The Director General

Maisons-Alfort, 22 June 2017

OPINION
of the French Agency for Food, Environmental and Occupational Health & Safety

on "the Third Individual and National Survey on Food Consumption (INCA3 survey)"

ANSES undertakes independent and pluralistic scientific expert assessments.
ANSES's public health mission involves ensuring environmental, occupational and food safety as well as assessing the potential health risks they may entail.
It also contributes to the protection of the health and welfare of animals, the protection of plant health and the evaluation of the nutritional characteristics of food.
It provides the competent authorities with the necessary information concerning these risks as well as the requisite expertise and technical support for drafting legislative and statutory provisions and implementing risk management strategies (Article L.1313-1 of the French Public Health Code).
Its opinions are published on its website.
This opinion is a translation of the original French version. In the event of any discrepancy or ambiguity the French language text dated 22 June 2017 shall prevail.

On 31 October 2014, ANSES issued an internal request to conduct the following expert appraisal: "To update the estimates on food consumption and nutrient intakes of individuals living in France by implementing the Third Individual and National Survey on Food Consumption (INCA3 survey)".

1. BACKGROUND AND PURPOSE OF THE REQUEST

The French Agency for Food, Environmental and Occupational Health & Safety (ANSES) is responsible for assessing food-related health and nutritional risks and benefits in France. To fulfil this mission, ANSES must have data that is as detailed as possible on food consumption and eating habits of individuals living in France. For this reason, it conducts food consumption surveys at regular intervals, and in particular the Individual and National Surveys on Food Consumption (INCA surveys). Two previous surveys were carried out in 1998-1999 (INCA1) (Volatier 2000) and 2006-2007 (INCA2) (AFSSA 2009). In order to update the food consumption database, the third INCA survey (INCA3) was conducted in 2014-15.

This INCA3 survey was carried out in collaboration with the French Public Health Agency (SpF), which conducted its Health Study on the Environment, Biomonitoring, Physical Activity and Nutrition ("Esteban") over the same period. INCA3 was also carried out in the framework of the "EU Menu" project of the European Food Safety Authority (EFSA), which seeks to harmonise food consumption studies between the Member States of the European Union. The INCA3 survey therefore followed the methodological recommendations drawn up by EFSA on this subject (EFSA 2014).

The purpose of the internal request was to update the Individual and National Survey on Food Consumption in order to describe, for individuals living in metropolitan France in 2014-2015:

- the foods, beverages and food supplements consumed;

- the weight status, physical activity, sedentarity;
- eating habits and food purchasing, preparation and storage practices;
- nutrient intakes of energy, macronutrients (including details on fatty acids), vitamins and minerals, after matching with the database on the nutritional composition of foods from the French Information Centre on Food Quality (CIQUAL).

2. ORGANISATION OF THE EXPERT APPRAISAL

The expert appraisal was carried out in accordance with the French Standard NF X 50-110 "Quality in Expert Appraisals – General Requirements of Competence for Expert Appraisals (May 2003)".

ANSES's internal request was coordinated by the Methodology and Survey Studies Unit (UME), within ANSES's Risk Assessment Department (DER). In particular, the UME was asked to:

- define the protocol, the questionnaires and the collection tools for the INCA3 survey in accordance with the EFSA guidelines and in partnership with a scientific committee, while taking into account the needs of those units of the DER responsible for assessing food-related risks;
- issue a call for tenders in order to select an external service provider to collect the data, and monitor its quality throughout the collection phase;
- prepare and analyse the collected data;
- write the report describing the main results of the study.

The Food Observatory Unit (UOA) was asked to provide scientific support by creating a nutritional composition database corresponding to the consumption data of the INCA3 survey.

In addition, the SpF's Directorate for Prevention and Health Promotion contributed to the internal request by defining the questionnaire on knowledge of the food-based dietary guidelines of the French National Health & Nutrition Programme (PNNS)[1], preparing and analysing the data obtained, and drafting the corresponding part of the descriptive report.

The collective expert appraisal was carried out by the "INCA3" expert working group (INCA3 WG) between February 2015 and April 2017. The INCA3 WG was tasked with:

- assisting ANSES with the preparation and analysis of the collected data, and comparing the results with data from the literature;
- defining the priority results to be exploited in the descriptive report of the survey;
- discussing the results obtained from the survey data and validating the descriptive report.

ANSES analyses the links of interests declared by the experts prior to their appointment and throughout the work, in order to avoid potential conflicts of interest with regard to the matters dealt with as part of the expert appraisal.

The experts' declarations of interests are made public via the ANSES website (www.anses.fr).

This opinion describes the method used to set up the INCA3 survey and presents the main results on the themes addressed in the study: food consumption and nutrient intakes, food origin and selection criteria, dietary behaviours, weight status, physical activity and sedentary behaviour, and sources of food information and knowledge.

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[1] This questionnaire was adapted from the 2008 Health & Nutrition Barometer.

The reader can refer to the collective expert working group report (ANSES 2017) for a comprehensive presentation of the results, including detailed results according to socio-demographic characteristics (age, sex, level of education, profession and socio-professional category, region and size of the urban area of residence).

3. STUDY METHOD AND RESULTS

3.1. Study method

The INCA3 survey was conducted between February 2014 and September 2015, in metropolitan France, among 5855 individuals (2698 children and adolescents from birth to 17 years of age, and 3157 adults from 18 to 79 years of age).

3.1.1. Population

The INCA3 survey population is representative of all individuals living in an ordinary household[2] in metropolitan France (excluding Corsica).

Individuals were selected according to a three-stage (geographical units, households and individuals) random sampling method. The geographical units and the households were randomly selected by the National Institute for Statistics and Economic Studies (INSEE) from the 2011 national annual population census, taking into account a geographical stratification (region, size of the urban area) in order to ensure national representativeness. One individual per household (one adult or one child) was then selected from among the eligible individuals during the first home visit.

Two independent samples were thus constituted: a "Children" sample including children and adolescents from birth to 17 years of age, and an "Adults" sample including adults aged 18 to 79 years.

3.1.2. Data collected

The data collected in the INCA3 survey cover various subjects of interest connected to food-related risk assessment (nutritional or health):

- the foods, beverages and food supplements consumed;
- physical activity and sedentary;
- anthropometric characteristics (weight, height);
- socio-demographic characteristics and standard of living, including food insecurity;
- eating habits: consumption places and occasions, consumption of foods grown or bred by the household or by friends or relations (vegetable garden, chicken breeding, etc.), consumption of foods obtained directly from the wild (hunting, fishing, picking), food production methods (processed products, organic farming, etc.), etc.;
- practices posing a potential health risk: food preparation and storage, refrigerator temperature, consumption of raw foods of animal origin;

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[2] According to the National Institute for Statistics and Economic Studies (INSEE), an "ordinary household", within the meaning of the census, is defined as all the people who share the same primary residence, without these people necessarily being united by family ties (for example in the case of cohabitation or flat-sharing). People living in mobile homes (including seamen and the homeless) or in communal accommodation (workers' hostels, retirement homes, hospitals, detention centres, boarding schools, university halls of residence or military barracks, etc.) are considered to be living "outside ordinary households".

- household treatment of drinking water;
- food knowledge and behaviour.

