Latvian National Dietary Survey on the general population

Institute of Food Safety, Animal Health and Environment BIOR

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Abstract

The first and at the same time the most recent national dietary survey in Latvia "National Comprehensive Food Consumption Survey, 2007-2009" was carried out focusing on target group age from seven to 64 years old. Due to the limited resources, available for that national survey, the population groups of infants, toddlers and children (up to seven years old) and elderly (from 64 to 74 years old) were not included in the design of the intended study supported by the Ministry of Agriculture, and thus have never been covered by a national dietary survey in Latvia. For this reason, the specific study of dietary and eating habits of these groups (infants, toddlers, children and elderly) are now included in the present national food consumption survey following the EU Menu guidance of EFSA. Different approaches are followed for each target population group. In addition, in order to achieve better results and encourage participation, different incentives were used.

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Key words: consumption, infants, eating habits, national survey, school children

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Summary

The first and at the same time the most recent national dietary survey in Latvia "National Comprehensive Food Consumption Survey, 2007-2009" was carried out focusing on target group age from seven to 64 years old. Considering the resources, available for the national survey, infants, toddlers and children (up to seven years old) and elderly (from 64 to 74 years old) were not included in the design of intended study supported by the Ministry of Agriculture. However, taking into account the fact that the mentioned sub-groups have never been covered by national dietary surveys, the specific study of dietary and eating habits of the two age groups (infants and elderly) are included in the present national food consumption survey.

The survey included 3595 participants, including 556 children under age of three years and 407 participants over 64 years of age for the first time, providing data on these population groups in Latvia. Different approaches are used for each target group to achieve better results and different incentives as well to encourage participation.

The food consumption data were obtained by using dietary recall, dietary record methods complemented with a food propensity questionnaire. Anthropometric data were obtained by trained interviewers in all population groups.

ESFA Guidance methodology is successfully adapted and will be used in all dietary surveys in near future. Obtained data has been already successfully used in different discussions related to food safety and health and will play important role in these decisions in Latvia. Already now data has been used to publish information on first food that infants are introduced to that can help paediatricians to make better advice and even review guidelines.

New tools has been developed in this survey – individual reports for participants that gives higher possibility to reach more respondents. It also helps individuals to understand requirements of such surveys.

EFSA FoodEx2 classification system was used to classify and code food items.
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1. Introduction and objectives

1.1. Background and Terms of Reference as provided by the requestor

Access to uniform food consumption data across the EU Member States is fundamental for several functions of EFSA, European authorities and other bodies and stakeholders. In addition to food safety monitoring of existing hazards and evaluation of emerging risks, standardised food consumption data will be very useful in establishing new and updating existing legislation on the safety of foods.

A long term objective of EFSA is the organisation of a fully harmonised pan-European Food Consumption Survey, this project is called “What’s on the Menu in Europe?” (EU Menu). The EU Menu survey is planned to be carried out in 2013-2018 whereas planning, harmonisation of protocols and implementation and piloting of methods have already started in 2010 for the different target population groups.

In October 2009, the EFSA Expert Group on Food Consumption Data (EGFCD) endorsed the Guidance of EFSA on “General principles for the collection of national food consumption data in the view of a pan-European dietary survey” (EFSA, 2009). The main objective of this Guidance is to recommend general principles for the collection of dietary information that can be used to calculate exposure to all possible biological agents and chemical substances considered by EFSA’s Scientific Panels as well as estimating intake of nutrients and vitamins.

In January 2010, EFSA started the Article 36 project (CFP/EFSA/DCM/2009/02) “Pilot study for the Assessment of Nutrient intake and food Consumption Among Kids in Europe” (PANCAKE), coordinated by RIVM (The Netherlands) to develop and test tools and procedures for the collection of individual food consumption data for infants, toddlers and other children up to 10 years of age (Ocké M. et al, 2012).

In January 2011, EFSA started the Article 36 project (CFP/EFSA/DCM/2010/02) “Pilot study in the view of a Pan-European dietary survey – Adolescents, adults and elderly” (PANEU), coordinated by the Hungarian Food Safety Office to develop and test similar tools and protocols for the different adult population groups (Ambrus A. et al, 2013).

The Guidance of EFSA on “General principles for the collection of national food consumption data in the view of a pan-European dietary survey” will probably be updated in 2013 with recommendations from the pilot studies.

Further, since December 2010, EFSA collaborates with the International Agency for Research on Cancer (IARC) through a negotiated procedure contract (NP/EFSA/DATEX/2010/01) in order to get the EPIC-SOFT dietary software and related interview and data management tools and databases developed and adapted according to the needs of EFSA and to ensure that this software can be used by EU Member States for their dietary surveys (EU Menu) (IARC, 2013).

The first series of support to the national dietary surveys was provided by means of the call for tender CFT/DCM/2011/02. Two applicants (from France and Estonia) were awarded a contract in October 2011.

The proposed call for tenders is aimed at supporting at least three (up to six) EU Member States, which are having the governmental mandate to carry out a national dietary survey in the period from 2012 to 2015. Resources will be made available to support the adaptation of the methodology used in these studies to comply, as much as possible, with the general principles proposed in the above mentioned EFSA Guidance. The dietary data collected through the activity should be available to EFSA’s scientific activities without restriction for its use.

