

**Report of**

**Informal Meeting to Review and Develop  
Indicators for Complementary Feeding**

**3–5 December 2002  
Washington, D.C.**



**Department of Child and Adolescent Health and Development  
Department of Nutrition for Health and Development  
World Health Organization, Geneva**

**Food and Nutrition Program  
Regional Office for the Americas  
World Health Organization, Washington, D.C.**



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**Report of an Informal Meeting**  
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An informal meeting—convened by WHO’s Department of Child and Adolescent Health and Development, the Department of Nutrition for Health and Development, and the Regional Office for the Americas—was held 3–5 December 2002 at PAHO headquarters in Washington, DC. The meeting objectives were to:

- Review precise definitions of recommended complementary feeding
- Discuss a proposed set of indicators for assessing complementary feeding
- Discuss experiences with assessing indicators for infant and young child feeding
- Identify indicators that can be endorsed for field validation immediately
- Identify areas where research is needed to validate the indicator
- Identify existing data sets and opportunities for research and field validation
- Develop a plan of action for next steps

In addition to WHO participants, the meeting was attended by representatives of UNICEF, the United States Agency for International Development and its Cooperating Agencies, non-governmental organizations, and academic and research institutions. Participants are listed in Annex 1.

The meeting was part of a consensus-building process initiated by WHO to develop and disseminate consistent, internationally accepted guidelines for complementary feeding and appropriate indicators. The process included scientific reviews of the evidence<sup>1</sup> and technical consultations<sup>2</sup> (WHO/UNICEF Technical Consultation on Infant and Young Child Feeding, 2000 and WHO Global Consultation on Complementary Feeding, 2001). The results of the consultations were: 1) updated definitions of appropriate complementary feeding practices, 2) discussion of care as a critical component of complementary feeding, 3) a checklist of actions and ten guiding principles for complementary feeding, and 4) the need for indicators to assess complementary feeding practices.

In response to the request for a standardized set of indicators, WHO commissioned the development of a conceptual framework for identifying useful indicators.<sup>3</sup> The guiding principles<sup>4</sup> (PAHO, 2003) and proposed indicators provided the framework for discussion at the December 2002 informal meeting. They apply to *breastfed* children less than 24 months who

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<sup>1</sup> WHO/UNICEF. Complementary feeding of young children in developing countries: A review of current scientific knowledge. Geneva, Switzerland: WHO, 1998.

Dewey KB, Brown KH. Update on technical issues concerning complementary feeding of young children in developing countries and implications for intervention programs. Geneva: WHO Global Consultation on Complementary Feeding, Special Supplement Food and Nutrition Bulletin 2003; 24 (1) in press

<sup>2</sup> WHO. Report of a technical consultation on infant and young child feeding: Themes, discussions and recommendations. World Health Organization, Geneva, 13-17 March 2000, WHO/NHD/00.8 and WHO Global Consultation on Complementary Feeding: background papers and summary report. Special Supplement Food and Nutrition Bulletin 2003;24 (1) (in press)

<sup>3</sup> Ruel MT, Brown KH, Caulfield LE. Towards the development of indicators for assessing complementary feeding practices. Draft, November 16, 2002.

<sup>4</sup> Pan American Health Organization. Guiding principles for complementary feeding of the breastfed child. Pan American Health Organization, World Health Organization Washington, DC, 2003.

were normal, term infants (at least 36 weeks gestation), including those born with low birth weight.

During the meeting, presentations were made on the guiding principles, suggested indicators, and experiences with measurement of infant and young child feeding practices. (See Annex 2 for the meeting agenda.) Three working groups were formed to review a set of principles related to either breastfeeding practices, energy and nutrient intake, or responsive feeding. The task of the groups was to determine whether the indicators were appropriate and whether they were ready for field validation or required further research.

This report highlights key points in the presentations, summarizes the discussions on issues related to indicators, and outlines proposed next steps in the process of reaching consensus on a set of indicators to assess complementary feeding practices and to monitor the impact of programs designed to improve them.

## **Overview of Main Issues**

Indicators can be used for various purposes: program assessment, monitoring, and evaluation; for global reporting and international comparisons; and for making population-level inferences. The purpose will determine which indicators are selected and how the data are collected. Agreement was reached in 1991 on indicators for assessing some breastfeeding practices.<sup>5</sup> This consensus is lacking for complementary feeding indicators. For example, complementary feeding indicators need to be age-specific to reflect changing feeding practices and energy requirements. At present, there are varying age groupings.

Summarizing the background paper prepared for the consultation, Marie Ruel presented potential indicators to assess complementary feeding practices and discussed their readiness for field testing or validation. These indicators are listed in Table 1 and their readiness for field testing or validation in Table 2. Some indicators may provide more accurate and valid information than other indicators but may be more difficult to collect and potentially less feasible for routine use. No indicators were proposed for responsive feeding, food consistency, or feeding during illness.

None of the indicators discussed by Ruel addressed guiding principle #3: responsive feeding. Patrice Engle reported on UNICEF's November 2002 consultation to begin the process of developing indicators to assess family psychosocial care as they relate to early learning and child development, responsive feeding, and protection. UNICEF's Integrated Early Childhood Development (IECD) program targets children < 8 years—with a special focus on children < 3 years—and incorporates nutrition, hygiene, psychosocial care, and child protection for young children. Among those attending the November consultation, responsive care during feeding was one of the least understood areas. Presently the IECD indicator examines knowledge and skills (% families with appropriate knowledge and skills to promote early child development) but not practices. In the next months UNICEF will seek feedback on possible questions and indicators and begin initial testing of indicators in the Multiple Indicator Cluster Surveys in July 2003.

