

Nutri-Bébé 2013 Study Part 1. Presentation and methodological considerations

Enquête Nutri-Bébé 2013 Partie 1. Présentation et considérations méthodologiques

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Summary

The French Agency for Children's Foods (SFAE) has conducted a national survey on the eating behaviors and food consumption of children under 3 years of age every 8 years since 1981. A survey of this scope requires the involvement of many stakeholders with diverse skills (professionals in conducting studies and surveys, healthcare professionals and researchers such as pediatricians and nutritionists, sociologists and statisticians) before, during and after the completion of the survey. In 2013, the survey was repeated and focused on 1188 children aged 15 days to 35 months. This survey is original in that it examines the habits and behaviors of mothers regarding their child's diet and also assesses the children's diet from a quantitative point of view (in terms of daily food intakes and nutrient intakes). The purpose of the present paper is to describe the methodology of the national dietary survey and to discuss the effects of the method on the assessment of food and nutrient intakes.

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Résumé

Le Secteur français des aliments de l'enfance (SFAE) conduit tous les 8 ans depuis 1981 une enquête nationale sur les comportements et la consommation alimentaires des enfants âgés de moins de 3 ans. Une enquête d'une telle envergure nécessite l'implication de nombreuses parties aux compétences variées (professionnels des études et sondages, professionnels de santé et chercheurs tels que des pédiatres et des nutritionnistes, sociologues et statisticiens), avant, pendant et après la réalisation du terrain. En 2013, l'enquête a été renouvelée et a porté sur 1188 enfants âgés de 15 jours à 35 mois. L'originalité de cette enquête réside dans le fait qu'elle a étudié d'une part les habitudes et comportements des mères en matière d'alimentation de leur enfant et d'autre part qu'elle a permis d'évaluer le régime alimentaire de ces enfants d'un point de vue quantitatif (en termes d'apports journaliers et d'apports nutritionnels). Le but du présent article est de décrire la méthodologie de l'enquête nationale sur l'alimentation des moins de 3 ans et de discuter les effets de la méthode sur l'évaluation des apports alimentaires et nutritionnels de cette population.

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1. Introduction

Knowledge on behavior and food consumption is valuable, for the entire scientific and medical community, the public authorities and child dietary professionals through the French Agency for Children's Foods (SFAE). Dietary professionals have been fully committed to this issue in their assistance in making an increasing number of foods that are specific to these ages available to families living in France. Products for infants and young children have a specific composition adapted to their nutritional requirements, most particularly because until the age of 3 years the composition of these is governed by extremely strict regulations. The first section of the Nutri-Bébé 2013 study ("Behaviors" arm) reviews mothers' behavior in feeding their child. The second section ("Consumption" arm) provides an understanding of the levels of nutritional intake and identifies significant differences according to the children's age in terms of certain nutrients compared to the guidelines defined by the qualified bodies, i.e., the food safety authorities (National Food, Environmental and Work Safety Agency (ANSES) and the European Food Safety Agency (EFSA) for Europe.

These types of food and nutritional studies are widely used to monitor levels of food and drink consumption and nutritional intake in population groups and to assess the risks of inadequate or excessive intake of certain nutrients due to poor dietary habits. The SFAE Nutri-Bébé 2013 national food study meets this primary objective.

2. Method

2.1. History of the study

Every 8 years since 1981 SFAE has conducted a national survey on food behaviors and consumption in children under 3 years of age. This has used an equivalent methodology over the years and now shows the change in children's eating behavior over a period lasting more than three decades. The first survey in 1981 involved 649 children between 0 and 24 months of age [1]. It was conducted again in 1989, in 1999 children between 0 and 18 months of age [2]. A third survey was conducted in 1997 in 660 children between 0 and 30 months of age [3].

In 2005, the survey was based on 713 children between 1 and 36 months old [4]. The survey conducted in 2013 and described here (the Nutri-Bébé 2013 study) examined 1,188 children.

