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Article

Nutri-Bébé 2013 Study Part 2. How do French mothers feed their young children?

Enquête Nutri-Bébé 2013 Partie 2. Comment les mères nourrissent-elles leur enfant ?

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Summary

Nutri-Baby SFAE 2013 is the 5th edition of a survey conducted every 8 years since 1981 by SFAE (Secteur Français des Aliments de l'Enfance) in collaboration with an opinion poll institute (SOFRES) for the feeding behavior part of the study and with CREDOC for calculating nutrient intake: 1,188 mothers of infants and young children from 15 days to 3 years of age were interviewed in 2013. The present paper is limited to the behavioral part of the investigation on the observance by mothers of pediatric recommendations. Overall, the "2013 mother" is self-confident (76% declare being confident in their experience and instinct). They are aware of the recommendations of healthcare professionals, but the family circle is also influential. Although growing-up milk is more widely consumed than in 2005 (+8%), cow's milk (half-skimmed and not whole milk), even if it is introduced 2 months later than in 2005, is still consumed by 34% of children at 12–17 months of age and by 64% of 24 – to 29-month-old children. Milk is still frequently warmed up in a microwave oven. Breastfeeding mothers or those who breastfed more frequently give growing-up milk and home-cooked foods and afterwards their children refuse different foods less frequently. Adult foods that are not adapted for children are introduced too early. Foods in morsels are proposed very late. Fried foods and sweet foods appear too early in infant meals. Consumption of infant formulas and specific baby foods is increasing, but at around 1 year of age a decrease in the consumption of these adapted foods is observed.

Résumé

L'étude Nutri-Bébé SFAE 2013 est la 5e édition d'une enquête menée tous les 8 ans depuis 1981 par le Secteur français des aliments de l'enfance (SFAE) avec la TNS-Sofres pour le volet « comportements alimentaires ou comportements » et le Centre de recherche pour l'étude et l'observation des conditions de vie (CREDOC) pour le volet « Consommation » : 1188 mamans de bébés âgés de 15 jours à 35 mois ont été interrogées en 2013. Cet article présente le volet « Comportement », qui nous éclaire sur l'observance des mamans vis-à-vis des recommandations pédiatriques. La maman 2013 est confiante (76 % déclarent faire confiance à leur expérience et à leur instinct). Les conseils du professionnel de santé restent écoutés mais concurrencés par ceux de l'entourage. Si le lait de croissance (LC) est plus consommé qu'en 2005 (+ 8%), le lait de vache, principalement demi-écrémé, même introduit 2 mois plus tard, concerne encore 34 % des enfants de 12 à 17 mois et 64 % de 24 à 29 mois. Le lait est encore souvent réchauffé au four à micro-ondes. Les mères allaitantes ou ayant allaité donnent davantage de LC et choisissent davantage le « fait maison ». Certains aliments d'adultes sont introduits trop tôt. Les morceaux sont proposés très tard, les produits frits trop prématurément, comme les produits sucrés. La consommation des laits infantiles et des repas spécifiques pour bébé est en hausse, mais vers 1 an une chute des aliments adaptés au très jeune enfant est observée.

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1. Introduction

The French Agency for Children's Foods (SFAE) has conducted a study on food behaviours and consumption in French children in metropolitan France between the ages of 0 and 35 months of age with the TNS-Sofres polling institute every 8 years since 1981 [1-5]. The Nutri-Bébé SFAE 2013 study is the fifth edition of this survey, which produces useful information for both parents and early childhood specialists that can measure with objective data the appropriate adherence to nutritional guidelines and any divergences from these recommendations.

2. Method

The survey questioned parents of infants and young children (hereafter children) between the ages of 15 days and 35 months, excluding ill children, those with a birth weight under 2.5kg and those already in school. A total of 1,188 mothers agreed to take part in the survey. The sample was representative of the French population excluding the extremely underprivileged, based on age, sex of the child (50/50), mother's activity (working/not working: 60/40), occupation and socio-economic categories (PSEC) [PSEC+ (farm workers, craftsmen/women, executives, intermediary occupations) / PSEC- (blue-collar workers, manual workers) / not working: 19/44/7], national geographical distribution [nine UDA-INSEE regions (Union of Announcers and French National Institute for Statistics and Economic Research)] and type of residence.

The study was conducted by TNS-Sofres, which is the reference organization for marketing and opinion studies [6]. Two home visits were conducted by specially trained professional interviewers. Each interviewer recorded the mothers' answers about their behaviour in feeding their child ("Behaviour" component) and explained how to complete the diary showing the child's precise consumption over 3 days (2 weekdays and 1 weekend day) (consumption component managed by the Research Centre for the Study and Observation of Living Conditions: CRÉDOC) [7]. This article presents the results of the "Behaviours" component. It differs from the study conducted in 2005 [3-5]:

- Age was defined as "strict" age, as in common parlance. The age of 4 months, for example, included children who were between 4 months and 4 months and 29 days old. Dividing the Nutri-Bébé 2013 survey into 11 age categories allowed behaviours to be identified as accurately as possible and made it possible to follow the recommendations of the health authorities concerning feeding infants and young children: "do not start foods other than infant preparations under the age of 4 months" [8], "never start diversifying the diet before 4 months and preferably not until after 6 months" [9], "start gluten between 4 and 7 months" [10], "start growing-up milk (GUM) from 10 to 12 months to 3 years" [11], etc.
- Inclusion of breastfed children who were excluded from previous studies provides essential information about the behaviour of breastfeeding mothers, their profile, length of breastfeeding, types of foods they chose for complementary feeding, and the use of GUM from 1 to 3 years;
- The child was weighed using scales (within 100 g) provided by the interviewers, whereas in previous studies only estimates based on the parents' answers were used;
- the number of children included in each age category was increased: approximately 80 children instead of 60, in order to improve the precision and significance of the results obtained.

In order to make comparisons possible, it was decided that PSEC would be defined in 2013 in the same way as in 2005. The distribution of the three professional categories in 2013 was 41% for PSEC+, 53% for PSEC- and 6% for those not working.

