Using Spectrum to Estimate the Effects of PMTCT Programs

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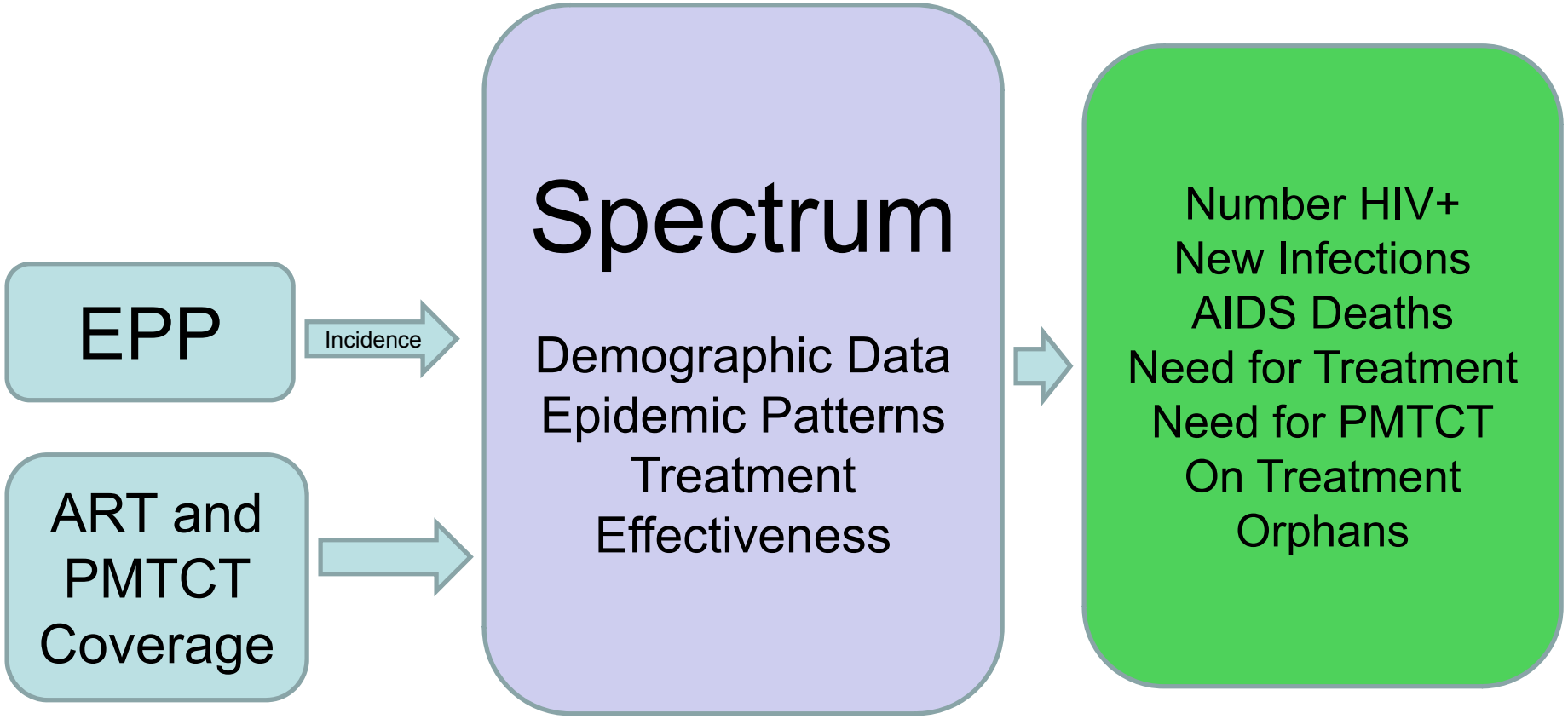
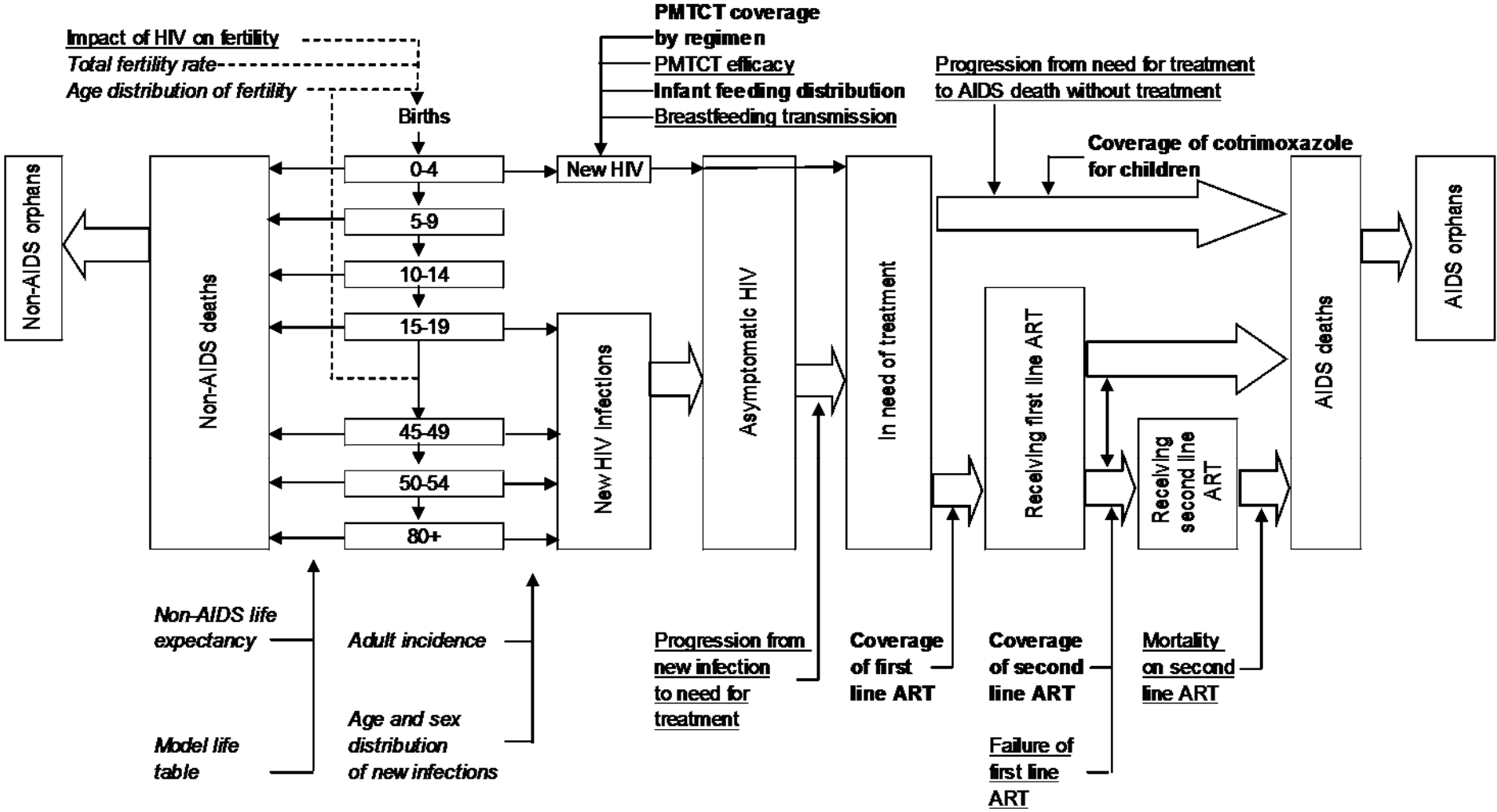
Updating Estimates of Mother-to-Child Transmission Rates: Standardized Rates to Use for Modeling, Program Evaluation, Reporting, and Target Setting