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<sup>5</sup> WHO. Indicators for assessing breast-feeding practices. Report of an informal meeting, 11–12 June 1991, WHO/CDD/SER/91.14

**Table 1. Potential Indicators to Assess Breastfeeding and Complementary Feeding Practices Presented for Discussion at WHO Informal Meeting on Complementary Feeding Indicators (Ruel, Brown, Caulfield)**

*Continued breastfeeding*

- % children who are breastfed:
  - 6–23 months
  - 6–11, 12–17, 18–23 months or other
- % children breastfed “on demand”

*Energy intake*

- % children who consume [*gruel 1*] at least in the average quantity (gruel-specific) for age, at least the minimum number of times (age and gruel specific) in past 24 hours
- % children who consume [*any gruel*] in the past 24 hours at least the average quantity (age-specific) for age, at least the minimum number of times (age specific for least energy-dense gruel)
- % children who consumed [*any gruel*] at least the minimum number of times in past 24 hours at least average quantity for age *and at least 1 nutritious snack*

*Nutrient density indicators*

- % children who consumed animal foods
- % children who consumed dairy products
- % children who consumed vitamin A-rich fruits/vegetables
- % children who consumed fortified foods
- Mean number of foods/food groups consumed
- % children with low, average, high dietary diversity (sample, age-specific)
- % children who received vitamin A, iron, iodine supplements

*Hand washing*

- % mothers who report washing own hands:
  - Before cooking
  - Before feeding child
- % mothers who report washing child’s hands before feeding
- % mothers who usually wash hands with soap

*Safe food preparation and storage*

- % mothers who usually wash child’s hands with soap
- % who report re-warming previously cooked food prepared for child before serving it
- % who report having no refrigeration (or any local cold storage facility)

*Clean utensils and avoidance of baby bottles*

- % mothers who report washing and drying feeding utensils/bowls before feeding child
- % children < 12 months bottle-fed in past 24 hours
- % children who have been bottle-fed in past 7 days, month or since birth

*Water used in food preparation*

- % mothers who treat water used to prepare food and drinks for child (e.g. boil, use chlorine, etc.)

**Table 2. Proposed Indicators for Field Testing and Validation (Ruel, Brown, Caulfield)**

Indicator	Field Testing	Validation
Continued breastfeeding	<ul style="list-style-type: none"> <li>• Age group reporting</li> <li>• On-demand feeding</li> </ul>	<ul style="list-style-type: none"> <li>• Breastfeeding frequency vs. on-demand</li> </ul>
Adequacy of energy intake	<ul style="list-style-type: none"> <li>• Usefulness for children &gt; 12 months</li> <li>• Main complementary food as basis for determining adequacy</li> </ul>	<ul style="list-style-type: none"> <li>• Community/group level approach to assessing energy density/amounts</li> <li>• Level of misclassification at different ages due to variability in recipes, variability in amounts consumed, breast milk intake</li> <li>• Nutritional contribution of snacks</li> </ul>
Nutrient density	<ul style="list-style-type: none"> <li>• Intake of animal-source foods</li> <li>• Mean # foods/food groups</li> <li>• Use of tertiles</li> </ul>	<ul style="list-style-type: none"> <li>• Micronutrient intake from dietary diversity and nutrient adequacy</li> <li>• Methods of measuring dietary diversity</li> <li>• Characterizing levels of diversity (low, average, high)</li> <li>• Contribution of selected foods/food groups and minimum amounts needed</li> </ul>
Safe preparation and storage	<ul style="list-style-type: none"> <li>• Approaches to minimizing recall bias</li> <li>• Difficulties encountered in assessing storage temperatures and duration</li> </ul>	<ul style="list-style-type: none"> <li>• Recall vs. observation</li> <li>• Development of spot check or other rapid observation methods</li> </ul>

### Experiences with Measurement of Infant and Young Child Feeding Practices

Individuals representing various organizations reported on their experiences assessing complementary feeding practices.

**UNICEF.** Tessa Wardlaw described UNICEF’s Multiple Indicator Cluster Surveys (MICS) as flexible, reasonably inexpensive, executed in a relatively short time, statistically sound, and capable of producing internationally comparable estimates of indicators. UNICEF reports on exclusive breastfeeding, timely complementary feeding, and continued breastfeeding, using indicators that were established by WHO in 1991<sup>6</sup> (although the exclusive breastfeeding rate has been changed from the first 4–6 months to 6 months). Wardlaw recommended keeping the indicators as simple as possible and advised thinking carefully before changing indicators because revised indicators would make it difficult to check trends. From UNICEF’s perspective, the following issues need to be addressed:

- include “full breastfeeding” in the definition of indicators;
- assess the impact on results due to under-representation of the youngest age group;
- distinguish between breastmilk-fed and breastfed;

<sup>6</sup> WHO. Indicators for assessing breast-feeding practices. Report of an informal meeting. 11–12 June 1991, WHO/CDD/SER/91.14

- develop guidelines for complementary feeding for the non-breastfed child and replacement feeding and foods for the child of an HIV-positive mother; and
- emphasize feeding practices as well as food quality and quantity.

**Demographic and Health Surveys (DHS).** The objectives of the DHS in measuring infant and young child feeding (IYCF) are to provide: 1) internationally comparable data on the status of the IYCF indicators, 2) national and regional population-based estimates on the status of IYCF indicators, and 3) trend data for countries with multiple survey results. Ten pages of the DHS report are reserved for nutrition (anthropometry, infant feeding, and micronutrients). Questions related to complementary feeding include current breastfeeding status, exclusive breastfeeding, duration of breastfeeding (median), bottle use, and frequency of feeding (24-hour recall of the number of times child fed solid/semi-solid foods, and 24-hour and 7-day recall of the number of times child fed 10 different food types). This information can be presented by age groups and residence (urban/rural). Summary indices may be useful for assessment by program managers, analysis, and communication with donors, but validation is needed for indices related to nutrient adequacy. Altrena Mukuria noted that for inclusion in the DHS, any new complementary feeding indicators need to be concrete, simple, practical, based on evidence, and limited in number.

**Private voluntary organizations.** Judiann McNulty, chair of the Nutrition Working Group of the Child Survival Collaborations and Resources Group (CORE), talked about the tools used by USAID-funded child survival and food-assisted projects in assessing complementary feeding practices. Most of the projects use Knowledge, Practices, and Coverage (KPC) surveys adapted to the local situation for specific child survival interventions. One module is on breastfeeding and infant/child nutrition. The methodology uses a 30-cluster sampling technique with randomly selected clusters in target areas. The sample size is around 300. To measure the effectiveness of nutrition education and/or counseling, a mother is asked various questions about her feeding practices. McNulty gave examples of questions related to complementary feeding asked by private voluntary organizations. Only the first two questions listed below are in the standard KPC tabulation plan for infant and young child feeding.

