Modelling of adequate and safe vitamin D intake in Danish women using different fortification and supplementation scenarios to inform fortification policies

Purpose: Fortification of foods with vitamin D may be a population-based solution to low vitamin D intake. We performed modelling of vitamin D from diet, fortified foods and supplements in a population of Danish women 18–50 years, a risk group of vitamin D deficiency, to inform fortification policies on safe and adequate levels. Methods: Based on individual habitual dietary vitamin D intake of female participants from the Danish National Survey of Dietary Habits and Physical Activity (DANSDA) (n = 855), we performed graded intake modelling to predict the intake in six scenarios increasing the vitamin D intake from a habitual diet without fish to habitual diet including fish, fortified foods and supplements (40/80 µg). Four different foods were used as potential foods to fortify with vitamin D. Results: The vitamin D intake was below the Average Requirement (AR) of 7.5 µg/day for 88% of the assessed women. Safe levels of intake (< 100 µg/day) were observed after adding four different fortified foods (plain yoghurt, cheese, eggs and crisp-bread) contributing with a total of 20 µg/day and a vitamin D supplement of 40 µg/day to the habitual diet. Consumption of fish, fortified foods and a vitamin D supplement of 80 µg resulted in intakes above the Tolerable Upper Intake Level (UL) < 100 µg/day. Conclusions: In a Danish female population with a low vitamin D intake, low-dose fortification of different foods with vitamin D may be an effective and safe population-based approach.

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Suggestion for a subdivision of processed meat products on the Danish market based on their content of carcinogenic compounds

Carcinogenic effects in humans are ascribed to processed meat by organisations such as International Agency for Research on Cancer, World Cancer Research Fund and American Institute for Cancer Research. However, the term ‘processed meat’ covers a heterogenic group of products whose content of potential hazards differ considerably. To improve estimates of associations between processed meat intake and cancer risk we investigated ways to divide processed meat into subgroups that more precisely reflects its carcinogenic characteristics. We collected ingredient lists and declarations of salt content for >1000 processed meat products on the Danish market and combined the information with knowledge related to processing parameters. Some compounds that could affect the products’ carcinogenic characteristics, alone or in combination, were evaluated and compared for 12 types of processed meat products, and we suggest subgrouping of processed meat with similar level of carcinogenic potential, which could improve the understanding of the cancer risk associated with processed meat intake in scientific human studies.

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DOIs:
10.1016/j.meatsci.2018.08.025

Vitamin D-fortified foods improve wintertime vitamin D status in women of Danish and Pakistani origin living in Denmark: a randomized controlled trial

Purpose: Low vitamin D status is prevalent worldwide. We aim to investigate the effect of vitamin D fortification on serum 25-hydroxyvitamin D (25(OH)D) concentration in women of Danish and Pakistani origin at risk of vitamin D deficiency.

Methods: A 12-week randomized, double-blinded, placebo-controlled intervention trial during winter time, designed to provide 20 µg vitamin D 3/day through fortified yoghurt, cheese, eggs and crisp bread, and assess the change in serum 25(OH)D. Participants were 143 women of Danish and Pakistani origin, living in Denmark, randomized into four groups, stratified by ethnicity.

Results: Mean (SD) baseline 25(OH)D concentrations among women of Danish and Pakistani origin were 49.6 (18) and 46.9 (22) nmol/L, respectively (P = 0.4). While 9% of Danish women had 25(OH)D < 30 nmol/L, the prevalence among women of Pakistani origin was 24%. Median (IQR) vitamin D intake among Danish and Pakistani women at endpoint was 32.0 (27.0, 34.4) µg/day and 24.2 (19.2, 30.8) µg/day, respectively. Endpoint serum 25(OH)D increased in fortified groups to 77.8 (14) nmol/L among Danish women and 54.7 (18) nmol/L among women of Pakistani origin (P < 0.01). At endpoint, 0% in the Danish-fortified group and 3% in the Pakistani-fortified group had 25(OH)D < 30 nmol/L, compared with 23 % and 34% in their respective control groups. Conclusions: Vitamin D fortification of four different foods for 12 weeks during winter was effective in increasing serum 25(OH)D and reducing the prevalence of very low vitamin D status among women of Danish and Pakistani origin. ClinicalTrials.gov with identifier: NCT02631629.

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Contributors: Grønborg, I. M., Tetens, I., Christensen, T., Andersen, E. W., Jakobsen, J., Kiely, M., Cashman, K. D., Andersen, R.
Accuracy of food photographs for quantifying food servings in a lunch meal setting among Danish children and adults

Visual aids, such as food photographs, are widely used in estimating food quantities in dietary surveys. The present study aimed to assess how accurately Danish adults and children can estimate food portion sizes using 37 series of photographs illustrating four to six different portion sizes under real-life conditions; determine whether adults were more accurate than children; and estimate the error caused by using portion size photographs to estimate weights of foods consumed in macronutrient calculation. Six hundred and twenty-two adults and 109 children were recruited in three workplace canteens and in two schools, respectively, to estimate their lunchtime portions based on photographs. Participants were instructed to keep the foods separated on their plate when taking lunch. Participants thereafter estimated their own portions by looking at the relevant series of photographs. The actual food portions were then weighed. The proportion of correct estimations was 42% overall (range 19-77%). The mean difference (%) between estimated and actual weight was 17% (range 1-111%). Small portion size photographs were more often used correctly compared to larger portion photographs. Children had as many correct estimations as adults, although they overestimated portions more. Participants using fractions of (or more than) one photograph to estimate the portion of a food had significantly larger errors. When calculating the macronutrient content of a weekly menu using the estimated portion sizes, protein had the largest error (29%). When used in a real-life situation, the portion size photographs validated in the present study showed a certain inaccuracy compared to the actual weights.

Food groups for allergen risk assessment: Combining food consumption data from different countries in Europe

To prevent allergic reactions, food producers have to be able to make a knowledge based decision on whether to label their products with precautionary labelling. As many manufactured food products are sold in different countries across Europe, the allergen risk assessment should be estimated at the European levels. As currently, there are no pan-
European food data suitable for food allergy risk assessment. The aim of this paper is to investigate if consumption data, at a meal level, from National Food Consumption Surveys, can be combined to form a common Food Consumption database. In this first attempt we developed a procedure to investigate, if national food consumption data can be combined and grouped using data from Netherlands, France and Denmark. The homogeneity of consumption patterns and the relevance of difference in risk of allergic reaction were compared, using a fixed framework of allergen concentration levels and threshold distribution. Thus, the relevance of using common consumption data across countries was verified. The food groups formed were subsequently evaluated and adjusted based on practical considerations. It resulted in designing 61 food groups that can be used for allergen risk assessment. The summary statistics and descriptive names for each food group are included.

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Organisations: Department of Applied Mathematics and Computer Science, National Food Institute, Research Group for Gut Microbiology and Immunology, Division of Risk Assessment and Nutrition, Netherlands Organisation for Applied Scientific Research - TNO, ANSES - French Agency for Food, Environmental and Occupational Health & Safety
Contributors: Birot, S., Madsen, C. B., Kruizinga, A. G., Crépet, A., Christensen, T., Brockhoff, P. B.
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Saltindhold i færdigpakokede supper der sælges i danske dagligvarebutikker - notat

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Saltindhold i færdigpakket ost der sælges i danske dagligvarebutikker - notat

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Saltindhold i fiskekonserves, skaldyrkonserves og sildekonserves der sælges i danske dagligvarebutikker - notat

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Saltindhold i frosne pizzaer der sælges i danske dagligvarebutikker - notat

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Vitamin D vitamers affect vitamin D status differently in young healthy males

Dietary intake of vitamin D includes vitamin D3 (vitD3), 25-hydroxyvitamin D3 (25OH-D3), and vitamin D2 (vitD2). However, the bioactivity of the different species has not been scientifically established. The hypothesis in this study was that vitD3, 25OH-D3, and vitD2 have an equal effect on 25-hydroxyvitamin D in serum (vitamin D status). To test our hypothesis, we performed a randomized, crossover study. Twelve young males consumed 10 µg/day vitD3 during a four-week run-in period followed by 3 × 6 weeks of 10 µg/day vitD3, 10 µg/day 25OH-D3, and 10 µg/day vitD2. The content of vitD3, vitD2, 25OH-D3, and 25-hydroxyvitamin D2 (25OH-D2) in serum was quantified by liquid chromatography-tandem mass spectrometry (LC-MS/MS). The hypothesis that the three sources of vitamin D affect vitamin D status equally was rejected. Based on the assumption that 1 µg vitD3/day will show an increase in vitamin D status of 1.96 nmol/L, the results showed that 23 µg vitD2 and 6.8 µg 25OH-D3 was similar to 10 µg vitD3. These results demonstrate that further investigations are necessary to determine how to quantify the total vitamin D activity based on chemical quantification of the individual vitamin D metabolites to replace the total vitamin D activity assessed in biological rat models.

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A procedure for grouping food consumption data for use in food allergen risk assessment

Food allergic subjects need to avoid the allergenic food that triggers their allergy. However, foods can also contain unintended allergens. Food manufacturers or authorities need to perform a risk assessment to be able to decide if unintended allergen presence constitutes a risk to food allergic consumers. One of the input parameters in risk assessment is the amount of a given food consumed in a meal. There has been little emphasis on how food consumption data can be used in food allergen risk assessment. The aim of the study was to organize the complex datasets from National Food Consumption Surveys from different countries (France, Netherlands and Denmark) to be manageable in food allergen risk assessment. To do this, a two-step method was developed. First, based on initial groups of similar food items, the homogeneity of consumption was evaluated using a customized clustering method. Then, the risk was calculated for each initial food group and its subgroups to verify if it also represents a relevant difference in risk. Forty-eight food groups were designated in Denmark (53 in the Netherlands, 54 in France). Finally, summary statistics and names for each food group for the Danish data illustrate the results when applying the procedure.