1-2 September 2010, Washington, DC

All Countries Prepare National Estimates with Spectrum



PMTCT calculations are embedded in Spectrum model



Variables in italics are country-specific demographic and epidemiological inputs

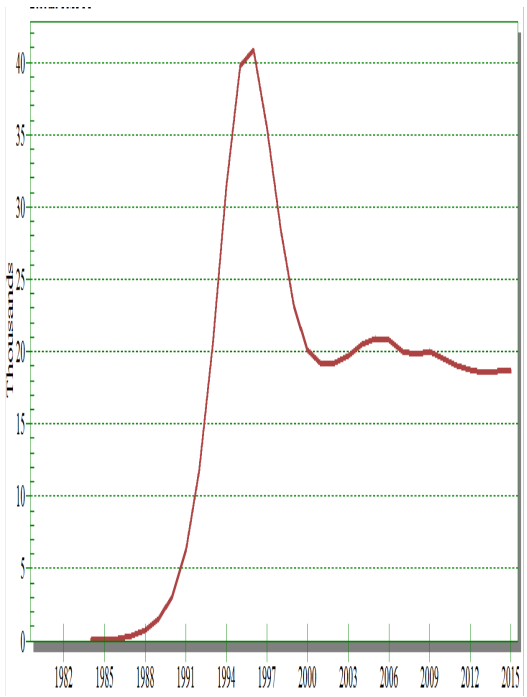
Variables in bold are based on country-specific service statistics and projections