- *Feeding frequency.* “How many times per day is the child offered something to eat?” No distinction is made between meals and snacks or between solids or semi-solid foods. Results are analyzed by the age of the child.
- *Complementary feeding rate.* “Did you give your child (list of possible foods given) in the past 24 hours?” Results are analyzed for children 6–9 months of age.
- *Dietary diversity.* “Did you feed your child (list of foods by groups) during the past 24 hours?” Food groups and vitamin A-rich foods fed children 6–23 months are noted. The usefulness of this indicator is questioned by some of the organizations that use it.
- *Energy enrichment.* “Did you add oil to child’s ‘weaning food’ yesterday? Do you ever add oil to the ‘weaning food’? How often? How much?” The results are a simple frequency in the population and/or an analysis by amount of oil added.
- *Diet diversity and malnutrition.* “How often in the past seven days did you give your child (list of foods by group)?” This provides information on the percentage of stunted or wasted children not consuming *X* food group. Some studies indicate that children who had consumed dairy products were not in the very malnourished group.

**BASICS Project.** Marcia Griffiths reported on this USAID-funded child survival project. Nutrition is one of BASICS’ four technical foci. Data on breastfeeding and appropriate complementary feeding are collected in four countries. Feeding practices are assessed through a question guide, feeding history, 24-hour dietary recall, food frequencies/inventories, trials of improved practices, and observation. Evaluation methods include anthropometry, illness history,

growth history, 24-hour recall, food frequency, and a pre-coded questionnaire. BASICS uses core indicators for various age groups, special program indicators for a particular country context, and composite scores. The evaluation yields information on program exposure, individual practices, and a composite child feeding score.

**LINKAGES Project.** Eunice Adjei shared lessons learned from the complementary feeding component of LINKAGES' community-based infant and young child feeding program in Ghana. In all countries, LINKAGES collects information on timely initiation of breastfeeding, exclusive breastfeeding, and timely complementary feeding. The Ghana program also collects information on supervision while feeding, use of a child's own plate, age when foods are regularly given (at least two times a week), and bottle use during the previous seven days. LINKAGES' experience in Ghana suggests that:

- The timely complementary feeding indicator provides limited information and does not adequately reflect program inputs and messages. It needs to be used in conjunction with other indicators to capture the richness of complementary feeding behaviors for program monitoring.
- Data on feeding frequency by three-month age groups can be derived from survey data with adequate sample sizes, although mothers in Ghana often do not know the age of their children. Difficulty in determining a child's age can affect estimates of the timing of the introduction of complementary foods.
- Timing of the introduction of various foods can be understood when the concept of "regular" is qualified numerically.
- Seven-day recall data for complementary feeding practices yield more useful information than 24-hour recall data.
- In recall questions, foods should be grouped into major categories to minimize interviewer fatigue and interviewee boredom with a long, detailed list of foods.

**Save the Children.** David Marsh reported on operations research to study the impact of a positive deviance approach in Viet Nam for improving breastfeeding and complementary feeding practices. The study was a collaborative effort of Save the Children, LINKAGES, and Emory University. Information was collected on demographic, behavioral, and environmental factors; child anthropometry and motor milestones; child morbidity; feeding and health-seeking practices during illness; and program participation, awareness, and quality. The project used hygiene spot observation, 24-hour recall of a child's dietary intake, and videotaping of more than 500 hours of child and caregiver practices focused on mealtime. The data sets are rich sources for functional indicator validation. Descriptions and results of the study will appear in the December 2002 supplement to the *Food and Nutrition Bulletin*.

## **Resources on Indicators and Complementary Feeding**

During the meeting, several resources on complementary feeding were described:

*Process for the Promotion of Child Feeding (ProPAN)* is a collaborative effort of PAHO, Emory School of Public Health, the National Institute of Public Health in Mexico, and the Institute for Investigation in Nutrition in Peru. The *ProPAN* manual provides step-by-step guidelines to assess infant and young child dietary and feeding practices, identify barriers and opportunities for improvement, test messages and recipes, develop an intervention, and monitor and evaluate the intervention. It includes both quantitative tools (a general survey, 24-hour recall, and a market survey), qualitative assessment tools (an opportunistic observation, mothers' semi-structured

interview, and food attributes exercise), and guidelines for data integration to identify key dietary and feeding problems. *ProPAN* software uses EPI INFO for analysis of quantitative data with data entry screens, an embedded food composition table, and programs for a standard set of analyses.

*Demographic and Health Survey* reports are available for more than 65 countries. More than 40 of these countries have conducted more than one DHS.

*UNICEF's Global Database on Breastfeeding Indicators* is updated annually. There are 263 entries for 122 countries. The database is available on [www.childinfo.org](http://www.childinfo.org). Data are published annually in *The State of the World's Children* report.

*WHO's Global Database on Breastfeeding and Complementary Feeding* reports on a total of 2,494 national and sub-national studies conducted between 1938 and 2002. The studies cover 168 countries and 98 percent of the world's infant population. The database will be put on the web in January 2003 and the data published in mid-2003. WHO receives 20 requests per week to share data. Two staff members work full time on maintaining and updating the database.

*Complementary Feeding Counselling: A Training Course* was developed by WHO. The three-day course, preceded by a three-day course for facilitators, complements existing courses such as IMCI, breastfeeding counseling, and HIV and infant feeding counseling. In some situations it could be used without the prior training or as part of pre-service training. The course, designed for those involved in primary health services, would need to be adapted if used with community workers. The training aims to provide health workers with up-to-date knowledge and counseling skills on complementary feeding and to contribute to standardization of feeding messages and sustainability in the health facility. The course is ready for country use. It was field tested in Jamaica and South Africa and will be used in a regional training in Bangladesh in February 2003.

*Linear programming* can answer two questions: Is it possible to design an adequate diet with locally available foods? What is the minimal cost need to adequately feed a child? The relevance of linear programming for complementary feeding is described in an article by Briend *et al.* in the January 2003 issue of the *Journal of Pediatrics Gastroenterology and Nutrition*.