3. Results

3.1. Social situation

Some social changes were noted compared to 2005:

- an increase in separated or divorced mothers (4% versus 2%);
- an increase in head-of-household mothers (18% versus 14%);
- an increase in paternity leave (13% versus 5%);
- 12% of mothers reported that their household had financial difficulties.

As in 2005, mothers prepared meals and usually fed their child (84%). Despite the increase in paternity leave, the role of the father in feeding their child remained minor. This changed with the child's age: more fathers served a meal prepared by the mother beginning at the age of 12 months. Mothers reported that only 2% of fathers (versus 1% in 2005) fed their child regularly. This was in response to a question on the practices in the days preceding the survey. When they were asked about their intention to participate in the upcoming days, the corresponding figure was 8% (versus 1% in 2005).

3.2. Source of advice

In feeding their children, mothers relied first on their own instinct and experience (76%). The medical profession, mostly paediatricians and mother and child protection (MCP) physicians were a greater source of nutritional information (58%) than the family circle (36%). The media were ranked last and were not reported as an important source of advice (22%) (Fig. 1).

The youngest mothers (< 25 years) and those whose child was their first trusted their doctor more as well as family and friends (61% used medical advice and 52% advice from the family circle).

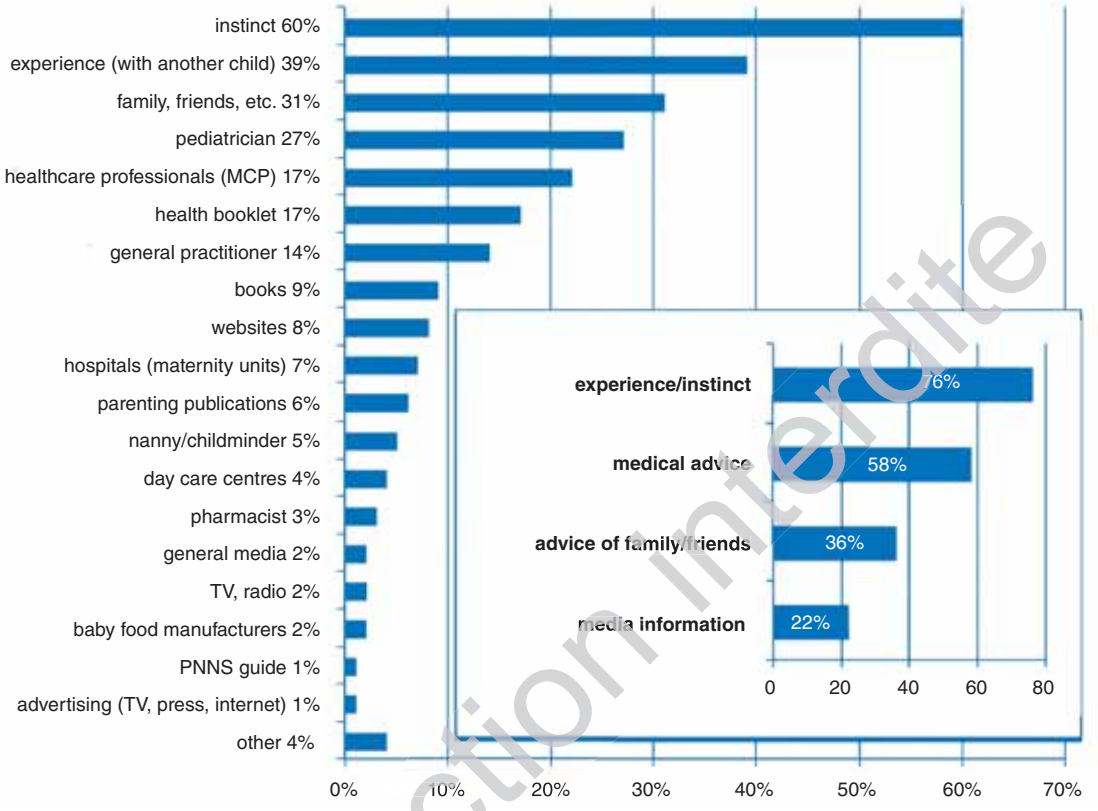

Figure 1. Source of advice for mothers of children between 15 days and 35 months old for feeding their child.
Mothers reported several items: on average each mother reported 2.64 items. The inset shows the sources of advice reported on the left in the four major categories. The item «medical advice» includes advice provided by the paediatrician, MCP, the child's health booklet, the general practitioner, hospital, day care centre, pharmacist and the national health nutrition program (PNNS) guide. When the above items were pooled, multiple responses were taken into account. Instinct was reported in 60% of responses and experience in 39%; given that 23% of mothers reported both items, pooling the two items together gives a total of 60 + 39 – 23 = 76%.

On the other hand, mothers who had several children and the oldest mothers based their decisions more on their experience (87% of multiparous women and 82% of those over 35 years) (Table I).

3.3. Milk intake

3.3.1. Breastfeeding practices

The survey showed that:

- The percentage of breastfed children (exclusively or partially) was 45% of those between 15 days and 3 months, 23% of those between 4 and 5 months, 15% between 6 and 7 months and 8% between 8 and 11 months.
- The average length of exclusive or partial breastfeeding was slightly over 4 months, whereas the majority of mothers had intended to breastfeed their child for 15 months.
- Mothers who breastfed exclusively did so on demand and not at a set time in 78% of cases.
- Mothers who breastfed or had breastfed gave more GUM (32% versus 25%) and less CM (31% versus 48%);
- Of all children between 0 and 3 years old, 11% received breastmilk (BM). This figure rose with socio-economic category: 12% for PSEC+, 10% for PSEC- and 7% for those not working (these were trends, not statistically different). Children of multiparous mothers received BM more often than those of primiparous mothers (12% versus 5%), and similarly for children of mothers ≥ 35 years old versus ≤ 25 years old (11% versus 5%) (Table II).
- Of all children between the ages of 0 and 3 years, 11% of mothers were breastfeeding their child at the time of the survey (54% were breastfeeding exclusively), 38% had never breastfed and 51% had breastfed in the past (27% had breastfed exclusively).
- There were more mothers who breastfed or had breastfed:

Table I. Sources of advice for mothers of children between 15 days and 35 months old according to age, number of children, breastfeeding status and socio-economic category

	Under 25 yrs old	35 yrs and older	Primi-parous	Multiparous	Breastfeeding or had breastfed	Not breastfeeding	PSEC +	PSEC-	Not working
Experience and instinct	67%	82%	59%	87%	74%	79%	75%	72%	82%
Medical advice	61%	59%	66%	54%	64%	51%	66%	**61%**	52%
Advice of family and friends	52%	29%	46%	29%	37%	35%	39%	35%	35%
Information from the media	20%	18%	31%	17%	25%	18%	28%	27%	14%

In this table, the magnitude of the different advice sources shown in Figure 1 is compared by mother's age, number of children and socio-economic category. Several advice sources could be reported by the mothers.
PSEC (Profession and Socio-Economic Categories):
1. PSECS+: farm workers, craftsmen/women, executives, intermediary occupations
2. PSEC-: blue-collar workers, manual workers
3. Not working

Table II. Type of milk consumed by children between 15 days and 35 months old depending on age, number of children, breastfeeding status and socio-economic group.

	Less than 25 yrs old	35 yrs old and older	Primi-parous	Multi-parous	Breastfeeding or had breastfed	Not breastfeeding	PSEC +	PSEC-	Not working
Breast milk	5%	11%	5%	12%	15%	0%	12%	10%	7%
1st stage milk	11%	5%	10%	8%	8%	10%	7%	9%	10%
2nd stage milk	12%	12%	13%	13%	12%	14%	15%	12%	12%
Growing-up milk	16%	33%	**35%**	**25%**	**32%**	**25%**	**40%**	**29%**	**23%**
Cow's milk	**52%**	**34%**	32%	40%	**31%**	**48%**	**24%**	**35%**	**46%**
Milk drink *	**0%**	**5%**	3%	**1%**	1%	3%	1%	3%	1%

* specific milk drinks for babies (ready-to-use milk **drinks with cereals, cocoa, etc.**).
The differences in consumption for each criterion are significant when the percentages are shown in bold on a grey background.

- in women between 30 and 35 years of age (66%) and in those > 35 years (62%) than in those between 25 and 29 years (58%) and those < 25 years old (60%);
- in multiparous women (64%) than in primiparous women (59%);
- in PSEC+ households (74%) than in PSEC- (65%) households and non-working households (52%) (Table III).

3.3.2. Use of infant milks

The change from infant formulas (first-stage milks) to follow-on formulas (second-stage milks) no longer occurred routinely at 4 months but at the time of introduction of complementary feeding and therefore more towards 5 or 6 months of age, leading to an increase in consumption of first-stage milk. Consumption of first-stage milk in all children between 0 and 35 months increased from 9% in 2005 to 12% in 2013, while consumption of second-stage milk fell from 18% to 15%, respectively. On average, more GUM was consumed, although a large amount of cow's milk continued to be used. In all children between 0 and 35 months, consumption of GUM increased from 24% in 2005 to 32% in 2013 and consumption of CM fell from 47% to 41%.

Compared to 2005, the age of switching to CM took place 2 months later (on average at 14 months instead of 12 months) and less CM was consumed before 12 months (32% versus 44%). Milk intake still consisted of CM in 2013 in 34% of children between 12 and 24 months and in 64% of those between 24 and 29 months. The switch to CM occurred later in children of mothers who breastfed or had breastfed than in non-breastfeeding mothers (15.1 months versus 12.9 months), in children of primiparous mothers than in children of multiparous mothers (14.7 months versus 13.7 months)

Table III. Mothers of children between 15 days and 35 months old: sample profile according to breastfeeding status

		Total	Under 25 yrs old	25–29 yrs old	30–34 yrs old	35 yrs old and over	Primi-parous	Multi-parous	PSEC +	PSEC-	Not working
Breastfeeding at the time of the survey		100	5	33	37	25	27	73	24	40	35
		11%	*5%*	*12%*	*12%*	*12%*	*8%*	*13%*	*14%*	*11%*	*10%*
	Partial	53	3	20	22	7	13	40	14	19	20
	Exclusive	54	2	13	14	17	13	34	10	21	16
Breastfeeding in the past		449	55	131	161	102	173	276	106	195	148
		51%	*55 %*	*46%*	*54%*	*50%*	*51%*	*50%*	*61%*	*54%*	*42%*
	Partial	391	50	115	137	89	151	240	96	160	134
	Exclusive	120	8	31	56	26	46	75	32	56	33
Mother who had never breasted		338	40	120	101	77	137	201	45	127	167
		38%	*40 %*	*42%*	*34%*	*38%*	*41%*	*37%*	*26%*	*35%*	*48%*
TOTAL		887	100	284	299	204	337	550	175	362	350

*Some mothers who had breastfed in the past first breastfed exclusively, then partially.
Sample sizes were adjusted: each subject was weighted with a coefficient to make the sample representative of the French population. Sums presented in the table are sums of numbers with 2 decimals and are rounded (for example, for the13 primiparous women who breastfed exclusively some may have a 0.98 coefficient, others 1.05 and the total 13 may be 13.4 rounded to 13. Sums are also rounded. For instance 13.4+13.4= 26.8 rounded to 27).
The total of interviewed mothers was 887 (whereas the main sample size was 897) because ten mothers answered "I don't know". These were mothers of children older than 1.1 years for questions that were difficult to answer such as "did I breastfeed if I breastfed only in the maternity hospital?"
The total of the 3 percentage points (breastfeeding mothers, mothers who breastfed and mothers who never breastfed) in each column represents 100% of the total of the subpopulation defined in the column heading.

and in children of mothers in PSEC+ households compared to non-working households (15.8 months versus 12.4 months). The preferred type of milk consumed was BM and first-stage milk up to 4–5 months. Second-stage milk took over at 6–7 months and was still used until the age of 1 year. GUM was used more during the 2nd year, although CM was given to 12% of children between 8 and 11 months and became the predominant type of milk after 2 years (Fig. 2). GUM was given more by:

- primiparous mothers (35% versus 25% in multiparous mothers);
- mothers > 30 years (33% versus 16% in those < 25 years);
- more affluent families (40% versus 29% in PSEC- and non-working households);
- mothers who breastfed or had breastfed (32% versus 25% for those who had never breastfed).