Variables in underlined type are based on international studies

ART = Antiretroviral therapy; PMTCT = prvention of mother-to-child transmission

HIV Progression

New Infections



Progression
(by age and sex)

>500

350-500

250-350

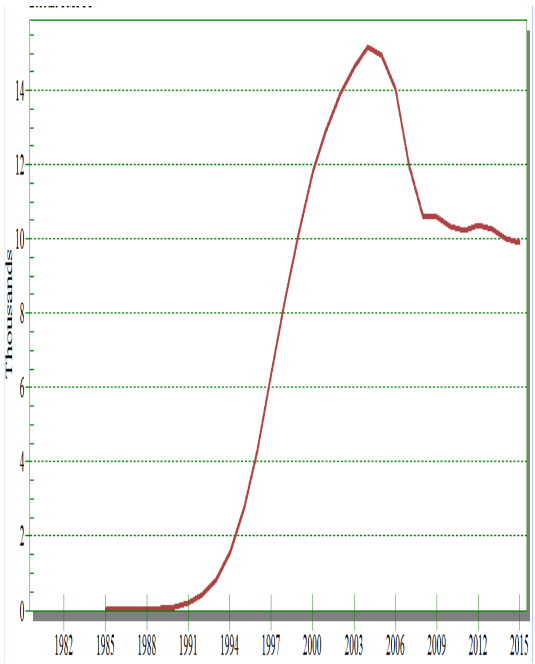
200-250

100-200

50-100

<50

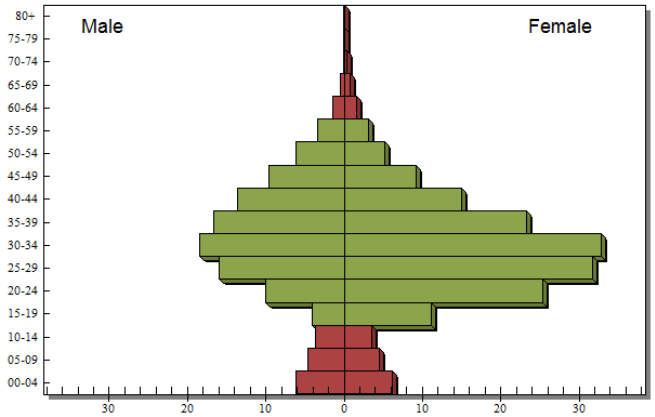
Need for Treatment



Incidence is estimated from prevalence trends based on surveillance and survey data. New infections progress to eligibility depending on eligibility criteria.

Births to HIV+ Women

HIV+ Population



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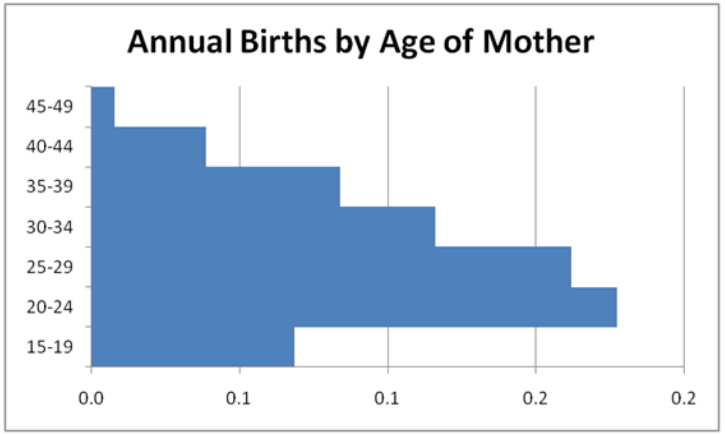
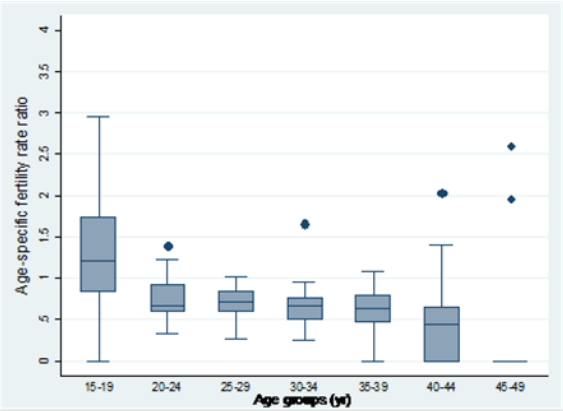


