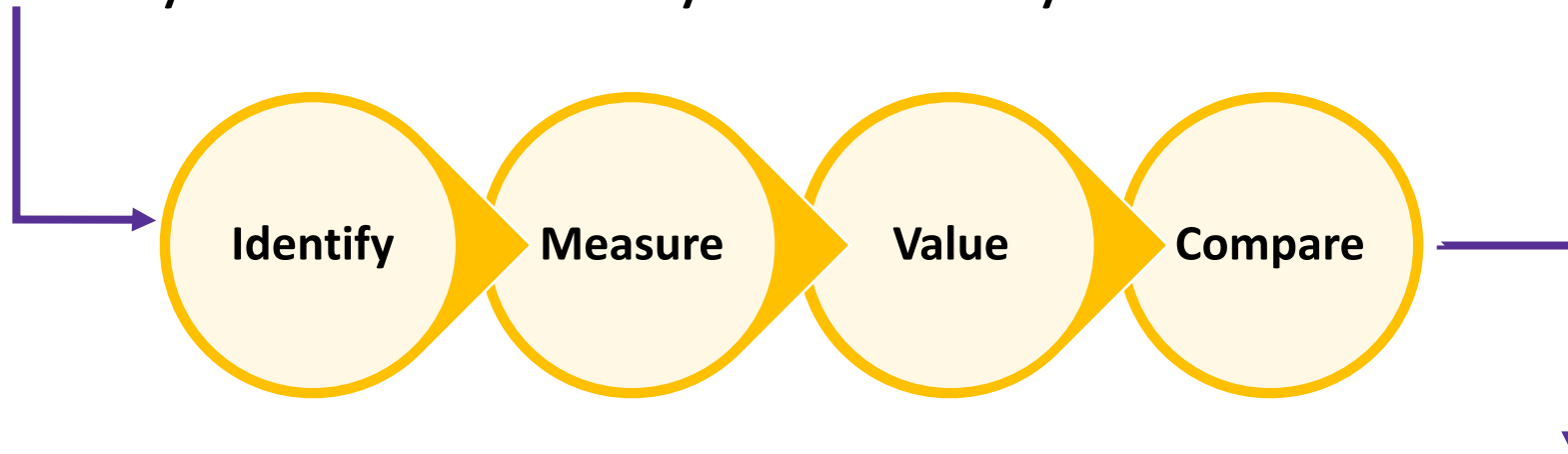


Cost Analysis:

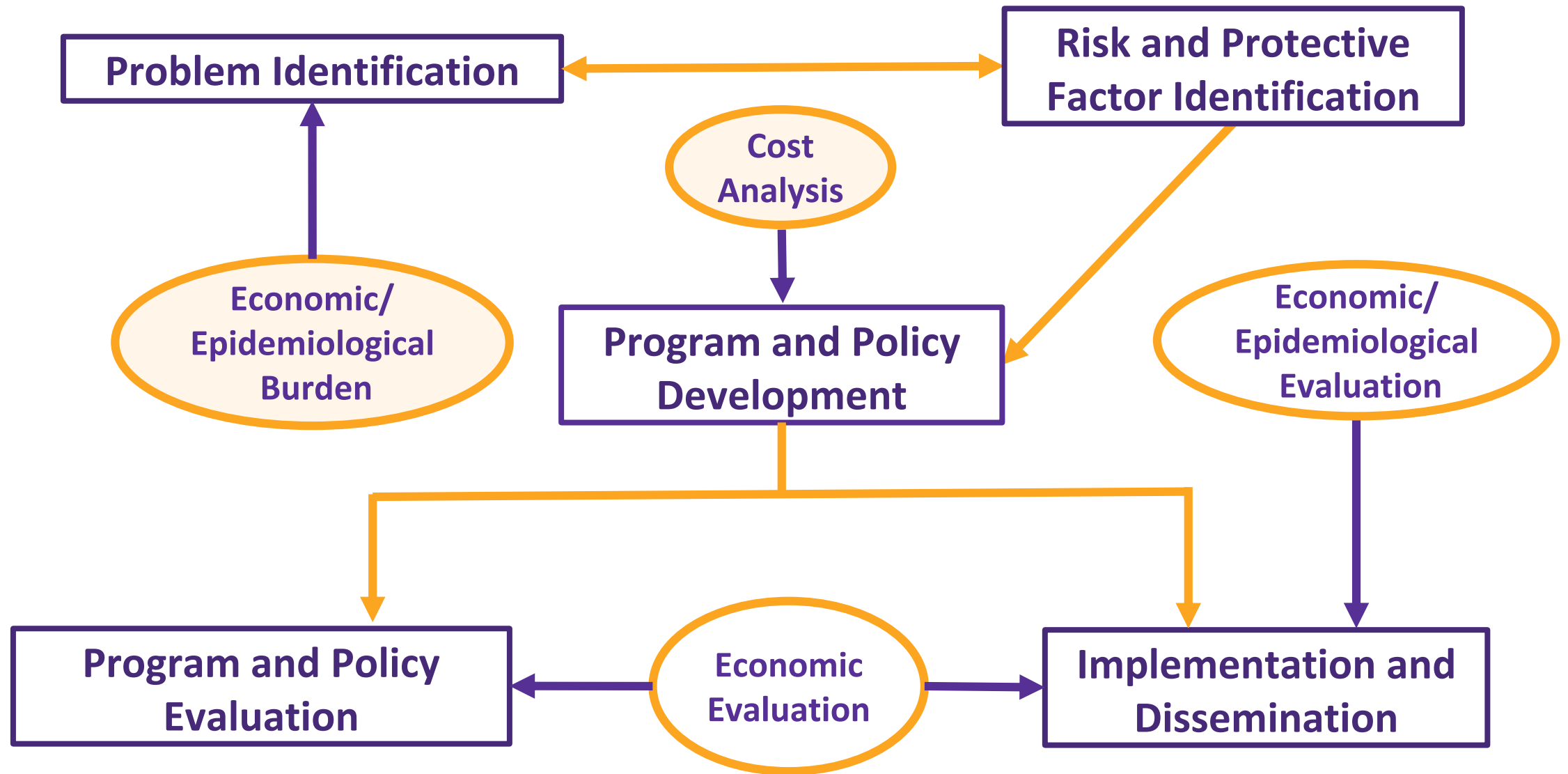
- Program cost analysis
- Cost of illness analysis

Brief review – economic evaluation

Applied analytic methods to systematically:



The **costs and consequences** of public health interventions, programs, etc.



Cost analysis (CA)

- **Partial economic evaluation**
 - Only involves costs
 - First step for full economic evaluation analyses, such as CEA
- **Cost inventory**
 - CA foundation
 - Itemizes resources used
 - Facilitates data collection organization
- **Costs are value of resources used, NOT money spent**
 - CA considers the value of ALL resources used to provide services, whether or not these resources were purchased directly for an intervention
- **Perspective informs which costs to include in analysis!**

Two types of cost analysis

Program cost analysis

- Costs of resources to operate a program/an intervention
- Actual program expenditure
 - If conducting analysis prospectively
- Used for budgeting
- Personnel, training, equipment, supplies, administrative costs ...

Cost of illness analysis

- Economic burden of a specific illness, disease, or condition
- Usually reported as a total annual cost or average cost over a patient's lifetime
- Used to show potential benefits of prevention efforts

Examples

Program cost analysis



\$2,191

The cost per patient associated with a Metformin intervention is \$2,191 relative to the placebo.¹

Cost of illness analysis



\$133B

The medical expenses of tobacco-related illnesses are at least \$133 billion.²

¹The Diabetes Prevention Program Research Group. Costs associated with the primary prevention of type 2 diabetes mellitus in the diabetes prevention program. 2003. Diabetes Care. 26;36-47.

²CDC. State-specific smoking-attributable mortality and years of potential life lost -- United States, 2000--2004 MMWR 2009;58(2):29-33.

Two types of costs for program cost analysis

Fixed costs

- Value of resources used **DO NOT change** regardless of the number of people served
- **Do not vary** with the quantity of output
- Examples:
 - Rent
 - Equipment lease
 - Media campaign design
 - Clinic maintenance costs

Variable costs

- Value of resources used **CHANGE** with number of people served
- **Vary** with the quantity of output
- Examples:
 - Educational material costs
 - Contraceptives given to patients
 - Costs of syringes, needles, vaccines
 - Media ad run costs (more ads, more people see ads, more money)

Two types of cost reporting

Average cost

- Total program cost divided by total number units of service provided
- Cost per unit
- Example:
 - Total diabetes program cost = \$500K
 - Total number of clinic visits = 50K
 - Avg. cost of diabetes program = \$10 per visit

