

# Infant Feeding in the Context of HIV Infection



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# **This presentation will discuss:**

- Maternal-to-child HIV transmission during breastfeeding
- New data on infant feeding, postnatal transmission, and infant mortality
- ICAP approach to infant feeding and improved HIV-free survival

# Important Definitions

- **Exclusive BF**- giving only breast milk and no other drinks or foods, not even water, with the exception of drops or syrups consisting of vitamins, mineral supplements or medicine.
- **Mixed feeding or partial breastfeeding** – feeding both breast milk and other foods or liquids (partial BF and predominant BF) when infant is less than 6 months of age
- **Replacement feeding** -the process of feeding a child who is not breastfeeding but being fed commercial infant formula or home modified animal milk (a diet that provides all the nutrients the child needs) until the child is fully fed on family food
- **Complementary feedings** – any food, whether manufactured or locally prepared, used as a complement to breast milk or formula and introduced to an infant at 6 months of age
- **HIV Free Survival** – Child is alive and **not** HIV-infected



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# Infant feeding in **Africa**

- Majority of women in **Africa** breastfeed their infants
  - However, exclusive breastfeeding is not very common for of a variety of reasons
    - Can you list some of the reasons why women may not exclusively breastfeed?
- Majority of women in **Africa** breastfeed until the child is 18-24 months old



Photo from TZ - IBFAN-Africa

# Breast milk is best for babies

- Breastfeeding provides optimal nutrition for first 6-12 months of life
- Breastfeeding is associated with decreased risk of infant illness and death during the 1st year of life. (*WHO Collaborative Study, Lancet 2002*)



Photo from Kenya - IBFAN-Africa



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# Breast milk is best for babies

- Children who receive replacement feeds and do not breastfeed are at increased risk of mortality
  - Risk is highest in the youngest infant
  - Also at increased risk for respiratory infections and diarrhea

# Breast milk is best for babies

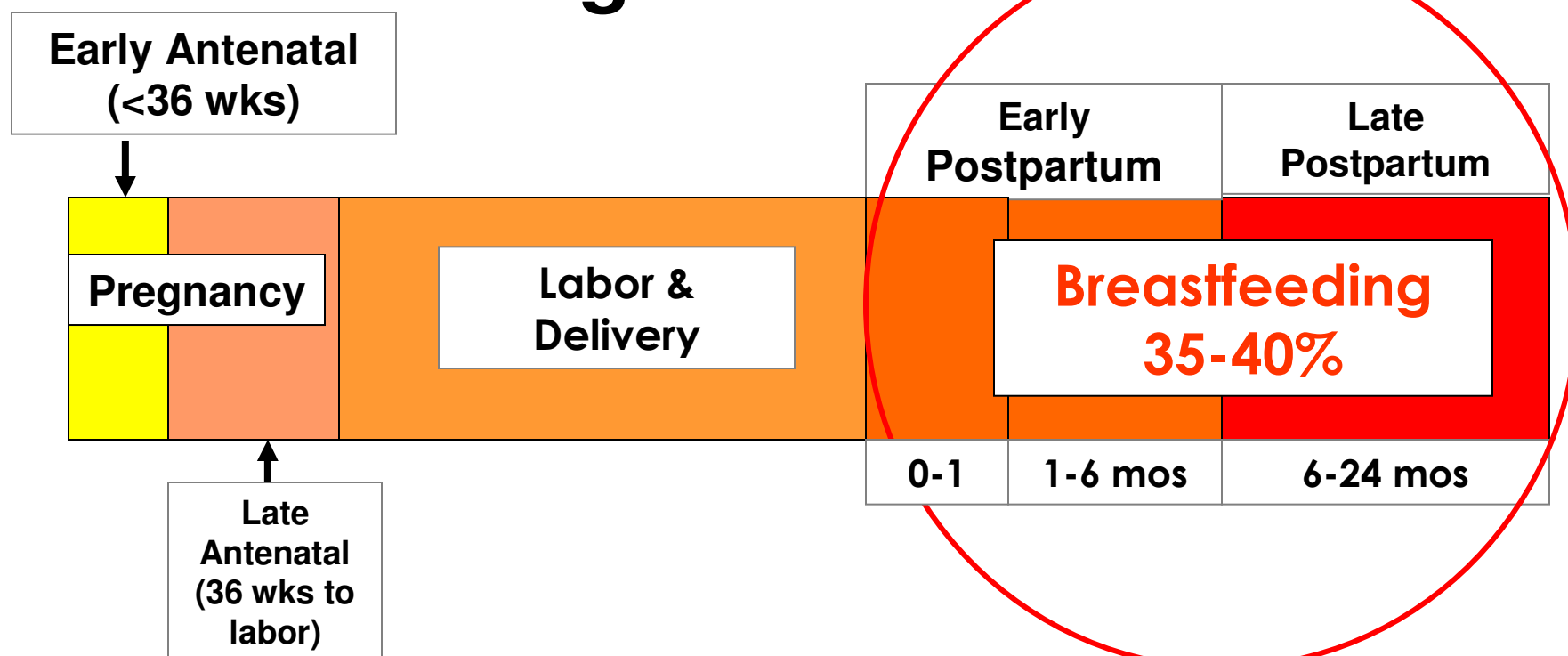
- Breastfeeding is protective even in highly developed countries such as the US and UK.
  - Infants in the UK who were breastfed had fewer hospitalizations for diarrhea and respiratory tract infections compared to non-breastfed children. *(Quigley et al, Pediatrics 2007)*

# The Problem: Breastfeeding Poses a Substantial Risk for MTCT

- While breast milk contains all of the elements needed for perfect infant nutrition, it is also contains the HIV virus
  - When a mother breastfeeds, her baby is exposed to HIV
- Transmission can occur throughout the entire time that a child breastfeeds
- Absolute risk of a mother transmitting HIV via breastfeeding is 10%
  - 40% of HIV infected children will have become infected via breastfeeding



# 40-50% of all HIV MTCT can be attributed to breastfeeding 10% of all infants who are breastfeeding will become infected



Substantial Proportion of infections occur during BF



## 32 of these babies will become infected with HIV if mothers do not receive any PMTCT intervention



➤ 20 of the 100 babies will become infected during pregnancy or delivery (in utero and peripartum transmission)

➤ 12 of the 100 babies will become infected through breastfeeding (postnatal transmission)

➤ 68 babies will remain uninfected



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# Several factors can increase the risk of MTCT during breastfeeding (1)

- Longer duration of feeding
  - Infants can acquire infection at any time during breastfeeding. The longer a child breastfeeds, the higher the risk
- Mixed Feeding
  - Giving a baby food or drink while breastfeeding increases the risk of transmission

# Several factors can increase the risk of MTCT during breastfeeding (2)

- More advanced maternal disease
  - Women with high viral load and low CD4 are more likely to transmit HIV during pregnancy and *during breastfeeding*
- Breast problems like mastitis, cracked nipples
- Acute maternal infection
  - If an uninfected woman becomes infected during pregnancy or lactation the risk of MTCT is dramatically increased

# **Approaches that have been evaluated and/or considered to decrease the risk of MTCT associated with breastfeeding**

- X** Complete avoidance of breastfeeding
- X** Shorten duration of breastfeeding
- ✓** Exclusive breastfeeding
- ✓** Antiretroviral therapy for the mother and/or child
- ✓** Improve breastfeeding practices
- ✓** Preventing acquisition of maternal HIV infection



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# To Breastfeed or Not To Breastfeed? The Balancing Act



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# 1. What about avoidance of breastfeeding to decrease risk of MTCT?

*Complete* avoidance of breastfeeding is the only way to completely avoid MTCT through breast milk.

