The Milky Way
Key Infant Feeding Terms

- **Exclusive breastfeeding:** the infant is given only breast milk and no other liquids or foods, not even water.

- **Mixed feeding:** feeding an infant breast milk along with other liquids and/or solid foods during the **first six** months of life.

- **Replacement feeding:** the infant who is receiving no breast milk is given a diet that provides all the nutrients the infant needs until the age at which he/she can be fully fed with family foods. During the first 6 months of life, replacement feeding should be with a suitable breast-milk substitute such as commercial infant formula. After 6 months, the suitable breast-milk substitute should be complemented with other foods.

- **Complementary feeding:** the infant or child receives both breast milk, or a breast-milk substitute, and solid or semi-solid food.
Black Lancet 2003

South Africa in Group 5 – 10% death caused by HIV and <10% by Malaria
Profile 5

0.3 million deaths (3%)

- Diarrhoea
- Malaria
- AIDS
- Other
66% of child deaths could be prevented

<table>
<thead>
<tr>
<th>Preventive Interventions</th>
<th>Number of deaths (×10³)</th>
<th>Proportion of all deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breastfeeding</td>
<td>1301</td>
<td>13%</td>
</tr>
<tr>
<td>Insecticide-treated materials</td>
<td>691</td>
<td>7%</td>
</tr>
<tr>
<td>Complementary feeding</td>
<td>587</td>
<td>6%</td>
</tr>
<tr>
<td>Zinc</td>
<td>459 (351)*</td>
<td>5% (4%)*</td>
</tr>
<tr>
<td>Clean delivery</td>
<td>411</td>
<td>4%</td>
</tr>
<tr>
<td>Hib vaccine</td>
<td>403</td>
<td>4%</td>
</tr>
<tr>
<td>Water, sanitation, hygiene</td>
<td>326</td>
<td>3%</td>
</tr>
<tr>
<td>Antenatal steroids</td>
<td>264</td>
<td>3%</td>
</tr>
<tr>
<td>Newborn temperature management</td>
<td>227 (0)*</td>
<td>2% (0%)*</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>225 (176)*</td>
<td>2% (2%)*</td>
</tr>
<tr>
<td>Tetanus toxoid</td>
<td>161</td>
<td>2%</td>
</tr>
<tr>
<td>Nevirapine and replacement feeding</td>
<td>150</td>
<td>2%</td>
</tr>
<tr>
<td>Antibiotics for premature rupture of membranes</td>
<td>133 (0)*</td>
<td>1% (0%)*</td>
</tr>
<tr>
<td>Measles vaccine</td>
<td>103</td>
<td>1%</td>
</tr>
<tr>
<td>Antimalarial intermittent preventive treatment in pregnancy</td>
<td>22</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Treatment Interventions</th>
<th>Number of deaths (×10³)</th>
<th>Proportion of all deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral rehydration therapy</td>
<td>1477</td>
<td>15%</td>
</tr>
<tr>
<td>Antibiotics for sepsis</td>
<td>583</td>
<td>6%</td>
</tr>
<tr>
<td>Antibiotics for pneumonia</td>
<td>577</td>
<td>6%</td>
</tr>
<tr>
<td>Antimalarials</td>
<td>467</td>
<td>5%</td>
</tr>
<tr>
<td>Zinc</td>
<td>394</td>
<td>4%</td>
</tr>
<tr>
<td>Newborn resuscitation</td>
<td>359 (0)*</td>
<td>4% (0%)*</td>
</tr>
<tr>
<td>Antibiotics for dysentery</td>
<td>310</td>
<td>3%</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>8</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

Jones Lancet 2003
1991 – BFHI – 10 Steps

1. Written breastfeeding policy regularly communicated to staff
2. Staff trained to implement this policy
3. Pregnant women informed that “Breast is best”
4. Mothers should breast feed within 30 minutes after delivery
5. Show mothers how to breast feed even when separated from the infant
6. Provide no other infant feed
7. Practice “rooming in”
8. Breast feeding on demand
9. No artificial teats
10. Breast feeding support groups
In General in SA

- Majority of women breastfeed their infants (>80% initiate BF)
- Exclusive breastfeeding is not very common
  - Only 25.7% of women report EBF in the first 6 months
  - 51% women report mixed feeding in the first 6 months