General information
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Comparison between analyzed and calculated nutrient content of fast foods using two consecutive versions of the Danish food composition databank: FOODCOMP and FRIDA

The objective of this study was to compare the content of selected nutrients of fast foods determined by chemical analysis versus estimated by recipe calculation based on data from two versions of the Danish food composition databank, FOODCOMP and the latest FRIDA. A total of 155 samples of ready-to-eat fast foods were collected from fast food outlets, separated into their components and weighed. Typical components were bread, French fries, vegetables, meat and dressings. The fast foods were analyzed, and energy, protein, saturated fat, iron, thiamin, potassium and sodium contents were compared to recipe calculation. When using the FOODCOMP in recipe calculation, the error percentage was largest for saturated fat (28%). When using FRIDA, the error percentage for saturated fat decreased to 11% and was below 15% for all nutrients. The correlations ranged from 0.49 to 0.89 with both databanks. For the individual fast foods, the error percentages were both acceptable (<15%) and large (>50%). Future challenges for the databank in relation to recipe calculation are to include more varieties, a better coverage of foods used as ingredients, and inclusion of analytical values of mixed dishes if they are commonly eaten from fast food outlets.

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Web of Science (2017): Indexed yes
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Electronic versions:
Intake and sources of gluten in 20- to 75-year-old Danish adults: a national dietary survey

PURPOSE: Celiac disease, an immunological response triggered by gluten, affects ~1 % of the Western population. Information concerning gluten intake in the general population is scarce. We determined intake of gluten from wheat, barley, rye and oat in the Danish National Survey of Diet and Physical Activity 2005-2008. The study population comprised a random cross-sectional sample of 1494 adults 20-75 years, selected from the Danish Civil Registration System.

METHODS: Protein content in wheat, rye, barley and oat was determined from the National Danish Food Composition Table and multiplied with the amount of cereal used in recipes. Amount of gluten was calculated as amount of cereal protein ×0.80 for wheat and oat, ×0.65 for rye and ×0.50 for barley. Dietary intake was recorded daily during seven consecutive days in pre-coded food diaries with open-answer possibilities. RESULTS: Mean total gluten intake was 10.4 ± 4.4 g/day (10th-90th percentiles: 5.4-16.2 g/day), in men 12.0 ± 4.6 g/day and 9.0 ± 3.4 g/day in women. It was higher among men than among women in all age groups (20-75 years; P <0.0001); however, this difference was eliminated when adjusting for energy intake. Intake of different gluten sources tended to be higher in men than in women with the exception of gluten from barley. Total gluten intake decreased with increasing age (P <0.0001) as did gluten intake from wheat (P <0.0001), whereas intake of gluten from rye (P <0.0001) and barley (P = 0.001) increased with increasing age, also when adjusted for energy intake or body weight. CONCLUSION: This study presents representative population-based data on gluten intake in Danish adults. Total gluten intake decreased with increasing age.

General information

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Contributors: Hoppe, C., Gøbel, R. J., Kristensen, M., Lind, M. V., Matthiessen, J., Christensen, T., Trolle, E., Fagt, S., Madsen, M. L., Husby, S.
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Relative validity of a web-based food frequency questionnaire for patients with type 1 and type 2 diabetes in Denmark

Diet has an important role in the management of diabetes. However, little is known about dietary intake in Danish diabetes patients. A food frequency questionnaire (FFQ) focusing on most relevant nutrients in diabetes including carbohydrates, dietary fibres and simple sugars was developed and validated. To examine the relative validity of nutrients calculated by a web-based food frequency questionnaire for patients with diabetes. The FFQ was validated against a 4-day pre-coded food diary (FD). Intakes of nutrients were calculated. Means of intake were compared and cross-classifications of individuals according to intake were performed. To assess the agreement between the two methods, Pearson and Spearman's correlation coefficients and weighted kappa coefficients were calculated. Ninety patients (64 with type 1 diabetes and 26 with type 2 diabetes) accepted to participate in the study. Twenty-six were excluded from the final study population. 64 volunteer diabetes patients at the Steno Diabetes Center. Intakes of carbohydrates, simple sugars, dietary fibres and total energy were higher according to the FFQ compared with the FD. However, intakes of nutrients were grossly classified in the same or adjacent quartiles with an average of 82% of the selected nutrients when comparing the two methods. In general, moderate agreement between the two methods was found. The FFQ was validated for assessment of a range of nutrients. Comparing the intakes of selected nutrients (carbohydrates, dietary fibres and simple sugars), patients were classified correctly according to low and high intakes. The FFQ is a reliable dietary assessment tool to use in research and evaluation of patient education for patients with diabetes.
The New version of Danish food composition database FRIDA including a case study on recipe calculation compared to a chemical analysis

Objective: Constantly updated food data that reflect the food supply, such as the recently published http://frida.fooddata.dk, is essential for recipe calculation in dietary assessment. The objective of this study was to compare the content of selected nutrients estimated by recipe calculation and chemical analysis of fast food based on data from http://frida.fooddata.dk. Materials and methods: New fast food data in http://frida.fooddata.dk was based on 135 samples of ready to eat fast foods as burgers and sandwiches collected from fast food outlets, separated into their recipe components which were weighed. Typical components were bread, French fries, vegetables, meat, and dressings. The fast foods were analyzed and the content of energy, protein, saturated fat, iron, thiamin, potassium and sodium were compared to recipe calculation. Wilcoxon Signed Rank test, Spearman correlation coefficients and Bland-Altman plots were used for comparing the two methods. Results: Overall there were differences between the chemical and recipe analysis for energy, protein, saturated fat and iron (P<0.01), but not for thiamin, potassium and sodium (P>0.05). The error percentage was largest for saturated fat (28%). Correlations ranged from 0.49 for iron to 0.75 for energy. Bland-Altman plots showed larger differences for higher contents for thiamin and potassium. Results depended on the type of fast food. For burgers (n=36) there was no significant difference for any of the nutrients between the two methods. Meat/French fry mix (n=16) had significant differences (P<0.01) for five out of seven nutrients, and the fast food type with the largest difference between the two methods. Significance: Recipe calculation is a cost-effective alternative to chemical analysis in dietary assessment and nutrient labeling. But recipe calculation can introduce deviations compared to chemical analysis. Future challenges for Frida.fooddata.dk in relation to recipe calculation, could be to include more varieties and better coverage of foods used as ingredients.
Validation of Reported Whole-Grain Intake from a Web-Based Dietary Record against Plasma Alkylresorcinol Concentrations in 8- to 11-Year-Olds Participating in a Randomized Controlled Trial

BACKGROUND: Whole-grain (WG) intake is important for human health, but accurate intake estimation is challenging. Use of a biomarker for WG intake provides a possible way to validate dietary assessment methods. OBJECTIVE: Our aim was to validate WG intake from 2 diets reported by children, using plasma alkylresorcinol (AR) concentrations, and to investigate the 3-mo reproducibility of AR concentrations and reported WG intake. METHODS: AR concentrations were analyzed in fasting blood plasma samples, and WG intake was estimated in a 7-d web-based diary by 750 participants aged 8-11 y in a 2 school meal × 3 mo crossover trial. Reported WG intake and plasma AR concentrations were compared when children ate their usual bread-based lunch (UBL) and when served a hot lunch meal (HLM). Correlations between subjects’ measurements at baseline and after the UBL were used to assess reproducibility. RESULTS: Overall there were differences between the chemical and recipe analysis for energy, protein, saturated fat and iron (P<0.01), but not for thiamin, potassium and sodium (P>0.05). The error percentage was largest for saturated fat (28%). Correlations ranged from 0.49 for iron to 0.75 for energy. Bland-Altman plots showed larger differences for higher contents for thiamin and potassium. Results depended on the type of fast food. For burgers (n=36) there was no significant difference for any of the nutrients between the two methods. Meat/French fry mix (n=16) had significant differences (P<0.01) for five out of seven nutrients, and the fast food type with the largest difference between the two methods. Significance: Recipe calculation is a cost-effective alternative to chemical analysis in dietary assessment and nutrient labeling. But recipe calculation can introduce deviations compared to chemical analysis. Future challenges for Frida.fooddata.dk in relation to recipe calculation, could be to include more varieties and better coverage of foods used as ingredients.

The New version of Danish food composition database FRIDA including a case study on recipe calculation compared to a chemical analysis

Objective: Constantly updated food data that reflect the food supply, such as the recently published http://frida.fooddata.dk, is essential for recipe calculation in dietary assessment. The objective of this study was to compare the content of selected nutrients estimated by recipe calculation and chemical analysis of fast food based on data from http://frida.fooddata.dk. Materials and methods: New fast food data in http://frida.fooddata.dk was based on 135 samples of ready to eat fast foods as burgers and sandwiches collected from fast food outlets, separated into their recipe components which were weighed. Typical components were bread, French fries, vegetables, meat, and dressings. The fast foods were analyzed and the content of energy, protein, saturated fat, iron, thiamin, potassium and sodium were compared to recipe calculation. Wilcoxon Signed Rank test, Spearman correlation coefficients and Bland-Altman plots were used for the two methods. Results: Overall there were differences between the chemical and recipe analysis for energy, protein, saturated fat and iron (P<0.01), but not for thiamin, potassium and sodium (P>0.05). The error percentage was largest for saturated fat (28%). Correlations ranged from 0.49 for iron to 0.75 for energy. Bland-Altman plots showed larger differences for higher contents for thiamin and potassium. Results depended on the type of fast food. For burgers (n=36) there was no significant difference for any of the nutrients between the two methods. Meat/French fry mix (n=16) had significant differences (P<0.01) for five out of seven nutrients, and the fast food type with the largest difference between the two methods. Significance: Recipe calculation is a cost-effective alternative to chemical analysis in dietary assessment and nutrient labeling. But recipe calculation can introduce deviations compared to chemical analysis. Future challenges for Frida.fooddata.dk in relation to recipe calculation, could be to include more varieties and better coverage of foods used as ingredients.

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Contributors: Christensen, T., Biltoft-Jensen, A. P.
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Contributors: Biltoft-Jensen, A. P.; Damsgaard, C. T.; W. Andersen, E.; Ygil, K. H.; Andersen, R.; Ege, M.; Christensen, T.; Thorsen, A. V.; Tetens, I.; Wu, H.; Landberg, R.
Variation in modelled healthy diets based on three different food patterns identified from the Danish national diet – and the impact on carbon footprint Nordic Nutrition Conference, Gothenburg 2016 (poster)

Background and aims: A healthy diet complies with the national food-based dietary guidelines (FBDG) and Nordic nutrition recommendations (NNR2012). In this study we aim at 1) developing new healthy diet compositions by a simple diet modelling technique that ensures a nutrient content in accordance with the recommended values and depending on food preferences and habits, and 2) further optimizing the diet composition with regard to carbon footprint (CF).