### **Issues and Proposed Indicators Identified by Working Groups**

On the second day of the meeting, three groups—breastfeeding practices, energy and nutrient intake, and responsive feeding—were formed to identify suitable indicators for the relevant guiding principles and to determine whether they needed further research or were ready for field testing. Issues that emerged during working groups and plenary sessions are summarized below followed by specific comments on the general principles and group recommendations.

- *“Ideal” indicators versus practical, alternative indicators.* Some felt that it was important to protect the integrity of the indicators based on the guiding principles and not let concerns about sample size initially drive discussion of the indicators. At the same time the case was made for simple, practical indicators that would be reasonably precise given typical sample sizes and sample designs.
- *Minimum set of indicators versus a comprehensive set.* Indicators should be prioritized to distinguish the primary indicators—the minimum set—from the secondary indicators. Resources, sample size, program needs, and the data collection process will influence the indicators that an organization chooses to use.

- *Current status versus lifetime history.* Most indicators are measured by current status (last 24 hours and sometimes supplemented with data from the last seven days). Some argue that current status data should always be collected even if history data are collected. History data, if proved valid on such issues as the length of exclusive breastfeeding, could be valuable.
- *Need for consistency.* Comparison of survey findings will be greatly aided by consistency in age groupings across indicators, the wording of questions, food composition tables, and recommended nutrient requirements. Consistency in the definition of terms is also needed. Until recent years, the term “complementary feeding” referred to the process of giving additional foods when breast milk no longer satisfied all of an infant’s nutrient requirements. Some people now use the term to apply to the non-breastfed child who receives infant formula. The current indicator for timely complementary feeding incorporates breast milk into the definition. Indicators cannot be clearly defined until this confusion in terminology is cleared up.

Comments on each of the guiding principles as well as recommendations by the working groups follow.

<p><b>Guiding principle #1: Duration of exclusive breastfeeding and age of introduction of complementary foods</b></p>
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<p>Practice exclusive breastfeeding from birth to 6 months of age, and introduce complementary foods at 6 months of age (180 days) while continuing to breastfeed.</p>
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Three indicators pertain to this guiding principle: 1) rate of exclusive breastfeeding, 2) rate of timely introduction of complementary foods, and 3) rate of continued breastfeeding. The latter is discussed in relation to guiding principle #2.

**Exclusive breastfeeding**

Data on exclusive breastfeeding can be collected by current status (last 24 hours and last 7 days) with a list of liquids and foods for infants 0–5.9 months or by history since birth. The most widely used measure for calculating exclusive breastfeeding is current status based on feeding during the last 24 hours. Many people misinterpret this indicator thinking that it reports on the lifetime rate. Collecting information for infants 5.0–5.9 months would give a more precise measurement of exclusive breastfeeding for the recommended period but would require a large sample size for a small age group. Another approach is to ask mothers of older infants when they introduced other foods or liquids. Recall of practices that took place months earlier often results in responses “heaped” at certain ages.

*Definitions:*

Exclusive breastfeeding:

- 1) % of infants 0–5.9 months who were exclusively breastfed in the last 24 hours
- 2) % of infants 5.0–5.9 months who are exclusively breastfed (based on current status)
- 3) % of infants 6.0–(age to be determined) who were exclusively breastfed for the first six months (based on historical recall)

The Breastfeeding Working Group proposed that the existing indicator (#1) be maintained and that a new one (#3) be tested by first comparing results of recall data (7-day recall and recall since birth) versus current status data. Women would be asked when they had ever introduced or

introduced on a regular basis any of the foods/fluids listed in the questionnaire. A decision would subsequently be made to determine whether recall bias and age heaping that often occur with recall data would prohibit use of this indicator. The second indicator is an example of an “ideal” indicator if sample size permits. Sample sizes for most national surveys are not large enough to yield precise estimates using a single month of age.

*Questions:*

- Is the definition of exclusive breastfeeding based on feeding practices in the last 24 hours a “good enough” measurement of exclusive breastfeeding?
- Should the definition of exclusive breastfeeding distinguish between breastmilk-fed and breastfed?
- Could survival analysis be used to predict exclusive breastfeeding at six months for current status data?
- How can under-reporting of exclusive breastfeeding in the early months be addressed?

### **Timely complementary feeding**

The standard indicator for timely complementary feeding is expressed by the percentage of infants 6.0–9.9 months who received breastmilk and a solid/semi-solid food in the last 24 hours. Some programs also report on the last seven days. The timely complementary feeding rate is a composite of two elements: 1) continued breastfeeding and 2) feeding of solid or semi-solid foods. Some people suggest an indicator that separates the two components. The timely complementary feeding rate provides information on delayed introduction of complementary foods, but it does not provide information on when foods are first introduced or whether the food is given on a regular basis. The working group considered a new indicator that would measure the percentage of children (breastfed and not breastfed) *introduced* to semi-solid or solid foods at 6.0–6.9 months. Collecting information on feeding by current status or history presents the same challenges as collecting information on exclusive breastfeeding at 5.0–5.9 months: small sample size for current status at a single month and unreliable retrospective data.

*Definitions:*

Timely complementary feeding:

- 1) % of infants 6.0–9.9 months (or another age range) who receive breastmilk and a solid/semi-solid food (based on current status)

Timely introduction of a solid/semi-solid food: [applicable only for breastfed infants]

- 1) % of infants 6.0–6.9 months who receive breastmilk and solid/semi-solid food (current status)
- 2) % of infants (age range to be determined) who were *breastfed* and *first introduced* to solid/semi-solid food at 6.0–6.9 months (historical recall)
- 3) % of infants (age range to be determined) who were *breastfed* and *first introduced* to solid/semi-solid food regularly at 6.0–6.9 months (historical recall)

Timely introduction of solids/semi-solid food: [definition not dependent on breast milk intake]