POSTNATAL TRANSMISSION OF AIDS-ASSOCIATED RETROVIRUS FROM MOTHER TO INFANT

JOHN B. ZIEGLER
RICHARD O. JOHNSON
for the Sydney AIDS Study Group*

DAVID A. COOPER
JULIAN GOLD

Prince of Wales Children’s and St Vincent’s Hospitals, Centre for Immunology, University of NSW; and Albion Street Centre, Sydney Hospital, Sydney NSW Australia
Timing of MTCT of HIV

36 Weeks
Breast feeding:

0-36 Weeks

Labor Delivery

Risk depending on strategy

12%

29% breast

1 2%

20%

39% if up to 2 yrs of feeding

Kourtis et al Lancet ID 2006
Timing of Mother to Child Transmission of HIV

100 INFANTS BORN TO HIV POSITIVE WOMEN WHO BREASTFEED, WITHOUT ANY INTERVENTION

5-10 INFANTS INFECTED IN UTERO

10-15 INFANTS INFECTED DURING LABOUR DELIVERY

5-20 INFANTS INFECTED DURING BREASTFEEDING

55-80 INFANTS WILL NOT BE HIV INFECTED

20-45 INFANTS INFECTED IN PREGNANCY, during Labour & Delivery AND through BREASTFEEDING
HIV in Breast milk

- HIV-1 in breast milk originate as:
  - Blood cell–free virus released into breast milk
  - Produced by local replication in macrophages and in ductal and alveolar mammary epithelial cells

- It is detected in both
  - Cellular compartment of breast milk
  - Cell-free milk (viral load usually +/- 2 logs lower than plasma)

- Detection is associated with:
  - Lower maternal CD4
  - Lower maternal Vit A
  - Mastitis
  - Infrequent emptying
  - Sooner after birth
Cell-associated virus—a stronger predictor for transmission than cell-free virus.

**Cell free virus**
- 2-fold increase in risk for every 10-fold increase in cell-free HIV-1 RNA and

**Cell-associated virus**
- a 3-fold increase in risk for every 10-fold increase in infected cells
Role of HIV antibodies in breast milk

The role of neutralizing antibodies in breast milk in postnatal transmission is not fully understood

- Predominantly IgG
- Specificity of IgG and IgA antibodies in breast milk can differ from that of the antibodies in the plasma
- Lower likelihood of postnatal transmission has been associated with specific secretory IgA and IgM
Cellular immune components and breast milk

• Lymphocytes have an activated phenotype and express chemokine receptors and mucosal homing markers. Specific cytotoxic T-lymphocyte responses may protect from transmission.

• Macrophages express receptors for HIV which may play a role in transmission.
A role for genetics?

- Particular HLA alleles are associated with protection: - HLA B18
- Maternal HLA homozygosity and mother-child HLA concordance may increase the risk of transmission through breastfeeding
1998 – UN Infant Feeding Guidelines

• Acknowledged the substantial risk of HIV transmission through breastfeeding

• “when children born to women living with HIV can be ensured an uninterrupted access to nutritionally adequate breast milk substitutes that are safely prepared and fed to them, they are at less risk of illness and death if they are not breastfed.”

• AFASS
1992-98 Breast vs Formula
Nairobi, Kenya

- Mothers randomized to breast or formula arms

- Formula provided free of charge and was accompanied by extensive counseling on safe formula feeding practices with follow-up

- Study stopped early by DSMB who recommended to advise all mothers that were still breastfeeding to stop and formula feed instead.

- Final results – 12% increased risk of HIV-infection or death at 24 months in breastfed compared to formula fed infants.

- To Consider – exclusive breastfeeding rate was only 9% at 6 months; infectious morbidity and malnutrition not measured

Mbori-Ngacha JAMA 2001
1999 –Exclusive Breastfeeding Study

- Transmission rates are dependent upon feeding practices
- The risk of transmission with exclusive breastfeeding half that of transmission via mixed feeding

Coutsoudis Lancet 1999
Avoidance of breastfeeding if AFASS situation exists
Specific guidance should be given to mothers who replacement feed
Not AFASS – exclusive breastfeeding in first months of life (duration not stipulated)
In practice – interpreted as breastfeeding, if chosen, should cease by 6 months
In practice - feeding policy was not always accompanied by effective nutritional counseling
2000 – 2009 Data emerging on:

