Improving HIV/AIDS management in children: Nutrition as a vital component

Isaac K. Quaye, University of Botswana
School of Medicine
(CODATA: 24-27th Oct)
Malnutrition in children

- Still prevalent worldwide
- It is a major factor in the 10.4 million annual child mortality in developing countries.
- Major cause of disability and disease
Nutrition is at the core of all causes of childhood mortality.
Protein Energy Malnutrition (PEM)

• Estimated that every fourth child has PEM in developing countries. This presents as:
  • Stunting (<length/Ht-for-age < 2 Z scores)
  • Underweight (<Wt-for-ht or Wt-for-age < 2 Z scores)
  • Wasting (<Wt/age or Wt-for-length/ht < 2 Z scores)
Specifically.....

A- indirect effect on child

B- direct effect on child

- malnutrition
- socioeconomic & political instability
- impaired development of education and health system
- poverty
- reduced productivity
- energy loss
- disease
- infection
- compromised immunity
- impaired child development
Clinical presentation of children with HIV infection in Low/middle income countries

- Stunted
- Wasted
- Underweight
- Low CD4 counts
- Aids defining illness
Pediatric HIV/AIDS malnutrition

- **Severe PEM defined by MUAC or BMI-indicators:**
  - (<70% wt/ht) +/- pitting oedema and anemia
  - presence of oedema defines *kwashiorkor*, absence is *marasmus*

- Or <60% wt/age +/- oedema (presence of oedema is marasmic-kwashiorkor, absence is marasmus
- 60-80% wt/age +/- oedema, presence of oedema is kwashiorkor, absence is underweight
Why concern ourselves with HIV/AIDS and nutrition in Children now?
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1880</td>
<td>First suggested case of HIV infection of Humans in Kinshasha</td>
</tr>
<tr>
<td>1959</td>
<td>First case confirmed retrospectively in Congo</td>
</tr>
<tr>
<td>1981</td>
<td><em>Pneumocystis carinii</em> outbreak and Kaposi’s sarcoma reported as a gay compromised syndrome or immune deficiency</td>
</tr>
<tr>
<td>1982</td>
<td>Syndrome renamed as AIDS</td>
</tr>
<tr>
<td>1983</td>
<td>Identification of HIV-1 as lymphadenopathy associated virus by Luc Montagnier</td>
</tr>
<tr>
<td>1986</td>
<td>Global AIDS strategy launched by WHO</td>
</tr>
<tr>
<td>1996</td>
<td>Launching of UNAIDS</td>
</tr>
<tr>
<td>Year</td>
<td>Event</td>
</tr>
<tr>
<td>-------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>1987</td>
<td>AZT (Zidovudine approved as the first anti-HIV drug)</td>
</tr>
<tr>
<td>1996</td>
<td>Triple combination ART drug approved</td>
</tr>
<tr>
<td>1998</td>
<td>First human trial of AIDS vaccine begins in the US</td>
</tr>
<tr>
<td>2008</td>
<td>Novel host derived factors of HIV-1 identified</td>
</tr>
<tr>
<td>2008</td>
<td>Luc Montagnier, Francoise Barre-Sinoussi and Harald zur Hausen receive Nobel prize for HIV and HPV discovery</td>
</tr>
</tbody>
</table>
Table 1. Projected Average Annual Rates of Change in Age-Standardized Death Rates for Selected Causes: World, 2002–2020

<table>
<thead>
<tr>
<th>Group</th>
<th>Cause</th>
<th>Average Annual Change (Percent) in Age-Standardized Death Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Males</td>
</tr>
<tr>
<td>All Causes</td>
<td></td>
<td>-0.8</td>
</tr>
<tr>
<td>Group I</td>
<td>Tuberculosis</td>
<td>-5.4</td>
</tr>
<tr>
<td></td>
<td>HIV/AIDS</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>Malaria</td>
<td>-1.3</td>
</tr>
<tr>
<td></td>
<td>Other infectious diseases</td>
<td>-3.4</td>
</tr>
<tr>
<td></td>
<td>Respiratory infections</td>
<td>-2.7</td>
</tr>
<tr>
<td></td>
<td>Perinatal conditions&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-1.7</td>
</tr>
<tr>
<td></td>
<td>Other Group I</td>
<td>-3.0</td>
</tr>
</tbody>
</table>

Source: Mathers and Loncar, 2006
Projected Deaths attributed to HIV/AIDS in relation to other causes globally

Source: Mathers and Loncar, 2006
Global HIV/AIDS Deaths

Source: Mathers and Loncar, 2006
Global Deaths due to HIV/AIDS by income

Source: Mathers and Loncar, 2006

Lower middle income countries

Low income countries

AIDS deaths (thousands)

Year


0 1000 2000 3000 4000 5000


0 1000 2000 3000 4000 5000
Conclusion

- HIV/AIDS will remain a major cause of disability and death in middle and low income countries in the next decade
What is the status in children currently?
Children (<15 years) estimated to be living with HIV, 2008