Fertility Reduction Among HIV+

X



= Number of births to HIV+ women

Use of PMTCT Regimens Entered as Numbers or Percentages

Distribution of HIV+ pregnant women by treatment regimen

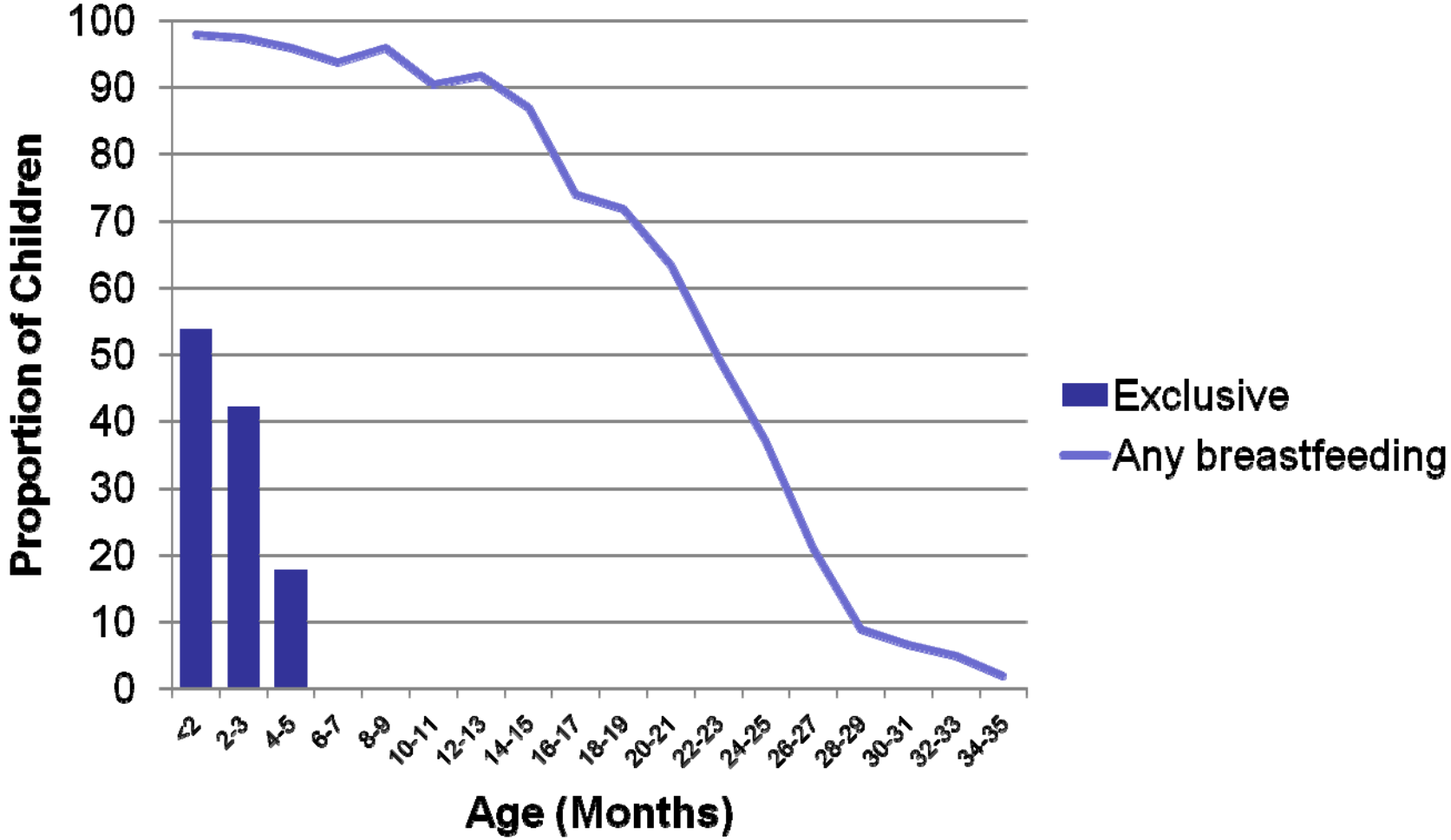
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
No prophylaxis										
Percent	100.00	87.50	100.00	100.00	61.30	52.50	43.90	35.70	27.90	20.00
Single dose nevirapine										
Number	15,000	20,619	18,198	9,099	0	0	0	0	0	0
Percent	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dual ARV										
Number	8,000	10,363	18,166	26,065	0	0	0	0	0	0
Percent	0.00	12.50	0.00	0.00	38.70	47.50	56.10	64.30	72.10	80.00
Option A - Maternal										
Number	0	0	0	0	0	0	0	0	0	0
Percent	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Option A - Child										
Number	0	0	0	0	0	0	0	0	0	0
Percent	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Option B. Triple prophylaxis from 14 weeks										
Number	0	0	0	0	0	0	0	0	0	0
Percent	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triple ARV Treatment										
Number	0	0	0	0	0	0	0	0	0	0
Percent	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Perinatal Transmission Rate

