The AIDS Epidemic: An Issue for Maternal and Child Health and Nutrition

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A mother with full-blown AIDS cradles her 2-year-old, who has been given just a few months to live. This child will be the third she has lost to AIDS-related illnesses. Three-quarters of young Africans infected with HIV are women ages 15 to 24.

Global summary of the AIDS epidemic, December 2007

| Number of people living with HIV in 2007 | Total 33.2 million (30.6 - 36.1 million) | Adults 25.8 million (23.2 - 28.5 million) | Children under 15 years 7.4 million (7.0 - 8.1 million) |
| People newly infected with HIV in 2007 | Total 2.5 million (1.8 - 3.1 million) | Adults 1.6 million (1.3 - 1.9 million) | Children under 15 years 0.9 million (0.7 - 1.3 million) |
| AIDS deaths in 2007 | Total 1.1 million (0.9 - 1.2 million) | Adults 0.8 million (0.7 - 1.0 million) | Children under 15 years 0.3 million (0.2 - 0.5 million) |

What will happen to these children?

They die at 6 times the rate of uninfected children

Or they become orphans

Mother to child transmission (MTCT) of HIV infection

MTCT: The big picture

HIV infection is not yet preventable among women (although it should be!)

But it is among children by addressing MCTC

--Improve maternal health

--Interrupt transmission before, during and after birth

“Timing may be everything”

Measures of HIV disease progression

Measures of HIV disease progression


Routes of MTCT

Modifying factors:
Maternal and infant health/nutritional status
Infant maturity (preterm birth; GI and immune system maturation)

Estimated risk and timing of mother-to-child transmission of HIV in the absence of interventions

<table>
<thead>
<tr>
<th>Timing</th>
<th>Transmission rate%</th>
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<tbody>
<tr>
<td>During pregnancy</td>
<td>5-10%</td>
</tr>
<tr>
<td>During labour and delivery</td>
<td>10-15%</td>
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<tr>
<td>During breastfeeding</td>
<td>5-20%</td>
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<tr>
<td>Overall without breastfeeding</td>
<td>15-25%</td>
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<tr>
<td>Overall with breastfeeding to 6 months</td>
<td>20-35%</td>
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<tr>
<td>Overall with breastfeeding to 18 to 24 months</td>
<td>30-45%</td>
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Effect of interventions on rates of mother to child transmission of HIV

Treatment of pregnant women


- Assess the clinical stage of the woman’s infection and, where possible, her CD4 cell count (to determine eligibility for ART)
- Give ART or ARV prophylaxis to prevent MTCT (as appropriate) and cotrimoxazole prophylaxis (if eligible)
- Screen for and treat tuberculosis
- Provide counseling and care related to nutrition and psychosocial support
Transmission of HIV by human milk

Association between infant feeding pattern and the probability of HIV infection

- Cumulative probability of detecting HIV infection over time among 137 children who were never breastfed (---), 1% exclusive breastfeeding (-----), and 7% breastfeeding (-----).


Association between breastfeeding mode and risk of HIV infection or death among 2060 HIV-infants born to HIV+ mothers: ZVITAMBO Project

- Exclusively breastfed (n = 156)
- Predominantly breastfed (n = 490)
- Early (< 3 mo) mixed feeding (n = 1414)

<table>
<thead>
<tr>
<th>Child age at observation</th>
<th>Hazard ratio for risk of HIV infection or death beginning at 6 wk of age</th>
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<tr>
<td>6 mo</td>
<td>0.1</td>
</tr>
<tr>
<td>12 mo</td>
<td>1</td>
</tr>
<tr>
<td>18 mo</td>
<td>10</td>
</tr>
<tr>
<td>24 mo</td>
<td>100</td>
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* P < 0.05, ** P < 0.01


Effect of feeding advice and provision of infant formula on HIV infection rate

- Breastfeeders
- Formula feeders

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<th>Age (mo)</th>
<th>Cumulative HIV-1 infection rate (%)</th>
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<tr>
<td>0</td>
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<td>5</td>
<td>10</td>
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<td>10</td>
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<td>25</td>
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<td>20</td>
<td>40</td>
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<td>25</td>
<td>50</td>
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Effect of infant feeding advice and provision of infant formula on mortality

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<th>Effect</th>
<th>Pediatric mortality (%)</th>
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<tr>
<td></td>
<td>0.016</td>
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<td>0.004</td>
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<td>0.003</td>
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Association of indicators of HIV disease severity with breast-milk infectivity among 425 Kenyan women