• Specific mixed feeding risk
• Duration of breastfeeding as it relates to transmission risk
• Weaning practice
• Morbidity and mortality in HIV uninfected formula fed infants
• Strategies to increase the safety of breast feeding
Duration of feeding determine risk

<table>
<thead>
<tr>
<th></th>
<th>South Africa</th>
<th>West Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>BF @ 6 months</td>
<td>83%</td>
<td>38%</td>
</tr>
<tr>
<td>BF @ 12 months</td>
<td>38%</td>
<td>20%</td>
</tr>
<tr>
<td>Transmission at 18 months</td>
<td>9%</td>
<td>5%</td>
</tr>
</tbody>
</table>

BF <6 months: 3.9% (CI 2.3-6.5%)
BF >6 months: 8.7% (CI 6.8-11%)
Longer duration associated with 2.1-fold (CI 1.2-3.7) increased hazard

Becquet R CROI 2008
## Feeding practice influence transmission risk

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Duration</th>
<th>Prophylaxis</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exclusive Breast</td>
<td>6 wks – 6 months</td>
<td>None</td>
<td>4%</td>
</tr>
<tr>
<td>Mixed Breast / Formula</td>
<td>6 wks – 6 months</td>
<td>None</td>
<td>8%</td>
</tr>
<tr>
<td>Mixed Breast / solid foods</td>
<td>6 wks – 6 months</td>
<td>None</td>
<td>UP TO 40%</td>
</tr>
</tbody>
</table>

Children exposed at least once to solids in first 2 months of life were 2.9-fold (CI 1.1-8.0) time more likely to be infected postnatally (p=0.04).

VTS Study – Coovadia et al, Lancet 2007
BAN Study – Chasela et al, NEJM 362;24 2010
MAshi study – Thior et all, JAMA Vol 296 No 7 2006
Mma Bana study – Shapiro et al, NEJM 362;24 2010
Becquet R CROI 2008
Weaning practice influence risk

- Increase inflammation
- Increased viral load

**Fig. 2.** Breast milk HIV viral load among pumped breast milk from 31 women who recently weaned compared with breast milk from 40 lactating women of the same postnatal age.
Several studies show the increase morbidity and mortality associated with early weaning and formula feeding.

NOT BREAST FEEDING 8x INCREASED RISK OF MORTALITY

Creek CROI 2007
Mashi

Infant mortality at 7 months:

• 9.3% vs 4.9%; P = 0.003
• Difference at age 18 months were not significantly P = .2
• Both strategies had comparable HIV-free survival at 18 months.

Thoir JAMA 2006
Safer breast feeding

- Maternal HAART
- Prolonged infant prevention
## PEPI-Malawi

### Intra-partum*

<table>
<thead>
<tr>
<th>Control</th>
<th>Extended NVP</th>
<th>Extended NVP + AZT</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVP x1*</td>
<td>Infant NVP x1</td>
<td>NVP x1*</td>
</tr>
<tr>
<td>Infant NVP x1</td>
<td>Infant ZDV x1 wk</td>
<td>Infant NVP x1*</td>
</tr>
</tbody>
</table>

### Post-partum

- **Birth**
  - Infant NVP x1
  - Infant ZDV x1 wk
- **1 - 7 d**
  - Infant: NVP x 14 wks
- **8 - 98 d**
  - Infant: NVP + ZDV x 14 wks

---

*If mothers diagnosed in time for intra-partum prophylaxis

**Mothers counseled to exclusively breastfeed and wean by 6 months**

Taha JID 2009
Probability of HIV-1 Infection in Infants Uninfected at Birth by Treatment Arm: PEPI-Malawi

<table>
<thead>
<tr>
<th>Age</th>
<th>1 W</th>
<th>6 W</th>
<th>9 W</th>
<th>14 W</th>
<th>6 M</th>
<th>9 M</th>
<th>12 M</th>
<th>15 M</th>
<th>18 M</th>
<th>24 M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0.3</td>
<td>5.1</td>
<td>7.4</td>
<td>8.4</td>
<td>10.1</td>
<td>10.6</td>
<td>11.5</td>
<td>12.4</td>
<td>13.9</td>
<td>14.5</td>
</tr>
<tr>
<td>Extended NVP</td>
<td>0.1</td>
<td>1.7</td>
<td>2.6</td>
<td>2.8</td>
<td>4.0</td>
<td>5.2</td>
<td>7.0</td>
<td>7.8</td>
<td>10.1</td>
<td>11.2</td>
</tr>
<tr>
<td>Extended NVP+ZDV</td>
<td>0.2</td>
<td>1.6</td>
<td>2.4</td>
<td>2.8</td>
<td>5.2</td>
<td>6.4</td>
<td>8.1</td>
<td>8.7</td>
<td>10.2</td>
<td>12.3</td>
</tr>
</tbody>
</table>