Replacement feeding eliminates transmission from breastfeeding

- Commercial infant formula
- Home-prepared formula with added nutrients



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## ***However replacement feeding is***

associated with a high risk of serious diarrheal infections and malnutrition

- Formula is often unsafe having been diluted, improperly mixed, given inconsistently or prepared with unclean water
- Babies miss out on the general health benefits of breast milk





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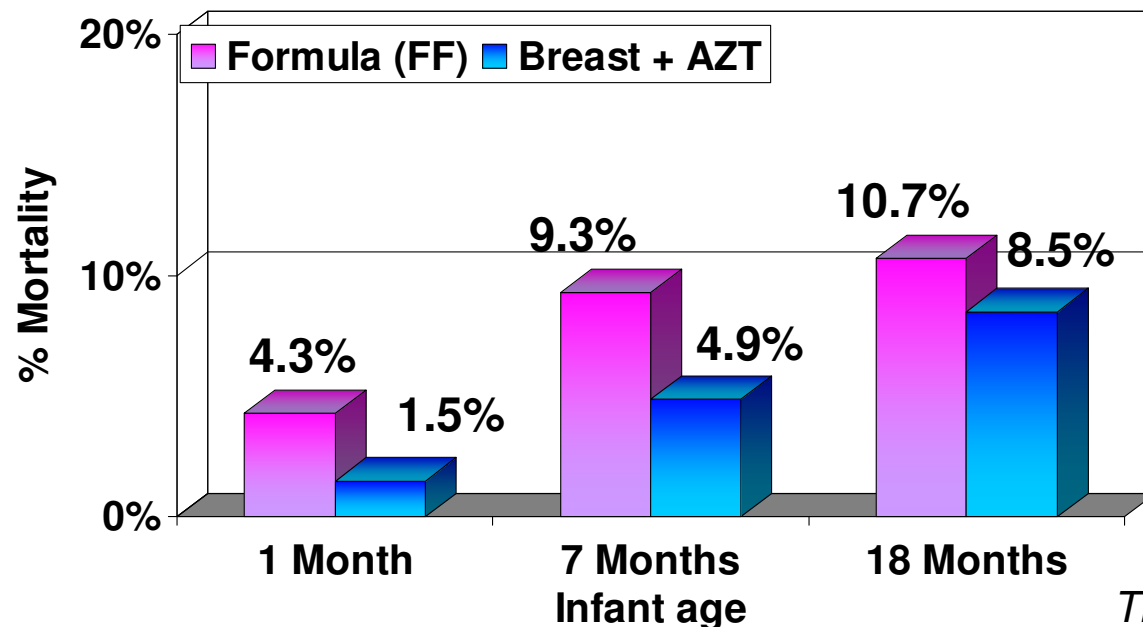
# Approaches that have been evaluated and/or considered to decrease the risk of MTCT associated with breastfeeding

## **X Complete avoidance of breastfeeding**

### **— Use of replacement feeds**

- Shorten duration of breastfeeding
- Exclusive breastfeeding
- Antiretroviral therapy for the mother and/or child
- Improve breastfeeding practices
- Preventing acquisition of maternal HIV infection

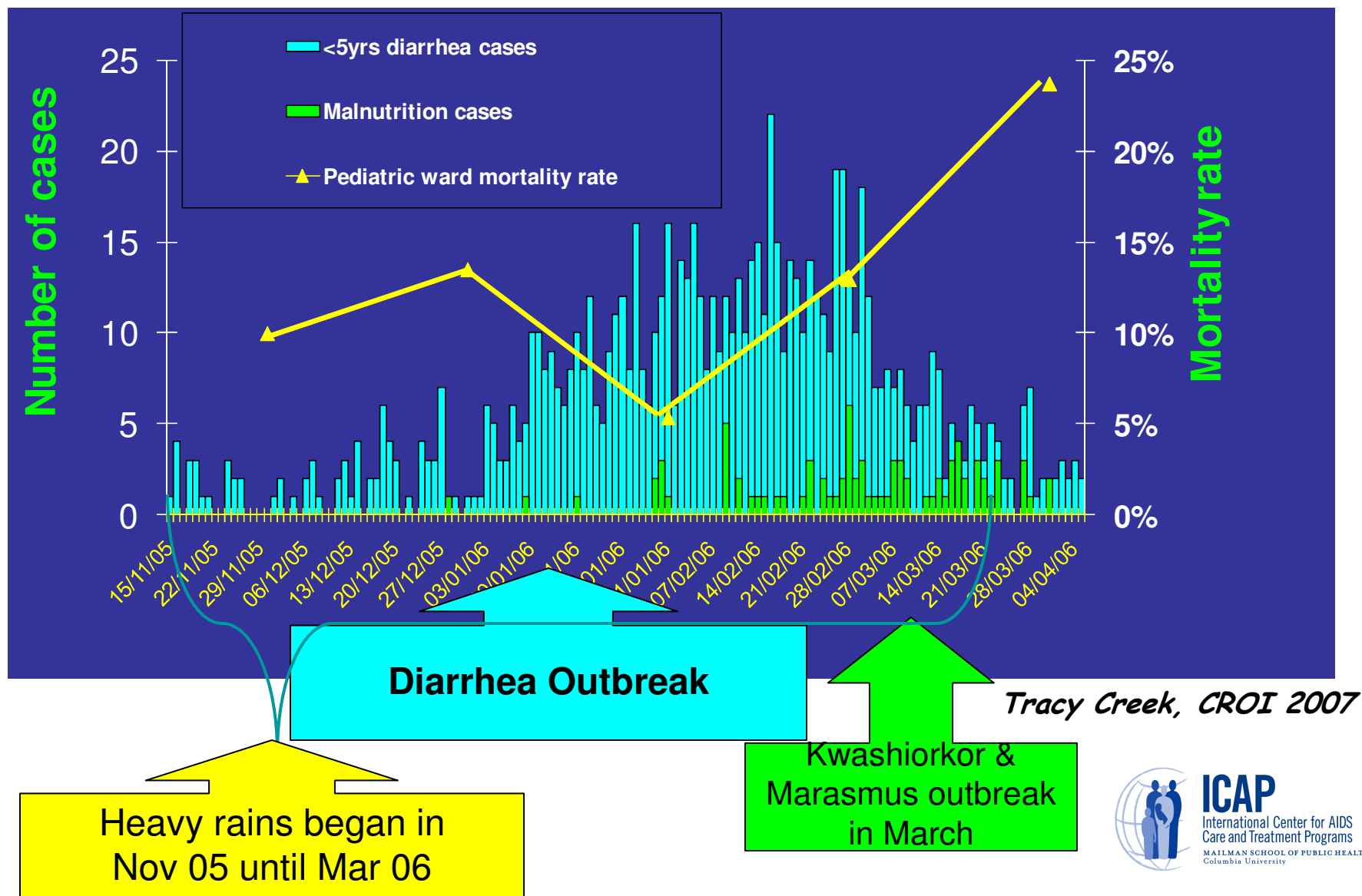
# Formula Feeding is associated with less HIV transmission but higher rates of early death in Mashi Study (Botswana)



*Thior et al, JAMA 2006*

- HIV transmission was **higher** in the breast fed (BF) group
- **Early mortality** was **higher** in the **formula fed (FF)** group
- Overall, no difference in 18 month HIV-free survival:  
HIV or death at 18 months: 14.2% in FF vs. 15.6% in BF

# Diarrhea Outbreak in Francistown, Botswana, 11/05-4/06



# CDC case study of diarrhea outbreak in Botswana, Feb-Mar 2006

N	153
Age	97% < 2 years
<b>Not breastfeeding was associated with 8.5-fold increased risk of mortality</b>	
100% infected	100%
Death	22% (33/153)



# Not breastfeeding was associated with increased risk of hospitalization & death during diarrhea outbreak in Botswana

- Not breastfeeding associated with 8.5-fold increased mortality risk
- 35% had diarrhea for >2 weeks
- 51% of the mothers reported poor growth before diarrhea illness
  - Mainly due to insufficient formula that was being provided

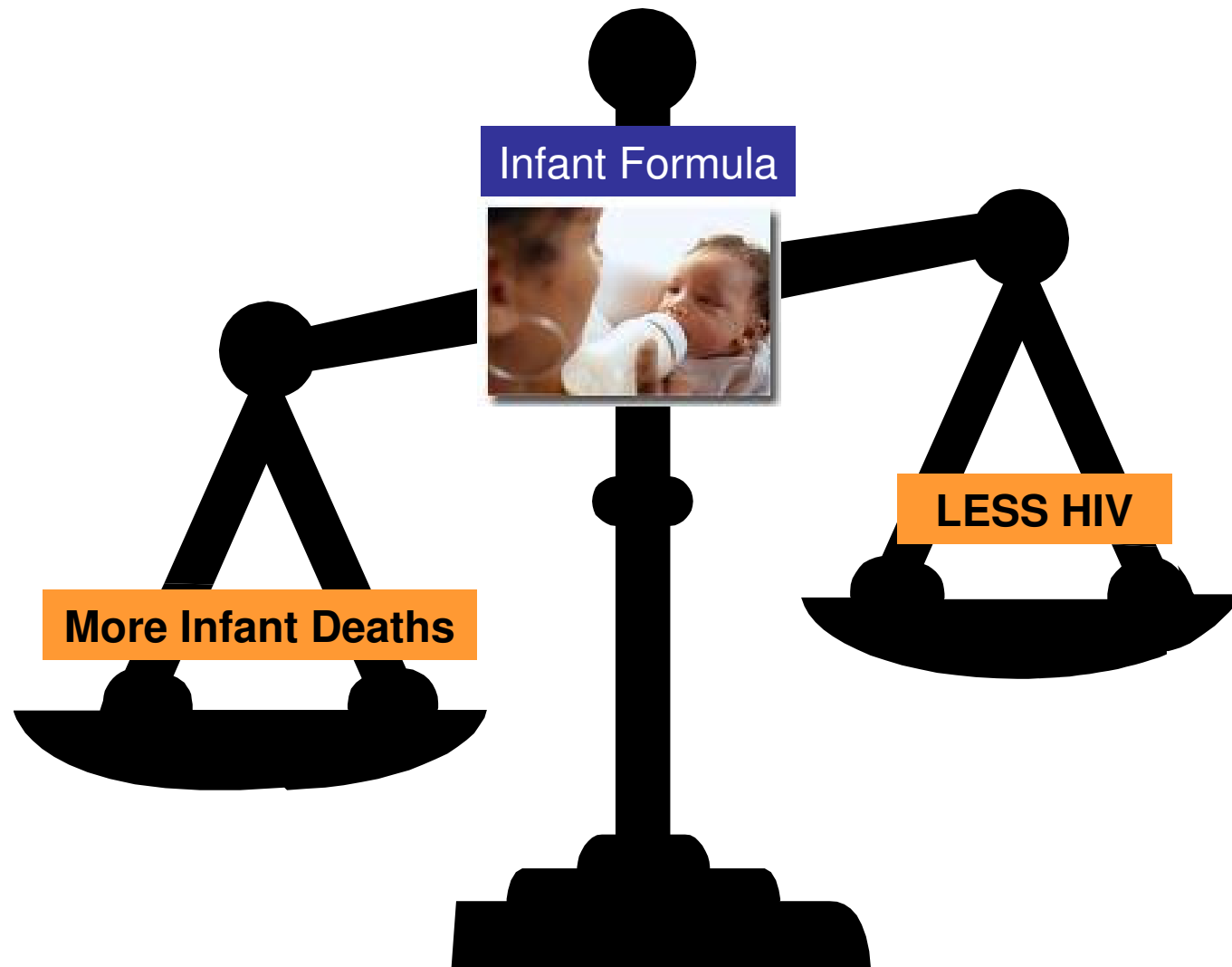
While several demonstration projects have shown that infant formula can be safely used in some settings, the risk of illness and death to the baby can be very high when formula is used, especially in areas with poor sanitation and hygiene.