The objectives of the contract resulting from the present procurement procedure are as follows:

1 The guidance of EFSA has been updated in December 2014 and is available as Guidance on the EU Menu Methodology at http://www.efsa.europa.eu/en/efsajournal/pub/3944
Objective 1: To adapt the methodology used in the national food consumption survey, as much as possible, according to the above mentioned EFSA Guidance document.

Objective 2: To provide the national food consumption and related data collected within the survey to EFSA in the format required by EFSA.

This contract was awarded by EFSA to: Institute of Food Safety, Animal Health and Environment BIOR

Contractor: Institute of Food Safety, Animal Health and Environment BIOR

Contract title: Support to national dietary surveys in compliance with the EFSA guidance on general principles for the collection of national food consumption data in the view of a Pan-European dietary survey

Contract/Grant number: CTF/EFSA/DCM/2012/01-CT04

2. Description of the protocol of the survey

Survey was started by Registration and Assessment Agency of Food and Veterinary Service of Latvia in 2012. Survey planning, adaptation of methodology, designing of tools for infants, toddlers and elderly according to the EFSA Guidance (EFSA, 2009) and the contract requirements signed with EFSA was carried out by Registration and Assessment Agency of Food and Veterinary Service of Latvia. Data collection for these population groups was started in 2012 as well. In 2013 after some structural changes in organisation, the responsibility for the dietary survey was referred to the Institute of Food Safety, Animal Health and Environment (BIOR) as well as the responsibility for particular survey. BIOR continued the second phase (mostly day two) of data collection for these population groups involving personnel that participated in phase one data collection in order not to lose any participants of the survey.

BIOR has previous experience in organizing dietary surveys by conducting School Fruit and Vegetable evaluation scheme where food diaries of school children were obtained, as well as dietary data collection and supervision of adult population in 2012 as order from Ministry of Agriculture. BIOR was responsible for adapting methodology, designing tools, organizing and supervising data collection for rest of population groups planned in survey. Data processing of all obtained data was carried out by BIOR. Food consumption data collection of children and adolescents was started in summer of 2013 and finished by end of 2013 covering three out of four seasons. Data collection for adult population was started in January of 2014 and finished by the end of the same year. Dietary information was collected by means of two 24 hour dietary recall, separated at least by 14 days. In all population groups, the two 24h recall were complemented by a Food Propensity Questionnaire (FPQ), designed specifically for this purpose. Information on physical activity, anthropometric data (height and weight) and socio-demographic data were collected as well. The survey calendar was organized in such a way that the appropriate proportion of working days and weekend days was taken.

3. Study population and exclusion criteria

The target population was the entire non-institutionalized population of Latvia under the age of 75 years old, divided into six subpopulations according to EFSA Guidance:

1. Infants (under 12 months of age);
2. Toddlers (1-2 years of age);
3. Other children (3-9 years of age);
4. Adolescents (10-17 years of age);
5. Adults (18-63 years of age);
6. Elderly (64-74 years of age).
The actual survey population differs from the target population for sampling convenience reasons. Due to the fact that subpopulations three and four can be most conveniently sampled via preschools and schools, the survey population was redefined by modifying subpopulations three to five as follows:

- **Preschool children (three to six years of age):** All children between the ages of three and six attending preschools/ kindergartens, excluding those attending special education preschools. This survey subpopulation covers 81% of the relevant target subpopulation (all non-institutionalized children between the ages of three and six). It is mandatory to attend preschool at the age five and six. Part of population not covered in a survey is children not attending preschool or are schooled by private caregivers until they reach the age of five.

- **Children and adolescents attending general education primary and secondary schools (seven to 18 years of age),** excluding those attending special education schools and boarding schools. This survey subpopulation covers 80% of the relevant target subpopulation (all non-institutionalized children and adolescents between the ages of seven and 18). The sample was calculated using data from Central Statistics Bureau of Latvia.

- **Adults (19-63 years of age)**

Pregnant women were excluded from participation according to survey plan as it was not target population and there was recently dietary data of this population group submitted to ESFA (CFT/EFSA/DCM/2011/01). Pregnant women were excluded from survey before first meeting, if that information was available to family doctor or at first meeting if information on pregnancy was not previously available.

### 3.1. Sampling frame

In subpopulations one (infants) and two (toddlers), a two-stage sampling procedure was followed. In the first stage, the sampling frame consisted of all family doctors and paediatricians practicing in Latvia. In the second stage, the sampling frame consisted of all infants/ toddlers registered with each sampled doctor. Every infant and toddler in Latvia is registered at family doctor or paediatrician practice right after birth.

In subpopulations three (preschool children) and four (children and adolescents in general education schools), a three-stage stratified random sampling procedure was followed. In the first stage, the sampling frame consisted of all preschools/ general education schools, excluding special education schools and boarding schools. This included 553 preschools and 739 schools. The first-stage frame was stratified by type of settlement (Riga; another major city; another city or town; rural area). In the second stage, the sampling stage consisted of all classes/ study groups in the school or preschool, stratified by level (kindergarten; grades 1-4; grades 5-8; grades 9-12). In the third stage, the sampling frame consisted of all students in the selected class/ study group.