Regimen	Perinatal Transmission Rate
No prophylaxis	20%
Single dose NVP	11%
Dual ARV	4%
Option A	?
Option B	?
Triple treatment	2%

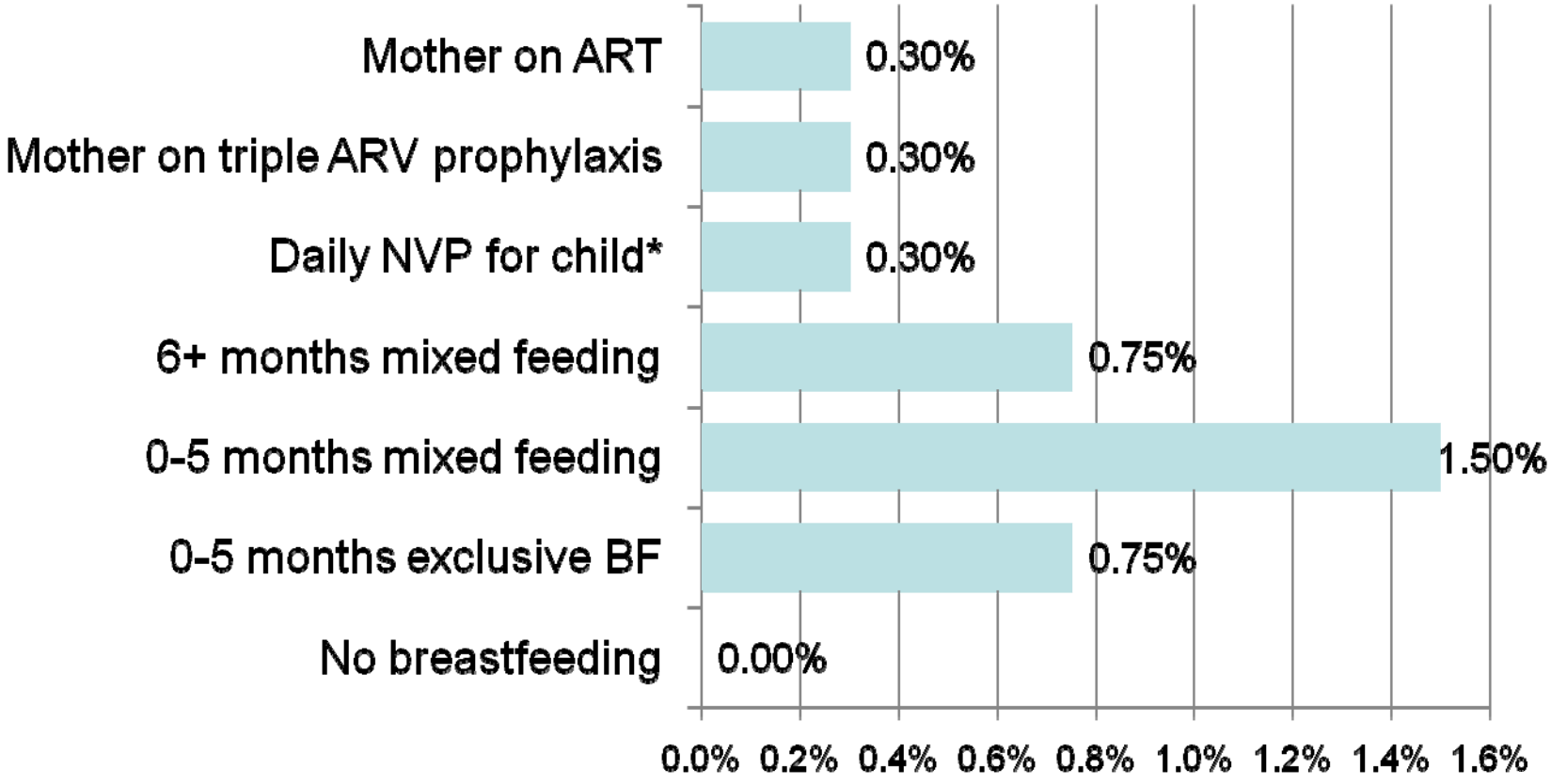
$$PTR_t = \sum_r tr_r \times \%\ HIV+\ pregnant\ women_{r,t}$$

Infant Feeding Patterns



Data are available from DHS or other national surveys for all mothers. In the absence of other data we assume that the same rates apply to HIV+ mothers.