2.2. Primary objectives of the study

The survey's objectives were to explore and identify behaviors and consumptions in French children under 3 years of age. The observations from the "Consumption" arm of the previous surveys were

both reassuring, confirming that young children living in France were well-nourished overall, and a warning to alert the authorities on nutritional differences in terms of certain nutrients [4,5]. The consumption database can also be used to estimate the intake of contaminants, toxins and additives, etc.

2.3. Date of data collection

The survey was conducted in the field in mainland France from 3 January to 21 April 2013, by the TNS Sofres Sampling Institute using a methodology that was fairly similar to those in the previous versions (1981, 1989, 1997, 2005).

2.4. Ethics and confidentiality rules

The study protocol was developed in accordance with the "Informatique et Libertés" law (Law no. 78-17, 6 January 1978) (French Data Protection Act), modified, through application of European Directive 95/46/EC on the protection of natural persons with regard to the processing and circulation of personal data [6]. Participation of the individuals questioned in this survey was entirely voluntary and optional at all stages. Answers were handled in a strictly statistical manner. When the databases ("Consumption" arm) were sent to a third-party institute, as occurs in the Research Centre for study and observation of living conditions (CRÉDOC) for analysis of nutritional intake, they were routinely anonymized. Confidentiality agreements for the TNS Sofres surveys were available to respondents on its website [7].

2.5. Construction of the survey and sampling plan

Since the first survey in 1981 and up to this survey, all questions were put to mothers of children under 36 months of age. The questions in the "Behaviors" arm have changed, although they were amended as little as possible in order to be able to compare the different surveys. The 2013 consumption booklet for the "Consumption" arm has remained very similar to the 2005 booklet. A main sample (897 children) was recruited using the quota sampling method [8] (based on the child's age and sex, the mother's activity, occupation or socio-occupational category of the household representative (excluding the extremely underprivileged) to recruit the population of mothers: the listing was produced by the National Institute for Statistics and Economic Research (INSEE)) using surveyors living throughout mainland France (national geographic spread over the five following major regions: Paris region, West, North and East, Southwest and Southeast) stratified by conurbation size to provide a good representation of all types of population and residential area. In addition to this main sample, further samples were formed based on whether or not the baby was consuming "follow-on milk"

preparations or specific baby milk drinks and whether or not the baby was being breastfed, in order to obtain larger numbers per age band or for some targeted areas of interest. The first additional sample was formed in order to compare nutritional intake of “follow-on milk” consumers to those of non-consumers and the second to obtain a similar sample to the previous wave of this survey (2005), which did not include breastfed babies [4].

A total of 1,188 mothers of children aged between 15 days and 35 months took part in the Nutri-Bébé 2013 study: 897 mothers questioned in the “Behaviors” arm; 1,184 mothers questioned in the “Consumption” arm (four mothers did not take part in this: one of a child from the additional sample of follow-on milk consumers and three from the main sample).

2.6. Population questioned and exclusion criteria

In 2005, breastfed children – either totally or partially – had not been included in the protocol. These exclusions ($n=123$) were counted when they were recruited by the surveyors and the final sample included 713 women who were questioned. In 2013, breastfed children were included, forming a sample of 1,188 mothers of children between 15 days and 35 months old in good health including 1,035 mothers who were not breastfeeding at the time of the survey. The exclusion criteria (the number of children excluded for each criterion is shown between parentheses) were:

- children in day care centers, which refused to complete the consumption diary ($n=4$);
- children at school during the days following the first visit from the surveyor;
- mothers not giving their consent for their child to be weighed during the second visit (if the mother refused, the surveyor could record the child’s weight entered in the child’s health booklet provided that the this weight was recent) ($n=4$);
- ill children (chronic ($n=5$) or acute ($n=3$) disease);
- birthweight under 2,500 g ($n=27$).

Thus, 43 recruitment questionnaires (3.5%) did not result in a usable consumption diary.

2.7. Conducting the survey

2.7.1. Recruitment questionnaire

Mothers and their children were recruited via a “recruitment” questionnaire. Each surveyor randomly recruited the mothers of young children according to quotas defined in advance. If the mother or her child did not meet the desired profile the surveyor continued to search for a new mother. Once the mother volunteered to take part in the survey, the surveyor made an appointment to conduct the face-to-face interview.