In subpopulation five (adults), a two-stage stratified random sampling procedure was followed. In the first stage, the sampling frame consisted of all family doctors in Latvia, stratified by region (Riga region; Kurzeme; Vidzeme; Zemgale; Latgale) and by type of settlement (Riga; another major city; another city or town; rural area). In the second stage, the sampling frame consisted of all patients registered with the selected family doctor and aged between 19 and 64 years. The second-stage frame was stratified by sex and age group (19-25; 36-50; 51-64). The ultimate sampling frame covers the entire survey population, as each resident of Latvia is required to register with a family doctor.

In subpopulation six (the elderly), a stratified single-stage random sampling procedure was followed. The sampling frame consisted of all residential (non-institutional) addresses in the country (obtained from State Address Register data), stratified by region (Riga region; Kurzeme; Vidzeme; Zemgale; Latgale) and by type of settlement (Riga; another major city; another city or town; rural area).

Sample distribution along the survey followed guidance described in guidelines for interviewers. Interviewers were instructed to capture adequate proportion of weekdays and weekend days.
Subjects were uniformly distributed over all seasons. However it was more difficult to reach certain population groups during summer time due to vacations and school holidays.

3.2. Sampling method and design

For subpopulations three (preschool children) and four, (children and adolescents in general education schools) a three-stage stratified random sampling procedure was followed. The primary sampling units (PSUs) were schools/ preschools, the secondary sampling units (SSUs) were classes/ study groups, and the tertiary sampling units (TSUs) were individual children/ adolescents. In the first stage, a list of all schools and preschools was obtained by the Ministry of Education; the exclusion criteria defined in Sections 2.1 and 2.2 were applied; the list was stratified by (type of settlement (Riga; another major city; another city or town; rural area), and PSUs were randomly sampled with probability proportional to size (PPS). In the second stage, the list of classes/ study groups was obtained from each sampled school, the list was stratified by level (kindergarten; grades 1-4; grades 5-8; grades 9-12), and SSUs were selected by simple random sampling from each stratum within each PSU. In the third stage, lists of students in each sample class/ study group were obtained from the schools, and TSUs were selected by simple random sampling from each SSU. Sampling in the second and third stages was carried out by trained interviewers in situ with the help of a Microsoft Excel macro. From each class one up to ten persons could be selected.

For subpopulation five (adults), a two-stage stratified random sampling procedure was followed. The primary sampling units (PSUs) were family doctors’ clinics and the secondary sampling units (SSUs) were individuals. In the first stage, a list of family doctors was obtained from the Ministry of Health. The list was stratified by region (Riga region; Kurzeme; Vidzeme; Zemgale; Latgale) and by type of settlement (Riga; another major city; another city or town; rural area), resulting in 16 strata. Within each stratum, PSUs were sampled randomly with probability proportional to size (PPS), with size defined as the number of patients registered with each doctor. In the second stage, patient lists were obtained from each sample doctor; the lists were stratified by sex and age group (19-25; 36-50; 51-64), and SSUs were sampled by simple random sampling from each stratum in each PSU.

In subpopulations one (infants) and two (toddlers), a two-stage sampling procedure was followed. In the first stage, family doctors and paediatricians registered with the Latvian Doctors Association were invited to participate (an invitation was sent to all doctors, and all volunteers were accepted). According to survey plan if some strata were not covered, repeated invitation was sent to doctors working in area to encourage participation. Incentives in form of certification point were used to motivate doctors to participate. In the second stage, the participating doctors were instructed to randomly invite a sample of their patients to participate in the survey. Each doctor was given sample plan – certain number of male and female participants to be invited by clinic. As doctors were already stratified by region no additional following on subjects’ place of residence were done. It is common that family doctor or clinic of paediatrician is close to place or residence of subject.

In subpopulation six (the elderly), the sampling frame was stratified by region (Riga region; Kurzeme; Vidzeme; Zemgale; Latgale) and by type of settlement (Riga; another major city; another city or town; rural area). Each interviewer was assigned to a stratum (eight strata together) and was instructed to randomly sample residential addresses in that stratum and to interview one elderly person at each address (selected at random if multiple elderly individuals resided in the same address). Each interviewer followed assigned plan – certain number of male and female subjects were selected in each strata.

Sampling bias and representativeness

Two separate issues need to be considered here; difference between the survey and target populations, and departures from randomness in the sampling procedure. We discuss each of the issues in turn for each age group.

- For ages three and under
Survey population; as all children are required to be registered with a family doctor, the survey population equals the target population. Hence, there is no bias.

Sampling procedure; sampling in this sub-population was carried out before our involvement in the project, and we do not have a record of the monitoring of second-stage sampling (sampling of respondents from each doctor's register). Thus, there could be some departures from random sampling from the survey population. We do not believe these to have followed a systematic pattern; hence there is no known bias.

For ages 3-6

Survey population; the survey population differs from the target population by excluding children not attending kindergartens (preschools). The survey population covers 81% of the target population. We do not believe that the survey population differs from the target population in a systematic way with respect to factors relevant for dietary habits. Hence, there should be no systematic bias, only possible random noise.

Sampling procedure; strict multi-stage random sampling procedures were followed, and sampling in all stages was carried out by our employees with the help of a random number generator. Thus, the sample is representative of the sampling population.