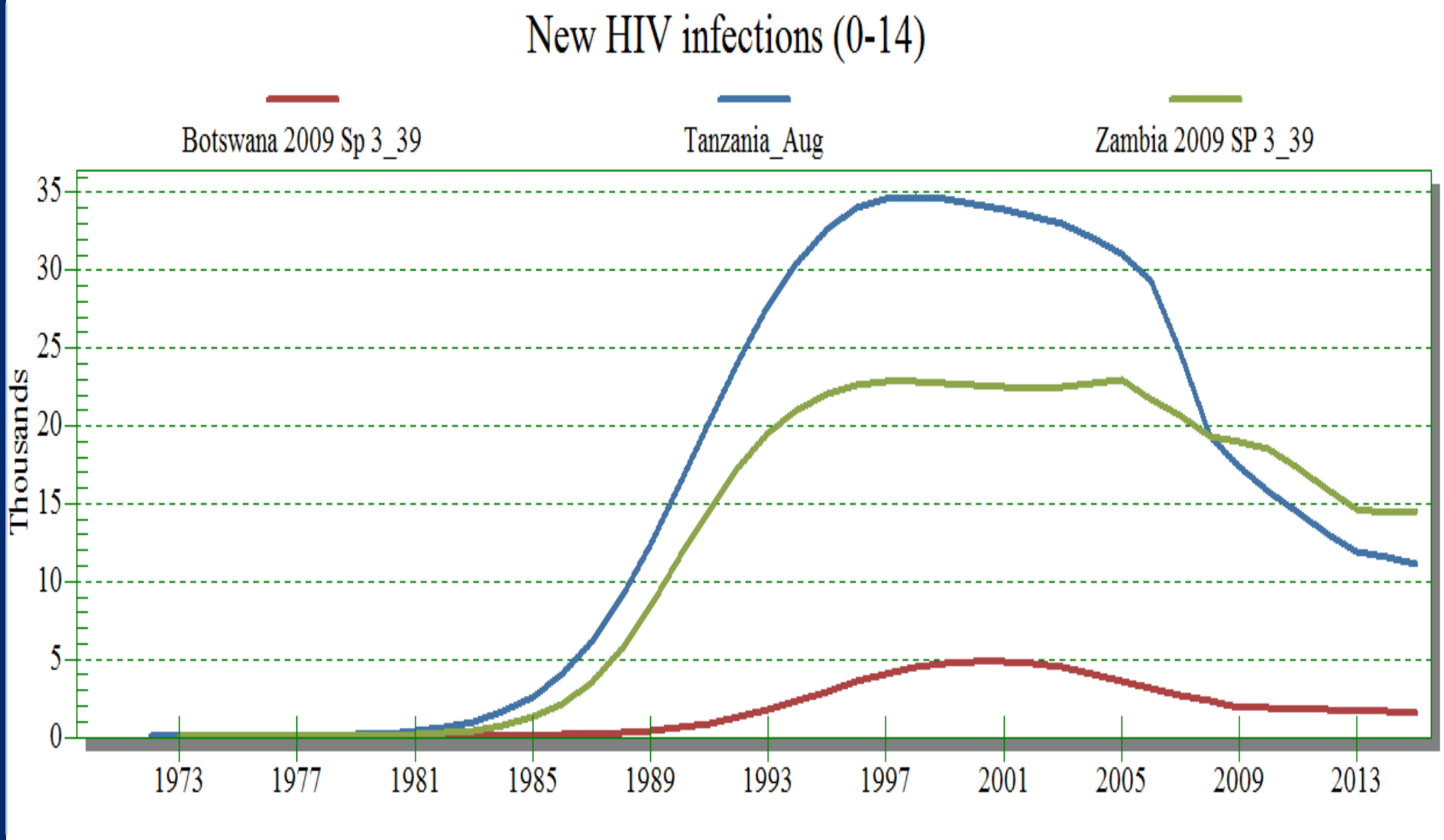
Monthly Probability of Transmission by Type of Infant Feeding