The information sources for giving GUM came from medical advice in 67% of cases: a paediatrician (29%), another healthcare professional (28%) or a general practitioner (16%). Experience or instinct were involved in 59% of cases, people close to the mother in 20% and the media in 19%. Primiparous mothers were more influenced by medical advice than multiparous mothers, who relied more on their experience and instinct. Unlike mothers in PSCE+ households, mothers in non-working households relied more on their experience and instinct than on medical or media advice. There were many reasons for mothers choosing GUM, in particular their better suitability for nutritional requirements and age (Fig. 3).

The amount of milk reported to have been consumed varied with age: the average daily amount for non-breastfed children between 0 and 35 months was 515ml. The largest consumers were children under 5 months with 758ml/day before 3 months, and 790ml/day between 4 and 5 months. There was then a gradual decrease to 382ml/day between 30 and 35 months. When CM was used, semi-skimmed milk was given in 88% of cases. Consumption of "plant juices" incorrectly called "milks" (almond, chestnut, soya, rice, barley, hazelnut and coconut) and milk from mammals other than cows remained extremely marginal (four cases out of 1,158).

3.3.3. In practical terms

Until 12 months, mothers use mostly diluted powdered milk (on average, 95% of cases up to 5 months of age and 72% between 8 and 11 months). Liquid milk was given predominantly over 1 year (72% of children between 12 and 17 months and 95% between 24 and 29 months). In 90% of cases the powered milk was diluted with bottled water and 6% of mothers boiled the water before preparing a milk feed.

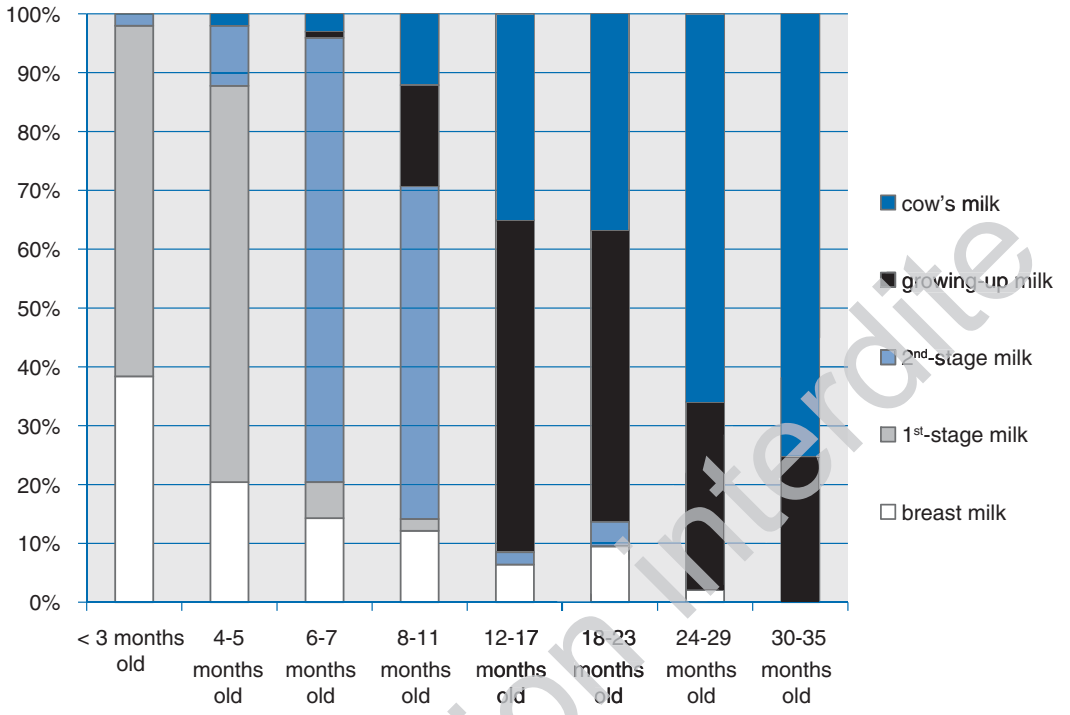

Figure 2. Type of milk consumed most according to the child's age.

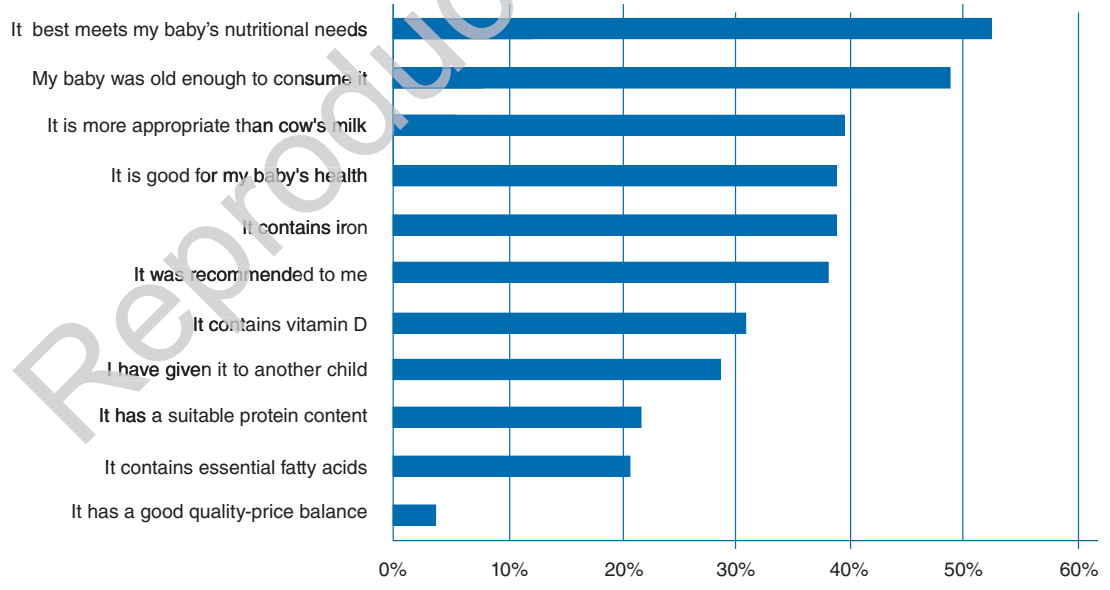

Figure 3. Reason for choosing growing-up milk.
These are not spontaneous reports but answers chosen from the proposed options (252 mothers giving GUM. Each mother could give several answers.)