For ages 7-15

Survey population; as schooling is mandatory for all children in this age group, the survey population differs from the target population only by excluding students in boarding schools and special education (not more than 15% of the target population). We do not expect this to introduce a systematic bias, only possible random noise.

Sampling procedure; as in the previous age group, strict multi-stage random sampling procedures were followed and the sample is representative of the sampling population.

For ages 16-18

Survey population; the survey population differs from the target population by excluding those not attending general education schools. Those excluded generally have lower income and social status than those included. As income and social status tends to be associated with different diets, this can introduce a bias. When analysing data from this age group, it might therefore be desirable to introduce design weights correcting for the distribution of household income and/or parental education.

Sampling procedure; as in the previous age group, strict multi-stage random sampling procedures were followed and the sample is representative of the sampling population.

For ages 19-63

Survey population; as all residents of Latvia are required to register with a family doctor, the sampling population should equal the target population and there should be no bias.

Sampling procedure; as in the previous age group, strict multi-stage random sampling procedures were followed and the sample is representative of the sampling population.

For ages 64 and over

Survey population; the survey population equals the target population; there is no bias.

Sampling procedure; sampling in this sub-population was carried out before our involvement in the project, and we do not have a record of the exact random sampling procedure followed by interviewers. Thus, there could be some departures.
from random sampling from the survey population. We do not believe these to have followed a systematic pattern; hence there is no known bias.

**Comparability between different age groups**

Given that, with the exception of the 16-18-year-olds, there is no known bias in the sampling of either age group, we expect the results to be comparable across age groups. Furthermore, because the bias in the 16-18-year-old group springs mostly from differences in social class, design weights with respect to household income and parental education should make this group comparable to the others as well.

**Replacement strategy**

- **Populations 1 (<1 yr.) and 2 (1-2 yrs.)**
  - In the first stage, all registered doctors in the country were initially invited to participate; a satisfactory number of PSUs (m=55) was reached and no replacements were carried out
  - In the second stage, only 24% of the respondents approached agreed to participate. An additional respondent was drawn randomly and independently from the same PSU following each non-response, ensuring that the final number of respondents reached matched the target sample size

- **Populations 3 (3-6 yrs.) and 4 (7-18 yrs.)**
  - In the first stage, a very small number of sampled schools (10) and preschools (2) refused to participate; these were replaced by new schools/preschools, drawn randomly and independently from the same strata as the refusing institutions
  - In the second stage, no refusals were observed and no replacement was needed
  - In the final stage, 94% of the respondents sampled agreed to participate. An additional respondent was drawn randomly and independently from the same SSU following each non-response, ensuring that the final number of respondents reached matched the target sample size

- **Population 5 (19-64 yrs.)**
  - This portion of the survey is still in the sampling stage, and hence no response rate estimates are available
  - The sampling protocol calls for a substitute doctor’s practice to be sampled randomly and independently from the same stratum in the case of each first-stage non-response/refusal, and for a substitute respondent to be sampled randomly and independently from the same stratum in the same PSU in the case of a second-stage non-response/refusal. The number of respondents reached will therefore match the target sample size

- **Population 6 (65-74 yrs.)**
  - 65% of the respondents sampled agreed to participate. An additional respondent was drawn randomly and independently following each non-response, ensuring that the final number of respondents reached matched the target sample size.

**Bias associated with replacement**

As the replacement and original samples were drawn independently, the replacement per se did not introduce any additional bias, over and above any possible selection bias arising from non-response itself.
Realized versus target sample sizes

Due to the replacement procedure, the number of respondents in subgroups reached in each final-stage sampling unit mostly equals the target sample size for that unit. The total number of respondents reached differs slightly from the target sample size due to indivisibilities arising from multi-stage sampling.

3.3. Sample size

The target sample sizes and achieved respondents after data cleaning (completely filled all required information in all questionnaires) are displayed in Table 1.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Gender</th>
<th>Target sample size</th>
<th>Achieved sample size</th>
<th>Achieved responders one day only</th>
<th>Achieved responders two days</th>
<th>Response rate(a) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants from 0 to 11 months</td>
<td>Males</td>
<td>130</td>
<td>125</td>
<td>29</td>
<td>96</td>
<td>74%</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>130</td>
<td>127</td>
<td>52</td>
<td>75</td>
<td>58%</td>
</tr>
<tr>
<td>Toddlers from 1 to 2 years</td>
<td>Males</td>
<td>150</td>
<td>168</td>
<td>41</td>
<td>127</td>
<td>85%</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>150</td>
<td>136</td>
<td>21</td>
<td>115</td>
<td>76%</td>
</tr>
<tr>
<td>Other children from 3 to 9 years</td>
<td>Males</td>
<td>375</td>
<td>361</td>
<td>2</td>
<td>359</td>
<td>96%</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>375</td>
<td>431</td>
<td>8</td>
<td>423</td>
<td>oversampling</td>
</tr>
<tr>
<td>Adolescents from 10 to 17 years</td>
<td>Males</td>
<td>375</td>
<td>242</td>
<td>-</td>
<td>242</td>
<td>65%</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>375</td>
<td>382</td>
<td>4</td>
<td>378</td>
<td>oversampling</td>
</tr>
<tr>
<td>Adults from 18 to 64 years</td>
<td>Males</td>
<td>600</td>
<td>562</td>
<td>55</td>
<td>507</td>
<td>85%</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>600</td>
<td>654</td>
<td>81</td>
<td>573</td>
<td>96%</td>
</tr>
<tr>
<td>Elderly from 65 to 74 years</td>
<td>Males</td>
<td>180</td>
<td>184</td>
<td>46</td>
<td>138</td>
<td>77%</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>180</td>
<td>211</td>
<td>49</td>
<td>162</td>
<td>90%</td>
</tr>
</tbody>
</table>

