Adding to the situation analysis based on new IAEA data

Christine Slater
Retired Nutrition Specialist, IAEA
Countries represented in the IAEA database: LAC 14, AFR 11, ASP 7
Objectively measured breastfeeding practices

• An objective measure of breastfeeding practices is required to validate mothers’ recall

• Deuterium oxide dose-to-mother technique
  – Accurately assesses the volume of human milk consumed by breastfed infants
  – Provides an estimate of the water intake from sources other than human milk
  – Provides an objective measure of the exclusivity of breastfeeding
Deuterium oxide dose-to-mother technique

- The mother consumes an accurately weighed dose deuterium oxide (D$_2$O)
- The deuterium mixes with the mother’s body water
- The baby consumes deuterium during breastfeeding
- Saliva is sampled from the mother and from the baby for 2 weeks
• Example of data from an exclusively breastfed infant
• Consumed 947 g/d human milk and a negligible amount of water from other sources

• Example of data from a partially breastfed infant
• Consumed 237 g/d human milk and 769 g/d water from other sources
IAEA Human Health Series

Stable Isotope Technique to Assess Intake of Human Milk in Breastfed Infants

Also available in French and Spanish

http://humanhealth.iaea.org
Assessing Intake of Human Milk in Breastfed Infants

Nutritional and Health-related Environmental Studies
Division of Human Health

http://humanhealth.iaea.org
Countries represented in the database

- **Latin America**: Argentina, Brazil, Chile, Cuba, Dominican Republic, Ecuador, Guatemala, Uruguay (n = 301)
- **Asia**: India, Sri Lanka, Thailand (n = 258)
- **Africa**: Benin, Central African Republic, Ghana, Kenya, Morocco, South Africa, Tanzania (n = 691)
- Some projects collected longitudinal data at 6 weeks, and 3, 6, 9, 12 months
Human milk intake over time

Estimated breastmilk intake (95%CI) over time

- Breastmilk intake (g/d)
- Age in months
- Estimated breastmilk intake (g/d) over time

N = 1057
Body composition

The main components of the body are:
- Water
- Protein
- Fat
- Mineral matter

The relative amounts of these can change with age, ethnicity and nutritional status.

Total Body Water can be measured by deuterium dilution. Fat free mass is estimated using an assumed hydration factor that varies with age, and fat mass is calculated by difference from body weight.
IAEA Human Health Series

No. 12
Introduction to Body Composition Assessment Using the Deuterium Dilution Technique with Analysis of Saliva Samples by Fourier Transform Infrared Spectrometry

IAEA Human Health Series
No. 13
Introduction to Body Composition Assessment Using the Deuterium Dilution Technique with Analysis of Urine Samples by Isotope Ratio Mass Spectrometry

Also available in French and Spanish

http://humanhealth.iaea.org
Assessing body composition by deuterium dilution technique

Deuterium dilution technique

Procedures

Planning the study

Preparation and storage of deuterium oxide doses

Anthropometric measurements of participants

Dosing and saliva sampling
IAEA database

- Contains data on body composition for 4651 children and adolescents
- Age 6-18 years
- From 20 member states
  - 2955 from Latin America
  - 1317 from Asia and
  - 225 from Africa.
- Data from 1516 children age 8-11 years from 8 African countries have not yet been added to the database
African Regional Project

- 1516 participants from 8 countries (Ghana, Kenya, Mauritius, Morocco, Namibia, Senegal, Tanzania, Tunisia)
- Age 8-11 years (mean 9.6, 95% CI 9.5-9.7)
- Weight and Height measured
- BMI for age calculated
- Obesity defined as BMI-SDS >2
- Body fatness assessed by deuterium dilution
- Excess body fat >25% in boys, >30% in girls
Conclusion

• BMI for age Z-scores do not provide an accurate prediction of adiposity in children

• Although BMI-for-age is a valuable tool for growth monitoring, more information on body composition is required to assess disease risk and the impact of interventions to address childhood obesity
Conclusions

• Maternal recall generally overestimates the true rate of exclusive breastfeeding
• BMI-for-age Z-score cannot be considered a good indicator of adiposity
• The IAEA database is a valuable resource providing data from 32 LMIC
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