Milk was given at different temperatures depending on the child's and mother's age. Most bottles were given warm or at room temperature for the early months.

- The bottle was given tepid in 46% of cases under 3 months and in 29% at 35 months.
- It was given at room temperature in 35% of cases under 3 months and in 15% at 35 months.
- It was cold in 8% of cases under 3 months and in 22% at 35 months.
- The milk was hot in 6% of cases under 3 months of age and in 34% at 35 months (Fig. 4). When the milk was heated, in 12% of cases it was heated in a bottle warmer and in 66% of cases in a microwave oven (on average for 51% of cases under 6 months and 78% between 24 and 29 months). The practice of bottle sterilization had fallen in 2013 compared to 2005 (28% versus 32%).

3.4. Complementary feeding

3.4.1. Beginning of complementary feeding

As in 2005, complementary feeding began at around 4–5 months of age and was generalized at around 6–7 months (96% of cases). It should be noted that:

- 6% of children under 3 months had already consumed foods other than milk;
- 31% began complementary feeding at 4 months;
- 90% had already consumed a food other than milk in their first 6 months;
- 10% did not start dietary complementary feeding until 7 months or later.

More mothers in PSEC+ households had introduced the first food by 6 months and fewer did so at 8 months or older. More mothers under 25 years started complementary feeding before 4 months but more also did so at 8 months or later. In response to the question "What are the first three foods consumed?" mothers answered in decreasing order: vegetables other than potatoes alone (77%), fruits (68%), dairy products (42%), cereals (31%), potatoes (20%), meat or fish (13%), rice and pastas (7%) and milky desserts (2%). The order was the same as in 2005, although the percentages were slightly different. Potatoes were given more often as the first food in 2013 than in 2005 (19% versus 12%), whereas cereals and ham were given less (30% versus 38%, and 4% versus 8%, respectively). More primiparous mothers began complementary feeding with fruits, whereas more multiparous women began with cereals. More women in PSEC+ households started with fruits and vegetables than mothers in PSCE- households who opted more for cereals. Baby-specific foods were started earlier than the same foods prepared at home or than the same non-baby-specific foods: 5.3 months versus 5.6 months for vegetables, 5.6 months versus 6.7 months for potatoes and 6.5 months versus 7.3 months for meat and fish.

3.4.2. Food choices for children under 3 years (after introduction of complementary feeding)

In 2013, commercial baby-specific foods accounted for a large proportion of foods consumed under 1 year of age, although these then

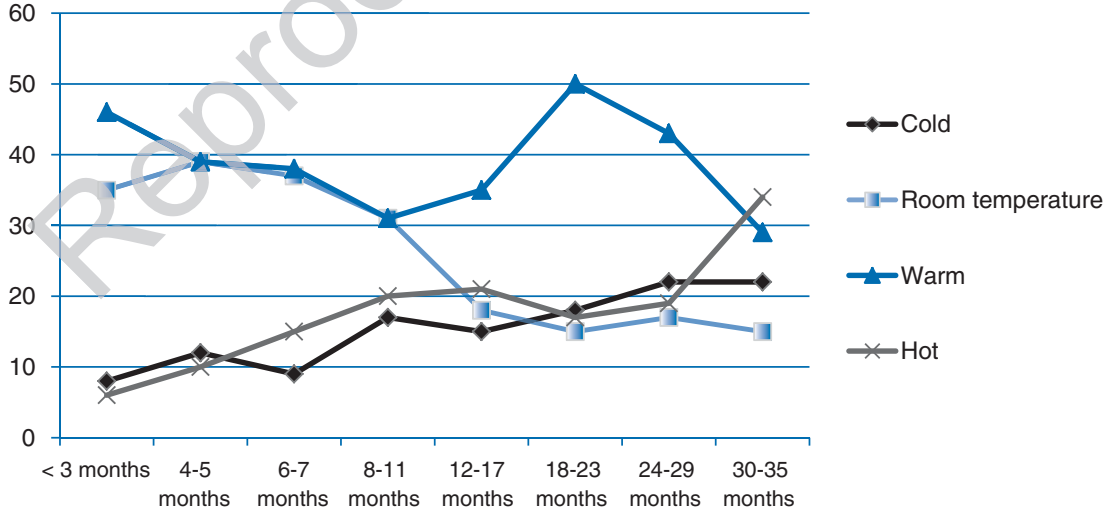

Figure 4. Bottle temperature by age.

became less common and practically nonexistent after 18 months. Commercial products for adults were started from 4–5 months and became predominant over 1 year. Home-made foods were found from the start of complementary feeding but particularly after 1 year. Of the 20 most consumed foods by age category, fried potatoes appeared from 12 months, confectionery from 18 months and processed meat (other than ham) from 24 months (Table IV). For complex carbohydrates, compared to 2005 there has been an increased consumption of potatoes (19% versus 12%) and a reduction in cereals (30% versus 38%). Fried potatoes were started very early at around 8 months, earlier than in 2005 (10 months), and were eaten by one-third of children at least once a week from 12 to 17 months of age. These fried potatoes included commercial non-baby-specific products as well as home-made preparations.