(a): Calculated as the number of responders with two days data versus the target sample size for each gender and age group

For subpopulation groups one, two and five, response rate have been calculated in two levels: paediatricians’, family doctors level and respondent level. For sub-populations three and four response rate is calculated in two levels: school or kindergarten level and respondent level. For subpopulation six, response rate is calculated only on respondents’ level.

Response rate calculations

- In the school and kindergarten sub-populations, age of non-respondents is representative of the grade (year in school) and is recorded by the interviewer. The interviewer also records the sex of non-respondents and the reason for non-response (failure to contact, refusal, failure to return the questionnaire)
In the adult population, exact age and sex of non-respondents is known from the doctors’ registers and are recorded by the interviewer. The reason for non-response (failure to contact, refusal, failure to return the questionnaire) is also recorded.

At the stage where individual respondents are sampled, the response rate is simply calculated as the ratio of the number of all respondents finally answering the survey questions to all respondents sampled. The non-response is one minus the response rate. This is further broken down by reason for non-response.

At earlier stages of sampling, the non-response rate is the ratio of the number of sampling units (doctors or schools) non-contactable or refusing to participate to the number of all units sampled.

For sub-population one and two there is no information available about the 1st stage refusal as paediatricians decided to participate in survey voluntarily. Additional invitation letter was sent to doctors in strata where population coverage was insufficient. All infants and toddlers coming in the clinic on particular day (day of first visit by interviewer) were asked to participate in survey. For most of doctors day when they accept healthy infants for prophylactic visit is certain day of a week, so it was easier to reach target group. There were on average 10% respondents refusing to participate in survey in each clinic. It is possible that due to the face to face contact between doctors and mothers and because of doctors participating voluntarily that they were more motivated to participate and to select participants. Drop-outs in second stage of survey (second day of questioning) is displayed in Table 1.

For sub-populations three and four on first level from 355 educational facilities only three refused to participate. On second level 6% refused to take part in survey.

For sub-population six the response rate is 63%.

For sub-population five on first level from 154 sampled Family doctors’ clinics 85 agreed to participate (55% responsiveness). On second stage 33% of invited participants agreed to participate in survey, response rate was represented. But it varied between regions – in Vidzeme region doctors were more likely to participate in survey than in other regions of Latvia.

Food consumption data on 12 subjects (seven males and five females) belonging to the age class of very elderly were also included in the dataset provided to EFSA.

3.4. Strategy to achieve an adequate response rate and the initial sampling size

The following incentives were used to encourage participation:

- Participating doctors (population groups one, two, and five) were rewarded with further education credits
- Participating parents of infants and toddlers (subpopulations one and two) received food pyramid stickers and baby bottles
- Participating preschool and school children received a gift consisting of a healthy snack (organic dried fruits, granola bars, or flavoured milk drinks).

For subpopulation group five individual dietary survey reports were made where nutrient analysis for one day was calculated based on national guidelines. Participants could freely choose either to receive it as an e-mail or at their doctor’s clinic. Just in few cases respondents did not want to receive a report. In future it is planned to provide individual reports in every survey as this motivates family doctors to participate as well.

Another issue was that schools did not have the correct number of students attending their facility since the number at the end of May could differ from the one in September. Therefore, some additional sampling had to be done by inviting more schools from insufficiently represented regions to participate.


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For the adult survey, there are some minor issues concerning the respondents’ living in the countryside. For them it was difficult to visit to doctors’ office (public transport is sometimes only 2-3 times a week). Therefore, respondents with such kind of issues usually didn’t want to participate. In order to solve this problem and if the responders agreed, the interviewer went to their house. The involvement of the medical personnel helped the survey participants to trust the interviewer. However, if the doctor was not willing to participate, time for additional sampling had to be taken into account. Besides, doctors who easily agreed to participate, were already more interested in their patients’ health than others. More valuable incentives for doctors to participate were considered.

3.5. **Legal and ethical aspects**

There is no obligation in Latvia to receive authorization from the Ethics Commission, if no clinical intervention is planned. At the beginning of the study it was decided that all participants above the age of 18 and the parents/guardians of all participants under the age of 18 were required to sign informed consent forms. Strict confidentiality and anonymity was ensured in all surveys.

4. **Dietary survey tools**

Methods chosen for the series of surveys are influenced by several objectives:

- Resources available
- Compliance with the “Guidance of EFSA on the General principles for the collection of national food consumption data in the view of a pan-European dietary survey” (EFSA, 2009)
- Experience from The first National Comprehensive Food Consumption Survey, 2007-2009

Taking into account above-mentioned factors, surveys of the study were carried out by following methodologies:

- 24-h recall method for two non-consecutive days;
- Food propensity questionnaire (FPQ);
- Dietary record method (DRM) for two non-consecutive days;
- Physical activity questionnaire (PAQ).