Detailed information on the consumption of foods and beverages was collected for three non-consecutive days (2 weekdays and 1 weekend day) spread over around three weeks, using the 24h recall method for individuals aged 15 to 79 years, and the 24h record method (via a food record) for individuals aged 0 to 14 years. For the three selected days, the individuals were asked to describe their food consumption by identifying all the foods and beverages consumed during the day or night. They were asked to describe them in as much detail as possible (brand, cooking method, storage method, sugar/fat/salt content, etc.) and quantify them with the help of a book of photographs of food servings and household measures. The data were collected by telephone by specially-trained interviewers, using standardised software (GloboDiet) developed by the International Agency for Research on Cancer (IARC, #1123) (Voss *et al.* 1998, Slimani *et al.* 1999). Individuals aged 15 to 79 years were not informed in advance of the days of the phone calls, unlike the children aged 0 to 14 years who were asked in advance to note their consumption information in a food record for a specific day.

The method used in the INCA3 survey was therefore different from that used in the INCA2 survey (food record on 7 consecutive days), meaning that it is not possible to compare changes in food consumption and energy and nutritional intakes between the two studies.

The other data were collected using questionnaires administered by interviewers, either face-to-face or by telephone, and a self-administered questionnaire completed directly, on paper or via the Internet, by the individual (or his representative, for children aged 0 to 10 years), as well as by the person responsible for food purchases and meal preparation in the household.

Anthropometric measurements (weight, height) of the individual, as well as readings from the household's refrigerator (temperatures, use-by dates for pre-packaged fresh produce) were taken at the individual's home by a trained interviewer.

Recruitment of individuals and collection of data were carried out, under ANSES's control, by a service provider specialised in conducting national studies in the general population and selected following a call for tenders in accordance with the rules of the French Public Procurement Code.

3.1.3. Review of included subjects

Finally, 5855 individuals (2698 children aged 0 to 17 years and 3157 adults aged 18 to 79 years) were recruited to participate in the INCA3 survey (STUDY participants) and fulfilled the conditions of the home visit (face-to-face questionnaire, anthropometric measurements and refrigerator readings).

Among these individuals, 4372 (2084 children and 2288 adults) also completed the self-administered questionnaire (SA participants) and 4114 (1993 children and 2121 adults) validated the consumption part by taking part in at least two food interviews (CONSUMPTION participants).

In order to ensure the national representativeness of the results, each of the three participant populations (STUDY, SA, CONSUMPTION) were weighted according to a method defined in association with INSEE. This weighting was performed separately for children and adults, and took into account the region and size of the urban area of residence, the profession and socio-professional category (PCS) of the reference person in the household, the size of the household, the sex and age of the selected individual, as well as their level of education (or that of his representative, for children aged 0 to 17 years).

3.1.4. Data processing

All the data collected were checked in terms of the consistency of the answers provided, and corrected when necessary. The food data were then coded using a 44-group nomenclature developed specifically for the survey and based on the EFSA nomenclature (FoodEx2), and linked

with the nutritional composition data from the CIQUAL table, taking into account the specific characteristics of the foods consumed (e.g. sugar/fat/salt content, cooking method, etc.).

The data were analysed taking into account the study's survey design and the individual weighting applied to ensure the national representativeness of the results.

Whenever the same methods and questionnaires were used for the INCA2 and INCA3 surveys, the resulting data were compared in order to identify any changes in food-related behaviours.

3.2. Main results

3.2.1. Food consumption and nutrient intakes of the population

The food intake habits (consumption occasions and places), food consumption and nutrient intakes of the French population were estimated from the two or three days of food interviews[3], retaining under-reporters[4] (14% of the children population and 18% for adults) and without modelling usual intakes over the long term[5] for the food consumption or nutrient intakes.

- *Consumption occasions and places*

On the two or three days studied, around 80% of children and 70% of adults ate breakfast, lunch and dinner every day, and 62% of children also had a daily afternoon snack. In addition, 10% of children and about one third of adults consumed food or beverages (including water) on a daily basis outside the four main meals (including the afternoon snack). Regardless of the population considered (children or adults), the main meals and food intakes outside mealtimes were consumed at the individual's home. Nevertheless, around 40% of children's lunches and 30% of those of adults took place outside the home, as were 40 to 50% of light food intakes during the day and 30% of afternoon snacks.

Breakfast, and to a lesser extent lunch, was missed more often by adolescents aged 15 to 17 years and adults aged 18 to 44 years: respectively 40% and 28% of them did not have breakfast every day and 15% and 19% did not eat lunch every day. Conversely, these meals were taken systematically by more than 90% of individuals when they (or their representatives) have a high level of education or PCS. These individuals also had their lunches, afternoon snacks and other light food intakes outside the home, with in particular more lunches taken in the canteen. For adults, the share of lunches eaten outside the home (including in the canteen) was higher for men and decreased with age. Lastly, adults living in the greater Paris metropolitan area were characterised by particular food rhythms compared to those living in smaller urban areas, with less regular lunches (23% did not eat lunch every day), most often consumed outside the home.

- *Food consumption*

On average, children aged 0 to 10 years consumed around 1.6 kg of food and beverages per day. This quantity increased to 2.2 kg for adolescents between the ages of 11 to 17 years, and 2.9 kg for adults aged 18 to 79 years. Beverages accounted for more than half of this daily intake.

For both children and adults, three of the five main groups contributing to daily food intake (excluding beverages) were fruits, vegetables, and yoghurts, in varying proportions depending on the age group. The other two were croissant-like pastries, cakes and sweet biscuits, plus pasta

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[3] Among the 4114 CONSUMPTION participants, 3982 completed three days of food interviews and 132 only two days.

[4] Participants who intentionally or unintentionally under-estimated their calorie intakes, with regard to their estimated needs based on their basal metabolism and physical activity level.

[5] Intake over the long term estimated by statistical modelling from the intakes observed on the 2 or 3 studied days.

and other cereals for children and adolescents, and bread plus soups for adults. In addition, water accounted for half of the beverages consumed by individuals, followed by milk-based beverages for children, sugar-sweetened beverages (SSBs, excluding fruit juices) for adolescents, and hot beverages for adults.

Regardless of age, total food intake was higher for males than females. The contribution of the food groups to this total intake differed according to sex. Thus, adolescent girls consumed proportionately more poultry, while adolescent boys preferentially consumed other types of meat. For adults, the food intake of men included a higher proportion of legumes (+84%), red meat (+46%), sandwiches and savoury pastries (+36%), delicatessen meats (+35%), potatoes (+35%), cheese (+32%), dairy-based desserts and cream desserts (+28%) and refined cereal products (bread, pasta and other cereals) (+24%), whereas women consumed more fruit compotes and fruit in syrup (+77%), soups (+44%), yoghurts (+34%) and poultry (+23%). In the case of beverages, adolescent boys preferred SSBs (+58%) while adolescent girls preferred fruit juices (+24%). In adulthood, men drank relatively more alcoholic beverages (+173%) and women more hot beverages (+24%).

Food intake increases from 0-11 months to 45-64 years, reaching 3.1 kg/d for adults aged 45 to 64 years, but was lower for adults aged 65 to 79 years (2.7 kg/d). For children and adolescents aged 1 to 17 years, the contribution to food intake of several food groups increased between the ages of 1 to 14 years: breakfast cereals (+333%), sandwiches and other savoury pastries (+269%), cereal products (bread, pasta and other refined cereals) (+212%), SSBs (+206%), soups (+202%), sweet foods (croissant-like pastries and sweet biscuits, confectionery and chocolate) (+173%), potatoes (+78%), meat (+60%) and vegetables (+37%). Their contribution to food intake then stabilised up to the age of 17 years, or even decreased for soups (-56%), sweet products (-35%) and vegetables (-19%). Conversely, the contribution of fruit compotes and fruit in syrup, as well as that of yoghurts decreased with age in children and adolescents aged 1 to 17 years (respectively -85% and -53%). In adulthood, the trends were reversed: breakfast cereals, SSBs, sandwiches and savoury pastries, and sweet products contributed less and less to food intake with age (respectively -85%, -75%, -73% and -40%), whereas yoghurts contributed more to the food intake of older individuals (+20%).