- 1) % of infants (6.0–6.9 months or age range to be determined) who receive solid/semi-solid food (current status)
- 2) % of infants (age range to be determined) who were *first introduced* to solid/semi-solid food at 6.0–6.9 months (based on historical recall)
- 3) % of infants (age range to be determined) who were *first introduced* to solid/semi-solid food regularly at 6.0–6.9 months (based on historical recall)

*Questions:*

- How feasible is it to conduct studies that will provide valid information on the timely *introduction* of complementary foods based on historical recall (for example at 12 months)?
- If the timely complementary feeding rate continues to be used, should the measurement remain current status based on feeding during the past 24 hours among children 6.0–9.9?
- What is the variability around the percentage of infants receiving solids and semi-solids by age group (6–6.9 months, 6–7.9 months, 6–9.9 months)?
- If the historical approach is validated, should current status eventually be dropped?
- How often must a food be given to be considered “regularly given” (twice a week, every day, etc.)?
- What constitutes a semi-solid? A thin porridge is usually classified as a semi-solid but animal milk, which provides more nutrients, is not.
- What term should be applied to the feeding of a non-breastfed child who receives solids/semi-solids?

**Guiding principle #2: Maintenance of breastfeeding**

Continue frequent, on-demand breastfeeding until 2 years of age or beyond

This principle consists of two components: 1) continued breastfeeding and 2) breastfeeding frequency.

**Continued breastfeeding**

WHO reports on continued breastfeeding at 1 year (proportion of children 12–15 months of age who are breastfeeding) and 2 years (proportion of children 20–23 months of age who are breastfeeding) based on current status. Three-month age groupings have been suggested (e.g., 6–8, 9–11, 12–14, 15–17, 18–20, 21–23). They could be combined to form six-month intervals, which four-month intervals would not allow. However, three-month intervals would not permit comparison with the values of data previously collected using 12–15 and 20–23 month intervals. Moreover, using different age intervals for different indicators could pose problems. Given the sample size of many programs, some questioned whether it would be possible to capture change if the age range were less than four months. Another way to report on continued breastfeeding is by measuring median duration. The breastfeeding working group proposed consideration of the following definitions:

*Definitions:*

- 1) % children (age groups to be determined) who are breastfeeding (receiving breast milk) (current status)
- 2) The age (in months) when 50% of children are breastfed and 50% are not breastfed

*Questions:*

- How should the ages be grouped to measure continued breastfeeding?

**Breastfeeding frequency**

This indicator is often expressed as the average number of suckling episodes reported within the last 24 hours across breastfeeding mothers. Studies in Guatemala, Peru, and Bangladesh show that breastfeeding frequency correlates with breast milk intake at 6–15 months, but the correlation

coefficients are moderate (0.5–0.6). This can result in “misclassification.” Some breastfeeds may be very short and primarily for comfort, with little breast milk intake. Moreover, many women are unable to specify the number of times in a day that they breastfeed.

For guiding principle #2, the breastfeeding working group proposed consideration of the following definitions, both current status and history.

*Definitions:*

- 1) % children breastfed at least  $X$  times per day at each age interval (to be determined)
- 2) % children breastfed “on demand” at each age interval (to be determined)

In some societies where babies receive breast milk substitutes, it might be useful to calculate the breastfeeding intensity ratio:

$$\frac{\text{\# of breastfeeds}}{\text{total \# breastfeeds + milk feeds}}$$

*Questions:*

- How should “on-demand” be defined?
- Is it adequate to use the term frequent breastfeeding and drop “on-demand” when referring to a child past one year?
- What does the evidence tell us about reported breastfeeding frequency versus observed frequency?

### **Guiding principle #3: Responsive feeding**

Practice responsive feeding, applying the principles of psycho-social care. Specifically: a) feed infants directly and assist older children when they feed themselves, being sensitive to their hunger and satiety cues; b) feed slowly and patiently, and encourage children to eat, but do not force them; c) if children refuse many foods, experiment with different food combinations, tastes, textures and methods of encouragement; d) minimize distractions during meals if the child loses interest easily; e) remember that feeding times are periods of learning and love - talk to children during feeding, with eye to eye contact.

### **Responsive feeding**

The impact of responsive feeding practices is not well documented. Of the five aspects of guiding principle #3 that illustrate responsive feeding, none has been studied separate from other interventions. Three principles of psycho-social care apply to responsive feeding:

- Perceive and interpret accurately the child’s signals
- Respond adequately and promptly
- Use “scaffolding” in interactions

“Scaffolding” describes a learning process in which a caregiver observes and builds on a child’s abilities and skills, responds to various cues from the child, provides support when necessary, and gradually releases responsibility for the accomplishment of a task (eating).

Since the area of psycho-social care as it relates to responsive feeding is a relatively new field, some basic methodological issues need to be addressed, such as the ages for various indicators and the potential unreliability of a caregiver’s response because of her desire to give the “right”

answer. Responses may be difficult to interpret without asking a long list of questions. For example, an indicator proposed in *ProPAN* measures the proportion of caregivers reporting that the child eats to satiety. It was noted that the child's diminished appetite because of illness might be the primary factor rather than the caregiver's feeding practices. Concern was also expressed that emphasis appears to be placed on problems associated with *laissez faire* feeding, with little attention to other problems, such as obesity, that are associated with controlled feeding. From the list of illustrative indicators proposed by the working group on responsive feeding, two or three may emerge after validation and field testing that best capture the principles of responsive feeding.

### *Definitions*

(for responsive feeding behaviors a, b, c)

- 1) % caregivers who can name at least one positive strategy for getting children to eat
- 2) % caregiver who feed children based on a cue other than crying
- 3) % caregivers who continue to assist children in eating until they reach age 2 years

(for enabled feeding environment, [d])

% children with separate bowl

% children who someone sits with when the child is eating

(for learning and emotional support [e])

% caregivers who report talking to the child during mealtimes

% children who are fed by consistent, 'adult' caregiver

### *Questions:*

- Use verbal reports or observation?
- Ask about practices or parental ethnotheories?
- Ask about "typical behaviors" or specific behaviors ("yesterday")?
- Ask about the index child or "usual behaviors"?