$$bt_{a,t} = \sum_m btr_{m,a} \times \%\ children_{a,m,t}$$

$$I_{a,t} = (C_{a,t} - H_{a,t}) \times bt_{a,t}$$

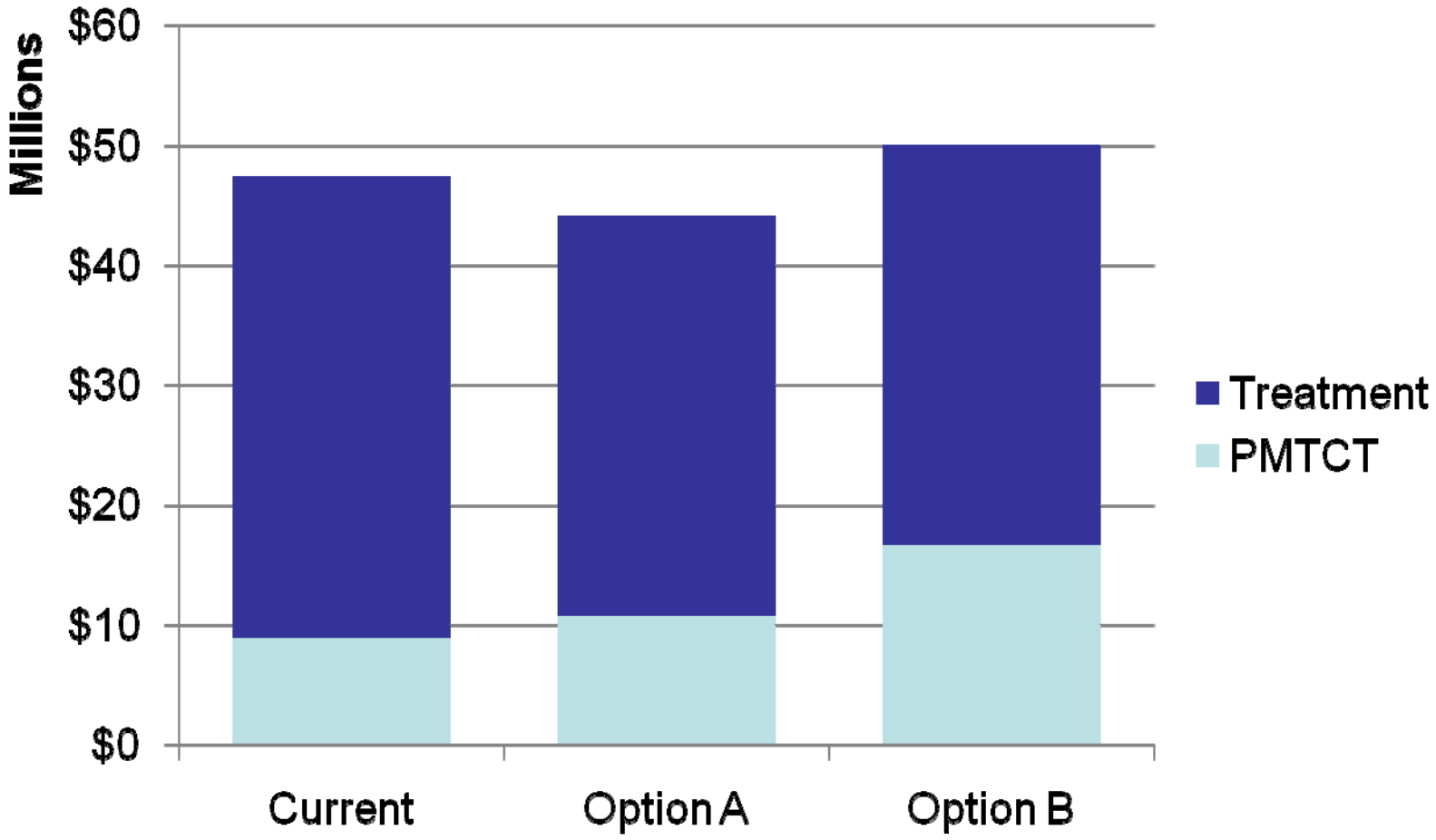
Illustrative Results – without new Options