Regardless of the population considered (children or adults), fruit consumption increased with the level of education (of the individual or his representative) while that of SSBs decreased. Levels of fruit and SSB consumption were one-and-a-half times lower and twice as high respectively when individuals (or their representative) have primary or middle-school education, compared to those with at least four years of higher education.

Some regional differences were also identified. Fewer delicatessen meats were consumed by individuals living in the Ile-de-France region, whereas consumption was higher for those living in the north-west of France. Adults living in the north-east consumed fewer fruits and vegetables but more potatoes. Consumption of SSBs was higher in the north (east and west) than in the south (east and west) of France. There was also a loose relationship between food consumption and the size of the urban area, especially in adults. The large urban areas were characterised by higher consumption of fish, confectionery and chocolate, and fruit juices, while rural areas saw greater consumption of meat, vegetables and cheese.

Lastly, the foods consumed varied according to the place or time of consumption. Thus, sandwiches and savoury pastries, potatoes, ice creams, confectionery and chocolate, and water tended to be consumed preferentially outside the home, while the home was the preferred place for consuming foods associated with breakfast (breakfast cereals, hot beverages, fruit juices and milk) and dinner (soups, eggs and egg-based dishes). In addition, croissant-like pastries and sweet biscuits, sandwiches, pizzas, savoury pastries and biscuits, delicatessen meats, as well as SSBs and alcoholic beverages were preferentially consumed on the weekend. The season was also linked to a different level of consumption for some foods, such as ice creams in summer and soups in winter.

▪ *Nutrient intakes*

Total energy intake (TEI) broadly followed the same variations according to age as food intake. It amounted to 1504 kcal/d for children aged 0 to 10 years, 1974 kcal/d for adolescents aged 11 to 17 years, and 2114 kcal/d for adults aged 18 to 79 years.

TEI gradually increases from 0-11 months to 18-44 years, reaching 2200 kcal/d, then decreases, particularly for 65-79 year-olds (1900 kcal/d). The higher food intake for male individuals was also reflected in energy intake, with a higher TEI than that of female individuals, by around 10% higher in children, 17% in adolescents and 38% in adults. For adults, the contribution of alcohol to TEI was also two and a half times higher in men than in women (5.1% of TEI *vs* 2%). Four major food groups: cereal products, dairy products, meat, fish and eggs (MFE), and fruit and vegetables in total accounted for more than half of energy intakes (around 55%), regardless of age. Croissant-like pastries, pastries, cakes and sweet biscuits, as well as sandwiches, pizzas, pies, savoury pastries and biscuits were also major contributors to energy intake, accounting for respectively 10% to 17% and 5% to 9% of energy intake depending on age.

For children aged 0 to 17 years, the contribution of macronutrients to the energy intake without alcohol (EIWA) was 50% for carbohydrates, 32-33% for fats and 15-16% for proteins. For adults, the contribution to EIWA of proteins and fats was slightly higher (respectively 17% and 34%) and that of carbohydrates was lower (47%) than that of children. Regarding fats, regardless of age, saturated fatty acids represented around half of the intakes in fatty acids, a little more than a third for mono-unsaturated fatty acids, and about a sixth for poly-unsaturated fatty acids. Regarding carbohydrates, intakes were mainly in the form of sugars up to the age of 10 years (57%), and then in the form of starchy food from 11 years of age onwards (54% in adolescents and 57% for adults). Water intake from both food and beverages accounted for around 1.4 kg/d for children aged 0 to 10 years, 1.7 kg/d for adolescents aged 11 to 17 years, and 2.5 kg/d for adults. Lastly, salt intake[6] was estimated to be 4.4 g/d in children aged 0 to 10 years, 6.5 g/d in adolescents aged 11 to 17 years, and 8 g/d in adults aged 18 to 79 years.

As with the energy intakes, croissant-like pastries, cakes and sweet biscuits, and to a lesser extent sandwiches, pizzas and savoury pastries were among the primary contributors to carbohydrate, protein and fat intakes for children aged 1 to 10 years, adolescents aged 11 to 17 years and adults aged 18 to 79 years. In addition, animal products (dairy products and MFE) provided about 60% of protein intakes, regardless of age. The contribution of the MFE category increased with age (34% for children, 38% for adolescents and 41% for adults), while that of dairy products decreased (respectively 27%, 19% and 17%). Animal products also accounted for around 40% of fat intakes, regardless of age. Dairy products (including hot beverages) contributed more in children aged 1 to 10 years (21% *vs* 17% for adults), while the same was true for MFE in adults (22% *vs* 19% for children). Confectionery and chocolate for children and adolescents, or fats, and sauces and condiments for adults were also significant contributors to total fat intakes. Lastly, plant products (cereal products, fruit and vegetables) contributed 40% of carbohydrate intakes for children and adolescents, and 50% for adults. Dairy products for children and adolescents, and sugar and sweetening foodstuffs (jams and fruit jellies, honey, syrups, sweeteners) for adults, also constituted major vectors of carbohydrates.

Regarding vitamins and minerals, dairy products were a major vector of calcium, iodine, vitamin D and vitamin B12, especially for children aged 1 to 10 years (respectively 58%, 44%, 63% and 39%). The contribution of dairy products for these four minerals and vitamins decreases with age but remains high for adults (respectively 38%, 20%, 25% and 16%). Fruit and vegetables

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[6] Salt intakes estimated from the observed days partly cover added salt.

contributed enormously to vitamin C (between 65% and 75% depending on age) and vitamin B9 intakes (between 27% and 36% depending on age).

▪ *Consumption of food supplements*

The level of consumption of food supplements (FSs), in the regulatory sense[7], over the last 12 months, was 14% for children aged 3 to 17 years and 22% for adults aged 18 to 79 years. The level of FS consumption increased with the level of education and PCS of the individual (or his representative). It was twice as high for individuals with higher education as for those with primary or middle-school education. For adults, it was also higher for women (+9 points) and for individuals aged 18 to 44 years (+10 points compared to those aged 65 to 79 years). Seasonal consumption of FSs was also observed, with consumption being higher in winter.

On the basis of a broader definition of FSs, including medicinal products that are sources of nutrients (also used in the INCA2 Survey), the rate of FS consumers grew significantly between 2006-2007 and 2014-2015, for both children aged 3 to 17 years (from 12% to 19%) and adults (from 20% to 29%).

Food supplements, in the regulatory sense, are mainly purchased in pharmacies (78% for children and 45% for adults), but Internet purchases have grown sharply for adults (from 1% to 11%) since the INCA2 Survey (2006-2007). Regardless of the population (children or adults), the most common practice was to follow a course of treatment (at least 3 consecutive days). On average, the mean number of different FSs consumed over the year remained low (around 1 product per individual), but they were sometimes taken for a long period (2 to 4 and a half months depending on age, on average). However, great variability in these two parameters was observed within the population.