Consumption of non-baby-specific sweetened fruit juices in 2013 was occasional under 1 year of age and they were consumed daily by 22% of children between 12 and 23 months and 36% of those between 30 and 35 months. Fizzy drinks were rarely given to young children, although 5% consumed these daily at 3 years. Sweetened non-milk syrups and drinks were consumed daily by 8% of 1-year-old children and 13% of 3-year-olds.

3.4.3. Proportions of home-made, baby-specific foods and common foods

Of all the children studied in 2013, only 4% of mothers gave their children only baby-specific foods, whereas 25% gave them none. The majority of mothers (64%) gave at the same time baby-specific foods, non-baby-specific foods and home-made foods. When children began complementary feeding, vegetables were home-made in 44% of cases, 55% were baby-specific and 1% were non-baby-specific. Fruits were home-made in 31% of cases, baby-specific in 67% and non-baby-specific in 2%. Dairy products were home-made in 1% of cases, baby-specific in 78% and non-baby-specific in 21%; meats and fish were home-made in 53% of cases and baby-specific in 47% (Table IV). Compared to mothers who had not breastfed, mothers who breastfed or had breastfed gave:

- more home-made products: fresh fruits 71% versus 61%; soups, 66% versus 57%; cooked meals, 55% versus 41%; biscuits, cakes and pastries, 53% versus 44%; fruit juices, 24% versus 17%; bread, 18% versus 9%; sauces (mayonnaise or ketchup, etc.), 13% versus 8%;
- as many baby-specific products except for vanilla- and cocoa-containing powders, which were given more by non-breastfeeding mothers;
- overall, as many non-baby-specific products, but mothers who did not breastfeed gave more soups, cooked dishes, puddings with milk and chocolate powders.

Seventy-three per cent used a microwave oven to heat foods other than milk and 63% of mothers used a container other than the original packaging to heat it.

The great majority of mothers went to shops to buy foods for their children (96%). Eleven per cent ordered on the internet and/or used the "Drive or Click & Go" service and 2% had foods delivered. The internet was used more by primiparous mothers (13%), mothers of children in the 30 – to 35-month age category (18%) and mothers in PSEC+ households (14%). The preferred places for buying baby products were hypermarkets and supermarkets (92%), "hard discount" shops (23%) and pharmacies (15%). However, 25% of products came from a market, a local producer or a vegetable grower and only 7% were bought from shop shelves or organic shops. Only 3% of products were purchased from frozen food retailers. More mothers from PSEC+ households bought from the shop shelves or organic shops (14%) and frozen food shops (7%), whereas more mothers in non-working households used "hard discount" shops (32%). Pharmacy sales predominated in the youngest children: 41% under 3 months, 30% between 4 and 5 months and 27% between 6 and 7 months.

3.4.4. Change in textures and the first milk-free meal

The first non-bottle meal was given on average at 10 months, i.e. 2 months later than in 2005. Non-smooth textures were started from 6 to 7 months, although foods containing pieces predominated only from 12 months and many received a smooth diet until 1 year.

4. Discussion

This study contains rich information on what children between 15 days and 35 months of age and living in France were fed in 2013. It has been repeated every 8 years since 1981 using a very similar methodology allowing assessment of the change in practices and impact of guidelines [1-5]. A similar study [the Feeding infants and toddlers study (FITS)] was conducted in the United States in 2002 [12] and repeated in 2008 [13,14]. This was a cross-sectional study on a national sample of 3273 children between 0 and 4 years of age in 2008. The French study was conducted by interviewers who went to the parents' homes and collected dietary habits over 3 days (2 non-consecutive weekdays and 1 weekend day), whereas the American study was a telephone survey in which interviewers used the NDSR (Nutrition Data System for Research) 2008 database: the interviews were based on the diet over a day (74% on weekdays, 26% at weekends), after sending explanatory information by post to collect the information and materials to measure the amounts of foods taken. A second day, 3–10 days later, was studied in a subgroup sample of 701 children [15]. The representativeness criteria for Nutri-Bébé were identical in 2005 and 2013, whereas the FITS 2008 population contained a higher proportion of Hispanics and African-Americans, fewer married parents, more working mothers and a larger proportion of wealthy families than in 2002.

Table IV. Ranking of the 20 most consumed foods in order of frequency according to age category from 4 months of age, when complementary feeding begins.

	4–5 months	6–7 months	8–11 months	12–17 months	18–23 months	24–29 months	30–35 months
1	Fruits	Fruits	Fruits	Meat, fish, eggs	Meat, fish, eggs	Meat, fish, eggs	Dairy products
2	Vegetables	Vegetables	Vegetables – meat	Bread**	Bread**	Starches	Bread**
3	Potatoes	Potatoes	Vegetables – fish	Dairy products	Vegetables	Dairy products	Vegetables
4	Vegetables	Vegetables – meat	Vegetables	Vegetables	Dairy products	Vegetables	Cakes*
5	Cereals	Vegetables	Vegetables	Starches	Starches	Bread**	Meat, fish, eggs
6	Dairy products	Dairy products	Meat, fish, eggs	Potatoes	Cakes*	Cakes*	Meat, fish***
7	Soups	Vegetables – fish	Potatoes	Cakes*	Potatoes	Fruit juices	Starches
8	Fruits	Cereals	Dairy products	Vegetables – meat	Starches	Meat, fish***	Cooked vegetables
9	Fruit juices	Meat, fish, eggs	Cereals	Fruits	Fresh fruits	Milky puddings	Starches
10	Potatoes	Soups	Potatoes	Vegetables fish	Cooked vegetables	Potatoes	Fruit juices
11	Soups	Potatoes	Bread	Fresh fruits	Meat, fish***	Soups	Confectionery
12	Vanilla/ cocoa powders	Milky puddings	Dairy products	Starches	Fruit juices	Fresh fruits	Processed meats other than ham
13	Vegetables – meat	Dairy products	Starches	Vegetables	Chips	French fries	Potatoes
14	Vegetables – fish	Soups	Soups	Soups	Milky puddings	Confectionery	Milky puddings
15	Cooked vegetables	Fresh fruits	Biscuits	Cooked vegetables	Chips	Chips	Chips
16	Milky puddings	Vanilla/cocoa powders	Milk puddings	Milk puddings	Cakes*	Cooked vegetables	chips
17	Fruits	Fruit juices	Fruits	Meat, fish***	Soups	Cooked dishes	Fresh fruits
18	Meat only	Cooked vegetables	Soups	Fruit juices	Confectionnary	Processed meats other than ham	Cooked dishes
19	Bread **	Biscuits	Cakes*	Potatoes	Cooked dishes	Starches	Soups
20	Biscuits	Bread**	Starches	Chips	Fruits	Chocolate powders	Cakes

* Biscuits, cakes, pastries.
** Bread, sandwich bread, rusks
*** Cooked meat or fish (nuggets, meat or fish in sauces, etc). Home-made: preparations are in black text on white background; baby-specific products, white text on dark blue background; non-baby-specific products, black text on light blue background.