### **Guiding principle #4: Safe preparation and storage of complementary foods**

Practice good hygiene and proper food handling by a) washing caregivers' and children's hands before food preparation and eating, b) storing foods safely and serving foods immediately after preparation, c) using clean utensils to prepare and serve food, d) using clean cups and bowls when feeding children, and e) avoiding the use of feeding bottles, which are difficult to keep clean.

### **Safe preparation and storage**

Five aspects of safe preparation and storage of complementary foods are included in guiding principle #4. It remains uncertain which of these aspects may have the greatest impact on the nutritional status of young children. The need for additional research on the impact of various preparation and storage methods was identified during the meeting.

A common problem with measuring hygiene practices is systematic falsification of responses because interviewees over-report better practices, knowing what the desired practices are. Methodologies are needed for collecting information on hygiene to improve the validity of the findings.

No working group was assigned to examine the proposed indicators for guiding principle #4. During the plenary sessions, a suggestion was made to consider proxy indicators about the last meal, water source, and location of soap.

#### **Guiding principle #5: Amount of complementary food needed**

Start at six months of age with small amounts of food and increase the quantity as the child gets older, while maintaining frequent breastfeeding. The energy needs from complementary foods for infants with “average” breast milk intake in developing countries are approximately 200 kcal per day at 6–8 months of age, 300 kcal per day at 9–11 months of age, and 550 kcal per day at 12–23 months of age. In industrialized countries these estimates differ somewhat (130, 310 and 580 kcal/d at 6–8, 9–11 and 12–23 months, respectively) because of differences in average breast milk intake.

#### **Quantity**

This principle adds a new dimension to principles #1 and #2 by focusing on the quantity of complementary foods consumed. One of the outcomes of the scientific review of the evidence was the lowering of total energy requirements from complementary foods for breastfed infants. These revised requirements are reflected in the guiding principle. The energy requirements should be used as rough estimates. For the individual child, the requirements could be higher depending on the level of breast milk intake and the health status of the child. Since the quantity of breast milk intake is unknown, the adequacy of energy intake is difficult to determine.

Energy density, quantity, and frequency serve as proxies for determining whether a child receives adequate energy from complementary foods. By determining the average energy densities of recipes and the average amount consumed, one can derive the minimum number of times the source(s) of energy should be fed per day according to the age of the child. Some participants questioned the value of recipe trials to arrive at energy density, maintaining that the recipe is often not representative.

Concern was expressed that the present indicators may lead some people to believe that the solution is to feed more when the problem may actually be illness, deficiencies in certain micronutrients like zinc that can depress appetite, unresponsiveness of caregivers to infant’s needs, the consistency of the food, or the quantity offered or available in the home. One suggestion was to ask the question, “Does baby eat all of the food given or leave some behind?” However, interpretation of the response to this question likely requires questions related to responsive feeding and the energy density of the food.

At one point the working group considered an indicator that would measure the proportion of infants 6–23 months fed at least  $X$  amount. In the end, the working group was not ready to recommend an indicator measuring adequate food intake. In a hierarchy of indicators, some felt that an indicator on food quantity should be a secondary level indicator.

#### *Questions:*

- What indicator can discriminate whether a child is receiving enough food without trying to estimate the quantity of food given to a child?
- Should the guiding principle state that a child should be eating family foods by 12 months? (The energy density of most family foods is likely to be more adequate than in special foods prepared for an infant.)

### **Guiding principle #6: Food consistency**

Gradually increase food consistency and variety as the infant gets older, adapting to the infant's requirements and abilities. Infants can eat pureed, mashed and semi-solid foods beginning at six months. By 8 months most infants can also eat "finger foods" (snacks that can be eaten by children alone). By 12 months, most children can eat the same types of foods as consumed by the rest of the family (keeping in mind the need for nutrient-dense foods, as explained in #8 below). Avoid foods that may cause choking (i.e., items that have a shape and/or consistency that may cause them to become lodged in the trachea, such as nuts, grapes, raw carrots).

#### **Food consistency**

A critical period may exist for the introduction of solid, lumpy food. If introduction is delayed, feeding and speech problems may develop. One suggestion was to measure food consistency using a set of pictures that illustrate different densities of a food falling off a spoon. Some felt that caregivers would have difficulty interpreting the pictures or that the time required to train interviewers to use the "spoon test" would be too time consuming.

#### *Questions:*

- Is the "spoon test" a valid methodology?
- Does consistency need to be measured beyond 8 or 11 months?

### **Guiding principle #7: Meal frequency and energy density**

Increase the number of times that the child is fed complementary foods as he/she gets older. The appropriate number of feedings depends on the energy density of the local foods and the usual amounts consumed at each feeding. For the average healthy breastfed infant, meals of complementary foods should be provided 2–3 times per day at 6–8 months of age and 3–4 times per day at 9–11 and 12–24 months of age, with additional nutritious snacks (such as a piece of fruit or bread or chapatti with nut paste) offered 1–2 times per day, as desired. Snacks are defined as foods eaten between meals-usually self-fed, convenient and easy to prepare. If energy density or amount of food per meal is low, or the child is no longer breastfed, more frequent meals may be required.

#### **Feeding frequencies**

The recommended number of meals and snacks is based on low breast milk intake. There is confusion around the recommendation for meals and snacks. Some interpreted the guiding principle to mean that snacks were optional. Others interpreted it to mean that one to two snacks should be offered daily at all ages. Concern was expressed that a single message campaign, such as one in Guatemala that promotes five meals per day, could result in the displacement of breast milk. In some places in Latin America, the caloric intake from a snack can equal or exceed the intake from a meal. Originally the working group proposed an indicator that would measure the proportion of infants 6–23 months fed solids/semi-solids at least (the minimum number) of meals. In the end, the working group felt that too many questions remained and was not prepared to recommend an indicator at this time.

*Questions:*

- Should the indicator refer to meals, meals and snacks, or feeds?
- What are the results when a mother is asked about the number of meals versus the number of feeds?
- What is the result of comparing answers to a question about the number of feeding episodes versus a series of questions about feeding at specific times during the day?