3.2.2. Food origin and selection criteria

On the two or three days studied, over half of the processed foods[8] consumed outside eating establishments, by adults aged 18 to 79 years, came from industrial manufacturing and more than a third were home-made, with the remainder being artisanally-prepared or from another source. Among children aged 0 to 17 years, industrial manufacturing and home-made respectively accounted for more than two thirds and almost a quarter of processed foods consumed outside eating establishments. Soups and egg or vegetable-based dishes were preferentially home-made, while dairy-based desserts, ice creams, fruit juices and fruit compotes were predominantly of industrial origin. There was a twofold increase in the home-made share between children aged 0 to 17 years (22%), and adults aged 65 to 79 years (48%).

The places where food products were purchased depended on the foods. Supermarkets were preferred by more than half of households for purchasing fish, meat, fresh fruits and fresh vegetables (respectively 59%, 55%, 54% and 51%). On the other hand, a large majority of households purchased bread and pastries from bakeries (78% and 66% respectively). Local shops (butchers, fishmongers, etc.) were also frequented by a non-negligible share of households for

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[7] The definition of food supplement is given in Article2 of Decree No. 2006-352. It concerns foodstuffs whose purpose is to supplement the normal diet and which are a concentrated source of nutrients or other substances with a nutritional or physiological effect, alone or in combination, marketed in dose form, namely presentation forms such as capsules, lozenges, tablets, pills and other similar forms, as well as sachets of powder, ampoules of fluid, bottles with a dropper and other similar forms of liquid or powder preparations designed to be taken in low-quantity, measured units.

[8] Processed foods here include croissant-like pastries, sweet pastries and biscuits, dairy-based desserts and cream desserts, ice creams, sorbets and frozen desserts, fruit compotes and fruits in syrup, fruit and vegetable juices, soups and broths, sandwiches, pizzas and savoury pastries, as well as mixed dishes made with eggs, meat, fish, vegetables or starchy food (cereals, legumes or potatoes). They can have various sources of production (home-made, industrial, traditionally-made or other).

purchasing meat and fish (36% and 20% respectively), as were markets and local sources (producers, pick-your-own farms, etc.) for fresh fruit and vegetables (31% and 33% respectively). At the time of purchase, price was the first selection criterion cited by households (48%), followed by consumption habits (43%), taste (38%), and the origin of the product (36%). These four criteria were also the most frequently cited in the INCA2 survey (2006-2007).

Purchasing behaviours varied according to socio-demographic characteristics. When the reference person in the household was aged 65 to 79 years, was a manager, or had completed four or more years of higher education, the quality criteria of products (origin, method of production, quality labels or nutritional composition) was cited twice as often, to the detriment of the price criteria (-15 to -20 points), as when the reference person in the household was aged 18 to 44 years, was a labourer or employee, or had a primary or middle-school education. In addition, the former gave a higher priority to purchasing via markets, short channels or local shops (+20 points) than the latter, to the detriment of supermarkets (-20 points). Furthermore, the criteria of origin or quality, as well as purchases from markets or local sources, were cited more by households living in the south of France, while those living in the north took more account of price and favoured supermarkets.

Although information on the composition of products, the list of ingredients or other information on the packaging, were not among the criteria most often cited when selecting foods, 19% of households said that when deciding between two identical products, they systematically chose the one mentioning a claimed nutritional or health benefit on its packaging, while 44% said they occasionally chose such a product. The frequency of this behaviour has not changed since the INCA2 Survey. In addition, almost half of adults and 19% of adolescents aged 11 to 17 years said that they always or often read the labels and packaging of food products. This proportion declined for adults between the INCA2 and INCA3 surveys (from 54% to 49%), while the opposite was true for adults reporting that they rarely read the labels and packaging (from 30% to 37%). The information read most often was the list of ingredients, followed, for adults, by the nutritional messages or statements describing the beneficial health effects claimed by the product, and for adolescents, by the information relating to serving sizes. Reading the packaging and labels was more frequent for the elderly (65 to 79 years) or for people with a high level of education.

Slightly less than 40% of children aged 3 to 17 years and adults aged 18 to 79 years reported having consumed organic food products in the 12 months preceding the survey, with around a quarter of them having a regular and varied consumption of a range of organic products. The most frequently consumed organic foods were eggs, dairy products, fruits and vegetables. The consumption of foods derived from organic agriculture appeared twice as frequent when the individual (or his representative) was a manager or had completed higher education, than when he was a labourer or employee, or had a primary or middle-school education. In addition, for adults, this practice increases with age, rising from 35% for those aged 18 to 44 years to 46% for those aged 65 to 79 years. These results are consistent with those observed previously for the selection criteria related to the method of production or quality labels of foods.

Lastly, nearly three quarters of children aged 3 to 17 years and adults aged 18 to 79 years reported having consumed foods derived from their own production (vegetable garden, livestock), picking, hunting or fishing, or that of a friend or relation, at least once a month in the 12 months preceding the survey. Among them, three quarters stated that they consumed these foods at least once a week. The most often consumed types of such foods were fruits, vegetables, potatoes and eggs. Weekly consumption was less frequent in the Ile-de-France region and in urban areas than in the other French regions and in rural areas. In addition, it increased with age for adults, rising from 51% for those aged 18 to 44 years to 63% for those aged 65 to 79 years.

3.2.3. Dietary behaviours

The INCA3 survey made it possible to collect information on dietary behaviours such as the consumption of raw foods of animal origin or water from private wells, food storage methods, and exceeded use-by dates, which can all have an impact in terms of microbiological risks. It also

provided new information on certain behaviours that could be associated with physico-chemical risks, such as food contact materials (*via* packaging or cooking utensils), fruit and vegetable peeling and washing practices, and at-home water treatment.

▪ *Consumption of raw foods of animal origin*

Consumption of raw foods of animal origin (eggs, meat, fish, molluscs) concerned more than 80% of individuals aged 15 to 79 years. The foodstuffs most often consumed raw were eggs or home-made preparations containing raw eggs, such as mayonnaise or chocolate mousse (65% of individuals aged from 15 to 79 years), fish, particularly in the form of sushi (31%), and molluscs (23% of adolescents and 46% of adults). Among the four categories of meat (beef, horse, pork and poultry), beef was the one most frequently consumed raw (18% of adolescents and 30% of adults).

Consumption of raw foods of animal origin was more frequent for male individuals (+7 to 10 points compared to female individuals, for raw fish and beef), or when individuals (or their representative) have a high level of education or PCS (+30 points compared with individuals having a primary or middle-school education, for raw fish and beef). For adults, the types of foods eaten raw varied with age: those aged 18 to 44 years were more likely to consume raw beef and fish, and those aged 45 to 79 years, raw molluscs. Lastly, a specific regional characteristic was identified for the Ile-de-France region, which presented the highest rates of raw fish consumption (68% of adolescents and 48% of adults).

Consumption of raw foods of animal origin has grown since the INCA2 survey (2006-2007), with in particular a doubling of the rate of raw fish consumers (from 15% to 31%) and a significant increase in that for raw beef (from 24% to 30%).

▪ *Consumption of water from private wells*

In 2014-2015, 7.5% of households reported having a water supply from a private well or borehole. Among these households, almost a quarter consumed this water as drinking water, and more than a third used it for meal preparation or for washing fruits and vegetables. Most of the time (64%), this was done without prior treatment of the water. Moreover, the share of households supplied with water from a private well increased sharply between the INCA2 (2006-2007) and INCA3 (2014-2015) surveys, from 4.7% to 7.5%.