Methods: We used a simple modelling of the 'Traditional', 'Health conscious' and 'Fast food' patterns identified from national dietary data (Knudsen et al. 2014) into isocaloric healthy diets that fulfil the Danish FBDGs and NNR2012 with respect to both micro- and macronutrients. Furthermore we updated the list of estimated carbon footprint (CF) of food items included in the diets and further optimized the diet composition with regard to CF. Extension of modelling was used to optimise the diets with regard to their estimated carbon footprint (CF).

Results: Around 365 food items are included in the three food patterns. Based on literature CF of these foods is updated, including the contribution from waste, transportation and cooking at home. Despite variation in the amounts of contribution of foods in each food group and in the composition of foods within each food group, the estimated CFs of the modelled healthy dietary patterns are similar to original Danish patterns. CFs of the CF-optimized dietary patterns similar to each other, and CF of CF-optimized dietary patterns are approx. 25% lower. Only a small contribution to CF from transportation and cooking at home.

Conclusion: Different dietary patterns can fulfill dietary recommendations. Specific optimization is needed to lower the CF of the diets.

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Contributors: Trolle, E., Thorsen, A. V., Mogensen, L., Christensen, T.
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Variation in modelled healthy diets based on three different food patterns identified from the Danish national diet – and the impact on carbon footprint Nordic Nutrition Conference, Gothenburg 2016 (poster)

Background and aims: A healthy diet complies with the national food-based dietary guidelines (FBDG) and Nordic nutrition recommendations (NNR2012). In this study we aim at 1) developing new healthy diet compositions by a simple diet modelling technique that ensures a nutrient content in accordance with the recommended values and depending on food preferences and habits, and 2) further optimizing the diet composition with regard to carbon footprint (CF).
Methods: We used a simple modelling of the 'Traditional', 'Health conscious' and 'Fast food' patterns identified from national dietary data (1)Knudsen et al. 2014) into isocaloric healthy diets that fulfil and the Danish FBDGs and NNR2012 with respect to both micro- and macronutrients. Furthermore we updated the list of estimated carbon footprint (CF) of food items included in the diets and further optimized the diet composition with regard to CF. Extension of modelling was used to optimise the diets with regard to their estimated carbon footprint (CF).

Results: Around 365 food items are included in the three food patterns. Based on literature CF of these foods is updated, including the contribution from waste, transportation and cooking at home. Despite variation in the amounts of contribution of foods in each food group and in the composition of foods within each food group, the estimated CFs of the modelled healthy dietary patterns are similar to original Danish patterns. CFs of the CF-optimized dietary patterns similar to each other, and CF of CF-optimized dietary patterns are approx. 25% lower. Only a small contribution to CF from transportation and cooking at home

Conclusion: Different dietary patterns can fulfill dietary recommendations. Specific optimization is needed to lower the CF of the diets.

General information
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Organisations: National Food Institute, Division of Risk Assessment and Nutrition , Aarhus University
Contributors: Trolle, E., Thorsen, A. V., Mogensen, L., Christensen, T.
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Research output: Contribution to conference › Conference abstract for conference – Annual report year: 2016 › Research › peer-review

Accuracy of self-reported intake of signature foods in a school meal intervention study: comparison between control and intervention period
Bias in self-reported dietary intake is important when evaluating the effect of dietary interventions, particularly for intervention foods. However, few have investigated this in children, and none have investigated the reporting accuracy of fish intake in children using biomarkers. In a Danish school meal study, 8- to 11-year-old children (n 834) were served the New Nordic Diet (NND) for lunch. The present study examined the accuracy of self-reported intake of signature foods (berries, cabbage, root vegetables, legumes, herbs, potatoes, wild plants, mushrooms, nuts and fish) characterising the NND. Children, assisted by parents, self-reported their diet in a Web-based Dietary Assessment Software for Children during the intervention and control (packed lunch) periods. The reported fish intake by children was compared with their ranking according to fasting whole-blood EPA and DHA concentration and weight percentage using the Spearman correlations and cross-classification. Direct observation of school lunch intake (n 193) was used to score the accuracy of food-reporting as matches, intrusions, omissions and faults. The reporting of all lunch foods had higher percentage of matches compared with the reporting of signature foods in both periods, and the accuracy was higher during the control period compared with the intervention period. Both Spearman's rank correlations and linear mixed models demonstrated positive associations between EPA+DHA and reported fish intake. The direct observations showed that both reported and real intake of signature foods did increase during the intervention period. In conclusion, the self-reported data represented a true increase in the intake of signature foods and can be used to examine dietary intervention effects.

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Organisations: National Food Institute, Division of Risk Assessment and Nutrition , Research group for Risk Benefit, Department of Applied Mathematics and Computer Science , Statistics and Data Analysis, University of Copenhagen, University of Waterloo
Contributors: Biltoft-Jensen, A. P., Damsgaard, C. T., Andersen, R., Ygil, K. H., Andersen, E. W., Ege, M., Christensen, T., Sørensen, L. B., Stark, K. D., Tetens, I., Thorsen, A. V.
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Scopus rating (2015): CiteScore 3.52 SJR 1.587 SNIP 1.18
Cumulative dietary exposure of the population of Denmark to pesticides.

We used the Hazard Index (HI) method to carry out a cumulative risk assessment after chronic dietary exposure to all monitored pesticides in fruit, vegetables and cereals for various consumer groups in Denmark. Residue data for all the pesticides were obtained from the Danish monitoring programme during the period 2004–2011. Food consumption data were obtained from DANSDA (the Danish National Survey of Diet and Physical Activity) for the period 2005–2008. The calculations were made using three different models to cope with residues below the limit of reporting (LOR). We concluded that a model that included processing factors and set non-detects to ½ LOR, but limited the correction (Model 3), gave the most realistic exposure estimate. With Model 3 the HI was calculated to be 0.44 for children and 0.18 for adults, indicating that there is no risk of adverse health effects following chronic cumulative exposure to the pesticides found in fruit, vegetables and cereals on the Danish market. The HI was below 1 even for consumers who eat more than 550 g of fruit and vegetables per day, corresponding to 1/3 of the population. Choosing Danish-produced commodities whenever possible could reduce the HI by a factor of 2.

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Organisations: National Food Institute, Division of Risk Assessment and Nutrition, Research group for Analytical Food Chemistry
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Web of Science (2015): Impact factor 3.584
Web of Science (2015): Indexed yes
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Keywords: Pesticides residues, Cumulative chronic exposure assessment, Hazard Index method, Handling of left-censored data
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Source: PublicationPreSubmission
Source-ID: 114718861
Research output: Contribution to journal › Journal article – Annual report year: 2015 › Research › peer-review
Dietary exposure to volatile and non-volatile N-nitrosamines from processed meat products in Denmark

Recent epidemiological studies show a positive association between cancer incidence and high intake of processed meat. N-nitrosamines (NAs) in these products have been suggested as one potential causative factor. Most volatile NAs (VNAs) are classified as probable human carcinogens, whereas the carcinogenicity for the majority of the non-volatile NA (NVNA) remains to be elucidated. Danish adults (15–75 years) and children (4–6 years) consume 20 g and 16 g of processed meat per day (95th percentile), respectively. The consumption is primarily accounted for by sausages, salami, pork flank (spiced and boiled) and ham. This consumption results in an exposure to NVNA of 33 and 90 ng kg bw\(^{-1}\) day\(^{-1}\) for adults and children, respectively. The exposure to VNA is significantly lower amounting to 0.34 and 1.1 ng kg bw\(^{-1}\) day\(^{-1}\) for adults and children, respectively. Based on a BMDL10 of 29 µg kg bw\(^{-1}\) day\(^{-1}\) a MOE value ≥17,000 was derived for the exposure to NA known to be carcinogenic (VNA including NSAR), indicating an exposure of low concern. The exposure to the NVNA is substantially higher and if found to be of toxicological significance the exposure may be of concern.

Dietary intake and sources of vitamin D in Pakistani immigrants living in Copenhagen

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Bibliographical note

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General information

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Organisations: National Food Institute, Research group for Risk Benefit, Division of Risk Assessment and Nutrition, University of Copenhagen
Contributors: Grenborg, I. M., Lundby, I. M., Melgaard, C., Ovesen, L., Tetens, I., Christensen, T., Andersen, R.
Pages: 129-129
Publication date: 2015
Effects of school meals based on the New Nordic Diet on intake of signature foods: a randomised controlled trial. The OPUS School Meal Study

A New Nordic Diet (NND) was developed in the context of the Danish OPUS Study (Optimal well-being, development and health for Danish children through a healthy New Nordic Diet). Health, gastronomic potential, sustainability and Nordic identity were crucial principles of the NND. The aim of the present study was to investigate the effects of serving NND school meals compared with the usual packed lunches on the dietary intake of NND signature foods. For two 3-month periods, 834 Danish children aged 8-11 years received NND school meals or their usual packed lunches brought from home (control) in random order. The entire diet was recorded over 7 consecutive days using a validated Web-based Dietary Assessment Software for Children. The NND resulted in higher intakes during the entire week (% increase) of root vegetables (116 (95 % CI 1.93, 2.42)), cabbage (26 (95 % CI 1.08, 1.47)), legumes (22 (95 % CI 1.06, 1.40)), herbs (175 (95 % CI 2.36, 3.20)), fresh berries (48 (95 % CI 1.13, 1.94)), nuts and seeds (18 (95 % CI 1.02, 1.38)), lean fish and fish products (47 (95 % CI 1.31, 1.66)), fat fish and fish products (18 (95 % CI 1.02, 1.37)) and potatoes (129 (95 % CI 2.05, 2.56)). Furthermore, there was a decrease in the number of children with zero intakes when their habitual packed lunches were replaced by NND school meals. In conclusion, this study showed that the children increased their intake of NND signature foods, and, furthermore, there was a decrease in the number of children with zero intakes of NND signature foods when their habitual packed lunches were replaced by school meals following the NND principles.
Helhedssyn på nødder: en risk-benefit vurdering