**Guiding principle #8: Nutrient content of complementary foods**

Feed a variety of foods to ensure that nutrient needs are met. Meat, poultry, fish or eggs should be eaten daily, or as often as possible. Vegetarian diets cannot meet nutrient needs at this age unless nutrient supplements or fortified products are used (see #9 below). Vitamin A-rich fruits and vegetables should be eaten daily. Provide diets with adequate fat content. Avoid giving drinks with low nutrient value, such as tea, coffee and sugary drinks such as soda. Limit the amount of juice offered so as to avoid displacing more nutrient-rich foods.

**Nutrient density**

Guiding principle #8 emphasizes the importance of a varied diet with animal source foods, vitamin A-rich fruits and vegetables, and fat. Numerous questions remain concerning infant and young child requirements for adequate daily nutrient intake. In some populations, good data are lacking on the prevalence of micronutrient deficiencies in children < 24 months. In most developing countries, consumption by infants of iron, zinc, and vitamin B6 is inadequate. Certain populations exhibit riboflavin and niacin deficiencies. The level of deficiencies in calcium, vitamin A, thiamin, folate, and vitamin C depends on the set of recommendations consulted. Harmonization of recommendations is needed.

Some participants favored 24-hour dietary recall while others argued that this procedure was impractical because it required extensive training and a lengthy questionnaire that resulted in boredom and fatigue for both interviewer and interviewee. For this reason some argued for focusing on a few foods or food groups.

Questions remain on the optimal percentage and type of fat for infants and young children. The addition of fat could limit the intake of other nutrients because babies tend to regulate their energy intake. On the other hand, it could increase the palatability of the food. Breast milk and milk products provide a major source of fat, yet they are not mentioned in this guiding principle.

The Working Group did not recommend an indicator but raised two research questions.

*Questions:*

- What is the validity of dietary diversity measures as compared to nutrient intakes?
- How do survey enumerators distinguish between token versus non-token amounts of different animal foods and milk? What is the minimum amount needed to be classified as non-token?

**Guiding principle #9: Use of vitamin-mineral supplements or fortified products for infant and mother**

Use fortified complementary foods or vitamin-mineral supplements for the infant, as needed. In some populations, breastfeeding mothers may also need vitamin-mineral supplements or fortified products, both for their own health and to ensure normal concentrations of certain nutrients (particularly vitamins) in their breast milk. [Such products may also be beneficial for pre-pregnant and pregnant women].

**Supplementation and fortification**

Issues regarding supplementation include feasibility and sustainability, identification of the most needed micronutrients, and possible risks of inappropriate dosages. None of the working groups focused on guiding principle #9. During the meeting, it was pointed out that iron requirements are virtually impossible to meet without supplementation in developing countries.

**Guiding principle #10: Feeding during and after illness**

Increase fluid intake during illness, including more frequent breastfeeding, and encourage the child to eat soft, varied, appetizing, favorite foods. After illness, give food more often than usual and encourage the child to eat more.

**Feeding during and after illness**

Continued intake of breast milk and complementary foods can help maintain nutrient intake and enhance recovery. After illness, increased nutrient intake is needed to compensate for losses and allow for catch-up growth. No working group reviewed this principle. In the discussion it was suggested that IMCI questionnaires be reviewed for appropriate questions and phrasing.

Table 3 summarizes the group work and recommendations. Because of time constraints, issues concerning hygiene, appetite, fortification, micronutrient supplementation, and feeding during and after illness received little attention during the meeting. No attempt was made to identify a summary indicator for complementary feeding practices.

**Table 3. Indicators Discussed by Working Groups and Suggested Actions**

Guiding principle	Indicator(s) for Consideration	Suggested actions
<b>1. Duration of exclusive breast-feeding and age of introduction of complementary foods</b>	Exclusive breastfeeding Current status: 0–5.9 months, 5.0–5.9 months History: age group to be determined (TBD)	Review standard definition; check data sets by current status vs. historical recall; perform survival analysis; study impact of under-estimates in early months
	Timely complementary feeding Current status: 6.0-9.9 months  Timely introduction of solid/semi-solid food [for breastfed child] Current status: age group TBD History: age group TBD  Timely introduction of solid/semi-solid food [definition not dependent on breast milk intake] Current status: age group TBD History: age group TBD	Review use of term “complementary feeding” and the implications for indicator definitions; check data sets (e.g. Zimbabwe, Viet Nam, Peru) by current status vs. historical recall for variability and validity
<b>2. Maintenance of breastfeeding</b>	Continued breastfeeding Age groups TBD  Median duration of breastfeeding (current status)	Check literature and, if needed, data sets on current status vs. historical recall and on age groupings
	Breastfeeding frequency (times per day, age groups TBD), (on-demand, age groups TBD)	Define “on-demand” and determine if needed in definition; check evidence for reported breastfeeding frequency vs. observed frequency
<b>3. Responsive feeding</b>	Proposed Indicators:  - % caregivers who can name at least one positive strategy for getting children to eat - % caregiver who feed children based on a cue other than crying - % caregivers who continue to assist children in eating until they reach age 2 years - % children with separate bowl % children who someone sits with when the child is eating - % caregivers who report talking to the child during mealtimes - % children who are fed by consistent,	Validate all of the proposed indicators; further analysis of Save the Children Viet Nam study, HOME questionnaire, and other survey findings can help in the validation process

	'adult' caregiver	
<b>4. Safe preparation and storage of complementary foods</b>	No group work	Identify methodologies that minimize bias
<b>5. Amount of complementary foods</b>	No recommended indicator	Determine whether the method used by Helen Keller International to measure consumption of vitamin A-rich foods could be applied to complementary foods
<b>6. Food consistency</b>	No recommended indicator	Suggest inquiry at community/project level using "spoon test"; determine age period when consistency is most critical
<b>7. Meal frequency and energy density</b>	No recommended indicator	Test different ways of asking the question (meals, meals and snack, or feeds) and compare response when asked about the number of feeding episodes vs. feeding at specific times of the day
<b>8. Nutrient content of complementary foods</b>	No recommended indicator	Harmonize recommended micronutrient requirements; test validity of dietary diversity measures vs. nutrient intakes; determine minimum amounts needed of selected nutrients such as iron and animal-source foods
<b>9. Use of vitamin-mineral supplements or fortified food products</b>	No group work	No explicit action proposed
<b>10. Feeding during and after illness</b>	No group work	Review IMCI questionnaires for appropriate questions and phrasing

### Next Steps

The responsive feeding working group proposed the following action plan.