▪ *Food storage practices and duration*

During the INCA3 survey, the temperature of the household refrigerator was measured. The data collected indicated that half of the households had a refrigerator whose temperature was between 2°C and 6°C, the most commonly recorded temperature being 5°C (14%). However, although three quarters of households believed that the recommended refrigerator temperature[9] should be between 2°C and 6°C, 44% of all households had a refrigerator whose temperature was higher than 6°C.

In terms of practices relating to food storage for later consumption, most households left home-cooked meat- or vegetable-based dishes, soups and starchy foods (bread, potatoes, cereal, etc.) cool down at room temperature before placing them in the refrigerator or freezer for later consumption. For more than 65% of them, this cooling-down time was less than 2h, as recommended by ANSES (ANSES 2013). In contrast, pastries and cakes were cooled down and then stored at room temperature by a quarter of households. The practice of cooling-down and storing meat-based dishes or home-made dairy-based desserts and cream desserts at room

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[9] The recommended temperature for a refrigerator is 4°C.

temperature was more frequent in households in which the reference person had a level of education below the high-school leaving certificate (*Baccalauréat).*

In terms of the maximum storage periods before consumption, several types of foods were studied. Concerning home-made culinary preparations, 78% of households indicated that they kept foods for a very short time before consumption (1 to 2 days at most). Concerning pre-packaged foods, ham, smoked salmon and meat were consumed before the use-by date (UBD) by around half of households, and ready-made dishes, butter and margarine by only a third of households. Consumption after the UBD was observed mainly for butter and margarine: around 12% of households consumed them seven or more days after the UBD, compared with 1% for other foods. The UBD readings taken from the household refrigerators confirmed what was reported: a UBD exceeded by more than seven days was recorded more frequently for butter or margarine (7.3% of households) than for raw or cooked ham (2.7%), or smoked salmon (4.5%). Lastly, concerning purchases of non-pre-packaged foods cut to order or from the delicatessen counter, consumption more than three days after purchase was more frequent for cheese (60% of households) than for the other categories of products (ham, delicatessen meats and starters, meat and cooked dishes for reheating).

Households in which the reference person was aged 65 to 79 years complied more with the UBDs of foods sold pre-packaged (+10 points) and consumed non-pre-packaged foods cut to order or purchased from the delicatessen counter more quickly than households in which the reference person was younger. In addition, households in which the reference person had completed higher education or had a high PCS, consumed meats, cheeses and ham purchased non-pre-packaged, as well as home-made culinary preparations, much later after purchase or preparation than households in which the reference person had a primary or middle-school education. Thus, 65% of the former consumed home-made preparations more than two days later, compared with 40% of the latter.

It is important to note that since the INCA2 Survey, storage periods for perishable foodstuffs before consumption have increased and it appears that the UBD is exceeded more frequently.

- ▪ *Food contact materials*

Packaging material in contact with foodstuffs was noted for 45% of the foods consumed by children and 36% of those consumed by adults on the days studied. The most frequently cited materials were plastic (62% for children and 60% for adults), multi-materials and aluminised paper or film (respectively 15% and 9.5%), and glass (respectively 7% and 13%). Some materials are specific to certain foods. Almost all of the pre-packaged consumed waters and yoghurts were packaged in plastic. More than three quarters of soups and broths consumed were packaged in multi-materials or aluminised paper/film. Around three quarters of the alcoholic beverages and sugars and sweetening foodstuffs (mainly jams and fruit jellies, honey and syrups) consumed were packaged in glass. Lastly, 52% of fruit compote and fruits in syrup consumed by children were packed in multi-material packaging (e.g. gourds), compared with only 13% in adults.

Concerning cooking utensils, the ones most used by households were those with a non-stick coating (67%) or made of stainless steel (49%). The utensils were more often made of stainless steel or cast iron when the reference person in the household was aged 65 to 79 years (respectively 59% and 26%), and more often had a non-stick coating when the reference person in the household was a manager or from an intermediate profession (75%). For heating food in a microwave oven, households used in equivalent proportions ceramic or porcelain tableware (33% each), glass tableware (30%) and plastic containers (29%). Glass tableware was used more frequently in households in which the reference person was aged 65 to 79 years or had completed higher education, while plastic containers were more commonly used by households in which the reference person had a primary or middle-school education. More specifically, for children under 3 years of age, the containers preferred by the parents for warming home-made dishes in the microwave oven were made of plastic, ceramic or porcelain.

▪ *Practices regarding fruit and vegetable preparation*

More than 90% of individuals washed, wiped or peeled fruits and vegetables before eating them raw or cooked. Washing was the primary method of preparation, regardless of the type of vegetable or fruit. Peeling was more specific to large fruits (respectively 53% and 56% of individuals peeled apples and pears eaten raw or cooked, and 31% and 26% peeled peaches and nectarines consumed raw or cooked) and certain vegetables (respectively 73% and 83% of individuals peeled carrots and cucumbers eaten raw or cooked, 27% and 33% peeled mushrooms consumed raw or cooked).

The peeling of fruits increased with age for adults and decreased for children between the ages of 4 and 17 years. In addition, peeling large fruits and peeling or washing vegetables was more common when the individual (or his representative) had a high level of education.

▪ *Practices regarding tap water treatment*

Almost all the households were connected to the public drinking-water supply and around a quarter of them used one or more supplementary household water treatment systems, the most common being the filter jug, which should exclusively be used for water from the public drinking-water supply (ANSES 2017). Consumers said they used these different treatment systems mainly to reduce limescale on pipes or devices (55%), to improve the taste (52%) or to eliminate chemical contaminants (42%).

▪ *Practices regarding preparation of baby bottles intended for children aged 0 to 35 months*

Among the 193 households with a child aged between 0 and 35 months in the INCA3 survey, 80% always or often used a bottle to feed their child. These parents mainly used a plastic bottle (91%) and a silicone teat (72%). Around one quarter of the households did not heat the baby bottles before consumption. Among the remaining three quarters of households, bottles were most often heated in the microwave oven (73%), even though ANSES has strongly discouraged this practice since 2006, in view of the risk of burns to the mouth and throat (AFSSA 2006).

3.2.4. Weight status

Prevalences[10], estimated from measured weights and heights[11], for thinness, overweight and obesity were respectively 11%, 13% and 4% for children aged 0 to 17 years, and 3.2%, 34% and 17% for adults aged 18 to 79 years. In the entire population, the prevalence of overweight, and even more so that of obesity, decreased as the level of education increased. Between the two extreme education classes (primary or middle-school education, and at least four years of higher education), the rate of obesity was reduced by two thirds for children and was two and a half times lower for adults. A regional disparity was highlighted for adults, and more particularly for men, with lower obesity rates in the Ile-de-France region (10%) and in the south-east of France (10%), compared to the north-east (22%).

Compared to the situation described by the INCA2 Survey (2006-2007), the prevalences of overweight and obesity were stable in children aged 3 to 14 years. In contrast, there were

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[10] Prevalence is the percentage of a population that is affected by a particular health condition at a given time (in %).

[11] The weight status was estimated by using international definitions for adults (2003 definition of the World Health Organisation) and children aged 2 to 17 years (2012 definition of the Childhood Obesity Working Group of the International Obesity Task Force). For children aged 0 to 2 years, weight status was estimated from the Body Mass Index z-score (WHO, 2006).

increased prevalences of overweight for adolescents aged 15 to 17 years (from 9% to 15%), and of obesity for adults (from 12% to 17%).