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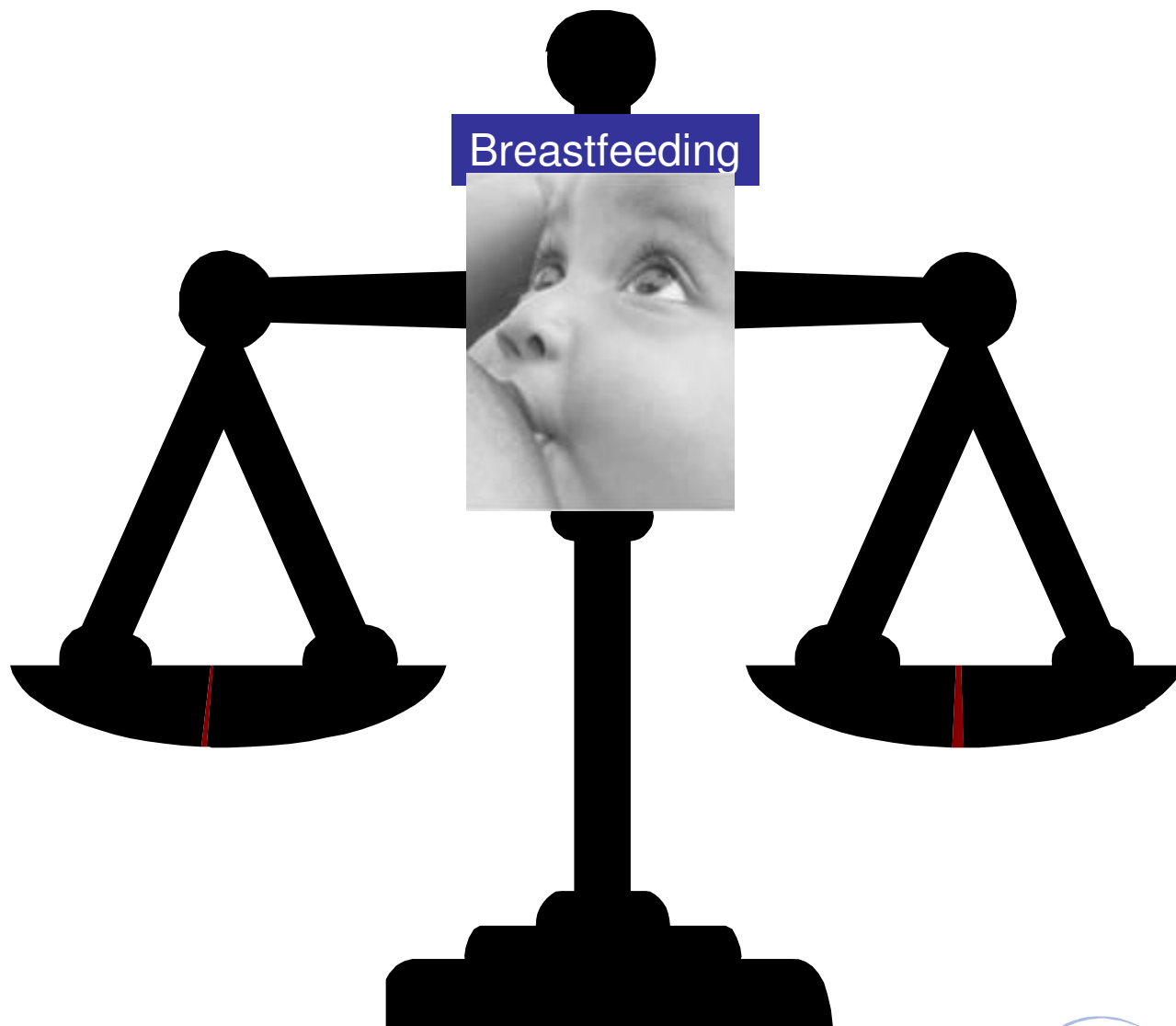


# Approaches that have been evaluated and/or considered to decrease the risk of MTCT associated with breastfeeding

- Complete avoidance of breastfeeding

## **X Shorten duration of breastfeeding**

- Exclusive breastfeeding
- Antiretroviral therapy for the mother and/or child
- Improve breast feeding practices
- Preventing acquisition of maternal HIV infection

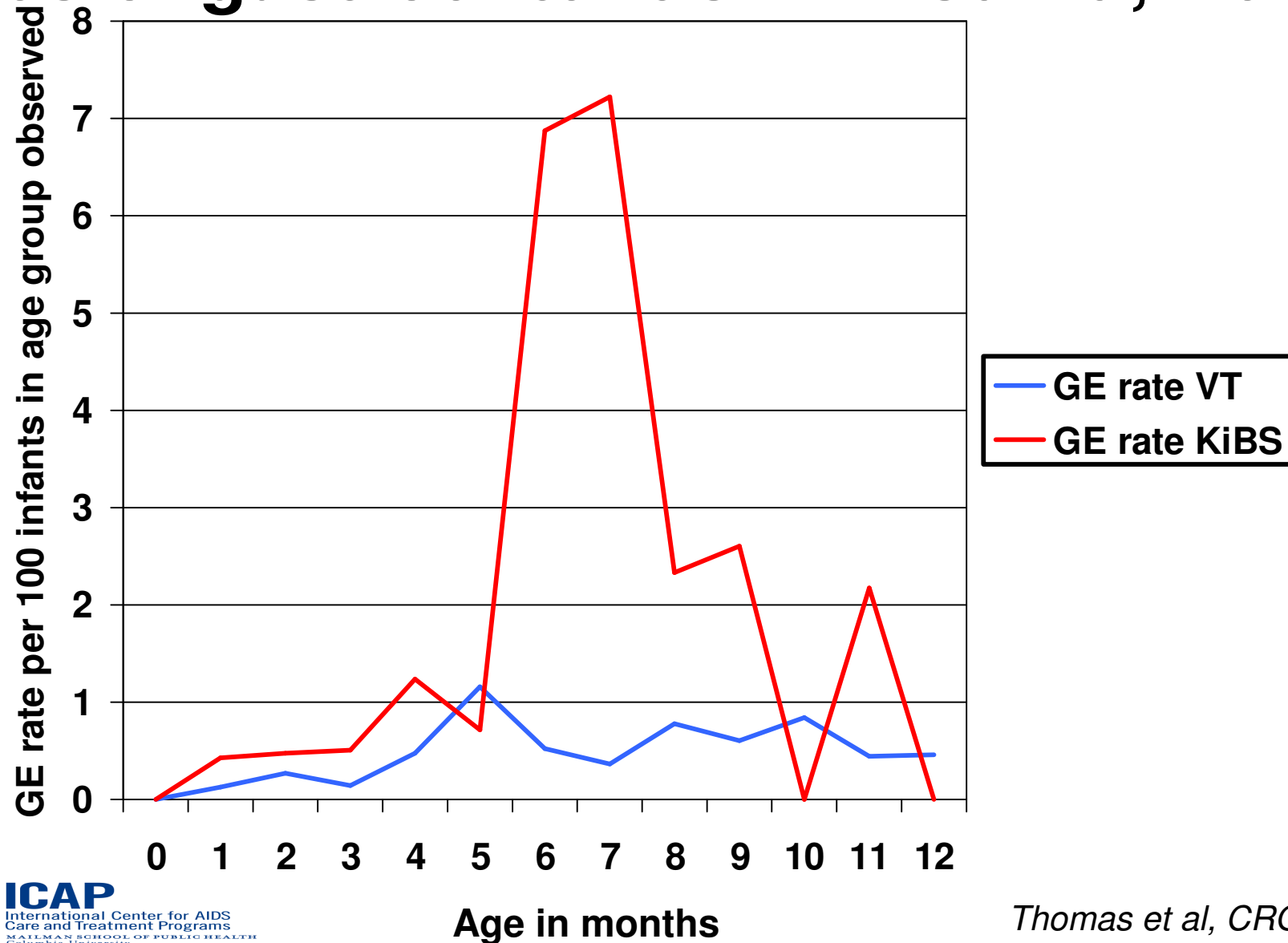


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## 2. What about shortening the duration of breastfeeding?