4.1. **Food propensity questionnaire**

Food propensity questionnaire (FPQ) is designed to be available online and offline. Food consumption information system operated online and was available for interviewers during the interviews to serve data collection. However, due to technical restrictions at some geographical regions or mobile computing availability, it was not always possible to collect data online during the interview. Therefore, a paper questionnaire was developed and could be used. The interviewers were obliged afterwards to enter the collected data into the online system by themselves.

The design of the FPQ during the study was based on circumstances to focus on chemical hazards, particularly acrylamides, dioxins, furans and trans fatty acids. Therefore, food groups responsible for the above-mentioned chemical contaminants were detected. Decisions on the foods to include in the FPQ were based on EFSA scientific reports:

- Update on acrylamide levels in food from monitoring years 2007 to 2010 (EFSA, 2012)
- Results of the monitoring of dioxin levels in food and feed (EFSA, 2010a)
- Update on furan levels in food from monitoring years 2004-2010 and exposure assessment (EFSA, 2011)
- Scientific Opinion on Dietary Reference Values for fats, including saturated fatty acids, polyunsaturated fatty acids, monounsaturated fatty acids, trans fatty acids, and cholesterol (EFSA, 2010b)
Afterwards food groups were evaluated on the consumption and tailored for the specific needs of each target group of the study.

The same principles were used when other products were chosen to be included in the FPQ. Based on the above mentioned information three sets of FPQ were developed:

- Target group infants (Annex A) – 115 foods included in FPQ
- Target group adults / elderly (Annex C) – 157 foods included in FPQ
- Other children and adolescents (Annex B) – 75 foods included in FPQ

Depending on age specific consumption of particular foods (for example, no beer consumption for infants) there are some differences in the above-mentioned sets of FPQ. Examples of the foods included in the FPQ are present in Appendix A.

4.2. Dietary recall and dietary record

As for the FPQ, the dietary recall questionnaire was also designed to be available online and offline. Food consumption information system operated online and is available for interviewers during the interviews to serve data collection. However, due to technical restrictions at some geographical regions or mobile computing availability, it was not always possible to collect data online during the interview. Therefore a paper dietary recall questionnaire was developed and could be used (Annex D). The interviewers were obliged afterwards to enter the collected data into the online system by themselves. All questionnaires on infants and toddlers, as well as elderly were done on paper. Dietary record method was used for children in kindergartens. For more complete data in food diary, caregivers in kindergartens were involved in filling questionnaire about foods children consumed at kindergarten.

Basic design of Dietary recall questionnaire includes information about:

- day of interview
- meal
- consumed foods during meal
- amount as consumed
- preparation of foods
- place where food is consumed
- brand of food

At the end of interview special attention was paid to clarify information about consumed water, vitamins and food supplements, sugar, fat or other spices added to the food and foods consumed between meals. This was used as probing questions to make sure captured information is sufficient and correct.

4.2.1. Food description

Food descriptions were included in the software used “Food consumption information system (FCIS)” which was available online and used during the interviews. FCIS include more than 10 000 food descriptions. If any description of the food wasn’t available during the interview, interviewers had the option to insert a new food and describe it. Afterwards data operators who were closely following data entry process by interviewers had the responsibility to evaluate the new foods entered in the FCIS and update the current list. If any information was missing or seemed missing data operator had a possibility to contact interviewer to request for additional information. For home-made composite dishes disaggregation was done to raw components. For industrially made products or composite dishes consumed at restaurants as detailed description as possible was obtained. Afterwards information was obtained from national recipes database.
4.2.2. Determination of portion sizes

Consumed portion sizes during the study were estimated by means of a country-specific and age-appropriate picture book "Photo book of Food and Eating Portions". Picture book was developed by Vilnius University Faculty of Medicine in 2007. It was translated and firstly used in national dietary survey in Latvia "National Comprehensive Food Consumption Survey, 2007-2009". Picture book consists of 144 foods combined in 27 groups. There are two to four picture series for each food. Different house hold measures were also used for better estimation of portion size. Electronic version of picture book was used for individual use. Picture book can be found on site: http://www.porcijas.area.lv/plogger/.

In case of infants and toddlers quantification of consumed breast milk was conducted as followed: there was reported number of eating occasions of breast milk. Participants who were exclusively breastfed were allocated a standard reference value of 780ml/day of breast milk if aged 0-5.9 months, and 600ml/day if aged 6-11.9 months. If participants were partially breastfed the amount of breast milk allocated was 780ml/day or 600ml/day minus total amount of “other milks” ml/day consumed according to age group. “Other milks” infant formula, cow’s/goat’s milk, flavored milk, soya/rice milk. If the total amount of “other milks” exceeded age specific daily reference value, the subject was allocated 89ml per reported feeding occasion. In children aged 12-17.9 months and 18.-23.9months the total daily amount of breast milk was calculated as 89ml or 59ml, respectively, for every reported feeding occasion. Dietary software

The dietary software (FCIS) was designed to maintain national food consumption data collection, analysis and data export.

Food consumption data was collected during several data collection studies. Data collections were carried out using the methodology recommended in the EFSA guidelines and included data from Food frequency methodology, Food propensity methodology and 24h recall methodology.