Control, Extended NVP, Extended NVP+ZDV
Maternal or Infant Antiretroviral Drugs to Reduce HIV-1 Transmission

- P-0.02 Maternal ART
- P<0.001 Infant ART

Chasela NEJM 2010
## Breastfeeding Risk of HIV with interventions

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Duration</th>
<th>Prophylaxis</th>
<th>Risk</th>
</tr>
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<tbody>
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<td>UP TO 40%</td>
</tr>
<tr>
<td>Exclusive Breast</td>
<td>6 wks – 6 months</td>
<td>NVP</td>
<td>2.6%</td>
</tr>
<tr>
<td>Exclusive Breast</td>
<td>6 wks – 6 months</td>
<td>Mother ART</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

VTS Study – Coovadia et al, Lancet 2007
BAN Study – Chasela et al, NEJM 362;24 2010
MASHI study – Thior et al, JAMA Vol 296 No 7 2006
Mma Bana study – Shapiro et al, NEJM 362;24 2010
<table>
<thead>
<tr>
<th>Drug</th>
<th>Birth Weight</th>
<th>Dose</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVP syrup (10mg/ml)</td>
<td>Birth to 6 weeks, ≤2.5kg birth weight</td>
<td>10mg/d</td>
<td>1ml</td>
</tr>
<tr>
<td></td>
<td>Birth to 6 weeks, ≥2.5kg birth weight</td>
<td>15mg/d</td>
<td>1.5ml</td>
</tr>
<tr>
<td></td>
<td>For all: 6 weeks to 6 months</td>
<td>20mg/d</td>
<td>2ml</td>
</tr>
<tr>
<td></td>
<td>6 months to 9 months</td>
<td>30mg/d</td>
<td>3ml</td>
</tr>
<tr>
<td></td>
<td>9 months to end BF</td>
<td>40mg/d</td>
<td>4ml</td>
</tr>
</tbody>
</table>
EDITORIAL COMMENT

Resistance, resistance, go away: persistence of nevirapine-resistant HIV mutations in HIV-infected infants

Elijah Paintsil

K103N and/or Y181C

- 82/108 (75.9%) @ 14 weeks
- 38/46 (82.6%) @ 6 months
- 19/26 (73%) @ 12 months

Fogel AIDS 2011
Conditions Needed To Safely Formula Feed

• Safe drinking water & sanitation assured
• Mother & family able to reliably provide sufficient formula milk (cost)
• Can be prepared cleanly and of sufficient frequency
• Can provide formula exclusively for first 6mo of infant’s life
• Family is supportive
• Can access health services that provide comprehensive child health services
2010 WHO Recommendations

- HIV infected mothers should:
  - Exclusively breastfeed 6 months
  - Introducing complementary foods 6-12 months
  - Breastfeed for the first 12 months
  - Breastfeeding should only stop after 12 months AND once a nutritionally adequate and safe diet without breast milk can be provided.

- Breastfeeding should stop gradually within one month.

- Infants receiving ARV prophylaxis should continue prophylaxis for one week

- HIV Infected infants should exclusively breastfeed for the first 6 months of life and continue up to two years or beyond.
Box 1. **Infant feeding recommendations in the 2010 South African clinical guidelines on prevention of mother-to-child HIV transmission**

**For all mothers:**
- Counselling on infant feeding must commence after the first post-test counselling session in pregnancy.
- Infant feeding should be discussed with women at every antenatal visit.
- Mixed feeding during the first 6 months of life should be strongly discouraged as it increases the risk of childhood infections.
- Provide nutritional support for ALL breastfeeding HIV-positive mothers and for formula-feeding mothers with food insecurity.

**Breastfeeding HIV-positive women:**
- All mothers who are known to be HIV-infected either on lifelong ART or not, who exclusively breastfeed their infants should do so for 6 months, introduce appropriate complementary foods thereafter and continue breastfeeding for the first 12 months of life.
- Trained health-care personnel should provide high quality, unambiguous and unbiased information about risks of HIV transmission through breastfeeding, ART prophylaxis to reduce this risk, and risks of replacement feeding.
- Mothers who are known to be HIV-infected, and not on lifelong ART, who decide to stop breastfeeding at any time should do so gradually during one month while the baby continues to receive daily NVP and should continue for one week after all breastfeeding has stopped.