- Early weaning has been considered a potential means of reducing MTCT while providing some of the benefits of breastfeeding
  - **Is early weaning safe?**
  - **Does early weaning improve HIV-free survival?**

# Early weaning was associated with high rates of gastroenteritis in Kisumu, Kenya



# Early Weaning: No Advantage in HIV-free Survival



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## The Zambian Exclusive Breastfeeding Study (ZEBS)

The study intended to measure whether weaning early would improve HIV-free survival: lower rate of death and lower rate of new HIV infections

### Randomized Clinical Trial

#### GROUP A

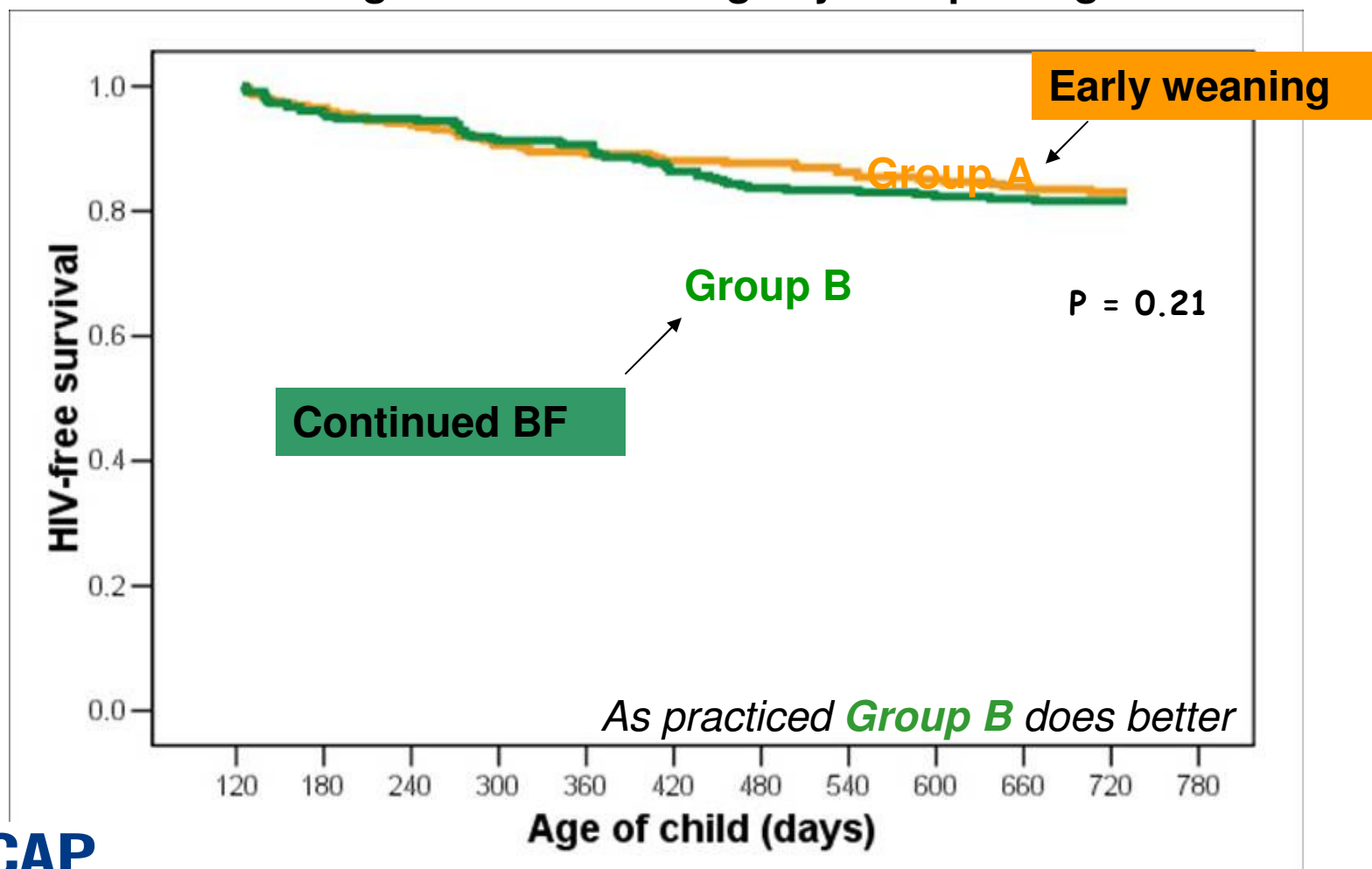
- EBF until 4 months
- Abrupt cessation of BF
- Introduce complementary foods and formula at 4mos

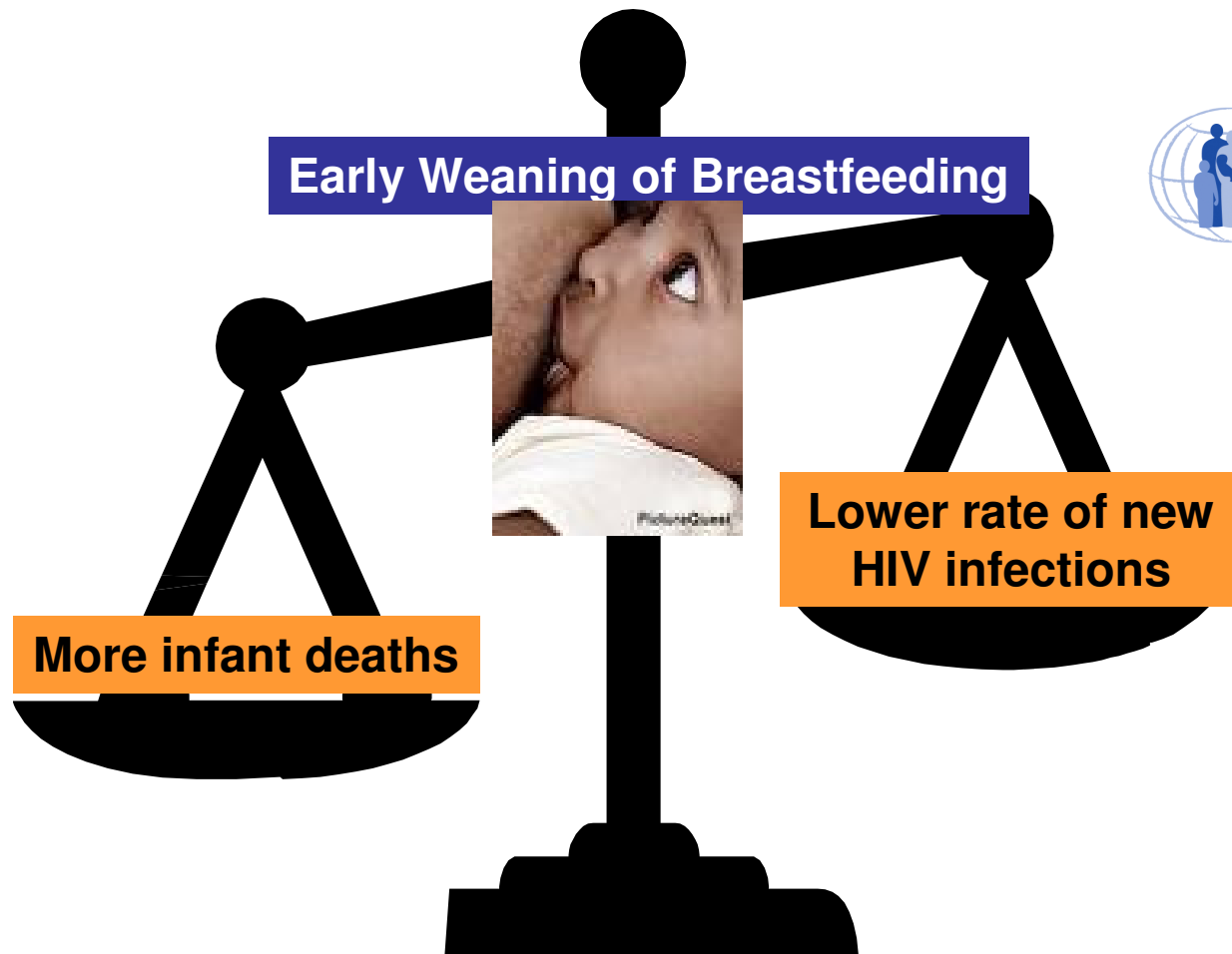
#### Group B

- EBF for  $\geq 4$  months
- “Weaning as usual”  
[prolonged BF (~16mos)]