2.7.2. First visit

The first visit involved an initial questionnaire lasting 20–25 minutes and had two objectives:

- to ask the mother about the characteristics of the child, herself and the household; the the methods used to feed the child (the person feeding or preparing meals, time of the day when the child was fed, ways of feeding the child, etc.); consumption of bottled milk (frequency of bottles, sterilization, method of preparation, type of milk, temperature, water used, heating); and methods for diversifying food if this had begun;
- to present and comment on the consumption diary: with the mother and as required the surveyor determined the days the food diary was completed. He or she provided a model diary, a photographic reference book of portions and household measures suitable for the child’s age, together with a measuring glass.

2.7.3. Completion of the consumption diary

The child’s consumption diary was generally completed by the mother over a period of 3 days (2 week days and 1 weekend day).

The mothers were given the following instructions:

- *You should record everything your baby consumes in this diary, even snacks and drinks. Breastfeeding should also be recorded.*
- *Please make the entries as your baby consumes the foods so that nothing is forgotten.*
- *If you leave your baby with someone else (childminder, nanny, friend, relative, etc.) please give the diary to that person so that they can record everything they have given your baby.*

All of the substances consumed were recorded, whether liquid or solid (name of food, brand if applicable) together with their ingredients if they were homemade. The type of water drunk on its own (filtered, bottled or tap) was recorded. For each food entered, the context of how it was taken (time, occasions) was recorded. The amounts served and remaining (in grams, milliliters or dose) of each food consumed and of their ingredients were recorded where applicable. To estimate the amounts of food served to the child and the amounts remaining after the meal, the mothers had a measuring glass and a photographic reference book of portions and household measures during the survey [9]. The person in charge of completing the food diary was asked to weigh the foods or use the information on the products or their packages for foods not prepared at home as often as possible.

On the back of the food diary, the mothers were asked to complete daily or occasional doses of vitamins or minerals taken with the question: “What vitamin or mineral supplements or medications are you giving your child at the moment?” They were also requested to record vitamin D supplementation taken every 3 months.

2.7.4. Second visit

The second visit, which lasted 35 minutes, was carried out by the surveyor with two objectives:

- to confirm that the whole diary had been correctly completed; any missing details present were completed with the mother;
- to ask the mother about the child's consumption of milk (daily amount, type of milk consumed, frequency of consumption, whether the child was breastfed only, partial breastfeeding and age when breastfeeding stopped, sources of advice and reasons for changing to follow-on milk/cow's milk) and solid foods (receipt of first solid foods, age started, types of texture, method for heating food, first foods consumed, frequency of consumption of specific baby foods or common foods depending on age), the context and times the child was fed (at the same time as its parents, the same thing as its parents, attitudes toward cooking, meals while watching television or other distractions, the child's independence, refusal of some foods), shopping habits (place the mother shopped for specific baby products) and the child's activities for those over 12 months of age (mode of locomotion, watching a screen).

2.8. Data from questionnaires and food diaries

2.8.1. Questionnaires from the "Behavior" arm

The answers to the questionnaires were recorded on site using CAPI (a computer-assisted personal interviewing method) software. Checks and coherence tests were performed after registration by TNS Sofres to guarantee the sample quality. Apart from weighing the child, an anthropometric measurement, no medical tests were carried out.

2.8.2. Food diaries for the "Consumption" arm

A table was produced containing the composition of foods consumed by children under 3 years of age (CIQUAL composition table for common foods [10] and composition table for foods specific for babies produced with the assistance of children's food sector companies). Each entry (of food) was coded in this table. The diaries were reread by two experienced dietitians and the foods or ingredients were coded using the predetermined codification. Double data entry was used to reduce registration errors. The proofreading and coding work was done by the Cfk-ISL Institute, which is specialized in this type of work: this organization carried out the INCA 2 national foods and nutritional consumption survey in 2005–2006 for the National Food, Environmental and Work Safety Agency (ANSES) [11]. Instructions for coding and electronic registration of the food diaries were established by CREDOC in order to facilitate their statistical analysis as much as possible (e.g., in terms of consistency of coding bottles of milk depending on whether or not the milk was prepared from powder). Corrections could be made so that the information completed in the food diaries was coherent.