- Incorporate results of the Responsive Feeding Working Group into the background paper on indicators by Ruel, Brown, and Caulfield
- Consolidate the bank of questions for testing
- Frame a testing procedure (validity and reliability)
- Identify testing sites and existing data
- Fund and conduct studies
- Report findings

Workshop participants agreed that this approach could be applied to the entire process of identifying complementary feeding indicators. Some questions could be answered by reviewing the large body of literature on the problems associated with historical recall. Other questions could be studied through a review of existing data sets. If existing data sets did not yield evidence of an indicator's validity, the indicator might need to be validated and field tested in diverse regions and among diverse populations.

Workshop participants identified ways in which their organizations might be able to move forward the process of defining a set of indicators for complementary feeding. They agreed that the mix of international organizations, bilateral programs, private voluntary organizations, and academia will enhance the process.

USAID would like to continue to be engaged in this collaborative effort. The USAID-funded FANTA Project could play an intermediary role between its academic partners and private voluntary organizations. FANTA may also be able to provide support for research activities. LINKAGES, another USAID-funded project, offered to provide technical review, the use of its data sets, field testing of questions in its 2003 surveys, and assistance in the analysis of indicators.

PAHO offered to host other meetings, feed information from *ProPAN* into the process, and examine data sets from small quantitative studies in the region. Data sets may also be available from Emory and Save the Children's Viet Nam study. It was suggested that university students could be enlisted to assist in data analysis and validation studies. The Instituto de Investigacion Nutricional in Peru has data sets on dietary intake and responsive feeding and the infrastructure to set up validation studies and conduct new research studies. The National Institute of Nutrition in India could also be involved in research activities

WHO plans to establish a mechanism to provide oversight for the development of indicators, develop a concrete work plan, send the meeting report with a message on proposed next steps to workshop participants, and convene another meeting, perhaps in the middle of 2003. Bernadette Daelmans invited participants to suggest the names of other to include in the process. One idea put forward was a joint meeting at some point with UNICEF's Early Childhood Development Group.

### **Acknowledgements**

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## **Annex 2 Agenda**

### **Informal meeting to review and develop indicators for infant and young child feeding practices**

WHO Regional Office for the Americas  
3-5 December 2002

*Tuesday, 3 December 2002*

9.00 – 9.30 Welcome (Dr Wilma Freire, PAHO)  
Background and objectives of the meeting (Dr Bernadette Daelmans, WHO/CAH)  
Introduction of the agenda and participants (Dr Chessa Lutter, PAHO)

#### *Definitions of recommended complementary feeding practices and outstanding issues*

09.30 - 10.45 Update on current scientific knowledge regarding appropriate infant and young child feeding practices, with emphasis on complementary feeding of the breastfed child (30 minutes - Dr Kathryn Dewey)

#### *Discussion*

10.45 - 11.15 Tea/coffee

#### Proposed indicators for complementary feeding

11.15 - 12.45 Overview of main issues described in the document 'Towards the development of indicators for assessing complementary feeding practices' (30 minutes – Dr Marie Ruel)

#### *Discussion*

12.45 – 14.00 Lunch

14.00 – 14.45 Conclusions and recommendations of the Consultation on Indicators for Care for Childhood Development, convened by UNICEF in November 2002 (20 minutes – Dr Patrice Engle)

#### *Experiences with measurement of infant and young child feeding practices to date*

14.45 - 15.30 Experiences developing and using global indicators to assess breastfeeding practices, and issues to be addressed (20 minutes – Dr Tessa Wardlaw, UNICEF)

15.30 – 16.00 Tea/coffee

16.00 - 16.45 Use of data related to complementary feeding practices from Demographic Health Surveys (15 minutes - Ms Mary Arimond, IFPRI and Dr Altrena Mukuria, Macro International)

16.45 - 17.30 Experiences developing and using indicators to assess complementary feeding in the context of field interventions (15 minutes – Dr Judiann McNulty, Mercy Corps)

### **Wednesday, 4 December 2002**

08.30 – 08.45 Summary of main issues identified on Day 1 (Chairperson)

08.45 – 09.15 Summary of key messages in WHO guidelines for complementary feeding (Dr Hilary Creed de Kanashiro, Mrs Randa Saadeh)

#### *Experiences with measurement of infant and young child feeding practices to date (continued)*

09.15 – 10.00 Experiences developing and using indicators to assess complementary feeding in the context of field interventions (15 minutes – Dr Tina Sanghvi, BASICS)

10.00 – 10.45 Experiences developing and using indicators to assess complementary feeding in the context of field interventions (15 minutes - Dr David Marsh, Save the Children)

10.45 – 11.15 Tea/coffee

11.15 - 12.00 Experiences developing and using indicators to assess complementary feeding in the context of field interventions (15 minutes – Dr Eunice Adjei, LINKAGES)

12.00 – 12.45 Process for the Promotion of Child Feeding (Propan) guidelines – overview and key issues (15 minutes – Dr Chessa Lutter, PAHO)

12.45 – 13.00 WHO Databank for infant and young child feeding (Mrs Randa Saadeh)

13.00 – 14.00 Lunch

#### *Identification of selected indicators for field validation and areas for research, possibly using existing data sets for validation*

14.00 – 14.15 Introduction to group work (themes and terms of reference for each groups to be determined)

14.15 – 17.30 Work in groups

### **Thursday, 5 December 2002**

08.30 – 10.30 Presentation of draft conclusions and recommendations from each group

10.30 – 11.00 Tea/coffee

11.00 – 12.30 Finalization of conclusions and recommendations in groups

12.30 – 13.30 Lunch

#### *Establishment of a formal inter-agency working group*

13.30 – 14.15 Plenary discussion on establishment of a formal inter-agency working group to guide the development of indicators for infant and young child feeding

#### *Consensus on strategy for developing a full set of indicators and identify next steps*

14.15 – 15.30 Final conclusions and recommendations, including responsibilities for next steps