# There is No Overall Benefit to Early Weaning Compared with Continued Breastfeeding

Overall HIV-free Survival among Children without HIV & still Breastfeeding at 4 Months of Age by Group Assignment





In the ZEBS study

- Early weaning was associated with a **lower** rate of new HIV infections but
- Early weaning was also associated with **higher** rate of death
- So there appears to be NO advantage to early weaning

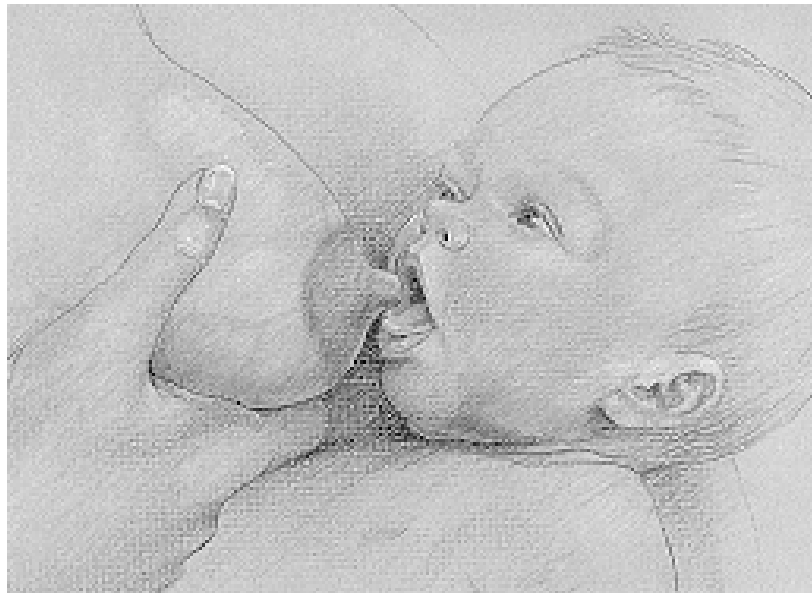
# Approaches that have been evaluated and/or considered to decrease the risk of MTCT associated with breastfeeding

- Complete avoidance of breastfeeding
- Shorten duration of breastfeeding
- ✓ **Exclusive breastfeeding**
- Antiretroviral therapy for the mother and/or infant
- Improve breastfeeding practices
- Preventing acquisition of maternal HIV infection

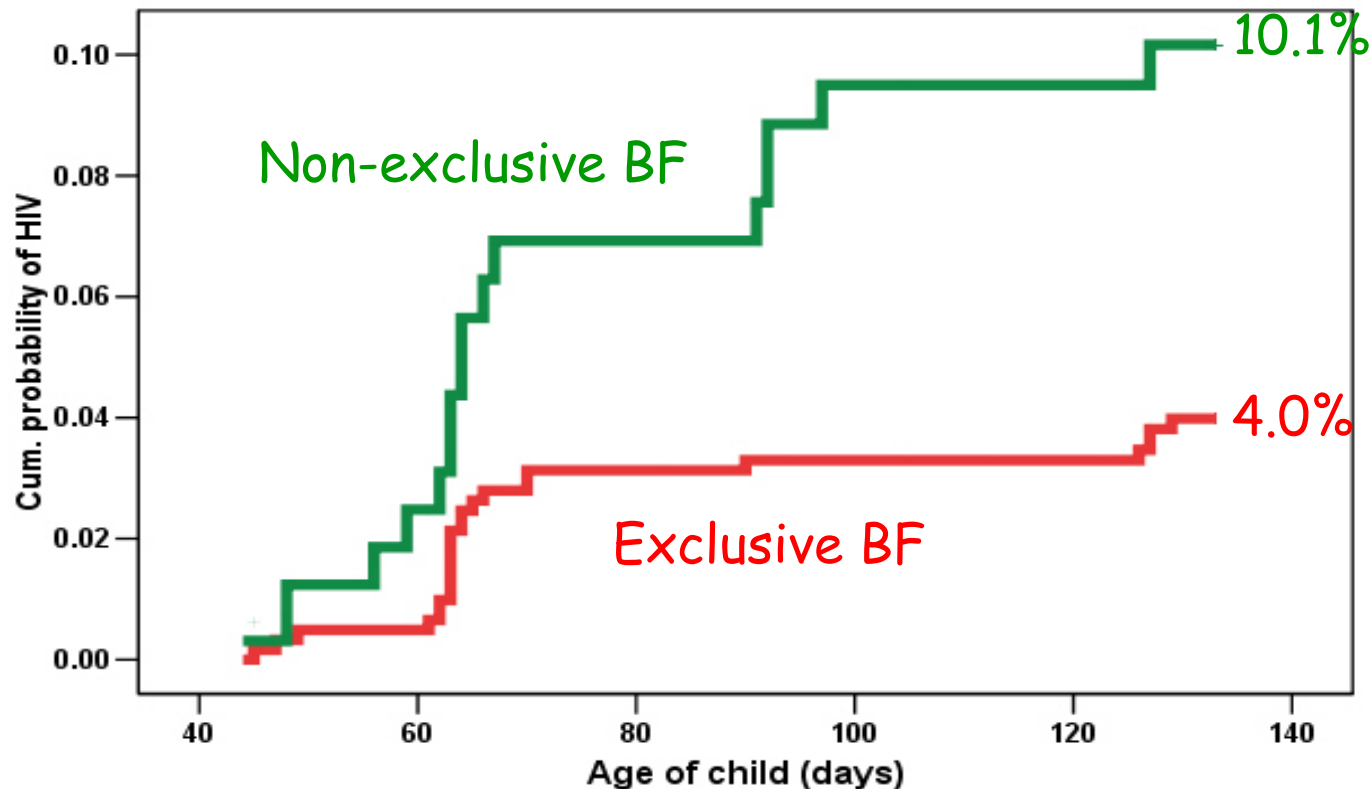


### 3. What about Exclusive Breastfeeding?

- Several studies have now demonstrated that babies who exclusively breastfeed are at lower risk of acquiring HIV infection compared with infants who mix feed.



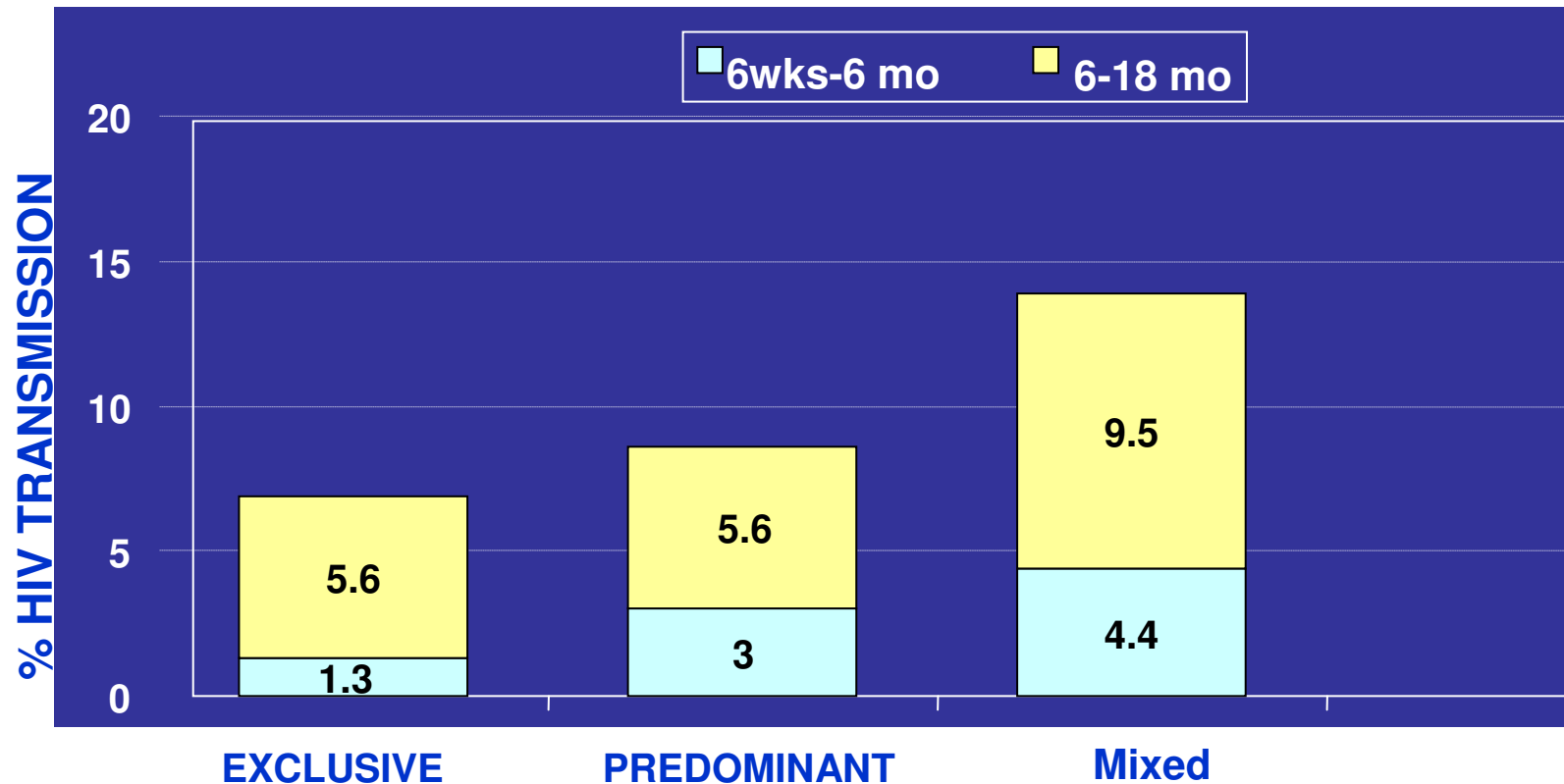
# Exclusive Breastfeeding is associated with Decreased Early Postnatal Transmission