In France in 2013, mothers reported that only 2% of the fathers (versus 1% in 2005) fed their child despite the increased paternity leave (13% versus 5%). The mother therefore remains the main person in charge. Did they think that the father fed his child when in fact he only prepared a bottle or heated a jar of baby food? The main source of advice reported by the mothers was "instinct and experience", far ahead of advice from family and friends and the media, particularly for multiparous or older mothers. This experience has probably been acquired over the years, mostly as a result of friends and family and the media, which are therefore underestimated in this survey.

In 2013, the practice of breastfeeding in France was still far from the frequency seen in the United States (in the FITS 2008 study compared to 2002: 42% versus 40% between 4 and 6 months, 33 versus 21% between 6 and 9 months of age, 33% versus 21% between 9 and 12 months) [16], and even further from Northern European countries where the corresponding figure is 72% in Sweden and 60% in Finland at 6 months [17], although France is gradually catching up [18]. As expected [19], breastfeeding was more common in women from privileged social environments. Women were breastfeeding on demand, as recommended [20,21] and not at a fixed time. We could think that the mothers who breastfed were looking more for natural foods, but they recognized the nutritional benefit of a highly technical product such as GUM (compared to CM, however, which is more established in tradition) and gave their child more home-made products. They probably attributed more importance to the choice of foods which they felt to be good for their child.

Parents followed nutritional recommendations better when using infant milks, no longer routinely switching from first-stage formulas to follow-on formulas at 4 months but depending on the age of complementary feeding [22] with a fall in the consumption of CM (6% less between 2013 and 2005). At the same time, consumption of GUM increased (8% more between 2013 and 2005), with a later switch from GUM to CM, on average 2 months later. However, whilst GUM is recommended from 10 to 12 months up to 3 years [11,23], CM was still the source of milk for 34% of 1-year-old children and 64% of 2-year-old children. Consumption of CM under 3 years of age may result both in inadequate or excess intake of some nutrients: compared to second-stage and GUM, CM contains two to three times more protein, as much fat (for whole milk) – although the fat fraction provides considerable amounts of saturated fatty acids and few essential fatty acids (EFAs), particularly omega 3 – four times as much salt and minerals, and very insufficient amounts of iron, zinc and vitamins A, D, E and C [22]. Compared to the 2002 FITS study, the 2008 FITS study showed that less CM was consumed (70% versus 84% of children between 12 and 15 months), although it was still being consumed by 17% of 9 to 12-month-old children. CM was consumed only half as much as in the Nutri-Bébé study. Up to 3 years of age, GUM remains the preference: it is a "safety food" which can compensate or correct for the consequences of an inappropriate diet including incorporation of adult foods too early (CM, pizzas, cooked dishes, etc.) [11,23]. There was a gradual fall in daily milk consumption in France in 2013 as the child grew older, decreasing to 382ml/day between 30 and 35 months. It is possible that consumption of dairy products and cheeses, which emerges after complementary feeding, would provide the milk or dairy equivalent intake of 500–800ml, the recommended daily dairy products intake at this age [24]. When CM is used, it is regrettable that in 88% of cases semi-skimmed milk is chosen, depriving the child of a significant proportion of the fat intake he requires (45–50% of total energy intake [25]), as a source of calories and as a brain growth and maturation factor (although CM lipids are not those which are ideal for a young child, in particular given the lack of EFAs and some higher-level homologous fatty acids such as docosahexaenoic acid) [26]. The concern in the United States is different, predominated by the risk of atherogenesis and overweight [14]. The "Dietary Guidelines for Americans 2005" and the American Academy of Pediatrics therefore recommend semi-skimmed milks from 2 years of age, whereas one-third of 2-year-old children and one-quarter of 3-year-old children drink whole milk.

As a result of the many messages which have been disseminated, it can be seen that "plant juices" and milk from other mammals which are unsuitable as milk feeds for young children remain very marginal. This use has possibly been underestimated in that it is possible that parents who use these types of foods did not wish to take part in the Nutri-Bébé 2013 survey. In March 2013, the French National Food, Environment and Work Safety Agency (Anses) issued an alert about these products, which should not be used even partially in children under 1 year of age because they can be a cause of severe malnutrition [27]. In 90% of cases powdered milk is reconstituted using bottled water, whereas the guidelines permit tap water [28]. The current practice of giving bottles at room temperature is similar to a warm temperature in summer, but what happens in winter, particularly if the place where the water is stored and/or the bottles are not heated? In the absence of a scientific study on the ideal temperature, it could be assumed that the warm temperature, which is close to that of breast milk, is probably the most appropriate. Heated milk was usually heated in a microwave oven, even though this is not recommended in order to avoid burns because of poor temperature distribution between the milk and wall of the bottle [28] and to reduce deterioration of different constituents of the milk such as probiotics and certain vitamins. It is very surprising to note that sterilization of bottles and teats is still a common practice. The emphasis currently is placed more on the quality of washing and early washing of bottles after use, and sterilization is no longer a routine recommendation. It is recommended that families with a dishwasher use a full cycle at a wash temperature of at least 65°C, followed by a drying cycle [28].