3.2.5. Physical activity and sedentarity

Around a quarter of children aged 3 to 10 years engaged in a physical activity five days per week and used an active means of transport to get to school. One third of adolescents aged 11 to 17 years did at least 60 min per day of physical activity, as recommended by the WHO. For adults aged 18 to 79 years, 63% reached an equivalent of at least 150 min per week of physical activity, as recommended by the WHO. From 11 to 64 years of age, the percentage of individuals who respected the WHO's recommendations on physical activity was higher for male individuals than for females (39% *vs* 26% for adolescents aged 11-17 years, 72% *vs* 49% for adults aged 18 to 44 years, and 75% *vs* 58% for adults aged 45-64 years). For adults, the proportion of individuals having a high physical activity level decreased with age (from 17% for those aged 18 to 44 years to 4.6% for those aged 65 to 79 years) and increased with the individual's level of education (for men in particular, from 13% for those with a primary or middle-school education to 27% for those with at least four years of higher education).

About a quarter of children aged 3 to 10 years, half of adolescents aged 11 to 14 years and two thirds of adolescents aged 15 to 17 years spent more than 3 hours a day in front of a screen. More than 80% of adults spent more than 3 hours a day in a sedentary activity. Between the INCA2 (2006-2007) and INCA3 (2014-2015) surveys, the average time spent in front of a screen for recreation purposes increased by around 20 min per day for children aged 3 to 17 years and by 1h20 for adults. Sedentary behaviour[12] increased with age for children (17% of children aged 3 to 6 years spent more than 3 hours a day in front of a screen compared with 71% of adolescents aged 15 to 17 years), and decreased for adults (89% of those aged 18 to 44 years spent more than 3 hours a day in a sedentary activity compared with 72% of those aged 65 to 79 years). The proportion of children aged 3 to 17 years with sedentary behaviour was lower when the representative's level of education was higher: 26% for those with at least four years of higher education compared with 52% for those with a primary or middle-school education. Conversely, in adults, the higher the individuals' level of education was, the more they were likely to have sedentary behaviour for more than 7 hours a day: 52% for those with at least four years of higher education compared with 30% for those with a primary or middle-school education.

In all, about one third of children and adults had behaviour combining both physical inactivity[13] and sedentary behaviour.

3.2.6. Sources of information and knowledge on food

▪ *Sources of information on food*

The main sources of information on food for adolescents were firstly the family, then advertising, teachers and product packaging, while adults relied firstly on the traditional media (radio, television, written press) and then friends and family. Regarding access to information, the Internet was cited more in the INCA3 survey (28%) than in the INCA2 Survey (15%), to the detriment of traditional media and books.

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[12] Sedentary behaviour is defined by at least 3 hours of screen time a day in adolescents aged 11 to 17 years and by at least 3 hours of sedentary activities a day for adults aged 18 to 79 years.

[13] Physical inactivity is defined by less than 60 minutes of moderate physical activity par day in children aged 3 to 17 years, and less than 30 minutes of moderate physical activity at least 5 times per week for adults aged 18 to 79 years

- *Knowledge of food-based dietary guidelines*

Compared to adults, adolescents aged 11 to 17 years were more likely to know national dietary guidelines on fruits and vegetables (74% *vs* 59%), dairy products (38% *vs* 22%), and starchy food (10% *vs* 7%). Conversely, adults were more likely to know the guidelines on fish (36% *vs* 29%) and on physical activity (71% *vs* 31%). Lastly, the proportions of adults and adolescents knowing the guidelines on meat, fish and eggs (MFE) were similar (respectively 52% and 51%).

Individuals (or their representative) with a primary or middle-school education were less likely to know the guidelines on fish. Male individuals were more likely to know the guidelines concerning physical activity. Among adults, more women knew the dietary guidelines than men (+7 to 9 points depending on the guideline), except for those on fruits and vegetables, and starchy food, for which there was no gender difference. Knowledge of the guidelines on fruits and vegetables and on dairy products was lower for older individuals, and higher for the fish and physical activity guidelines.

The proportion of adolescents knowing the guidelines on MFE and physical activity seemed lower in the INCA3 survey than in the 2008 Health & Nutrition Barometer. For adults, knowledge of the guidelines on dairy products and MFE has decreased while that of the guideline on physical activity has increased slightly. The guideline on starchy food remains the least well-known since 2008, both for adolescents and adults (less than 13%).

4. ANALYSIS AND CONCLUSIONS OF THE INCA3 WG

The INCA3 survey made it possible to update the data on consumption and eating habits for a representative sample of the population living in metropolitan France in 2014-2015. When linked with the CIQUAL nutritional composition table, it also enabled the nutrient intakes of the population to be estimated and allowed the identification of the major food-group contributors. It also provided additional data on the weight status of the population, physical activity and sedentary behaviours, consumption of food supplements, habits and practices potentially posing microbiological or physico-chemical risks, knowledge of dietary guidelines, and on different dietary behaviours of the population (purchases and origin of foods, sources of information, reading of labels, etc.).

The INCA3 WG identified several important points relating to the dietary situation in metropolitan France, as based on the results of the INCA3 survey detailed in the study report.

▶ The many themes addressed in the study revealed significant disparities in behaviour within the population, in particular according to gender, age and socio-economic level (level of education or PCS).

The disparities by gender appear in adolescence and become more marked in adulthood. They mainly concern food consumptions that are more in line with the dietary guidelines for women (favouring poultry, yoghurts, fruit compotes, soups, fruit juices and hot beverages) than for men (favouring other meats, cheeses, dairy-based desserts and cream desserts, delicatessen meats, sandwiches and savoury pastries, SSBs and alcoholic beverages). It should also be noted that women were less likely than men to consume raw foods of animal origin. Women were also characterised by a higher consumption of food supplements and a better knowledge of the national PNNS food-based dietary guidelines. On the other hand, they engaged in less physical activity and were less familiar with the PNNS guidelines on physical activity than men.

The age-dependent disparities related more to adults, with young adults (18-44 years) being markedly different to older people (65-79 years), probably reflecting generational effects. Compared to younger adults, people aged 65 to 79 years ate meals more regularly and consumed more home-made or home-produced foods, and fewer food supplements and processed foods such as breakfast cereals, sweetened foods and beverages, sandwiches and savoury pastries. They also stored perishable foods for shorter periods. In addition, they were less active, but also less sedentary than young adults.

Concerning social disparities, the survey results tend to indicate behaviours closer to the recommendations in terms of food consumption (more fruit and fewer sweetened beverages), weight status (less obesity) and physical activity (more active behaviours) for individuals with a high level of education or PCS. They also had their meals more regularly and were more likely to consume food supplements. On the other hand, the behaviour of individuals with a lower level of education seemed to be safer in terms of microbiological risks (lower consumption of raw foodstuffs of animal origin, shorter storage of perishable foodstuffs before consumption). Moreover, older individuals (65-79 years) and those with a high level of education or PCS paid closer attention when choosing their foods (more frequent reading of packaging and labels, more qualitative criteria for selecting foods, purchases in local shops or markets, higher consumption of organic foods).

Lastly, a few regional disparities were identified but these are mainly limited to adults, suggesting a homogenisation of behaviour between the regions for the younger generations. In particular, adults living in the Ile-de-France region had specific behaviours, with more irregular lunches, a greater share of consumption outside the home and a higher rate of consumption of raw foods of animal origin. This was also the region with the lowest obesity rate.