FCIS also includes a food composition database and the FoodEx2 classification system of EFSA (EFSA, 2011).

In order to maintain the information about products, recipes and nutrient components (food composition data) a catalogue of products is included in the FCIS which contains the following main data:

Nutrient composition – fats, carbohydrates, vitamines, etc.

Raw products – products can be eaten as raw or included in complex recipes (raw cucumber, pickled cucumber)

Composite foods – standard recipes of complex products used as final foodstuff (onion soup, croissant, etc.) Also nutrient composition data are calculated and added. The main purpose of the standard recipes is to describe the food and maintain the link between the composite food (e.g. pizza) with its main ingredients (e.g. ham, cheese, etc.). This approach provides the possibility to identify food ingredients and calculate their nutrient composition data.

4.3. Other information

4.3.1. Questionnaires

Sociodemographic information

During the interviews the following sociodemographic information about respondents was collected (Annex E):

- Age
- Sex
- Height
• Weight
• Place of origin
• Occupation
• Education
• Family income (for target groups 3, 4 and 5)
• Education of parents (target groups 3 and 4)
• Occupation of parents (target groups 1 to 4)

Physical activity

Three types of physical activity questionnaires (children and adolescents, adults, elderly) were developed and adapted (Annex F). During the interviews information about physical activity of respondents were collected. Respondents were asked to evaluate their level of physical activity on matrix-based questionnaire. For elderly, more specific questions about everyday activities were made, though for school children there were more questions to find out free time activities.

4.3.2. Measurement of body weight and height

Measurement of body weight and height was performed during the study for all population groups. All interviewers were provided and trained with specific equipment for such purposes. Only in case of infants (due to need of specific equipment), measurement were carried out by the paediatrician or the family doctor. In some cases in adult population where respondents were recently (measurement done up to three months before first interview) measured by family doctor no additional measurement was carried out. Participants were weighed in kilograms using validated portable digital scale (accuracy 0.1 kg).

4.3.3. Food supplements

Information about food supplements was collected during the study. Interviewers had to collect data about the brand, composition, strength and duration of intake of each food supplement used. Interviewers were trained to ask specific questions about the food supplement intake.

5. Administration of the interview

According to the sampling design, every interviewer had his/her specific region to carry out the interviews. The target number of respondents for each interviewer did not exceed 50. At first, information letter was sent to responsible institutions (schools, kindergartens, Association of doctors etc.) to give more information about survey.

5.1. Selecting the examination site

The examination site was different in every case. In Infant and toddler survey – more often the examination site was the doctors’ office; in some cases the interview could take part at the respondents’ home. In case of elderly, interviews were usually carried out at the respondents’ house.

5.2. Content and organization of the study visits

5.2.1. First contact

At first, an information letter was sent to the responsible institutions (schools, kindergartens, association of doctors etc.) to give more information about the survey.

A different approach was followed for each target group to make the first contact. For infants, toddlers and adults the first contact was made by the family doctor or paediatrician due to the
patients-doctors confidentiality law. For school children and kindergarten, the first contact was through schools’ and kindergartens’ personnel (director, etc.). Only when the personnel completely agreed to participate, then the information letter was sent to parents and families were contacted.

5.2.2. First interview

The first interview had to be face-to-face in all cases. During the first meeting the interviewer explained all relevant information about the survey, did all required measurements and left his/her contact information if additional information was needed about the survey and in a later stage information on the results of the survey. An electronic version of portion size catalogue was also left to respondents for filling the second interview.

5.2.3. Second interview

The second interview was carried out by phone. However, in the case of elderly, a face-to-face interview was preferred due to the difficulty of the subjects to write down or estimate the right portion sizes.

5.2.4. Interviewing and checking questionnaires

For school children and adults, questionnaires were directly filled in the dietary software (FCIS). A coordinator, responsible for checking the questionnaires online and provide additional information where required, was available for every interviewer. He/she was also the contact person for the interviewers if there difficulties or unusual situations during interview were met. Each coordinator was assigned to no more than eight interviewers. When all questionnaires were completed properly and no more additional or missing information were present, the coordinator closed the questionnaires of that interviewer and data were ready to be imported in the dietary software.

5.3. Recruitment and training of the staff

The staff for carrying out the field work for infants, toddlers and elderly was recruited by the Registration and Assessment Agency (Food and Veterinary Service). In the case of school children and adults the staff was recruited by BIOR.

5.3.1. Selection of the fieldwork staff

The interviewers had to have an appropriate education (nutritionists, dietitians, public health specialists or other medical background) as well as experience in conducting a dietary survey. All interviewers recruited had an experience in other surveys, for example survey of pregnant women (EFSA funded CFT/EFSA/DCM/2011/01), survey of school children (Evaluation of Fruit and Vegetable Scheme in Latvia). Interviewers living in different regions (for example, Liepāja) were also welcome to participate due to less travel time to the place of interview.