*Only including postnatal transmission rates*

*Sinkala et al, CROI 2007*

# The Risk of Postnatal HIV Transmission Is Lowest in Infants Who Exclusively Breastfeed



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*Iliff PJ et al. AIDS 2005*

# Early Introduction of Solids is Associated with a Higher Risk of HIV Transmission

Method of Feeding	HIV prevalence rates at 26 weeks
EBF (n=362)	55 (15%)
MBF (solids introduced <14 wks; n=332)	89 (27%)
'MBF (solids introduced >14 weeks; n=239)	61 (26%)

*\* This study includes cumulative transmission rates*



Overall, it appears that women who exclusively breastfeed are much less likely to transmit HIV infection to their infants

# Approaches that have been evaluated and/or considered to decrease the risk of MTCT associated with breastfeeding

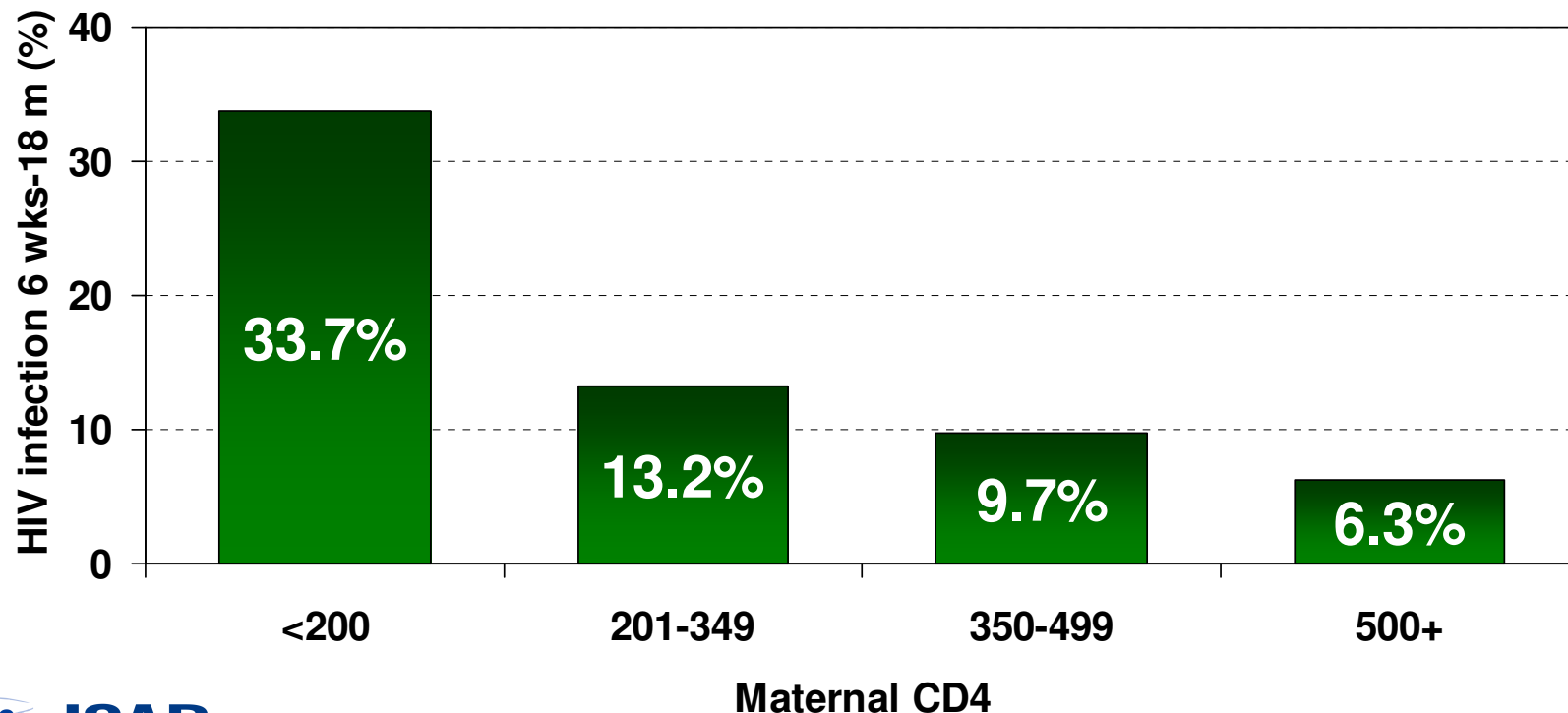
- Complete avoidance of breastfeeding
- Shorten duration of breastfeeding
- Exclusive breastfeeding
- ✓ **Antiretroviral therapy for the mother and/or child**
  - ✓ **Prioritize HAART for pregnant women & lactating women with advanced disease**
  - ? ART to woman and/or infant for PMTCT during BF**
- Improve breastfeeding practices
- Preventing acquisition of maternal HIV infection

## 4. What about keeping moms healthy to protect their babies?

- Multiple studies have demonstrated that women with advanced HIV disease are at highest risk for transmitting HIV to their babies

# Women with Advanced HIV Disease are at Higher Risk of Infecting Their Infants through Breastfeeding

Rate of Postnatal HIV Infection from Age 6 Weeks - 18 Months by Maternal Baseline CD4 Count: ZVITAMBO Study (N=2,055)