These initial results therefore emphasise the need to take account of the heterogeneity of behaviours within the population when assessing food-related risks and benefits, to ensure that the potentially most affected population groups are targeted.

► The finding of a growing reliance on processed food was reflected by the higher share of food consumed in prepared rather than raw form than that of the INCA2 survey. In addition, industrial agri-food products accounted for the majority of these processed foods (two thirds for children and half for adults) consumed outside eating establishments. This processing and this substantial use of agri-food products has contributed to the development of a certain distance between individuals and their food, particularly in terms of knowledge of food composition. This poorer knowledge about the composition of the foods consumed could affect the application of national dietary guidelines based on groups of raw or relatively unprocessed products such as fruits and vegetables. Indeed, it is becoming increasingly difficult for individuals to calculate the number of servings of raw foods theoretically consumed when the foods actually consumed are more complex and highly processed.

This trend towards more and more processed food has been accompanied by a large increase (around 50%) in the number of food supplement consumers since the INCA2 survey. This sharp increase reinforces the importance of the nutrivigilance scheme set up by ANSES to monitor the safety of these products. In this context, consumers should be reminded of the importance of reporting any adverse effects appearing after the consumption of a food supplement to a health professional. Raising awareness among health professionals of the potential risks associated with this type of product also needs to be continued.

► Alongside these trends, local supply, via home-production and the wild (hunting, fishing, picking) of products that are not placed on the market and, more anecdotally, consumption of water from private wells are common practices that may concern up to 75% of the population, of whom two thirds consume such products on a weekly basis. These products are not, or are only partially, subject to official food safety controls by the public services. Some work has already been done to evaluate the specific risks associated with these modes of supply in metropolitan France (e.g. fresh-water anglers and contamination of fish by polychlorinated biphenyls (ANSES and InVS 2011), vegetable gardens near household waste incinerators (InVS 2009)) or in the French overseas territories (e.g. contamination of food by chlordecone in the French Caribbean (AFSSA 2007)). Given the share of the

population concerned, this type of work should continue, in order to better assess the potential risks associated with these local supply practices.

▶ The results of the INCA3 survey show the emergence of new issues in terms of the microbiological safety of food. Indeed, a number of practices posing a potential health risk seem to be more frequent in the INCA3 survey than in the INCA2 survey: the increase in the rates of consumers of raw foods of animal origin (mainly fish and beef), longer storage times before the consumption of perishable foodstuffs, and a higher percentage of use-by dates exceeded, which is particularly problematic for sensitive products (like meat and fish).

This observation raises the question of again communicating precautionary messages on food hygiene to the population in order to limit risk situations and food poisoning (exceeding the UBD and the recommended refrigerator storage temperature). Assessments of the microbiological risks associated with these more frequent practices concerning consumption of raw foods of animal origin or unsound storage practices for perishable foodstuffs in the consumer's home should also be considered.

5. AGENCY CONCLUSIONS AND RECOMMENDATIONS

After the INCA1 survey in 1998-1999 and the INCA2 survey in 2006-2007, the INCA3 survey conducted in 2014-2015 marked a methodological turning point. Indeed, ANSES wanted to integrate the INCA3 survey in the European process for harmonising food consumption data collection, as implemented by the European Food Safety Authority (EFSA). This approach, via the "EU Menu" project, aims to improve the comparability of food consumptions, and therefore that of both dietary exposure to chemicals and nutrient intakes, between European countries. The harmonised food consumption data, including those from the INCA3 survey, will be used by EFSA for its own risk assessment needs at the European level. The collection method defined by the "EU Menu" project helped to improve the quality of the food consumption data from the INCA3 survey, with firstly a more exhaustive data collection, in particular for consumption between main meals, and secondly a much more detailed description of the foods consumed. These improvements will contribute to refining future risk assessments using the INCA3 survey data. Nevertheless, they make it very difficult to compare the results of the INCA3 survey with those of the previous INCA surveys, and therefore to explore changes in terms of food consumption, nutrient intakes, or dietary exposure to chemicals or microbiological agents. Changes in results from data from other parts of the INCA3 survey, such as consumption of food supplements or certain food storage practices, can however be studied.

The INCA3 survey offers an updated picture of food consumptions and eating habits in 2014-2015 based on a representative sample of the population living in metropolitan France. The descriptive study report accompanying this opinion provides detailed results on food consumption, nutrient intakes, weight status, levels of physical activity and sedentary behaviour, as well as behaviours, practices, attitudes and knowledge of the French population with regards to diet and nutrition. After reviewing the situation described in this report, the French Agency for Food, Environmental and Occupational Health & Safety (ANSES) adopted the conclusions and recommendations of the INCA3 working group. These conclusions give rise to the following comments from ANSES:

▶ Knowledge of the diversity of eating behaviours of the metropolitan population will enable ANSES to target those populations that are most exposed or likely to be exposed when assessing food-related risks and benefits. This diversity should also be taken into account in communications on the risks and in messages on prevention to ensure that the most concerned populations are properly informed.

▶ Consumption of complex processed foods, particularly by children and adults aged 18 to 44 years, can make it more difficult for these populations to understand and apply prevention messages that are based on groups of raw or relatively unprocessed foods. Hence, the

communication related to the new dietary guidelines of the French National Health and Nutrition Programme (PNNS) established in 2017 by the High Council for Public Health (HCSP 2017) on the basis of ANSES's Opinion 2012-SA-0103 (ANSES 2016), will have to take into account, firstly, the means of expression that are most understandable to the consumer (formats of expression and time reference), and secondly, the trend towards increasingly consumed complex and processed foods observed in the INCA3 survey. It will also be necessary to adapt the messages to different population categories and their specific food and dietary behaviours.

▶ The fifty percent increase in the number of consumers of food supplements between 2006-2007 (INCA2 Study) and 2014-2015 (INCA3 survey) strengthens the importance of the nutrivigilance scheme set up by ANSES in 2009 and aiming at improving consumer safety by identifying the potential adverse effects associated with the consumption of these products. Thanks to the reports received from healthcare professionals, ANSES has published eight scientific opinions on food supplements or their ingredients. As such, ANSES reiterates that, by reporting adverse effects identified in their patients following the consumption of these products, healthcare professionals are essential in maintaining the effectiveness of this scheme. At the same time, a more in-depth study of food supplements consumed in the INCA3 survey will make it possible to identify other potential health concerns related to these types of products.

▶ Foodstuffs obtained via local channels that are not or only partially subject to official safety controls by the public services (home-production, hunting, fishing, picking, private water wells) concerns up to 75% of individuals, consuming them at varying frequencies. However, the foods derived from these channels may present physico-chemical or biological contamination that has still not been adequately documented. Ad hoc work conducted by ANSES or other health agencies has shown that risks for consumers are possible, and has led to specific consumption recommendations for foods obtained through these channels. Given the share of the population concerned, ANSES recommends that additional studies be performed so as to better characterise and assess the potential risks associated with such local supply practices. To do this, data on the levels of contamination of the derived foods should be acquired, as well as consumer practices with regard to these supply channels. The Pesti'home study conducted by ANSES, whose results will be available at the end of 2017, will for example provide evidence on household practices in terms of the treatment of vegetable gardens with plant protection products.