5.3.2. Training

All interviewers had training before starting the field work. In case of any misunderstanding of incorrect filling of the questionnaires, the coordinator could ask for additional training for some of the interviewers. Training was organized by project team and usually lasted three days. Training sessions were organized for each field work group separately due to different needs and approach. Usually the first two days were focused on training conducting the interview and the last day for familiarizing with the dietary software and filling in questionnaires on-line. Written guidelines were given to each interviewer during training process with all relevant information starting from purpose of survey to technical explanation of data entry.
6. Quality assurance

For assuring quality, respondents were asked to give their contact information (telephone number or e-mail). Quality assurance was carried out in two stages. The first stage was performed by the coordinator, who was checking the interview process on-line and could also track missing information already during the process of interviews. The second stage was carried out at the end of the data collection when certain number of respondents was chosen to be contacted to assure that interviews were done properly. For infants, toddlers and elderly, there were no coordinators involved for following interview process on-line and the survey managers were able to contact the chosen respondents after first part of questionnaires were sent to BIOR. For obtaining qualitative data interviewers were following protocols for weight and height measuring and food consumption data collection.

Quality of interview was controlled by probing questions at the end of questionnaires and coordinators who followed interview process on-line. Additional warning and data entry restriction was added to software to prevent entering of erroneous data, for example: age not appropriate for subpopulation, height over 250cm. Software does not have possibility to calculate total energy intake at the end of interview as final control check but it is possible to obtain individual results after data import in food composition data base.

7. Data management

Data management was carried out by the project team, who was involved in all stages of the survey. For high quality data, there was also a statistician involved in the data analysis. All obtained questionnaires from respondent were marked with unique identification code to assure that all questionnaires of one respondent are connected and confidentiality rules are followed. The project team has experience in other surveys and was involved in the first National Comprehensive Food Consumption Survey in Latvia 2007-2009.

8. Dissemination and publicity

Information about the ongoing study was disseminated on regular basis. Several meetings with representatives from the Ministry of Agriculture, Food and Veterinary Service, Latvian Medical Association and other institutes or authorities were held during the study.

Information about study was published in the websites of the Institute BIOR and Latvian Medical Association. Also a Press Release about the start of study was done.

The results of the study are planned to be presented in the scientific conference of institute BIOR and annual Latvian Doctor's Association's conference, Ministry of Health and Ministry of Agriculture and in conference of Latvian Nutrition and Dietetics Association's Conference.

9. Special issues/challenges

Due to changes in the project team (survey organisation from Registration and Assessment Agency passing to BIOR) there were some challenges during the second stage of interviewing infants, toddlers and elderly. All previous interviewers, except two who didn’t want to continue the work, continued. The respondents of the two interviewers dropping out were divided between other interviewers and there are no doubts that work has been done properly.

Survey showed difficulties to reach and to motivate parents of infants and toddlers to provide repeated day dietary record. More interesting incentives should be considered.

Conclusions

The EFSA Guidance methodology was successfully adapted and used in the national food consumption survey in Latvia and it will be used in all dietary surveys in near future. The obtained survey data is very important and will be used as strong basis for different risk management purposes in Latvia as
well as for evaluation of national nutritional guidelines. They have already been successfully used in different discussions related to food safety and health and will play important role in these decisions in Latvia. In addition, these data has been used to publish information on the first food that infants are introduced to, which can help paediatricians to give better advice and even review existing guidelines on the subject.

Individual dietary reports generated by the software are new and very useful tool to reach population and it will be used in every survey in future. It helps participants to make better food choices and gives respondent better understanding of the survey.
References


**Abbreviations**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>BIOR</td>
<td>Institute of Food Safety, Animal Health and Environment BIOR</td>
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<tr>
<td>DRM</td>
<td>Dietary Record method</td>
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<td>EFSA</td>
<td>European Food Safety Authority</td>
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<td>EU</td>
<td>European Union</td>
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<td>FCIS</td>
<td>Food Consumption Information System</td>
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<td>FPQ</td>
<td>Food Propensity Questionnaire</td>
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<td>PAQ</td>
<td>Physical activity questionnaire</td>
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<tr>
<td>PSU</td>
<td>Primary sampling unit</td>
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<td>SSU</td>
<td>Secondary sampling unit</td>
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<tr>
<td>TSU</td>
<td>Tertiary sampling unit</td>
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</table>
Appendix A – Food groups included in FPQ

Food groups responsible for the contamination with acrylamides:

- French fries sold as ready to eat
- Potato crisps
- Pre-cooked
- French fries/potato products for home cooking
- Bread
- Breakfast cereals
- Biscuits including infant biscuits
- Roasted coffee
- Jarred baby foods
- Processed cereal-based baby foods
- Other products
- Biscuits
- Crackers Infant
- Not specified Wafers
- Bread
- Bread crisp
- Bread soft
- Non specified
- Breakfast cereals
- Cereal-based baby food
- Coffee
- Instant
- Not specified
- Roasted
- French fries
- Jarred baby foods
- Other products
- Gingerbread
- Muesli and porridge
- Not specified
- Substitute coffee
- Potato crisps
- Home-cook potato product
- Deep fried
- Not specified
- Oven baked
Annex A – Food Propensity questionnaire for infants
Annex B – Food Propensity Questionnaire for other children and adolescents
Annex C – Food Propensity Questionnaire for adults and elderly
Annex D – Paper version of the 24 hour recall questionnaire
Annex E – Sociodemographic Questionnaire for adults
Annex F – Physical Activity Questionnaire