In compliance with the guidelines [8,9], dietary complementary feeding started in the great majority of cases between 4 and 6 months of age. The same is true in the United States and most European countries. Differences were found particularly in the youngest mothers and less privileged environments. A child who starts to eat something other than milk before 4 months of age increases its risk of obesity in adulthood [29-32] and of allergies [33,34]. Under 3 years of age the excess protein may be harmful to the kidneys and may increase the risk of overweight or obesity [35-38]. Excessive intake of mineral salts can also be harmful: sodium excess can increase blood pressure in adulthood and also increase the appetite for salt [39]. Considering the ranking of the 20 most widely consumed foods by age category, i.e. the most commonly eaten foods, it is unfortunate that chips are seen as early as 12 months, confectionery beginning at 18 months and processed meats (other than ham) beginning at 24 months (Table IV). Compared to 2005, there is an increased consumption of potatoes but a reduction in the consumption of cereals. Although consumption of complex carbohydrates is recommended and is one of the consumption milestones in the national health nutrition program (PNNS) [24], it is surprising to see that fried potato was started very early, at around 8 months, and therefore even earlier than in 2005 (10 months) and this was eaten by one-third of children at least once a week. The situation is even more worrying in the United States: whilst potatoes are the most widely consumed starch in that country, more than half of them are eaten as chips (6% in 2008 compared to 8% in 2002 between 9 and 12 months and 17% compared to 19% between 21 and 24 months) [14]. Up to the age of 3 years, early childhood specialists do not recommend fried foods and cooked fats, which may be harmful to both current and future health [41]. As in France, in the United States consumption of fruits, and even more so vegetables, is inadequate: a large proportion of children had not eaten vegetables by the day the study was conducted (between 28 and 37% of children between 6 and 24 months depending on age in 2008 versus 19 and 32%, respectively, for the same age category in 2002). In the FITS 2008 study, 30% of children between 2 and 3 years of age did not eat at least one portion of vegetables daily and 27% did not eat a portion of fruit per day, as in 2002 [40]. In our study, regular fruit juice consumption (21% of children at 1 year of age and 36% at 3 years) was not ideal because these often tend to replace milk at breakfast and afternoon feeds, whereas it is better to eat whole fruits which contain fibre, which should be mashed and are generally less sweet. Daily consumption of sweet drinks was limited, only involving 5% (fizzy drinks) and 13% (flavoured non-milk syrups and drinks) of 35-month-old children. This inappropriate intake of sweet drinks produces bad habits and the child then refuses water alone and has a greater risk of dental caries, overweight and increased appetite for sugar [24]. In the United States, regular consumption of puddings, sweets and sweet drinks was even more abnormal (in 43% of 9 – to 12-month-old children, 81% of 21 – to 24-month-old and 86% of 2 – to 3-year-old children), although a significant reduction had been seen between 2002 and 2008 (43% versus 59% and 81% versus 87%), respectively [40].

Home-made food is an excellent solution, although it is important that the quality of the products used is prioritized and that their preparation follows guidelines: reducing proteins, salt and sugar, providing selected oils (using rapeseed oil in preference to sunflower oil, for example) in sufficient amounts but avoiding cooked fats and fried foods [26, 41], etc. If these precautions cannot be observed, the child should instead be offered specific dishes such as jars of baby food or baby meals, which guarantee a high level of chemical and microbiological safety and the certainty that their composition is appropriate for young children [42,43].

Acceptance of foods cut into pieces depends on the child's development as well as mastication and swallowing skills and tooth eruption. This is facilitated by introducing less smooth-textured foods early and there is therefore a need to offer the child different textures to avoid an overly abrupt break and gradually encourage mastication [44]. The child can begin holding bread crusts and biscuits in his/her hand between 6 and 9 months of age and at 9 months he can grasp small pieces on his plates with his fingers. It has been shown that 15-month-old children who have not been given coarsely mixed foods until 10 months then had more difficulty eating pieces and broadening their dietary repertoire: at 7 years these children ate less fruit and vegetables and had more problems with eating behaviour [45]. Late introduction of non-smooth textures may have orthodontic consequences, particularly on harmonious adequate growth of the dental arcades [46].

The vulnerability of children during their first 1,000 days of life (from pregnancy until 2 years of age) is being increasingly emphasized and should encourage us to offer a specific diet at this age [47]. During the young child's first 3 years of life, their diet is extremely important to their health and has consequences throughout life [48]. The composition of commercial foods intended for children under 3 years is subject to French and European Regulations: regulation (EU) No. 609/2013 of 12 June 2013 (rescinding the former framework directive 2009/39/EC) [49], and specific regulations for childhood foods [50]. Around the age of 1 year there is a break in the consumption of appropriate foods: mothers have been vigilant, initially using infant milks if they do not breastfeed and baby-specific meals (jars of baby food, specific dairy products, etc.), but then they view their child as a miniature adult. At walking age at around 1 year, parents believe that their children are no longer babies and that they can eat like grown-ups.

5. Conclusion

Compared to the 2005 study, the Nutri-Bébé 2013 study shows that cow's milk is introduced later, infant milks are used for longer periods, complementary feeding occurred gradually and began at the right time and healthcare professionals are the contact people for parents. There were more breastfeeding mothers in more affluent socio-occupational categories and their behaviour in feeding their children showed differences in food choices with more growing-up milk and home-made foods.

The 2013 children generally appeared to be well fed, although this finding is not as positive after the age of 1 year, when there is a break in the consumption of foods appropriate for children under 3 years with chips, sweet drinks and dishes prepared for adults starting to appear.

This study shows differences in the majority of items depending on the mother's age, the number of children they have, the socio-economic category and the decision of whether or not to breastfeed. By assessing these behaviours, early childhood specialists can better identify the progress made in the field of nutrition and change their communication to further improve compliance with recommendations.

Declaration of interests

M. Vidailhet: the author declares no conflicts of interest with this article.

A. Bocquet: declares working on clinical studies as principal investigator, coordinator or principal investigator (Nestlé) and as co-investigator, non-principal investigator and study collaborator (Novalac); and has been an invited speaker at conferences (Blédina, Nestlé, Novalac, Sodilac) and worked as an auditor (Blédina, Nestlé, Sodilac).

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