General information
Publication status: Published
Organisations: National Food Institute, Division of Risk Assessment and Nutrition, Research group for Risk Benefit, Research group for Analytical Food Chemistry
Contributors: Mejborn, H., Jakobsen, L. S., Olesen, P. T., Jørgensen, K., Christensen, T., Nauta, M., Poulsen, M.
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Source-ID: 115722593
Research output: Book/Report › Report – Annual report year: 2015 › Research

Køn- og aldersfordeling hos patienter i fødevarebårne udbrud anvendt til hypotesegenerering i udbrudsefterforskningen: Danske fødevarebårne udbrud med kendt kilde

In this study we attempted to systematically utilize the varying gender and age distributions of foodborne outbreaks, combined with knowledge of Danish age and gender specific food intakes from the survey “The Danish National Survey of Diet and Physical Activity 2003-2008” (DANSDA), to risk rank food groups and obtain an indication of the outbreak source. The study included 12 Danish foodborne outbreaks with a known outbreak source. For each of the 12 outbreaks and for the Danish population, the theoretical proportion of exposed persons for each of 214 food groups was calculated. The theoretical exposure for each food item in each outbreak and in the Danish population was compared using three different methods (preference measures). The preference measures comprised the difference (Præfdiff) and the quotient (Præfkvot) between exposure in the outbreak and the population and Præfdiff compared to the maximum difference for the food group (Præfpot). In addition, the similarity between the gender- and age distribution of outbreak cases was compared with the distribution by gender and age of the part of the Danish population which the DANSDA found exposed to each food group. The similarity between the two gender- and age distributions were calculated for each food group as a Proportional Similarity Index (PSI). For each outbreak, the food groups were ranked according to the size of the three preference measures (Præfdiff, Præfkvot og Præfpot) as well as the PSI, and the ranking of selected indicator food groups for the outbreak source was compared between methods. Large differences in food preferences were found for patients in outbreaks with different food source, and strong similarities were observed between food preferences for patients in outbreaks with the same or similar food sources. The study identifies Præfpot as the best preference measure. An indicator food group for the outbreak source could be found among the 25 highest-ranked Præfpot in 11 of the 12 outbreaks. The probability of this outcome of the investigation to be a result of pure chance is less than 1 per thousand. The outbreak, in which an indicator food group for the outbreak source was not in the top-25 for Præfpot, was a sub-outbreak comprising the “tail” of cases in the end of a larger outbreak. For the preference measures Præfdiff, Præfkvot and for PSI, indicator food groups for the outbreaks source were only ranked in the top-25 of respectively, 9, 5 and 3 of the 12 outbreaks. Calculation and ranking of Præfpot in this study was Excel-based and is fast and easily conducted, once the underlying Excel-data sheets have been established. Ranking of Præfpot for food groups was assessed to be a useful supplement to the investigation of foodborne outbreaks. There is a need for further studies to determine how and when the food preference ranking is best used, and the method can probably be refined by adding seasonal and geographical variation in food intake into the ranking of food groups.

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Organisations: National Food Institute, Division of Epidemiology and Microbial Genomics, Division of Nutrition
Contributors: Wingstrand, A., Fagt, S., Christensen, T., Porsbo, L. J., Hald, T.
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Place of publication: Søborg
Polycyclic aromatic hydrocarbons (PAH) in Danish barbecued meat

Barbecuing is known to result in the formation of polycyclic aromatic hydrocarbons (PAHs). A validated method that employed pressurized liquid extraction (PLE), gel permeation chromatography (GPC) followed by solid phase extraction (SPE) on Silica and analytical determination by GC-MS was applied for the detection of 24 PAHs in barbecued meat. In total, 203 commercially barbecued meat samples (beef, pork, chicken, salmon and lamb) and 15 samples barbecued during controlled time and heat conditions were included. The sum of PAH4 (benzo[a]pyrene, benz[a]anthracene, chrysene and benzo[b]fluoranthene) was highest for a pork tenderloin (195 μg/kg) and lowest for chicken breast (0.1 μg/kg) and controlled barbecued meat.

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Organisations: National Food Institute, Research group for Food Production Engineering, Division of Nutrition, Division of Risk Assessment and Nutrition, Research group for Nano-Bio Science, Danish Technological Institute, Regional Veterinary and Food Administration Center
Contributors: Duedahl-Olesen, L., Aaslyng, M. D., Meinert, L., Christensen, T., Jensen, A., Binderup, M.
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Scopus rating (2015): CiteScore 3.65 SJR 1.516 SNIP 1.616
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Source: FindIt
Source-ID: 275230351
Research output: Contribution to journal → Journal article – Annual report year: 2015 → Research → peer-review

Potentiel effekt af at spise Nøglehulsmærkede produkter: fokus på indtag af næringsstoffer og fuldkorn

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Contributors: Biltoft-Jensen, A. P., Ygil, K. H., Kørup, K., Christensen, T., Fagt, S.
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Original language: Danish
Electronic versions:
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Research output: Book/Report → Report – Annual report year: 2015 → Research
Relative validity of a semi-quantitative, web-based FFQ used in the ‘Snart Forældre’ cohort – a Danish study of diet and fertility

Objective: To assess the relative validity of a semi-quantitative, web-based FFQ completed by female pregnancy planners in the Danish ‘Snart Forældre’ study. Design: We validated a web-based FFQ based on the FFQ used in the Danish National Birth Cohort against a 4 d food diary (FD) and assessed the relative validity of intakes of foods and nutrients. We compared means and medians of intakes, and calculated Pearson correlation coefficients and de-attenuated coefficients to assess agreement between the two methods. We also calculated the proportion correctly classified based on the same or adjacent quintile of intake and the proportion of grossly misclassified (extreme quintiles). Setting: Participants (n 128) in the ‘Snart Forældre’ study who had completed the web-based FFQ were invited to participate in the validation study. Subjects: Participants in the ‘Snart Forældre’ study, in total ninety-seven women aged 20–42 years. Results: Reported intakes of dairy products, vegetables and potatoes were higher in the FFQ compared with the FD, whereas reported intakes of fruit, meat, sugar and beverages were lower in the FFQ than in the FD. Overall the de-attenuated correlation coefficients were acceptable, ranging from 0·33 for energy to 0·93 for vitamin D. The majority of the women were classified in the same or adjacent quintile and few women were misclassified (extreme quintiles). Conclusion: The web-based FFQ performs well for ranking women of reproductive age according to high or low intake of foods and nutrients and, thus, provides a solid basis for investigating associations between diet and fertility.

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Web of Science (2015): Impact factor 2.433
Web of Science (2015): Indexed yes
Original language: English
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10.1017/s1368980015002189
Source: FindIt
Source-ID: 2280256832
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What do Danish children eat, and does the diet meet the recommendations? Baseline data from the OPUS School Meal Study

A child's diet is an important determinant for later health, growth and development. In Denmark, most children in primary school bring their own packed lunch from home and attend an after-school care institution. The aim of the present study was to evaluate the food, energy and nutrient intake of Danish school children in relation to dietary guidelines and nutrient recommendations, and to assess the food intake during and outside school hours. In total, 834 children from nine public schools located in the eastern part of Denmark were included in this cross-sectional study and 798 children (95·7 %) completed the dietary assessment sufficiently (August-November 2011). The whole diet was recorded during seven consecutive days using the Web-based Dietary Assessment Software for Children (WebDASC). Compared with the food-based dietary guidelines and nutrient recommendations, 85 % of the children consumed excess amounts of red meat, 89 % consumed too much saturated fat, and 56 % consumed too much added sugar. Additionally 35 or 91 % of the children (depending on age group) consumed insufficient amounts of fruits and vegetables, 85 % consumed insufficient amounts of fish, 86 % consumed insufficient amounts of dietary fibre, 60 or 84 % had an insufficient Fe intake (depending on age group), and 96 % had an insufficient vitamin D intake. The study also showed that there is a higher intake of fruits and bread during school hours than outside school hours; this is not the case with, for example, fish and vegetables, and future studies should investigate strategies to increase fish and vegetable intake during school hours.

General information
Dietary effects of Introducing school meals based on the New Nordic Diet: a randomised controlled trial in Danish children. The OPUS School Meal Study

The OPUS (Optimal well-being, development and health for Danish children through a healthy New Nordic Diet (NND)) School Meal Study investigated the effects on the intake of foods and nutrients of introducing school meals based on the principles of the NND covering lunch and all snacks during the school day in a cluster-randomised cross-over design. For two 3-month periods, 834 Danish children aged 8-11 years from forty-six school classes at nine schools received NND school meals or their usual packed lunches brought from home (control) in random order. The whole diet of the children was recorded over seven consecutive days using a validated Web-based Dietary Assessment Software for Children. The NND resulted in higher intakes of potatoes (130 %, 95 % CI 2·07, 2·58), fish (48 %, 95 % CI 1·33, 1·65), cheese (25 %, 95 % CI 1·15, 1·36), vegetables (16 %, 95 % CI 1·10, 1·21), eggs (10 %, 95 % CI 1·01, 1·19) and beverages (6 %, 95 % CI 0·84, 0·89) and lower intakes of bread (13 %, 95 % CI 0·84, 0·89) and fats (6 %, 95 % CI 0·90, 0·98) were found among the children during the NND period than in the control period (all, P< 0·05). No difference was found in mean energy intake (P= 0·4), but on average children reported 0·9 % less energy intake from fat and 0·9 % higher energy intake from protein during the NND period than in the control period. For micronutrient intakes, the largest differences were found for vitamin D (42 %, 95 % CI 1·32, 1·53) and iodine (11 %, 95 % CI 1·08, 1·15) due to the higher fish intake. In conclusion, the present study showed that the overall dietary intake at the food and nutrient levels was improved among children aged 8-11 years when their habitual packed lunches were replaced by school meals following the principles of the NND.
Effectiveness of offering healthy labelled meals in improving the nutritional quality of lunch meals eaten in a worksite canteen

Healthier meal selections at restaurants and canteens are often limited and not actively promoted. In this Danish study the effectiveness of a healthy labelling certification program in improving dietary intake and influencing edible plate waste was evaluated in a quasi-experimental study design. Employees from an intervention worksite canteen and a matched control canteen were included in the study at baseline (February 2012), after completing the certification process (end-point) and six month from end-point (follow-up) (total n=270). In order to estimate nutrient composition of the consumed lunch meals and plate waste a validated digital photographic method was used combining estimation of food intake with food nutrient composition data. Food satisfaction was rated by participants using a questionnaire. Several significant positive nutritional effects were observed at the intervention canteen including a mean decrease in energy density in the consumed meals from 561kJ/100g at baseline to 368 and 407kJ/100g at end-point and follow-up, respectively (P<0.001). No significant changes were seen with regard to food satisfaction and plate waste. In the control canteen no positive nutritional effects were observed. The results of the study highlight the potential of using healthy labelling certification programs as a possible driver for increasing both the availability and awareness of healthy meal choices, thereby improving dietary intake when eating out.
Identifying dietary patterns and associated health-related lifestyle factors in the adult Danish population.