▶ The observed excessively high temperature of refrigerators in households, important consumption of raw foods of animal origin, and longer storage of perishable foodstuffs before consumption (especially for sensitive foods such as meat or fish) create new issues regarding the microbiological safety of foods that can lead to increased risks for the consumer. Despite not being able to assert the existence of a link at this stage, these results can be set against the increased number of collective foodborne infections occurring in the family context, described by ANSES in its Opinion 2012-SA-0005 (ANSES 2013). ANSES therefore insists on the need to remind consumers of essential food hygiene messages formulated in Opinion 2012-SA-0005 and, in particular, the rapid consumption of food prepared at home or purchased non-pre-packed without any use-by date (delicatessen products, pastries), keeping the temperature in domestic refrigerators below 4°C, and restricting the consumption of raw foods of animal origin (steak tartare, sushi, raw eggs) by certain sub-populations (young children and pregnant women in particular). At the same time, assessing the microbiological risks associated with behaviours observed in the INCA3 survey in terms of consumption of raw foods of animal origin and food cooking levels or storage practices should be considered to ensure that additional measures are not necessary to guarantee consumer safety.

Besides the points emphasised by the INCA3 working group, ANSES also notes several points requiring particular attention based on the situation described in the INCA3 survey.

▶ The body weight status and levels of physical activity and sedentary behaviour of the population living in metropolitan France remain inadequate, despite the national plans implemented since 2001. In 2014-2015, 13% of children aged 0 to 17 years and 34% of adults aged 18 to 79 years were overweight, and respectively 4% and 17% were obese. In addition, one third of children and adults have behaviour combining both physical inactivity and sedentary behaviour. The percentage of individuals with sedentary behaviour is alarming; half of adolescents aged 11 to 14 years, two thirds of adolescents aged 15 to 17 years and more than 80% of adults aged 18 to 79 years are concerned. The efforts made within the framework of national policy must therefore be strengthened, in particular for the most disadvantaged social categories. These efforts should focus on both improving food from a nutritional point of view and promoting physical activity. Given the worrying situation on sedentary behaviour, ANSES also recommends consolidating this policy through a new specific guideline on the reduction of sedentary behaviour, in parallel with the promotion of regular physical activity. The Agency's Opinion 2012-SA-0155 (ANSES 2015) underlined the fact that simultaneously increasing physical activity and reducing accumulated continuous sedentary time produces the greatest effects on health.

▶ Communication to consumers on the new PNNS guidelines drawn up by the HCSP should be considered. ANSES underlines the importance of assessing the effectiveness of the communication campaigns that will be implemented. Indeed, with the exception of the guidelines on fruits and vegetables and physical activity, the INCA3 survey revealed that in 2014-2015, only a minority of the population were familiar with the previous PNNS guidelines established in 2001, and that this proportion was in decline since the 2008 Health & Nutrition Barometer. In addition, ANSES underlines the very different behaviours depending on sex, age and social level observed in the INCA3 survey. The Agency again insists on the need to adapt the communication to the diversity of situations existing within the population, in order to better target the messages, in particular towards those categories of the population whose behaviour seems furthest from the national recommendations.

▶ Given the high variability in dietary behaviours, both between individuals and for the same individual over time, it is very difficult to compare food consumption or nutrient intakes observed over 2 or 3 days with the national recommendations, particularly for fatty acids, sugars and micro-constituents. ANSES will subsequently carry out the additional work needed to assess the differences between the recommendations and individuals' actual behaviour. Nevertheless, concerning salt intakes, which can be assessed directly from the INCA3 data, ANSES notes that the average intake observed in adults in the INCA3 survey (9 g/d in men and 7 g/d in women) remain higher than the public health goal set by the PNNS of 8 g/d on average for men and 6.5 g/d for women. The main contributing foods are bread, sandwiches, pizzas and savoury pastries, condiments and sauces, soups, and delicatessen meats. The efforts made by the relevant professional sectors to reduce the salt content of foods should therefore be continued and scaled up.

With these first results, the INCA3 survey offers multiple opportunities and constitutes an essential database for ANSES's expert appraisal activities in dietary health. When combined with the data available at ANSES on the nutrient composition[14] or the levels of chemicals[15] or microbiological

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[14] Composition table of the French Information Centre on Food Quality (CIQUAL) or database of the Observatory of Food Quality (OQALI).

[15] Databases on the chemical contamination of food from the surveillance and control plans of the DGAL and the DGCCRF (CONTAMINE), on pesticide residues in foodstuffs from the French Observatory for Pesticide Residues (ORP), and Total Diet Studies (TDSs).

agents in foods, this data can be used to estimate the energy and nutrient intakes of the population as well as dietary exposures to chemicals or microbiological agents. The data collected will thus be exploited, over the next few years, to respond to any future requests that ANSES will deal with on the assessment of food-related nutritional, physico-chemical or microbiological risks in metropolitan France. However, ANSES emphasises that the INCA3 survey targeted the general population from birth to 79 years of age living in metropolitan France. Thus, certain specific populations in metropolitan France have not been adequately covered in the study (infants and children less than 3 years of age, pregnant or breastfeeding women, vegetarians and vegans, people with food allergies, economically vulnerable populations, etc.), or have not been addressed at all (people aged 80 years and over). This limitation raises the question of the need for additional consumption data and the need to produce data on certain populations by setting up specific consumption studies. Thus work should be undertaken to establish priorities among all specific populations of potential interest. In addition, the INCA3 survey did not cover the French overseas territories because such a study would require protocols and survey tools adapted to the very specific local dietary characteristics and data collection conditions. Individual food consumption data have been published for Martinique, Guadeloupe and Mayotte (Castetbon, Ramalli *et al.* 2016, Castetbon, Vaidie *et al.* 2016, Vernay M *et al.* 2009). Carrying out additional studies should however be considered for French Guiana and Réunion, for which no recent individual food consumption data are available.

In the short term, ANSES plans in-depth analyses of the data from the INCA3 survey in connection with its risk assessments for the population. Thus, certain opinions resulting from ANSES's expert appraisal work will shortly be published:

- Assessment of the risks associated with inadequate physical activity and sedentary behaviour levels for the population in view of the latest guidelines defined by ANSES (ANSES 2015). This work will describe the physical activity and sedentary behaviours in greater detail (types of physical activities and forms of sedentary behaviour), their profiles within the population and their relationship with other parameters such as weight status, food consumption and nutrient intakes;

- Assessment of the risks associated with inadequate nutrient intakes of macronutrients (fat, carbohydrates, proteins), fatty acids, vitamins and minerals, also taking into account the intakes from food supplements and fortified foods. Before this work takes place, the usual nutrient intakes will be modelled in order to assess over the long term whether the intakes of the population are in line with the needs recently defined by ANSES during the updating of food consumption guidelines.

In the longer term, this work will be supplemented by expert appraisals on the assessment of microbiological risks associated with changes in consumer behaviour (consumption of raw foods of animal origin, food cooking levels, food storage practices) and on the characterisation and assessment of the potential risks associated with food supply channels that are not subject to public health controls. Work targeting those populations with very particular consumption behaviours is also being considered, in order to assess the health risks and benefits associated with their dietary specificities.

Thus, the INCA3 survey is a structuring element for ANSES's expert appraisal activities in food safety, insofar as it constitutes an essential tool for estimating dietary exposure and nutrient intakes. Besides the work mentioned above, this study will also be exploited extensively in the case of future topics of particular interest that emerge in the field of dietary health and safety.

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