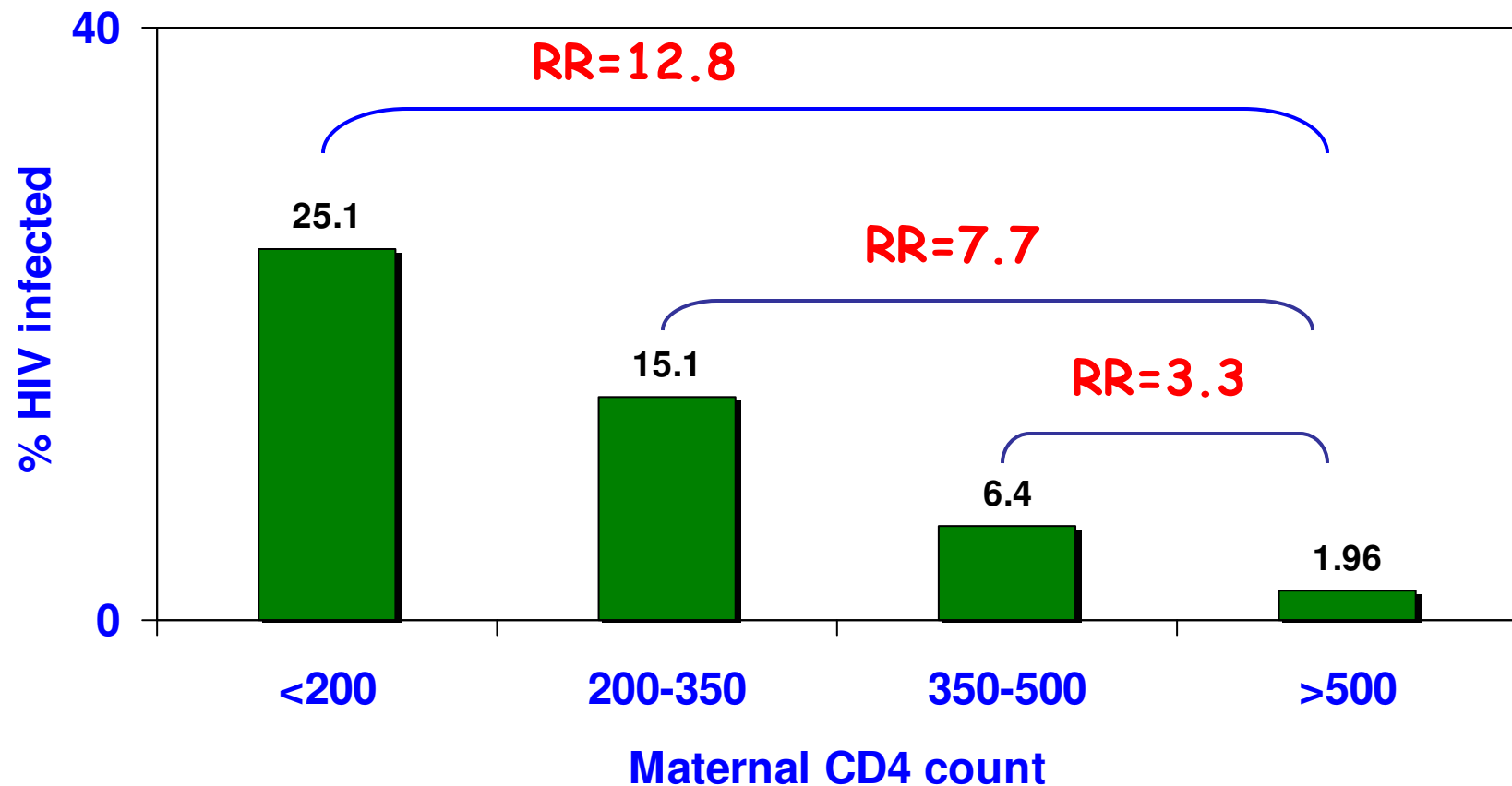


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*Illiff PJ et al. AIDS 2005*



# Postnatal HIV Transmission is Strongly Related to Maternal CD4 count, ZEBS



< 200: 45% of postnatal infections  
< 350: 83% of postnatal infections



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# Women with Advanced Maternal Disease are at Higher Risk of Infecting Their Infants

## Vertical Transmission Study [VTS]– South Africa

Estimated Transmission Rate at 6mos in **Exclusively Breastfed Infants** born to HIV infected mothers  
*(includes all routes of transmission)*

Maternal CD4 count

<200

34.1%

>200

17.0%

*Coovadia HM et al, Lancet 2007*



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# **Prioritizing Pregnant and Lactating Women for HIV Treatment to Enhance Exposed Infant HIV Free Survival**

- Women with advanced disease are at highest risk for transmitting HIV to their infants during breastfeeding.
- Treating women with advanced disease with HAART should protect their babies from acquiring the virus.
- Need to ensure that women with advanced disease are retained in HIV care
- Keep lactating women not on HAART in postnatal care services and ensure regular monitoring of HIV disease stage

# ART for Prevention of PMTCT during Breast Feeding

- Studies are currently underway evaluating the efficacy of ART for prevention of postnatal transmission
  - HAART to women who do not qualify for treatment
  - NVP to the infant during breastfeeding
  - Other drug regimens to mother and/or child for PMTCT
- No data available at the current time but anticipated in the next months to years

# 16 of these babies will become infected with HIV if mothers receive Sd-NVP as PMTCT intervention



➤ 7 of the 16 babies will become infected during pregnancy or delivery (in utero and peripartum transmission)

➤ 9 of the 16 babies will become infected through breastfeeding (postnatal transmission)

➤ 84 babies will remain uninfected



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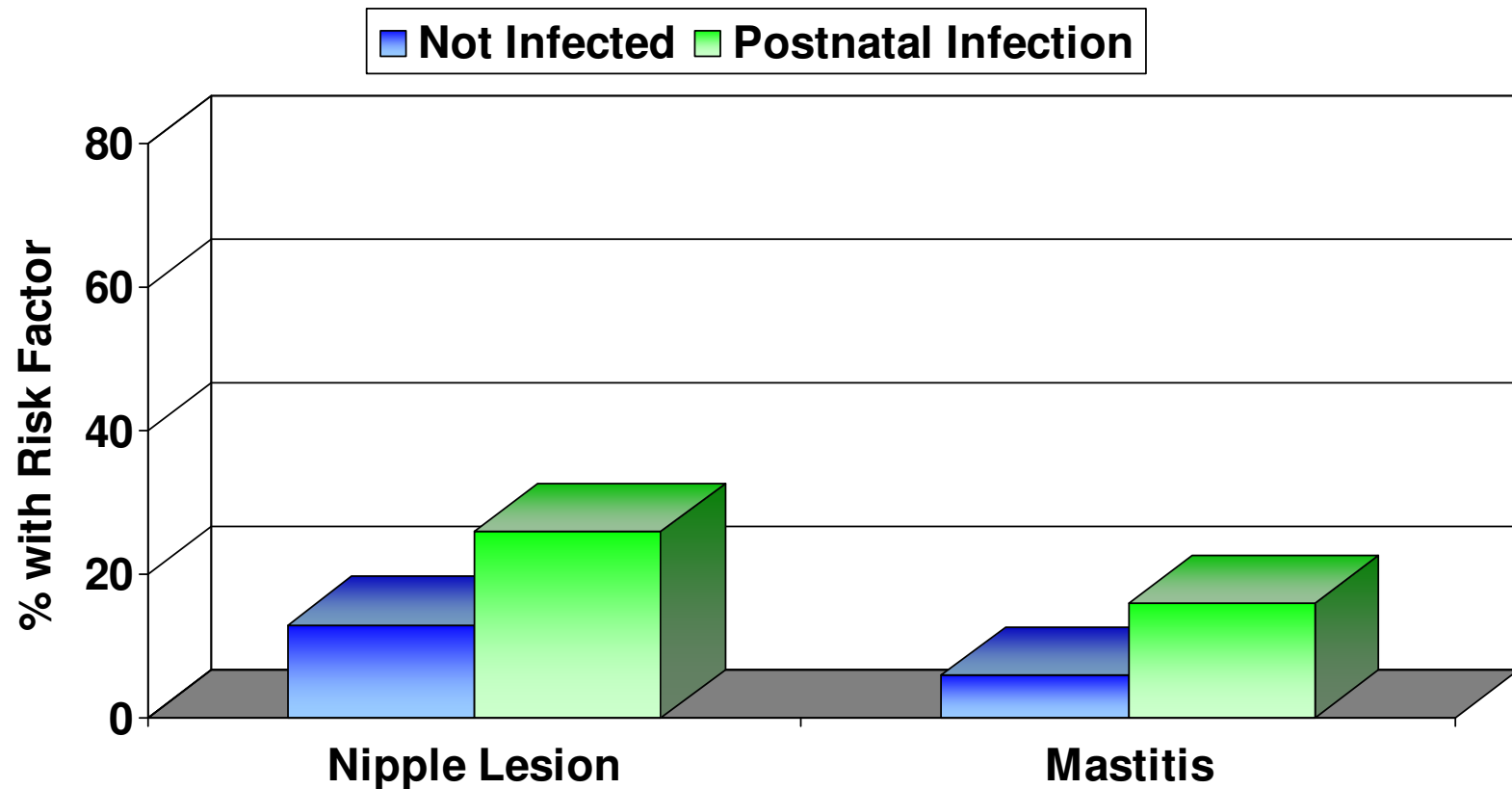
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# **Approaches that have been evaluated and/or considered to decrease the risk of MTCT associated with breastfeeding**

- Complete avoidance of breastfeeding
- Shorten duration of breastfeeding
- Exclusive breastfeeding
- Antiretroviral therapy for the mother and/or child
- ✓ **Improve breastfeeding practices**
- Preventing acquisition of maternal HIV infection

# Women with Mastitis and Nipple Lesions are at increased risk of transmitting HIV during lactation, Nairobi (N=410)



# Abrupt Weaning Increases Risk of Breast Health Problems and Reduces Duration of Amenorrhea - (ZEBS)

	1: HIV+, stopped BF (n=93)	2: HIV+, still BF (n=129)	3: HIV-ve, still BF (n=24)
Breast engorgement	8.1%	0.8%	4.2%
Reported fever	21.8%	7.0%	8.3%
Mastitis	11.5%	0.8%	0
Amenorrheic @ 6 mo PP	43.3%	83.0%	79.2%



# Viral Load in Breast milk Increases After Early Rapid Cessation of Breastfeeding

	<b><u>A</u>: Stopped BF</b>	<b><u>B</u>: Still BF</b>
Detectable HIV RNA	21 of 31 (67.7%)	17 of 40 (42.5%)
2 Weeks PRE WEANING - Median RNA concentrations (cop/mL) - BM Viral Load HIV RNA >1000 cop/mL	353 17.2%	
2 Weeks POST WEANING - Median RNA concentrations (cop/mL) - BM Viral load HIV RNA > 1000 cop/mL	7930 45.2%*	904 12.5%