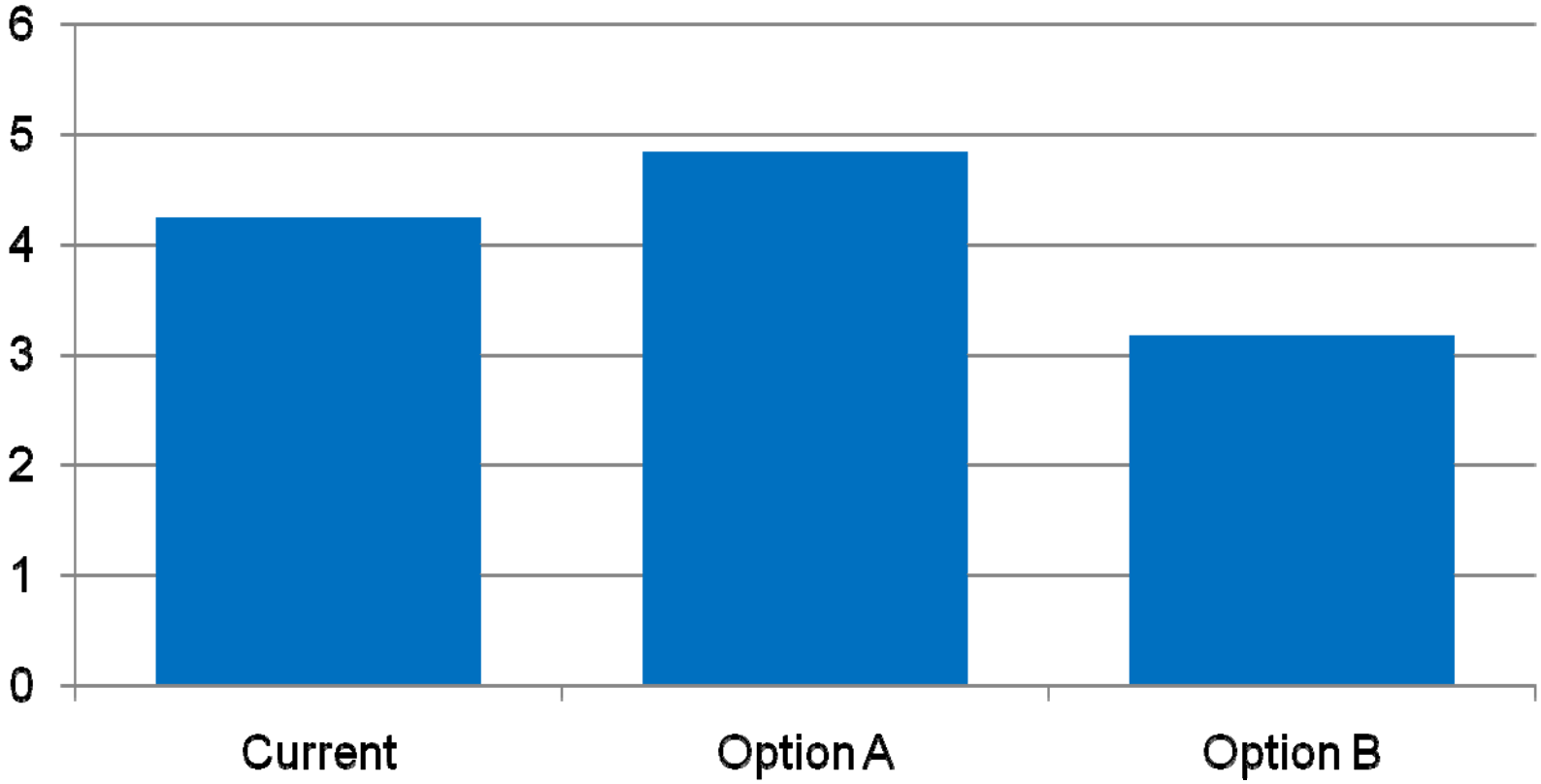
Costs of PMTCT

- Counseling
  - Pre-test
  - Post-test HIV+
  - Post-natal
- HIV testing
  - Mother
  - PCR for child at birth
  - Infant after BF ends
- Service delivery
- Formula
- ARVs
  - NVP for mother
  - NVP for infant
  - AZT
  - 3TC
  - Triple treatment regimen
  - Triple prophylaxis regimen

Costs of PMTCT and Pediatric Treatment by Approach



Benefit Cost Ratio (2010-2015)



Benefits are future treatment costs avoided. Costs are total PMTCT and pediatric treatment costs. Future benefits are discounted at 5% per year. Counterfactual is no PMTCT.

Key Questions

1. What are perinatal transmission rates for Options A and B?
2. What are monthly breastfeeding transmission rates for Options A and B?
3. Can we continue to use DHS feeding patterns or do we expect these patterns to change for HIV+ women in the PMTCT program?
4. Can we assume that the distribution of HIV+ pregnant women by CD4 count is similar to all HIV+ women?
5. Should Spectrum provide estimates of need for PMTCT for women <350 and >350?
6. Do we need to adjust the effectiveness of PMTCT regimens for median starting time on prophylaxis?