**Formula feeding HIV-positive women:**
- Free commercial infant formula will be provided to infants for at least 6 months.
- Women should receive practical support, including demonstrations on how to safely prepare formula and feed the infant.
- At 6 months of age, infants with — or at risk of — poor growth should be referred for continued nutritional monitoring and dietary assistance.
- An appropriate formula milk product for the infant’s age and circumstances should be chosen.
- In cases in which commercial formula is provided free of charge at health facilities, managers, supervisors and health care personnel should ensure an uninterrupted supply at clinic level. A reliable procurement and distribution system should be put in place.
SSSUPORT the Mother

- Screen all women for HIV
- Send CD4 count on all HIV-infected women
- Screen all HIV-infected women for AFASS criteria
- Understand the women’s personal and socio-cultural context
- Promote exclusive or predominant breastfeeding if all AFASS criteria are not met
- Promote exclusive formula feeding if all AFASS criteria are met
- Organise supplies – cotrimoxazole (formula)
- Review mothers and infants 3 days after delivery, 2 weeks after delivery and monthly thereafter; review health and feeding practices
- Treat all women with ART who are eligible
Infant Feeding Counselling Principles

• It is mother’s choice, do not make a decision for her
• Explore the mother’s views, preferences and psychosocial support structures in place
• Ensure the mother has the necessary information for an informed choice
  – Risks & Benefits with avoidance of early mixed feeding
  – Role of NVP prophylaxis
  – Practicalities of each option (option most suitable for her situation)
• Demonstrations are very helpful
• Build a relationship, offer ongoing support
The AFASS Criteria

• **Acceptable:** No cultural or social barriers exist or fear of stigma or discrimination
• **Feasible:** Caretaker has adequate time, knowledge, skills, and resources to feed child and cope with outside pressures
• **Affordable:** Family can afford infant feeds without compromising spending for health or nutrition
• **Sustainable:** Caretaker has access to a continuous, uninterrupted supply of formula
• **Safe:** Replacement feed is hygienically stored and prepared under sanitary conditions.
Key counselling questions to ask mothers if they have chosen replacement feeding

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes (✓)</th>
<th>No (✓)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will you be able to cope with the stigma or discrimination from family who see you formula feeding as proof that you are HIV+? (Disclosure)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have a fuel source such as electricity or gas all the time to boil water?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have a working refrigerator or will you always have enough time to safely and correctly prepare each formula feed freshly?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you always have R400 extra per month for sterilising liquid, transportation to clinic, and formula — should the clinic run out? Do you have financial stability?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there a shop nearby where you can buy the formula in an emergency?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you always have the following: clean tap water close to your home, a method of boiling water, soap for washing your hands and sterilizing feeding utensils (cups and bottles)?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
If **ALL FIVE** of the boxes are **NOT ticked**, please **do not** recommend replacement feeding and **do recommend six months of exclusive breastfeeding** for this mother and her infant.
What To Feed Infants When Mothers Stop Breastfeeding

• For infants < 6mo of age
  – Commercial infant formula as long as home conditions appropriate

• For infants 6mo or older:
  – Commercial infant formula as long as home conditions appropriate
  – Complementary solid foods
Can animal milk be used

- Increased hospitalization also noted
- Nutritionally insufficient
- Not just “milk”
  - Water
  - Sugar
  - Essential fatty acids
  - Vitamins
Add water and sugar

<table>
<thead>
<tr>
<th>Quantity of cow milk (ml)</th>
<th>Added water (ml)</th>
<th>Added sugar (g)</th>
<th>Amount of prepared formula (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>20</td>
<td>4</td>
<td>60</td>
</tr>
<tr>
<td>60</td>
<td>30</td>
<td>6</td>
<td>90</td>
</tr>
<tr>
<td>80</td>
<td>40</td>
<td>8</td>
<td>120</td>
</tr>
<tr>
<td>100</td>
<td>50</td>
<td>10</td>
<td>150</td>
</tr>
</tbody>
</table>
Quantity of oil (ml) needed daily to provide 300 mg of (n-6) fatty acids per 100 kcal/day

