Measuring Effectiveness of PMTCT Programs

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Enhancing Implementation Science:
Program Planning, Scale-up, and Evaluation
WHO’s Four Prong PMTCT Strategy

Component 1: Prevention of HIV in women, especially young women
Component 2: Prevention of unintended pregnancies in HIV-infected women
Component 3: Prevention of transmission from an HIV infected woman to her infant
Component 4: Support for HIV infected women, their infant, and family
PMTCT Cascade

All women presenting for delivery

(A) Attend antenatal care
(B) Be offered HIV Test
(C) Accept HIV Test
(D) Obtain HIV Test Results
(E) Agree to ARV prophylaxis
(F) Adhere to ARV prophylaxis
(G) Adhere to infant ARV doses

HIV infected women only

INFECTIONS AVERTED

Preventing mother-to-child transmission

Coverage of antenatal care services and services for preventing mother-to-child transmission among women living with HIV in high-prevalence countries, 2010

Source: WHO and UN Statistics Division
PMTCT Evaluation Challenges

• PMTCT programs widely implemented
• Significant variability of programs
• Long follow-up periods
• Facility-based evaluations may be biased
• Ethical problems with following mother-infant pairs and linking to PMTCT services
• Attrition a significant problem
So how do we measure impact on:

- Perinatal transmission
- Postnatal transmission, and
- 12-month HIV-free survival?
A common approach: Program Coverage

- Counts the number of mother-infant pairs in a population receiving PMTCT services
- Assumes benefit of PMTCT intervention (from efficacy trials) can be applied to population

→ Why might program coverage not be a good method for impact evaluation? (but good for process and outcome evaluation)
Figure 2. Cascade of Events Negotiated by Mothers Infected With Human Immunodeficiency Virus (HIV) and Their HIV-Exposed Infants to Prevent Mother-to-Child HIV Transmission

Stringer, E. M. et al. JAMA 2010;304:293-302

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Of 3196 HIV-exposed infants, 1845 (58%) had NVP detected
A common approach: MTCT at a single point in time

- Using facility registers, count the number of HIV-exposed infants in a calendar year that are HIV-positive at 4-6 weeks
Single measurement of impact

What are some problems with this approach?

Legend:
- ▲ Intervention group

Source: Mead Over, Center for Global Development.
Single measurement of impact

Source: Mead Over, Center for Global Development.
Group activity

• Consider various methods to evaluate the effectiveness of PMTCT programs

• Evaluate strengths and weaknesses of each approach

• ~15 minutes
Immunization Clinic Survey

Visit infant immunization clinics or immunization campaign events and conduct HIV DNA PCR on HIV-exposed infants at their first immunization visit (e.g., DTP1). Repeat two years later and compare the number of infected & exposed infants.
Immunization Clinic Survey

**Counterfactual:** Baseline measurement (pre-post)

**Strengths:**
- Can be representative if vaccine coverage high
- Convenient

**Weaknesses:**
- Depends on vaccine coverage >90%
- Facility based
- Misses late postnatal infections (breastfeeding)
- Can be expensive
Importance of Comparison Groups

Source: Mead Over, Center for Global Development.
Importance of Comparison Groups

![Graph showing the comparison between intervention and control groups before and after the program. The graph indicates a decrease in early transmission rate post-program, suggesting an estimated impact.]

Legend:
- ▲ Intervention group
- ■ Control group

Source: Mead Over.
Retrospective Cohort

Identify HIV+ women who accessed services at ANC clinics in the last year. Link to infant records and, if necessary, follow-up and test infant for HIV (DNA PCR). Compare transmission rate across time.
A common approach: Cohort Studies (prospective)
A common approach: Cohort Studies (retrospective)

ANC Booking → Deliveries to HIV+ mothers → 24 months
Retrospective Cohort

Counterfactual: Baseline (first measurement)

Strengths:
• Can examine individual-level questions
• Efficient (start with HIV+ women)

Weaknesses:
• Need to track down infant outcomes or link to infant data (expense)
• Loss to follow-up
• Facility based
Household Surveys

Visit a representative sample of households (e.g., DHS) and test all infants <2 years to measure exposure to HIV and HIV infection. Ask mothers about infant deaths. Repeat and compare the number of infected & exposed infants and HIV-free survival.
Household Surveys

**Counterfactual:** Baseline (first measurement)

**Strengths:**
- Nationally representative (DHS)
- Efficient (piggy-back on other survey)
- Can examine HIV-free 12 month survival

**Weaknesses:**
- Large survey size
- Maybe only practical in high-prevalence countries
Routine Early Infant Diagnosis (EID) Data

Examine routine EID data (at 4-6 weeks) over time to determine the EID positivity rate.
Routine Early Infant Diagnosis (EID) Data

**Counterfactual:** Baseline measurement

**Strengths:**
- Trend data
- Available surveillance data

**Weaknesses:**
- Validity depends on EID coverage
- Facility-based
INVITATION TO SATELLITE SESSION AT IAS 2011

Elimination of Mother-to-Child Transmission of HIV: Measuring the Effectiveness of National PMTCT Programmes

Sunday, 17 July 2011, 17:00 - 19:00
Mini Room 2

This satellite will present global initiatives to eliminate new paediatric HIV infections, introduce a new short guide on measuring the impact of PMTCT programmes in various settings, and share country lessons learnt from designing and analyzing PMTCT impact assessments.