2.9. Adjustment and data analysis

2.9.1. Data analysis

TNS Sofres analyzed the "Behavior" arm questionnaire. The "Consumption" arm, which was analyzed by CRÉDOC, was based on the consumption diary containing all of the foods consumed by the children, recorded over 3 days (2 week days and 1 weekend day). A nutritional composition table of children's foods (foods specific for small children) and of common foods (those eaten by the rest of the family) was used to estimate the average nutritional intake of the infants and young children by age band and the contribution of different categories of foods (specific baby foods and common foods) to this intake. Different references were used to assess the appropriateness of nutritional intake: the French recommended nutritional intakes [12] as well as recent recommendations published by EFSA [13, 14]. The statistical analyses were done using SAS 9.2 software.

3. Discussion

The surveys conducted by SFAE on feeding infants and young children are at present the only surveys of this type developed in France. The questions were put to large samples and allow statistical inferences to be drawn. The nutritional surveys (food records via diaries or recall within the previous 24 hours) are widely used methods to estimate average food and nutritional intakes in populations. They are also commonly used for monitoring purposes by the food health safety agencies and answer the following questions: What do we eat? How much? What does this mean in terms of energy, macronutrient and micronutrient intake? Do the nutrients eaten cover nutritional requirements? The "24 hour recall" method is widely used in Europe and is recommended by EASA for adult populations [15]. In terms of collecting individual data for young children, the "food diary" method is more recommended and therefore was used in the Nutri-Bébé 2013 survey. There is a great deal of literature on the advantages and disadvantages of each of these methods. The main differences found are listed below:

- The food diary generally provides a higher level of detail than 24-hour recall where the respondents' memory effect has a negative impact on the accuracy of data collection.
- Intra-individual variability exists with both methods, but the estimate appears to be better when the days declared are independent (at least nonconsecutive). With this in mind, it is common to ask about weekdays (nonconsecutive) and at least one weekend day. This option was chosen here.
- the participation rate appears to be lower for the food diary collection method, which requires greater cooperation from respondents,

while the 24-hour recall method should be used in preference to reach populations with lower educational levels.

Particularly in the population of young children, it is essential to use an open method in which all of the foods and drinks consumed can be recorded and described with maximum details on the types of products or their brand. The nutritional composition of children's foods is specific and varies greatly between brands and products within the same brand. This applies particularly to follow-on preparations and follow-on milks. There was no composition table for specific children's food in France in 2013 and to estimate nutritional intake one had to be created. Data on many products were recorded from SFAE members (1076 products) through healthcare professional brochures (21 products), official company websites (54 products) or shops (eight products). Completion rates varied depending on the nutrients and estimates were made for missing values based on competing brand products or the same category of food (baby-specific or nonspecific). Nutritional intake was therefore obtained from actual and estimated composition data. This technique is increasingly used on a larger scale and many composition tables now contain "generic foods" (such as generic cheese and generic vegetables) the composition of which is based on the average compositions of foods of the same type. The work conducted in the Nutri-Bébé 2013 study is derived from these estimation methods. Its advantage is that it provides a value for all products for which content is not available per 100 grams and allows the reality of consumption to be optimally estimated (rather than allocating a zero value if data are missing).

There are several significant methodological differences compared to the 2005 survey:

- The age bands were defined as "strict" age, as in common parlance. The 4-month band, for example, included children who were from 4 months to 4 months and 29 days old. Dividing the Nutri-Bébé 2013 survey into 11 age bands allowed behaviors to be identified as accurately as possible and enabled us to determine whether or not the recommendations were being followed for each age band. The health authorities release messages for feeding babies and young children: "do not start foods other than infant preparations under 4 months of age," "start diversifying the diet between 4 and 6 months of age," "start gluten between 4 and 7 months of age," "follow-on milk from 10 to 12 months to 3 years of age," etc.
- The inclusion of breastfed children who were excluded from previous studies provided essential information about the behavior of breastfeeding mothers, their profile, length of breastfeeding, types of foods they chose for diversification, and the use of follow-on milk from 1 to 3 years of age.
- The child's weight was measured using scales (with a precision of 100 g) provided by the investigator, whereas in previous studies the mother's estimate, which may have been more approximate, was used.