Background/objectives: To identify and describe dietary patterns in Danish adults and to examine which demographic and health-related lifestyle factors are associated with dietary patterns.

Subjects/methods: Data derived from the Danish national survey of diet and physical activity collected in 2003-2008 and included 1569 men and 1785 women. Diet was assessed by a 7-day pre-coded food diary. Information on age, gender, weight, height, physical activity, smoking habits, educational level and attitudes towards healthy eating habits was derived from face-to-face interviews. Principal component analysis was applied to explore dietary patterns. Associations with lifestyle factors were examined by means of multiple regression analyses.

Results: Three major dietary patterns were identified: a 'traditional' pattern correlated with intake of rye bread, white bread, fat on bread, cheese, jam, cold meat, minced meat, potatoes and gravy, and cake and biscuits; a 'health-conscious' pattern correlated with coarse bread, fruit, vegetables, low-fat dairy, nuts, water and tea; and a 'fast food' pattern correlated with pizza, hamburger/spring rolls, crisps, rice and pasta, sugar-sweetened soft drinks and sweets. The 'traditional' pattern was positively associated with male gender and age, whereas the 'health-conscious' pattern was positively associated with being female, increasing age and educational level. The 'fast food' pattern was inversely associated with age and smoking.

Conclusions: Three distinct dietary patterns were identified, and associated lifestyle and demographic factors were characterised. The findings are valuable in targeting future nutrition education and will enable more focused strategies in communicating food-based dietary guidelines.

Towards harmonized data interchange in food consumption data

Food consumption data are collected and used in several fields of science. The data are often combined from various sources and interchanged between different systems. There is, however, no harmonized and widely used data interchange format. In addition, food consumption data are often combined with other data such as food composition data. In the field of food composition, successful harmonization has recently been achieved by the European Food Information Resource Network, which is now the basis of a standard draft by the European Committee for Standardization. We present an XML-based data interchange format for food consumption based on work and experiences related to food composition. The aim is that the data interchange format will provide a basis for wider harmonization in the future.
WebDASC: a web-based dietary assessment software for 8-11-year-old Danish children

Background: The present study describes the development and formative evaluation of the Web-based Dietary Assessment Software for Children (WebDASC). WebDASC is part of the OPUS project ('Optimal well-being, development and health for Danish children through a healthy New Nordic Diet') and was intended to measure dietary change resulting from a school-based intervention. Methods: WebDASC was developed as a self-administered tool that could be used by 8-11-year-old children with or without parent's aid. The development of WebDASC followed a prototyping approach: focus groups, informal interviews, literature review, and usability tests preceded its release. Special consideration was given to age-appropriate design issues. Results: In WebDASC an animated armadillo guides respondents through six daily eating occasions and helps them report foods and beverages previously consumed. A database of 1300 food items is available either through category browse or free text search, aided by a spell check application. A type-in format is available for foods not otherwise found through category browse or text search. Amount consumed is estimated by selecting the closest portion size among four different digital images. WebDASC includes internal checks for frequently forgotten foods, and the following features to create motivation: a food-meter displaying cumulative weight of foods reported, a most popular food ranking, and a computer game with a high score list. Conclusions: WebDASC was developed as an intuitive, cost-effective, and engaging method to collect detailed dietary data from 8- to 11-year-old children. Preliminary testing demonstrated that it was well accepted among children.
Comparison of estimated energy intake in children using a Web-based Dietary Assessment Software with accelerometer-estimated energy expenditure in children

Background
The OPUS (Optimal well-being, development and health for Danish children through a healthy New Nordic Diet) project carried out a school meal study to assess the impact of a New Nordic Diet (NND). The random controlled trial involved 834 children aged 8–11 in nine local authority schools in Denmark. Dietary assessment was carried out using a program known as WebDASC (Web-based Dietary Assessment Software for Children) to collect data from the children.

Objective
To compare the energy intake (EI) of schoolchildren aged 8–11 estimated using the WebDASC system against the total energy expenditure (TEE) as derived from accelerometers worn by the children during the same period. A second objective was to evaluate the WebDASC's usability.

Design
Eighty-one schoolchildren took part in what was the pilot study for the OPUS project, and they recorded their total diet using WebDASC and wore an accelerometer for two periods of seven consecutive days: at baseline, when they ate their usual packed lunches and at intervention when they were served the NND. EI was estimated using WebDASC, and TEE was calculated from accelerometer-derived activity energy expenditure, basal metabolic rate, and diet-induced thermogenesis. WebDASC's usability was assessed using a questionnaire. Parents could help their children record their diet and answer the questionnaire.

Results
Evaluated against TEE as derived from the accelerometers worn at the same time, the WebDASC performed just as well as other traditional methods of collecting dietary data and proved both effective and acceptable with children aged 8–11, even with perhaps less familiar foods of the NND.

Conclusions
WebDASC is a useful method that provided a reasonably accurate measure of EI at group level when compared to TEE derived from accelerometer-determined physical activity in children. WebDASC will benefit future research in this area.

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Organisations: National Food Institute, Division of Nutrition, Department of Applied Mathematics and Computer Science, Statistics and Data Analysis
Contributors: Biltoft-Jensen, A. P., Hjort, M. F., Trolle, E., Christensen, T., Brockhoff, P. B., Andersen, L. F., Tetens, I., Matthiessen, J.
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Contributors: Trolle, E., Gondolf, U. H., Ege, M., Kørup, K., Ygil, K. H., Christensen, T.
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Dietary intake and main sources of plant lignans in five European countries

Total lignin intake was approximately four-fold higher in the Dutch lignin database, which includes the lignin precursors LARI and PINO, compared to estimates based on the Finnish database based only on SECO and MAT. The main sources of lignans according to the Dutch database in the five countries studied were cereals and grain products, vegetables, fruit, berries, and beverages.

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Organisations: National Food Institute, Division of Nutrition, National Research Institute for Food and Nutrition, National Institute for Health and Welfare, Fred Hutchinson Cancer Research Center, Karolinska Institutet
Dietary patterns and associated health-related lifestyle factors in Denmark

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Evaluation of Web-based Dietary Assessment Software for Children: comparing reported fruit, juice and vegetable intakes with plasma carotenoid concentration and school lunch observations

Web-based Dietary Assessment Software for Children (WebDASC) was developed to estimate dietary intake in a school meal intervention study among 8- to 11-year-old Danish children. The present study validates self-reported fruit, juice and vegetable (FJV) intakes in 8- to 11-year-old children by comparing intake with plasma carotenoid concentration, and by comparing the reported FJV intake to actually eaten FJV, as observed by a photographic method. A total of eighty-one children, assisted by parents, reported their diet for seven consecutive days. For the same five schooldays as they reported their diet, the children's school lunch was photographed and weighed before and after eating. In the week after the diet reporting, fasting blood samples were taken. Self-reported intake of FJV and estimated intake of carotenoids were compared with plasma carotenoid concentration. Accuracy of self-reported food and FJV consumption at school lunch was measured in terms of matches, intrusion, omission and faults, when compared with images and weights of lunch intake. Self-reported intake of FJV was significantly correlated with the total carotenoid concentration (0.58) (P < 0.01). Fruit and juice consumption showed higher correlations than vegetables with plasma carotenoid concentration (0.38 and 0.42 v. 0.33) (P < 0.01). A total of 82 % of the participants fell into the same or adjacent quartiles when cross-classified by FJV
intake and carotenoids biomarkers. WebDASC attained 82% reporting matches overall and a higher percentage match for reporting fruits compared with beverages. The present study indicated that WebDASC can be used to rank 8- to 11-year-old Danish children according to their intake of FJV overall and at school meals.

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Pesticide Residues, Results from the period 2004-2011
The present report presents the results from the 2004-2011 period of the monitoring programmes conducted by The Danish Veterinary and Food Administration. The programmes included commodities of fruit, vegetable, cereals and animal origin using random sampling from food on the Danish market. Since the beginning of the 1960, Denmark has monitored fruit and vegetables for pesticides residues. For the periods 1993-1997 and 1998-2003, results were collated and the dietary exposure was calculated. In this report data for the analyses carried out in the period 2004-2011 are reported as well as the exposure calculations performed on the background of the residues found. All the analyses have been carried out by the laboratory of the Danish Veterinary and Food Administration in Ringsted. The samples were collected by the food control offices. The residue data have been combined with consumption data and the exposures for different consumer groups have been estimated.

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Pilot project on the Danish implementation of FoodEx2 as part of the Standard Sample Description for the electronic transmission of harmonised chemical occurrence data to EFSA (NP/EFSA/DCM/2012/01)

The National Food Institute at the Technical University of Denmark has been recoding and transmitting data for chemical contaminants and pesticide residues to EFSA in the SSD format on behalf of the Danish Veterinary and Food Authority using FoodEx1 and MATRIX food classification. To prepare for the updated data format for food description and classification, FoodEx2, this terminology has been fully translated into the Danish language. The translation tables (based on FoodEx1 as food classification) prepared while performing the data transmission grant project (Electronic Transmission of Chemical Occurrence Data (CFP/EFSA/DATEX/2009/01)) have been supplemented with the FoodEx2 code, comprising of base term and additional (non-implicit) facets. Approximately 1000 distinct food descriptions from the LIMS have been associated with the equivalent FoodEx2 codes. The performance of FoodEx2 in classifying and describing the food items present in the LIMS of the Danish Veterinary and Food Authority have been critically evaluated and commented on. Details on problems encountered have been submitted to EFSA in the form of a translation table containing the LIMS food descriptions in the catalogue used for translating these categories before transmitting results in SSD format to EFSA. Some of the problems or difficulties in coding the LIMS to FoodEx2 might originate from the apparent strong influence of the Exposure hierarchy on the FoodEx2 codes. Apart from this, difficulties mainly originated from differences in the level of detail and the coding of national specialties. The FoodEx2 codes have been used in twelve transmitted and accepted datasets. A total of 3496 samples of food and 223 samples of feed have been coded with FoodEx2 codes; a total of 73883 results for food and 1738 results for feed have been uploaded to the EFSA DCF.

