

Très peu d'études ont mis en oeuvre l'observation systématique pour décrire le contenu et les contextes de l'alimentation infantile. Nous discuterons ici l'intérêt de l'analyse séquentielle dans la description du comportement alimentaire et des interactions enfants-adultes et enfants-enfants au cours du repas. Cette approche est avantageuse parce qu'elle permet de mettre en relation des données du comportement alimentaire – quand et comment l'enfant est exposé à quel aliment – et des données du contexte social concurrent – où, avec qui et comment interagit-il avec les autres.

Malgré le faible échantillon d'enfants suivis à ce jour, du fait du coût temporel de cette approche, l'analyse éthologique du comportement alimentaire devrait nous aider à mieux comprendre comment, au cours des 2 premières années, l'enfant est progressivement introduit aux habitudes ingestives de son groupe culturel. Bien que notre travail demeure préliminaire, il apportera quelques éléments à une discussion portant sur les facteurs qui gouvernent le modelage du jeune mangeur.

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COMPLEMENTARY FEEDING OF INFANTS IN DEVELOPING COUNTRIES: HOW TO DESIGN APPETIBLE TRANSITIONAL FOODS ?

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Protein-energy malnutrition still affects about one third of pre-school children in developing countries. Generally, it appears just after introduction of complementary foods which, at the beginning of the weaning period, consists in special transitional foods, i.e. gruel. Recently, the international scientific community and the United Nations agencies have reviewed the situation of current scientific knowledge on complementary feeding (WHO, 1998) in order to identify the recommendations to use when implementing nutritional interventions aimed at improving infant and young child nutrition and necessary additional research studies.

It is generally assumed that the gastric capacity of infants and young children ranges from 30 to 40 ml per kg of body weight. Actually, published data and preliminary results of surveys recently carried out in various African countries show that energy intakes per meal of gruel amongst 4-23-month-old children greatly vary and are considerably lower than expected considering their supposed gastric capacity. During the ten surveys we carried out in five African countries (Burkina Faso, Cameroon, Congo, Guinea and



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Senegal), the average amount of gruel consumed per meal ranged between 6.2 and 20.6 g per kg of body weight with a general average of about 15 g per kg of body weight.

As the increase of energy and nutrient intakes from gruels constitutes one of the possible and necessary conditions for improving child nutritional status, some recent reviews (WHO, 1998; Brown, 1997) had been devoted to the identification of the factors affecting intakes from complementary foods. Amongst the determinants of energy intakes from gruel, one can distinguish between immediate factors, underlying factors and some more fundamental causes.

Three immediate factors determine the level of the daily energy intake from gruel: the number of meals per day, the energy density of each gruel and the amount of gruel consumed at each meal. In most developing countries, the number of meals per day is generally two or three and cannot be easily increased because of caregivers' time constraints. Energy density mainly depends on the nature of foods and processes used for preparing gruels. The amount of gruel consumed per meal is undoubtedly the one which depends on the most numerous underlying factors. In fact, it depends on child's aptitude for ingesting food (i.e., gastric capacity, appetite, and possible food aversions), feeding habits, and gruel characteristics, particularly organoleptic ones such as consistency, flavour or aroma.

Three main categories of underlying factors can be distinguished depending on whether they are gruel-, caregiver- or child-dependent. Gruel characteristics (e.g., consistency, sweetness, aroma) determine its appetibility, that is to say its tendency to correspond to the infant's and the mother's expectations. Caregivers' dependent factors include the factors which determine the methods of preparing gruels, in particular the choice of food ingredients and processes and feeding habits (e.g., breast-feeding patterns, nature and feeding time of other complementary foods, intervals between meals, level of supervision and encouragement provided during gruel consumption). The main child-related underlying factors correspond to its appetite and gastric capacity.

In addition to immediate or underlying factors, three kinds of basic causes can be distinguished. The first one includes household characteristics (i.e., standard of living and purchase power, size and structure of the household, ethnic origin of household members) and mother's characteristics (age, occupations, level of education, nutritional knowledge, technological know-how) which have a significant influence on gruel preparation methods and determine feeding habits. The second one corresponds to food availability and depends on the agro-ecological context and, when foods are not produced by the mother or the household, on the price of ingredients likely to be incorporated into the gruels. The third one corresponds to a child's characteristics, both permanent (i.e. genetic factors and gender) and temporary (i.e., weight, nutritional and health status) which determine their aptitude for ingesting food.

The relative significance of the various immediate and underlying factors in free-living conditions is still not well known. The importance of some of them as gruel consistency (Trèche, 1996) is still controversial. But, it appears that, on top of a sufficient energy density, conferring on gruels sensory qualities corresponding to food preferences of infants is of the highest importance. In addition, the diet-related factors (i.e. energy density, consistency, fat content, sweetness, aroma) appear to be easier to influence than factors depending on feeding habits.

Until now, two approaches have been used to assess sensory characteristics of complementary foods in developing countries: sensory evaluation or consumer studies with mothers and consumption survey with infants or young children. Sensory evaluation is easy in its principle but its implementation in the field is often complicated because of mothers' illiteracy and the difficulty for them to understand some sensory testing methods. In addition, it only gives information on the mothers' preferences but neither on true preferences of children nor on the gruel acceptability by children. Consumer studies with mothers can be used to know their acceptance to give a kind of gruel to their child but the validity of this approach is limited by the reliability of their answers. The second one, which consists in measuring food intakes, provides a global indicator of food appropriateness. The consumption surveys have to be carried out in free living conditions following standardised protocols which require numerous surveyors and laboratory facilities for some necessary analyses. In the past, it allowed us to establish the importance of some gruel characteristics as energy density, consistency and sweetness (Vieu et al., 2001) but it takes a long time, needs the bringing into play of considerable resources and does not always allow to distinguish between child- and gruel-dependent factors.

Thus, in order to allow technologists to identify the best characteristics to confer on complementary foods, development of appropriate techniques to assess adequacy of gruel sensory qualities to infant preferences is urgently needed.

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**SMELLING, TASTING, EATING:
FOCUS ON DEVELOPMENT**

**HUMER, SAVOURER, MANGER :
ECLAIRAGES SUR LE DEVELOPPEMENT
PRECOCE**



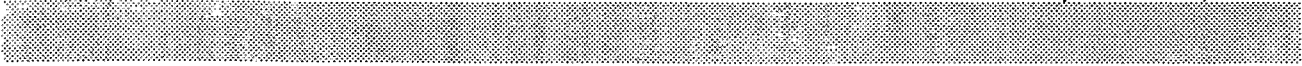
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Complementary feeding of infants in developing countries: How to design appetible transitional foods ?

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As the increase of energy and nutrient intakes from gruels constitutes one of the possible and necessary conditions for improving child nutritional status, some recent reviews^(1,2) had been devoted to the identification of the factors affecting intakes from complementary foods. Amongst the determinants of energy intakes from gruel, one can distinguish between immediate factors, underlying factors and some more fundamental causes.

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