- Per liter Per day of breast-milk infectivity
- Higher viral load* (n = 160)
- Lower viral load (n = 160)
- Higher CD4 count (n = 174)
- Lower CD4 count (n = 160)

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<thead>
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<th>Ingested exposure</th>
<th>Breast-milk infectivity</th>
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<tr>
<td></td>
<td>0.0016</td>
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<td></td>
<td>0.0004</td>
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<td>0.0003</td>
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*Divided at the median: viral load, 43,120 copies/mL of HIV RNA; CD4 count, 400 x 10^6/L in maternal plasma, measured prenatally

Association of nevirapine treatment, counseling and available infant formula with death or HIV infection: KwaZulu Natal, n = 1132

Surviving alive
Surviving HIV-free


Breastfeeding plus zidovudine (6 mo) v. formula feeding plus zidovudine (1 mo): A randomized comparison, the Mashi Study

Cumulative event rate intervention consisting of active, open-label nevirapine to all infants and availability of HAART to qualifying mothers and infants:
348 assigned to formula feeding (including 172 to single-dose placebo to mother) and 346 assigned to BF + zidovudine (including 177 to single-dose placebo to mother)


Benefits of breastfeeding
Association of breastfeeding with the risk of death in the first year of life: pooled data from 5 countries

Recommended infant feeding practices
(American Academy of Pediatrics, 1997)

- Exclusive breastfeeding is ideal nutrition and sufficient to support optimal growth and development for approximately the first 6 mo after birth.
- In the first 6 mo, water, juice, and other foods are generally unnecessary for breastfed infants. Vitamin D and iron may need to be given before 6 mo of age in selected groups of infants.

The conflict

- Breastfeeding prevents mortality from many infectious diseases
- Breastfeeding may transmit HIV
- Breastfeeding is the cultural norm and is affordable

- Infant formula is expensive and may not be prepared properly
- Use of infant formula
  - May reveal a woman’s HIV status
  - Is a tacit endorsement of the use of infant formula, which may undermine breastfeeding
  - Exposes the mother to engorgement, mastitis and increased risk of pregnancy
  - Exposes the baby to malnutrition, loss of closeness with its mother and increased risk of neglect

Exclusive breastfeeding is recommended for the infants of HIV-infected women for the first 6 mo of their lives unless replacement feeding is acceptable, feasible, affordable, sustainable and safe before that time.


From: Piwoz E, et al. SARA Project, undated.

When replacement feeding is acceptable, feasible, affordable, sustainable and safe, avoidance of all breastfeeding by HIV-infected women is recommended.

All breastfeeding should stop once a nutritionally adequate and safe diet without breast milk can be provided.


The most appropriate infant feeding option for an HIV-infected mother should depend on her individual circumstances, but should consider the health services available and the counseling and support she is likely to receive.

Breastfeeding mothers of infants and young children who are known to be HIV-infected should be strongly encouraged to continue breastfeeding.


The cautionary tale of rains in Botswana

http://www.blsmeetings.net/implementhiv2006/TracyCreek_files/frame.htm

- When there is a disease outbreak, formula-fed infants are undefended and die at many times the usual rate!
- Formula feeding cannot be assume to be “safe”
  - Clean water and adequate, reliable supplies of formula are required
- Running a formula program for HIV+ women is complex and expensive and results in lower breastfeeding among HIV- women


The reality of breastfeeding in Africa

![Breastfeeding rates](https://example.com/breastfeeding_rates.png)

Fig. 2: Infant mortality in breastfeeding (BM) and formula-feeding (FF) children. The graph represents the proportion of children who were infected at birth, with breastfeeding and formula feeding continuing at the same time. The graph shows the proportion of children who were infected at birth, with breastfeeding and formula feeding continuing at the same time. The graph shows the proportion of children who were infected at birth, with breastfeeding and formula feeding continuing at the same time.


Infant feeding when the mother is HIV+

Another possible solution: flash-heating of human milk at home

HIV in breastmilk killed by flash-heating, new study finds

Prevent HIV infection in general, especially among young women and pregnant women
• Prevent unintended pregnancies among HIV+ women
• Prevent MTCT
• Provide care, treatment and support to HIV+ women, their infants and family

"We know what works but we don’t know how to implement it in the real world."


What are some of the things that we could do now?