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The dietary effect of serving school meals based on the new Nordic diet – A randomised controlled trial in Danish children

Background and objectives:
The OPUS study is a school-based intervention study testing selected health effects of New Nordic Diet (NND). Children are served lunch and snacks based on NND. The hypothesis is that Danish school children eat a healthier diet when receiving NND school meals as compared with packed lunch brought from home. To investigate the effects on intake of selected macronutrients in Danish school children when served school meals based on NND compared with packed lunch.

Methods:
In a cluster-randomized controlled unblinded cross-over study children received school meals based on NND for 3 months and their usual packed lunch for 3 months. The daily intake of food and beverages was recorded 3 times during 7 consecutive days using a validated self-administered web-based dietary assessment software tool for children. Statistical analysis was performed by hierarchical mixed models.

Results:
834 children from 9 schools were included and 96%, 89% and 80% filled out the first, second and third dietary assessment sufficiently (4-7 days), respectively. The preliminary results showed that the effect of serving NND resulted in a reduction in fat E% (P<0.0001), total fat (P=0.0007) and saturated fat (P=0.0001) intake for the NND compared to packed lunch; and an increase in protein E% (P<0.0001), and a borderline significant increase in dietary fiber intake (P=0.0471). There was no effect for energy intake, carbohydrate E% and added sugar E% (P>0.05). Effects are adjusted for BMI, season and household education.

Conclusions:
Danish school children’s dietary intake of total and saturated fat decreased, fat E% decreased and protein E% increased when eating NND lunch and snacks compared to packed lunch brought from home. The OPUS project (Optimal well-
WebDASC: a web-based dietary assessment software for 8-11-year-old Danish children

Background: The present study describes the development and formative evaluation of the Web-based Dietary Assessment Software for Children (WebDASC). WebDASC is part of the OPUS project ('Optimal well-being, development and health for Danish children through a healthy New Nordic Diet') and was intended to measure dietary change resulting from a school-based intervention. Methods: WebDASC was developed as a self-administered tool that could be used by 8-11-year-old children with or without parent's aid. The development of WebDASC followed a prototyping approach: focus groups, informal interviews, literature review, and usability tests preceded its release. Special consideration was given to age-appropriate design issues. Results: In WebDASC an animated armadillo guides respondents through six daily eating occasions and helps them report foods and beverages previously consumed. A database of 1300 food items is available either through category browse or free text search, aided by a spell check application. A type-in format is available for foods not otherwise found through category browse or text search. Amount consumed is estimated by selecting the closest portion size among four different digital images. WebDASC includes internal checks for frequently forgotten foods, and the following features to create motivation: a food-meter displaying cumulative weight of foods reported, a most popular food ranking, and a computer game with a high score list. Conclusions: WebDASC was developed as an intuitive, cost-effective, and engaging method to collect detailed dietary data from 8- to 11-year-old children. Preliminary testing demonstrated that it was well accepted among children.
groups, informal interviews, literature review, and usability tests preceded its release. Special consideration was given to age-appropriate design issues. Results: In WebDASC an animated armadillo guides respondents through six daily eating occasions and helps them report foods and beverages previously consumed. A database of 1300 food items is available either through category browse or free text search, aided by a spell check application. A type-in format is available for foods not otherwise found through category browse or text search. Amount consumed is estimated by selecting the closest portion size among four different digital images. WebDASC includes internal checks for frequently forgotten foods, and the following features to create motivation: a food-meter displaying cumulative weight of foods reported, a most popular food ranking, and a computer game with a high score list. Conclusions: WebDASC was developed as an intuitive, cost-effective, and engaging method to collect detailed dietary data from 8- to 11-year-old children. Preliminary testing demonstrated that it was well accepted among children.

Long-term dietary exposure to lead in young European children: Comparing a pan-European approach with a national exposure assessment

Long-term dietary exposures to lead in young children were calculated by combining food consumption data of 11 European countries categorised using harmonised broad food categories with occurrence data on lead from different Member States (pan-European approach). The results of the assessment in children living in the Netherlands were compared with a long-term lead intake assessment in the same group using Dutch lead concentration data and linking the consumption and concentration data at the highest possible level of detail. Exposures obtained with the pan-European approach were higher than the national exposure calculations. For both assessments cereals contributed most to the exposure. The lower dietary exposure in the national study was due to the use of lower lead concentrations and a more optimal linkage of food consumption and concentration data. When a pan-European approach, using a harmonised food categorisation system and "European" concentration data, results in a possible health risk related to the intake of an environmental chemical for a certain country, it is advisable to refine this assessment, as part of a tiered approach, using national occurrence data, including an optimised linkage between foods analysed and consumed for that country. In the case of lack of occurrence data, these data can be supplemented with data from the "European" concentration database or by generating additional concentration data at country level. © 2012 Copyright Taylor and Francis Group, LLC.
Nøglehullet på spisesteder: Undersøgelse af ordningens effekt på kundernes frokostindtag i en dansk personalekantine

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Using Google Analytics to measure visitor statistics: The case of food composition websites

Measuring visitor statistics is a core activity for any website provider. However, the analytical methods have so far been quite limited, difficult, expensive, or cumbersome. Google Analytics (GA) offers a free tool for measuring and analysing visitor statistics. GA was tested on three food composition websites (Denmark, Finland, and Switzerland). All the websites had a considerable number of visitors, which seemed to increase with the maturity of the website. The results also suggested that there were a considerable number of potential unreached users in Denmark and particularly in Switzerland, thus suggesting that promotion be increased and search engines be taken into account more during website design. About 15–20% of users visited the website more than nine times and about 20% spent there more than 10min on the site. Following traffic from referring websites showed that most of the visitors could not be categorised as food or nutrition professionals. Our experience showed that GA was quite easy to use and gave useful and versatile information that can be used to compare different websites and improve the website design. Finally, we would like to encourage other food composition website providers to utilise either GA or another of the similar tools available.

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A workplace feasibility study of the effect of a minimal fruit intervention on fruit intake

Objective: The main purpose of the study was to investigate the feasibility of using workplaces to increase the fruit consumption of participants by increasing fruit availability and accessibility by a minimal fruit programme. Furthermore, it was investigated whether a potential increase in fruit intake would affect vegetable, total energy and nutrient intake.

Design: A 5-month, controlled, workplace study where workplaces where divided into an intervention group (IG) and a control group (CG). At least one piece of free fruit was available per person per day in the IG. Total fruit and dietary intake was assessed, using two 24 h dietary recalls at baseline and at endpoint. Setting: Eight Danish workplaces were enrolled in the study. Five workplaces were in the IG and three were in the CG. Subjects: One hundred and twenty-four (IG, n 68; CG, n 56) healthy, mainly normal-weight participants were recruited. Results: Mean daily fruit intake increased significantly from baseline to endpoint only in the IG by 112 (SE 35) g. In the IG, mean daily intake of added sugar decreased significantly by 10?7 (SE 4?4) g, whereas mean daily intake of dietary fibre increased significantly by 3?0 (SE 1?1) g. Vegetable, total energy and macronutrient intake remained unchanged through the intervention period for both groups. Conclusions: The present study showed that it is feasible to increase the average fruit intake at workplaces by simply increasing fruit availability and accessibility. Increased fruit intake possibly substituted intake of foods containing added sugar. In this study population the increased fruit intake did not affect total energy intake.
Dietary patterns, food and macronutrient intakes among adults in three ethnic groups in rural Kenya

Objective. To compare dietary patterns and food and macronutrient intakes among adults in three ethnic groups in rural Kenya. Design. In the present cross-sectional study, dietary intake was estimated in adult volunteers using two non-consecutive interactive 24 h recalls. Dietary patterns were assessed from the number of meals and snacks per day and from the food items and major food groups registered, and their contribution to energy intake (EI) was calculated. Anthropometric values were measured and sociodemographic data obtained using a questionnaire. Setting. A cross-sectional study was conducted in the Bondo, Kitui and Transmara districts of rural Kenya. A high prevalence of food insecurity in Kenya underlines the importance of describing the dietary patterns and intakes in different Kenyan ethnic groups. Subjects. A total of 1163 (61% women) adult Luo, Kamba and Maasai, with a mean age of 38.6 (range: 18–68) years, volunteered to participate. Results. Dietary patterns and food groups contributing to EI differed significantly among the ethnic groups. Mean EI ranged from 5.8 to 8.6 MJ/d among women and from 7.2 to 10.5 MJ/d among men, with carbohydrates contributing between 55.7% and 74.2% and fat contributing between 14.5% and 30.2% of total EI. Mean protein intake ranged from 0.72 to 1.3 g/kg per d, and EI:BMR ratio ranged between 1.1 and 1.6 in both sexes, and was highest among the Luo. Prevalence of underweight (BMI <18.5 kg/m2) was 13.7%, 20.5% and 24.2% in the Luo, Kamba and Maasai, respectively. Conclusions. The degree of food insecurity measured as a degree of undernutrition and as dietary patterns differed considerably among the ethnic groups. The Maasai and Kamba in particular were exposed to food insecurity. Copyright © The Authors 2011.