Marginal cost

- Cost for providing one additional service unit
 - Generally excludes fixed costs
 - Could include value of staff time, educational materials, and clinic visits
- Change in total cost divided by change in quantity
- Example:
 - It costs \$500K to cover 50K visits, and \$650K to cover 60K visits
 - It will cost \$15 to provide an additional clinic visit

Questions a program cost analysis can answer

- What are the pre-implementation, implementation, and post-implementation costs of an intervention?
- How much funding is expected annually for a program?
- What is the average cost per person, served by the program?
- What is the cost distribution among key intervention activities?

Fixed Costs	Unit \$	N units	Total \$	Data source and notes
Facility costs				
Rent (monthly)				
Utilities (monthly)				
Clinic cleaning services (monthly)				
Fully loaded personnel salaries (monthly)				
MD				
RN				
Lab 1				
Intervention program manager				
Supplies and equipment				
Computers and printers				
Medical equipments				
Paper and ink				
Contracted services				
Intevention Ad campaign design				
TOTAL FIXED COSTS				
Variable Costs	Unit \$	N pt. served	Total \$	Data source and notes
Intervention description pamphlet				
Screening kits				
Gloves				
TOTAL VARIABLE COSTS				
Patient costs	Unit \$	N pt. served	Total \$	Data source and notes
Treatment cost (drug)				
Transportation cost				
Lost wage				
TOTAL PATIENT COSTS				

Cost data source examples

- Payroll (salaries)
- Claims records (drugs, time, salaries) and medical bills
- Published reports (everything)
- Questionnaires (salaries, supplies, non-medical and indirect cost)
- Observation / Going market prices for items (rent, price of fuel)
- Time studies (how much time does it take to do something)
- WHO website (price list , drugs, supplies, vaccines)
- Program data (births, deaths, on care, clinic visit)
- Partners databases (salary, supplies)
- Clinic database (payroll, utilities, rent)
- Finance department (everything!)
- Capital cost (market value of building, what government pays)

Syphilis program cost analysis example

Syphilis intervention example

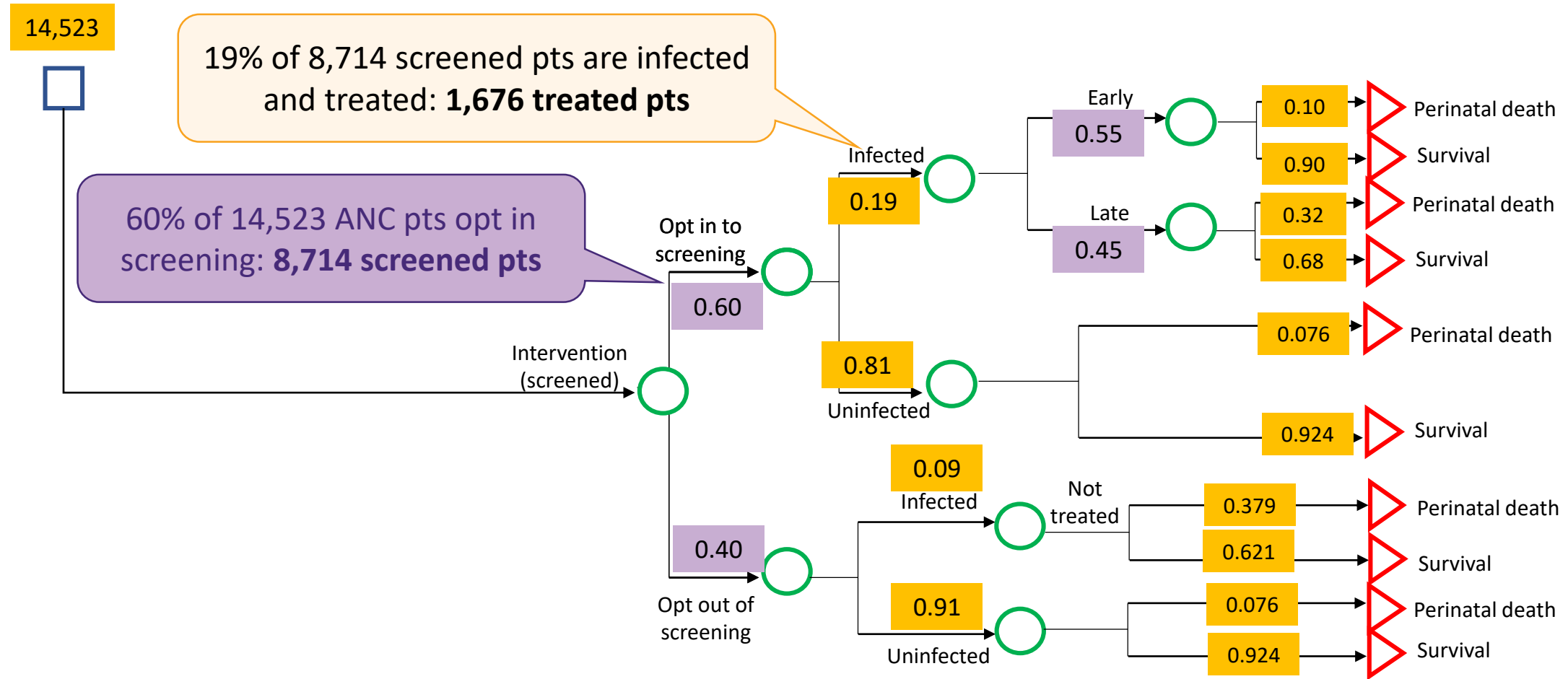
- In rural Philippines, syphilis in pregnant women accounts for many adverse pregnancy outcomes
- Group of antenatal clinics (**n=5**) in a high-burden rural area are trying to decide if they should screen and treat pregnant women for syphilis
 - Option 1. Not screen or treat pregnant women (status quo)
 - Option 2. To screen and treat and require \$3 from patient
 - Option 3. Treat without screening & require \$3 from patient
- Which option to choose?