- Western & Central Europe: 1400 (<1000 – 1800)
- Middle East & North Africa: 15 000 (7600 – 24 000)
- Sub-Saharan Africa: 1.8 million (1.0 – 2.5 million)
- Eastern Europe & Central Asia: 20 000 (12 000 – 28 000)
- East Asia: 16 000 (11 000 – 23 000)
- South & South-East Asia: 140 000 (91 000 – 200 000)
- Oceania: 1500 (<1000 – 2600)
- North America: 4500 (4000 – 5800)
- Caribbean: 11 000 (7400 – 16 000)
- Latin America: 31 000 (22 000 – 40 000)
- North America: 4500 (4000 – 5800)
- Caribbean: 11 000 (7400 – 16 000)
- Latin America: 31 000 (22 000 – 40 000)

Total: 2.1 million (1.2 – 2.9 million)
(6.3% of global burden)
Estimated deaths of children (<15 years) due to AIDS, 2008

Total: 280 000 (150 000 – 410 000)

(16% of infected)
• **Pediatric HIV will still constitute a significant proportion of HIV infection in future projections**
HIV transmission in children

- World wide, >90% of children acquire HIV infection primarily by Mother to child transmission (MTCT) (in utero, intrapartum or postpartum)

- **SO.......**

- *Maternal care and adequate nutrition postpartum for mother and child is critical.*
Problem of HIV patients in low income countries

- Access to treatment
- Food insecurity
- Poor maternal health care delivery
Nutrition and HIV Research issues

• Only a fraction of funds is available for improving patient care nutritionally

• Early diagnosis is missed because of stigmatization and poor health systems

• Malnutrition is endemic in most low income countries with HIV/AIDS epidemic
Facts on the ground needing attention

• Problem with capture and management of HIV/AIDS patient data (AMPATH (Academic Model for the prevention and treatment of HIV/AIDS)
• Syndemic theory (disease interactions including the social context define the course and cluster)
• Changes in assessment of malnutrition introduced by new WHO definitions from NCHS
Lessons

- Big Gap in targeted goals and practice in HIV care
- Medical care is necessary but not sufficient in HIV care
- Food insecurity is pervasive in HIV infected patients and dependants
- Attending to only index patients does not give the expected outcomes
- Care should extend to vulnerable members of patients’ households
- Program to ensure food security may differ between rural and urban communities

- Need to reassess number of malnourished patients based on new WHO indices for targeted intervention.
Pilot clinical nutrition trial in Botswana

- Design: Single-blind randomized study
- Test food product - fortified sorghum & bean
- Control food product - sorghum
- Subjects: 6-14 year old HIV+ children; n = 201 participants
- Participants on HAART on average 12 months before enrolment in study
- HAART: 3TC/AZT/EFV (88%) or 3TC/AZT/NVP (12%)
- Follow-up assessments at quarterly intervals for 12 months:
  - Nutrition assessment: anthropometric assessment using skin folds and bio-impedance; Dietary intake was assessed with the 24-hr recall method and nutrient intake was estimated using Food Finder 3
Prevalence of malnutrition in HIV+ children in Botswana

![Graph showing the prevalence of malnutrition in HIV+ children in Botswana, comparing stunting, underweight, and wasting. The graph includes data from a study and surveys from 1993 and 2000.]
Socio-demographic profile of the subjects

- 201 subjects enrolled
- 56% were males and 44% females
- over 60% had lost either one or both parents
- Over 70% reported that their mother or grandmother was their primary caregiver
- Majority of the caregivers (almost 80%) had only primary or secondary education
- The majority of the households (80%) were earning less than P2,000 / month (i.e. < US$300 / month)
Improvement in nutritional status of HIV+ children in Botswana

Source: Jackson et al, 2008

Supplements Improved Stature of HIV Positive Children

Source: Jackson et al, 2008
Improvement in nutritional status of HIV+ children in Botswana

Source: Jackson et al, 2008
Improvement in immune status of HIV+ children in Botswana

Children eating the bean-sorghum supplement had a greater increase in CD4% \( (p<0.05) \)

Source: Jackson et al, 2008
Conclusions from the pilot

- The majority of children were nutritionally compromised at baseline displaying signs of underweight, wasting and stunting.

- Poor socio-economic and living conditions put them at an increased risk for nutritional and developmental problems.

- Interventions can be useful stop gap measures for improving the nutritional and immune status of children with HIV/AIDS combination.

- Nutritional support augments ARV therapy and should be integrated into HIV/AIDS programs.
The way forward: HIV/Nutritional intervention

• New studies are needed on the epidemiology of malnutrition in HIV/AIDS patients based on current WHO criteria
• Studies should involve patients on HAART and those who are not
• Studies should include adults, pregnant women, infants and children
• Core syndemic components (eg socioeconomic status, co-morbidities) needs to be urgently assessed
• The importance of food supplements with local bias +/- micronutrients requires urgent interrogation
Acknowledgements

• ICSU Science planning on Health and Human Well being
• ALL researchers on the project:
• Project WB01: HIV/AIDS and Public Health: Nutrition, HIV and livelihoods
• WB01.1
• University of Botswana
• Michigan State University.
• Dr Jose Jackson, ORD, University of Botswana, Gaborone, Botswana

• Dr Ama Essel, University of Ghana Medical School, Korle-Bu Accra, Ghana