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Organisations: Division of Nutrition, National Food Institute, University of Southern Denmark, SUHR’S University College of Nutrition and Health, Kenya Medical Research Institute, Kenyatta University, Steno Diabetes Centre, University of Copenhagen
Contributors: Hansen, A. W., Christensen, D., Larsson, M., Eis, J., Christensen, T., Friis, H., Mwaniki, D., Kilonzo, B., Boit, M., Borch-Johnsen, K., Tetens, I.
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Food composition data: Identifying new uses, approaching new users
Food composition data (FCD) are fundamental for nutrition science and also extensively used in the public health domain. Advances in information technologies allowing rapid transmission of large data volumes likely will foster the development of new FCD uses and in the future FCD could be retrieved any time and location-independent (e.g. in supermarket and restaurants) through the use of mobile or stationary devices having incorporated Internet access. To achieve this, FCD need to be standardised and available on the Internet, two requirements towards which the Network of Excellence EuroFIR has already substantially contributed. The technology needed for the implementation of FCD into innovative interfaces, either mobile or stationary, is already available and allows for sufficiently rapid data transfer. Improved data coverage and quality as well as standardised availability and accessibility, allowing easier data interchange, will further facilitate new FCD uses providing a maximum of user-relevant data and meeting users’ requirements. Next to classical uses, FCD could also easily be incorporated to a greater extent in educational or entertainment tools, which would respond to the call of the World Health Organization and European Commission for the dissemination and development of new activities in the fields of nutrition, physical activities and health.

General information
Intake of micronutrients among Danish adult users and non-users of dietary supplements.

Objectives: To evaluate the intake of micronutrients from the diet and from supplements in users and non-users of dietary supplements, respectively, in a representative sample of the Danish adult population. A specific objective was to identify the determinants of supplement use. Design: A cross-sectional representative national study of the intake of vitamins and minerals from the diet and from dietary supplements. Method: The Danish National Survey of Dietary Habits and Physical Activity, 2000-2004. Participants (n=4,479; 53% females) aged 18-75 years gave information about the use of dietary supplements in a personal interview. The quantification of the micronutrient contribution from supplements was estimated from a generic supplement constructed from data on household purchases. Nutrient intakes from the diet were obtained from a self-administered 7-day pre-coded dietary record. Median intakes of total nutrients from the diets of users and non-users of supplements were analysed using the Wilcoxon rank-sum test. Results: Sixty percent of females and 51% of males were users of supplements. With the exception of vitamin D, the intake of micronutrients from the diet was adequate at the group level for all age and gender groups. Among females in the age group 18-49 years, the micronutrient intake from the diet was significantly higher compared with the non-users of dietary supplements. The use of dietary supplements increased with age and with ‘intention to eat healthy.’ Conclusion: Intake of micronutrients from the diet alone was considered adequate for both users and non-users of dietary supplements. Younger females who were supplement users had a more micronutrient-dense diet compared to non-users.
Relative validity of the pre-coded food diary used in the Danish National Survey of Diet and Physical Activity

Objective: To determine the relative validity of the pre-coded food diary applied in the Danish National Survey of Dietary Habits and Physical Activity. Design: A cross-over study among seventy-two adults (aged 20 to 69 years) recording diet by means of a pre-coded food diary over 4 d and a 4 d weighed food record. Intakes of foods and drinks were estimated, and nutrient intakes were calculated. Means and medians of intake were compared, and crossclassification of individuals according to intake was performed. To assess agreement between the two methods, Pearson and Spearman's correlation coefficients and weighted kappa coefficients were calculated. Setting: Validation study of the pre-coded food diary against a 4 d weighed food record. Subjects: Seventy-two volunteer, healthy free-living adults (thirty-five males, thirty-seven females). Results: Intakes of cereals and vegetables were higher, and intakes of fruit, coffee and tea were lower, in the weighed food record compared with the food diary. Intakes of nutrients were grossly the same in the two methods, except for protein, where a higher intake was recorded in the weighed record. In general, moderate agreement between the two methods was found. Conclusions: Participants were classified moderately correct according to food and nutrient intakes assessed in the pre-coded food diary; however values of absolute food intakes should be used and interpreted with caution. Improvement of the methods to estimate portion size may increase the accuracy of the dietary intake estimates.

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Brug af kosttilskud blandt uge danskere - og sammenhæng med næringsstofindtag, kostkvalitet og livsstilsfaktorer

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Contributors: Gille, M., Biltoft-Jensen, A. P., Hartkopp, H. B., Christensen, T., Fagt, S., Trolle, E.
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Estimated intake of benzoic and sorbic acids in Denmark

The monitoring of food additives and recent dietary surveys carried out in Denmark have earlier been used to estimate the intake of sweeteners and nitrite in relation to acceptable daily intakes. The ubiquitous use of the preservatives benzoic and sorbic acids raises the question of the magnitude of the intake of these preservatives in relation to acceptable daily intakes. This area is explored in this paper. The content of benzoic and sorbic acids in all food groups, where they are allowed, was monitored in Denmark 17 times between 2001 and 2006 with a total of 1526 samples. Transgressions of maximum limits, illegal use or declaration faults were found in about 3% of samples. From repeated investigations on fat-based foods (salads and dressings), marmalade and stewed fruit, it is concluded that the amounts used in industry have been relatively stable throughout the whole period, although limited data for marmalade show some variation. Most foods in the categories soft drinks, dressings, fat-based salads, pickled herrings, and marmalade contain benzoic and sorbic acid, and sliced bread also contains in some cases sorbic acid. The median daily intake and intake distribution of benzoic and sorbic acids were calculated with data from the Danish National Survey of Dietary Habits and Physical Activity (age from 4 to 75 years) conducted in 2000-2004 with 5785 participants. The median intakes of both benzoic acid and sorbic acid are well below the acceptable daily intakes of 0-5 and 0-25 mg kg-1 body weight (bw) day-1 for benzoic and sorbic acid, respectively. However, the 90th percentile based on the average of the samples with a content of benzoic acid is higher than the acceptable daily intake for both men and women, with the highest value of 16 mg kg-1 bw day-1 for boys and girls in the 4-6-year-old age group. Based on the average of all samples, the 95th percentile is over the acceptable daily intake for men up to 34 years and for women up to 24 years, and the 90th percentile for men up to 18 years and for women up to 10 years. Soft drinks, salads and dressings are the main contributors to benzoic acid intake. The sorbic acid intake based on the average of all samples is well below the acceptable daily intake. However, for the intake based on the average of samples with content, the 95th percentile exceeds the acceptable daily intake. This is caused by the dominating contribution to the intake of sorbic acid from sliced bread, but since only seven out of 42 samples have added sorbic acid, the calculation based on the average of samples with content will exaggerate the intake. With a built-in safety factor of 100 in the acceptable daily intakes and judging from the literature, the high intakes of benzoic acid should not cause any concern for ill-effects. However, there must be a reason to reconsider the maximum
limits especially for benzoic acid in soft drinks, dressings and salads and for sorbic acid in sliced bread.
Harmonisation of food categorisation systems for dietary exposure assessments among European children

Within the European project called EXPOCHI (Individual Food Consumption Data and Exposure Assessment Studies for Children), 14 different European individual food consumption databases of children were used to conduct harmonised dietary exposure assessments for lead, chromium, selenium and food colours. For this, two food categorisation systems were developed to classify the food consumption data in such a way that these could be linked to occurrence data of the considered compounds. One system served for the exposure calculations of lead, chromium and selenium. The second system was developed for the exposure assessment of food colours. The food categories defined for the lead, chromium and selenium exposure calculations were used as a basis for the food colour categorisation, with adaptations to optimise the linkage with the food colour occurrence data. With this work, an initial impetus was given to make user-friendly food categorisation systems for contaminants and food colours applicable on a pan-European level. However, a set of difficulties were encountered in creating a common food categorisation system for 14 individual food consumption databases that differ in the type and number of foods coded and in level of detail provided about the consumed foods. The work done and the problems encountered in this project can be of interest for future projects in which food consumption data will be collected on a pan-European level and used for common exposure assessments.

General information

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Harmonised information exchange between decentralised food composition database systems

Background/Objectives: The main aim of the European Food Information Resource (EuroFIR) project is to develop and disseminate a comprehensive, coherent and validated data bank for the distribution of food composition data (FCD). This can only be accomplished by harmonising food description and data documentation and by the use of standardised thesauri. Subjects/Methods: The data bank is implemented through a network of local FCD storages (usually national) under the control and responsibility of the local (national) EuroFIR partner. Results: The implementation of the system based on the EuroFIR specifications is under development. The data interchange happens through the EuroFIR Web Services interface, allowing the partners to implement their system using methods and software suitable for the local computer environment. The implementation uses common international standards, such as Simple Object Access Protocol, Web Service Description Language and Extensible Markup Language (XML). A specifically constructed EuroFIR search facility was designed for end users. The EuroFIR eSearch facility compiles queries using a specifically designed Food Data Query Language and sends a request to those network nodes linked to the EuroFIR Web Services that will most likely have the requested information. The retrieved FCD are compiled into a specifically designed data interchange format (the EuroFIR Food Data Transport Package) in XML, which is sent back to the EuroFIR eSearch facility as the query response. The same request–response operation happens in all the nodes that have been selected in the EuroFIR eSearch facility for a certain task. Finally, the FCD are combined by the EuroFIR eSearch facility and
delivered to the food compiler. Conclusions: The implementation of FCD interchange using decentralised computer systems instead of traditional data-centre models has several advantages. First of all, the local partners have more control over their FCD, which will increase commitment and improve quality. Second, a multicentred solution is more economically viable than the creation of a centralised data bank, because of the lack of national political support for multinational systems.

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Source-ID: 268810
Research output: Contribution to journal › Journal article – Annual report year: 2010 › Research › peer-review

Diet quality: associations with health messages included in the Danish Dietary Guidelines 2005, personal attitudes and social factors
Objective: To Study the association between diet quality and the new health messages in the Danish Dietary Guidelines 2005, i.e. 'Eat a varied diet', 'Engage in regular physical activity' and 'Maintain a healthy body weight'. Design/setting/subjects: The study was cross-sectional, comprising a random sample of 3151 Danish adults aged 18-75 years. Dietary intake was estimated using a 7 d pre-coded food diary. information on social background, leisure-time physical activity, height, body weight and intention to eat healthily was Obtained by in-person interviews. Logistic regression models Were used to explore the independent effects of energy intake, leisure-time physical activity, food variety, BMI, age, gender, education, household income, location of residence and intention to eat healthily on the likelihood to have high diet quality measured by an index based on the intake of dietary fibre and Saturated fat. Results: Greater food variety (OR = 1.32 for women, 1.13 for men), high leisure-time physical activity (OR = 2.20 for women, 1.91 for men), frequent intentions to eat healthily (OR = 8.19 for women, 5.40 for men) and low energy intake (OR = 0.78 for women, 0.85 for men) were significantly associated with high diet quality. For women education was positively associated with diet quality. The study did not demonstrate any association between BMI and diet quality. Conclusion: The health behaviours 'Eat a varied diet' and 'Engage in regular physical activity were positively associated with healthy eating. The dietary habits reported were strongly influenced by personal intentions. Thus, the biggest challenge for public health nutritionists will be to reach non-compliers who seldom have intentions to eat healthily.