- The number of babies included in each age band was increased: approximately 80 babies instead of 60, in order to improve the significance of the results obtained.
- Taking nutritional supplements (particularly vitamin D) was to be declared by the person completing the diary.

4. Conclusion

The consumption data from the Nutri-Bébé 2013 survey are essential to analyze nutritional intake of children under 3 years of age and to identify inadequate (or excess) intake with regards to the French or European recommendations by measuring differences and their possible causes. The data can also be used to assess exposure to pesticides and additives, etc., partly due to the flexible design and its methodology. The use of this type of data in assessing risks, however, requires particular attention be paid to the many food descriptors that need to be collected (for example, information about brands is essential).

Declaration of interests

The author declares that he has no conflicts of interest with this article.

References

- [1] Boggio V, Lestrade H, Astier-Dumas M, et al. Caractéristiques de la ration alimentaire des enfants français de 3 à 24 mois. *Arch Pediatr* 1984;41:499-505.
- [2] Boggio V, Fantino M. Évolution récente des apports nutritionnels chez les nourrissons français : comparaison des 2 enquêtes nationales réalisées en 1981 et 1989. In: Journées parisiennes de pédiatrie. Médecine-Sciences Flammarion 1991, p.275-82.
- [3] Boggio V, Grossiord A, Guyon S, et al. Consommations alimentaires des nourrissons et des enfants en bas âge en France en 1997. *Arch Pediatr* 1999;6:740-7.
- [4] Fantino M, Gourmet É. Apports nutritionnels en France en 2005 chez les enfants non allaités âgés de moins de 36 mois. *Arch Pediatr* 2008;15:32-47.
- [5] Fantino M. Contribution des aliments spécifiques bébés aux apports nutritionnels des enfants non allaités âgés de moins de 36 mois : nouvelle analyse des données de l'enquête alimentaire de 2005. *Arch Pediatr* 2008;15:48-63.
- [6] CNIL. Textes fondateurs. Loi informatique et libertés. <http://www.cnil.fr/documentation/textes-fondateurs/loi78-17/> (site accessible le 15 juin 2015).
- [7] TNS Sofres. Données personnelles : engagement de confidentialité vis-à-vis des répondants à nos enquêtes. <http://www.tns-sofres.com/donnees-personnelles> (site accessible le 15 juin 2015).
- [8] Ardilly P. Les techniques de sondage. Editions Technip, Paris, 2006.
- [9] Le Moullec N, Deheeger M, Preziosi P, et al. Validation du manuel-photos utilisé pour l'enquête alimentaire de l'étude SU.VI.MAX. *Cahiers de Nutrition et de Diététique* 1996;31:158-63.

- [10] Agence nationale de sécurité sanitaire alimentation, environnement, travail (Anses). Composition nutritionnelle des aliments : TABLE Ciqual 2012. <http://www.afssa.fr/TableCIQUAL/> (site accessible le 15 juin 2015).
- [11] Étude Individuelle Nationale des Consommations Alimentaires 2 (INCA 2) 2006-2007. Rapport Sept. 2009. <http://www.afssa.fr/Documents/PASER-Ra-INCA2.pdf> (site accessible le 15 juin 2015).
- [12] Martin A. Apports Nutritionnels Conseillés pour la population française, 3^e édition, Paris : Éditions Tec & Doc, Lavoisier, 2001.
- [13] EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA). Scientific opinion on nutrient requirements and dietary intakes of infants and young children in the European Union. *EFSA Journal* 2013;11:3408.
- [14] EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA). Scientific opinion on the essential composition of infant and follow-on formulae. *EFSA Journal* 2014;12:3760.
- [15] General principles for the collection of national food consumption data in the view of a pan-European dietary survey. *European Food Safety Authority. EFSA Journal* 2009;7:1435

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