<table>
<thead>
<tr>
<th>Per 100 kcal</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>0.5</td>
<td>1.0</td>
<td>1.6</td>
<td>2.1</td>
<td>2.6</td>
<td>3.1</td>
</tr>
<tr>
<td>Sunflower</td>
<td>0.5</td>
<td>0.9</td>
<td>1.4</td>
<td>1.8</td>
<td>2.3</td>
<td>2.7</td>
</tr>
<tr>
<td>Rapeseed</td>
<td>1.4</td>
<td>2.7</td>
<td>4.1</td>
<td>5.4</td>
<td>6.8</td>
<td>8.1</td>
</tr>
<tr>
<td>Soya</td>
<td>0.9</td>
<td>1.7</td>
<td>2.6</td>
<td>3.4</td>
<td>4.3</td>
<td>5.2</td>
</tr>
<tr>
<td>Groundnut</td>
<td>0.8</td>
<td>1.6</td>
<td>2.4</td>
<td>3.2</td>
<td>3.9</td>
<td>4.7</td>
</tr>
</tbody>
</table>

Soy preferred
<table>
<thead>
<tr>
<th>Minerals</th>
<th>Recommended nutrient intake 0 to 6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>zinc</td>
<td>2.8-6.6 mg</td>
</tr>
<tr>
<td>copper</td>
<td>0.33-0.62 mg</td>
</tr>
<tr>
<td>iodine</td>
<td>90 μg</td>
</tr>
<tr>
<td>selenium</td>
<td>6 μg</td>
</tr>
<tr>
<td>Vitamins</td>
<td></td>
</tr>
<tr>
<td>Vitamin A</td>
<td>375 μg</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>5 μg</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>2.7 mg</td>
</tr>
<tr>
<td>Vitamin K</td>
<td>5 μg</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>25 mg</td>
</tr>
<tr>
<td>Vitamin B1</td>
<td>0.2 mg</td>
</tr>
<tr>
<td>Vitamin B2</td>
<td>0.3 mg</td>
</tr>
<tr>
<td>Niacin</td>
<td>2 mg</td>
</tr>
<tr>
<td>Vitamin B6</td>
<td>0.1 mg</td>
</tr>
<tr>
<td>Folic acid</td>
<td>80 μg</td>
</tr>
<tr>
<td>Vitamin B12</td>
<td>0.4 μg</td>
</tr>
</tbody>
</table>
For children 6-24 months

• “Diets that do not contain animal-source foods (meat, poultry, fish or eggs, plus milk products) cannot meet all nutrient needs at this age unless fortified products or nutrient supplements are used.”
A word on prematurity

- Risk of hospital infection and NEC decreased with breast milk
- The constitution of breast milk allows for optimal growth and development
- Pasteurization or flash heating used to increase safety
- Feeding pasteurized expressed breast milk remains:
  - nutritionally superior to other replacement feeds,
  - maintains some immunological protection,
  - avoids risk of allergy and
  - costs very little.
Step 1: Use only a 1 liter hart aluminum pot. Make a mark on the inside of the pot 1 cm from the top.
Pretoria Pasteurization: Method

Step 2: Mother washes hands with soap and water before expressing breast milk.

Step 3: Express breast milk into a clean container or glass jar.
Pretoria Pasteurization: Method

Step 4: Place breast milk in glass jar and put the lid on.

Step 5: The glass jar containing the breast milk is placed into the aluminum pot.
Pretoria Pasteurization: Method

**Step 6:** Boil water. When the water is bubbling vigorously the water is poured into the pot.

**Step 7:** Pour boiling water into the pot up to the mark.
Pretoria Pasteurization: Method

Step 8: Leave milk in pot for 25-30 minutes, until the water is comfortable to touch.
Pretoria Pasteurization: Method

**Step 9:** If there is only a small volume of milk in the jar, the jar may tend to float. This must be avoided!!

**Step 10:** To prevent the jar from floating, place a heavy object on the lid.
Step 11: The jar is removed from the water and baby is spoon-fed, cup-fed or tube-fed. Pasteurised breast milk can be stored in a fridge for 12 hours, and thereafter discarded.
If we follow the traditional way of thought, there will always be traditional enemies. Extremist circles from both sides will find causes to give rise to problems. Fatos Nano
Thank you

• Kevin Clark
• Liezl Smit
• Mark Cotton