*\*Median increase of 15,822 copies/mL*

*No increase in BM viral occurred in women who continued to BF*

# **Abrupt Weaning may be particularly problematic**

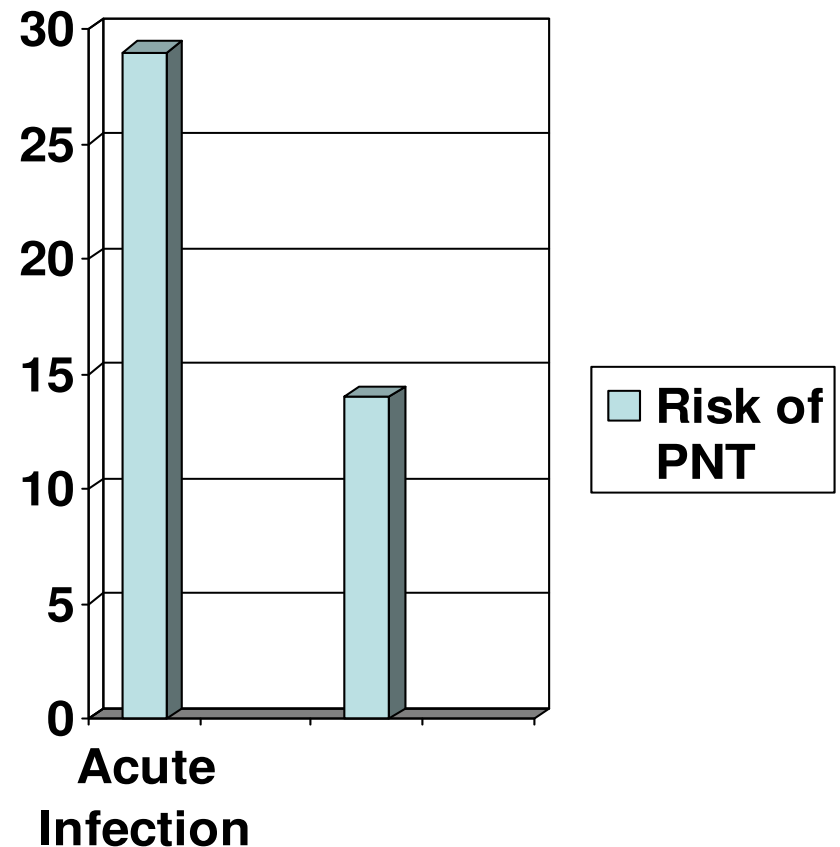
- Breast milk viral load increases when a woman weans abruptly
- If a woman tries to wean abruptly and then puts the baby to the breast, re-establishing breastfeeding at a later time point (when the baby is crying for example) the breast milk may contain high levels of virus and increase the risk of the baby getting HIV.
- So, abrupt weaning is not recommended

# **Approaches that have been evaluated and/or considered to decrease the risk of MTCT associated with breastfeeding**

- Complete avoidance of breastfeeding
- Shorten duration of breastfeeding
- Exclusive breastfeeding
- Antiretroviral therapy for the mother and/or child
- Improve breastfeeding practices
- ✓ **Preventing acquisition of maternal HIV infection**

# Seroconversion during breastfeeding increases postnatal transmission

- In a meta analysis of 4 studies from Zambia, Rwanda, Zaire and Australia, the risk of breast milk transmission from a mother who became infected during pregnancy was 29% compared to 14% in women with chronic infection.



*Dunn DT et al, Lancet 1992*

# Women with Advanced Maternal Disease are at Higher Risk of Infecting Their Infants

## Vertical Transmission Study [VTS]– South Africa

Estimated Transmission Rate at 6mos in **Exclusively Breastfed Infants** born to HIV infected mothers  
*(includes all routes of transmission)*

Maternal CD4 count

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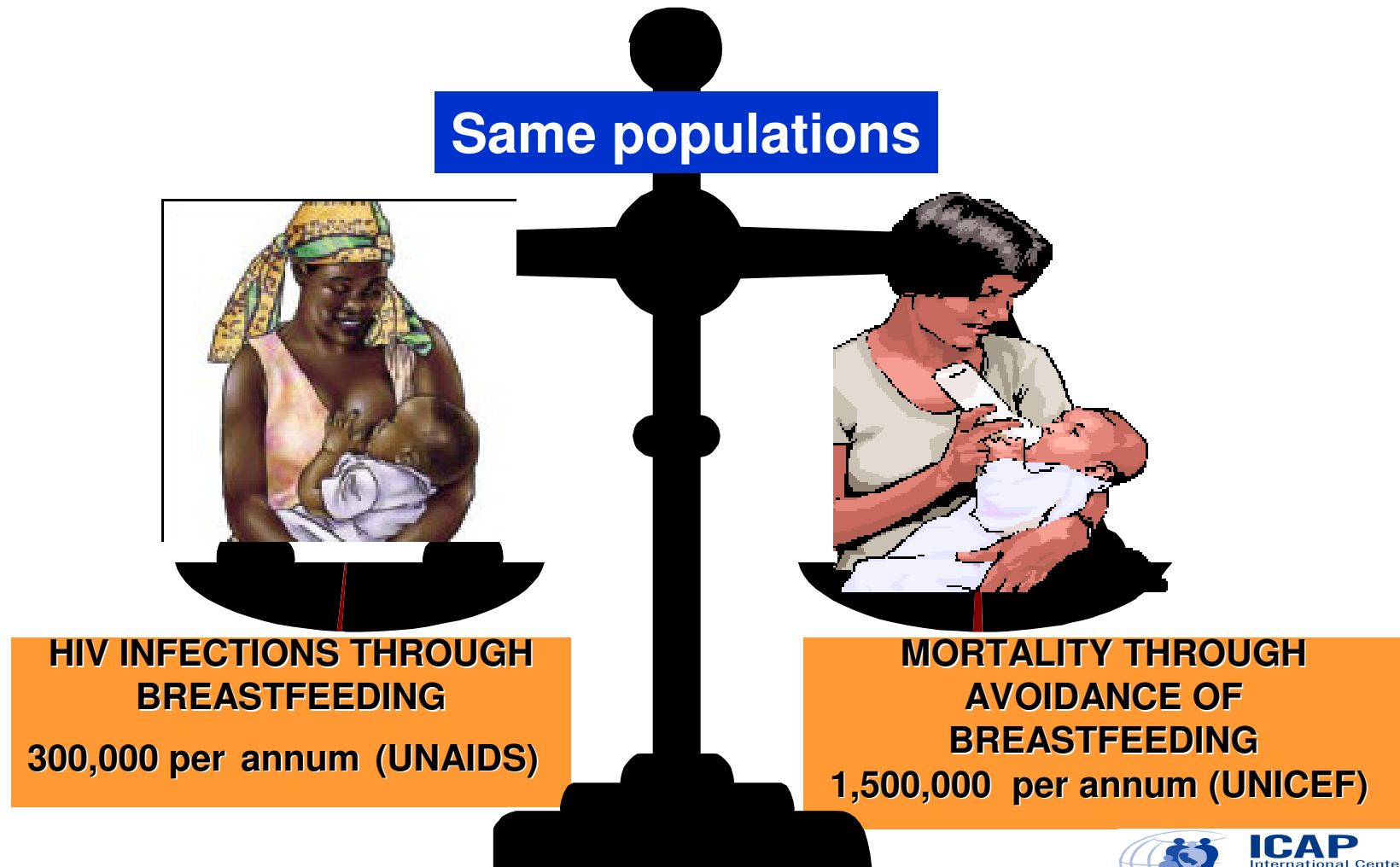
17.0%

*Coovadia HM et al, Lancet 2007*



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# How can we safely feed infants and at the same time reduce postnatal transmission of HIV infection?



# Conclusions

- ❖ Based on the data and studies presented:
  - ✓ HIV+ mothers who breastfeed should do so exclusively ([\*the old message\*](#)).
  - ✓ In particular, mothers should avoid early introduction of solid foods and non-human milks ([\*a new message\*](#)).
  - ✓ Early weaning had no effect on HIV-free survival ([\*a new message\*](#)).
  - ✓ Postnatal HIV transmission is extremely high in mothers who have low CD4. ([\*an old message\*](#))
    - ✓ Need to incorporate CD4 screening into PMTCT services which could help identify women at high risk of HIV transmission ([\*a new strategy\*](#))

# How can we decrease postnatal transmission?



**S**creen mothers for treatment eligibility

- **T**reat sick mothers
  - Treat pregnant and lactating HIV-infected women with low CD4 and advanced disease



- **A**ctively support Exclusive Breastfeeding for as long as possible until 6 months
  - Avoid mixed feeding
  - Avoid early weaning
  - Avoid abrupt weaning



- **C**omplementary feeding should be initiated after 6 months and breastfeeding should continue until 12-18 months.
- **K**eep mothers and infants engaged in care





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