Fixed and variable costs

Fixed costs per month for 5 clinics		Variable costs per patient screened	
Additional clinic room rent	\$500	Supplies	\$0.30
Salary (1 person at \$5 per hour)	\$400	Test kits	\$3.00
Educational materials	\$200	Gloves	\$0.15
Clinic room cleaning	\$300	Utilities	\$0.10
Total monthly fixed costs	\$5,000	Waste	\$0.10
Total yearly fixed costs	\$60,000	Total variable cost per patient served	\$3.65

Additional cost per patient treated: \$2.00 (drugs)

Number of patients screened & treated per year



Syphilis program cost, clinic perspective

Total yearly fixed cost: \$60,000
Cost per screened patient: \$3.65
Cost per treated patient: \$2.00

Number of screened patients: 8,714
Number of treated patients: 1,656

Total yearly expense = fixed costs + variable costs
\$95,118 = (\$60,000) + (\$3.65 * 8,714) + (\$2.00 * 1,656)

Total clinic revenue = income from patient * number screened
\$26,142 = \$3.00 * 8,714

Total syphilis program cost = expense - revenue
\$68,976 = **\$95,118** - **\$26,142**

Total cost per patient screened = Total program cost / number of screened patients
\$7.92 = **\$68,976** / 8,714

Per-Patient Costs from Clinic Perspective

Costs	No Intervention	Screen & Treat
Cost to clinic to screen an uninfected person	\$0	\$3.65
Cost to clinic to screen & treat and infected person	\$0	\$5.65
Fixed cost of program/target population person (\$)	\$0	\$4.13
Paid by patient (\$)	\$0	(\$3.00)

Syphilis cost of illness example

Cost of illness for an intervention

- Shows how an intervention *reduces costs* associated with an illness

- Costs of treatment, hospitalization
- Income lost from missed work days
- Cost of diagnosis

If these are not reduced,
why do an intervention?

- Perspective determines which costs to include!
- Syphilis program example:
 - **Clinic perspective:** does not include costs of illness (very few exceptions)
 - **Patient or societal perspective:** would include costs of illness

Infants born w/ syphilis patient perspective COI

Cost types (for infants with clinical syphilis for first year)	Inpatient	Outpatient
Clinical care	\$77.30	\$23.10
Rehabilitative care	\$4.40	\$46.15
Total transportation cost	\$3.90	\$27.30
Parent lost income for missed work	\$0.00	\$95.00
Total cost per infant born with syphilis	\$85.60	\$191.55

COI would only be included if costs were being calculated from the patient's perspective OR the societal perspective.

From the clinic perspective, patient cost of illness are not relevant.

END