General information
Publication status: Published
Organisations: Division of Nutrition, National Food Institute
Contributors: Biltoft-Jensen, A. P., Groth, M. V., Matthiessen, J., Wachmann, H., Christensen, T., Fagt, S.
Pages: 1165-1173
Publication date: 2009
Peer-reviewed: Yes

Publication information
Journal: Public Health Nutrition
Volume: 12
Issue number: 8
ISSN (Print): 1368-9800
Ratings:
Probabilistic assessment of the cumulative dietary acute exposure of the population of Denmark to organophosphorus and carbamate pesticides

Organophosphorus and carbamate pesticides are acetylcholinesterase-inhibiting pesticides and as such have a common mode of action. We assessed the cumulative acute exposure of the population of Denmark to 25 organophosphorus and carbamate pesticide residues from the consumption of fruit, vegetables and cereals. The probabilistic approach was used in the assessments. Residue data obtained from the Danish monitoring programme carried out in the period 2004-2007, which included 6704 samples of fruit, vegetables and cereals, were used in the calculations. Food consumption data were obtained from the nationwide dietary survey conducted in 2000-2002. Contributions from 43 commodities were included in the calculations. We used the relative potency factor (RPF) approach to normalize the toxicity of the various organophosphorus and carbamate pesticides to the two index compounds chlorpyriphos and methamidophos. RPF values derived from the literature were used in the calculations. We calculated the cumulative acute exposure to 1.8% and 0.8% of the acute reference dose (ARfD) of 100 μg kg⁻¹ body weight (bw) day⁻¹ of chlorpyrifos as an index compound at the 99.9th percentile (P99.9) for children and adults, respectively. When we used methamidophos as the index compound, the cumulative acute intakes were calculated to 31.3% and 13.8% of the ARfD of 3 μg kg⁻¹ bw day⁻¹ at P99.9 for children and adults, respectively. With both index compounds, the greatest contributor to the cumulative acute exposure was apple. The results show that there is no cumulative acute risk for Danish consumers to acetylcholinesterase-inhibiting pesticides.

General information
Publication status: Published
Organisations: Division of Food Chemistry, National Food Institute
Contributors: Jensen, B. H., Petersen, A., Christensen, T.
Pages: 1038-1048
Publication date: 2009
Peer-reviewed: Yes

Publication information
Journal: Food Additives and Contaminants
Volume: 26
Issue number: 7
ISSN (Print): 0265-203X
Ratings:
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.945 SNIP 1.708
Web of Science (2009): Indexed yes
Original language: English
Keywords: fruit, probabilistic modelling, exposure assessment, vegetables, cereals, pesticides - organophosphorous
DOI:
10.1080/02652030902859754
Source: orbit
Source-ID: 246663
Research output: Contribution to journal → Journal article – Annual report year: 2009 → Research → peer-review

Danskernes kostvaner 1995-2006: Status og udvikling med focus på frugt og grænt samt sukker

General information
Publication status: Published
Organisations: Division of Nutrition, National Food Institute
Contributors: Fagt, S., Biltoft-Jensen, A. P., Matthiessen, J., Groth, M. V., Christensen, T., Trolle, E.
Number of pages: 56
Publication date: Sep 2008
Acrylamide-asparagine relationship in baked/toasted wheat and rye breads

General information
Publication status: Published
Organisations: Division of Food Chemistry, National Food Institute, Division of Nutrition
Contributors: Granby, K., Nielsen, N. J., Hedegaard, R. S. V., Christensen, T., Kann, M., Skibsted, L. H.
Pages: 921-929
Publication date: 2008
Peer-reviewed: Yes

Publication information
Journal: Food Additives and Contaminants
Volume: 25
Issue number: 8
ISSN (Print): 0265-203X
Ratings:
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.096 SNIP 1.054
Web of Science (2008): Indexed yes
Original language: English
DOIs:
10.1080/02652030801958905
Source: orbit
Source-ID: 233159
Research output: Contribution to journal › Journal article – Annual report year: 2008 › Research › peer-review

Danish Food Information: EuroFIR Web Services - EuroFIR Food Data Transport Package, Version 1.3

General information
Publication status: Published
Organisations: Danish Food Information
Contributors: Møller, A., Christensen, T.
Number of pages: 106
Publication date: 2008

Publication information
ISBN (Print): 978-87-92125-08-8
Original language: English
URLs:
Source: orbit
Source-ID: 274944
Research output: Book/Report › Report – Annual report year: 2008 › Research

Development of a recommended food intake pattern for healthy Danish adolescents consistent with the Danish dietary guidelines, nutrient recommendations and national food preferences

General information
Publication status: Published
Organisations: Division of Nutrition, National Food Institute
Pages: 451-463
The intake of saturated fat and dietary fibre: a possible indicator of diet quality

The aim of the present study was to assess if a simple dietary quality index (SDQI) is a useful indicator for nutritional quality in the Danish diet. Data from the Danish National Dietary Survey 2000-2 for adults (n 3151; age 18-75 years) were used to construct an SDQI based on the intake of dietary fibre and saturated fat. The SDQI was used to rank the individuals into three subgroups: the 25 % closest in meeting the recommended intakes of saturated fat and dietary fibre (compliers), the 25 % furthest away (non-compliers) and the 50 % in between (intermediates). Significant differences in food and nutrient intake between these subgroups were identified by intakes of food groups and intakes of nutrients followed by non-parametric tests. Compared with the Nordic Nutrition Recommendations 2004 and the Danish Dietary Guidelines 2005, compliers had a significantly better nutrient profile than intermediates and non-compliers, as the diet of
compliers contained more whole-grain cereals, fruits, vegetables and fish, and more frequently low-fat dairy products, lean meats and boiled potatoes. The diet of all subgroups, especially non-compliers, had a high content of nutrient-poor, energy-dense foods, for example, salty snacks, confectionery, and beverages, for example, soft drinks and alcohol. The SDQI is a simple and useful tool to characterise the diet quality of Danish adults.

General information
Publication status: Published
Organisations: Division of Nutrition, National Food Institute
Contributors: Biltoft-Jensen, A. P., Fagt, S., Groth, M. V., Matthiessen, J., Wachmann, H., Christensen, T.
Pages: 624-632
Publication date: 2008
Peer-reviewed: Yes

Publication information
Journal: British Journal of Nutrition
Volume: 100
Issue number: 3
ISSN (Print): 0007-1145
Ratings:
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.111 SNIP 1.066
Web of Science (2008): Indexed yes
Original language: English
DOIs:
10.1017/S0007114507904353
Source: orbit
Source-ID: 233359
Research output: Contribution to journal › Journal article – Annual report year: 2008 › Research › peer-review

Whole grain intake in the Danish population

General information
Publication status: Published
Organisations: Division of Nutrition, National Food Institute
Contributors: Biltoft-Jensen, A. P., Ygil, K. H., Fagt, S., Matthiessen, J., Christensen, T., Groth, M. V.
Publication date: 2008
Peer-reviewed: Unknown

Publication information
Journal: Diætisten
Volume: 94
ISSN (Print): 1395-1769
Original language: English
Source: orbit
Source-ID: 234323
Research output: Contribution to journal › Journal article – Annual report year: 2008 › Communication

Wholegrain Intake in the Danish population

General information
Publication status: Published
Organisations: Division of Nutrition, National Food Institute
Contributors: Biltoft-Jensen, A. P., Ygil, K. H., Fagt, S., Matthiessen, J., Christensen, T., Groth, M. V., Mejborn, H., Trolle, E.
Publication date: 2008
Peer-reviewed: Yes
Event: Abstract from 9th Nordic Nutrition Conference, Copenhagen, Denmark.
Source: orbit
Source-ID: 234332
Research output: Contribution to conference › Conference abstract for conference – Annual report year: 2008 › Research › peer-review
Børns og unges måltidsvaner 2000-2004

General information
Publication status: Published
Organisations: Division of Nutrition, National Food Institute
Contributors: Fagt, S., Christensen, T., Groth, M. V., Biltoft-Jensen, A. P., Matthiessen, J., Trolle, E.
Number of pages: 81
Publication date: Aug 2007

Publication information
Publisher: Danmarks Tekniske Universitet, Fødevareinstituttet
Edition: 1
ISBN (Print): 978-87-92158-07-9
Original language: Danish
Electronic versions:
boernunge_maaltidsvaner_20002004.pdf
Source: orbit
Source-ID: 247474
Research output: Book/Report › Report – Annual report year: 2007 › Research

Danish Monitoring System for Foods 1998-2003: Content of As, Cd, Hg, Ni, Pb, and Se and Dietary Intake by Children and Adults

General information
Publication status: Published
Organisations: Division of Food Chemistry, National Food Institute, Division of Nutrition
Contributors: Larsen, E. H., Rokkjær, I., Christensen, T.
Number of pages: 733
Pages: 297-332
Publication date: 2007

Host publication information
Title of host publication: The Determination of Chemical Elements in Food
Publisher: Wiley-Interscience
ISBN (Print): 978-0471687849
Source: orbit
Source-ID: 238936
Research output: Chapter in Book/Report/Conference proceeding › Book chapter – Annual report year: 2007 › Research

Iodine content in bread and salt in Denmark after iodization and the influence on iodine intake
Objective To measure the iodine content in bread and household salt in Denmark after mandatory iodine fortification was introduced and to estimate the increase in iodine intake due to the fortification. Design The iodine content in rye breads, wheat breads and salt samples was assessed. The increase in iodine intake from fortification of bread and the increase in total iodine intake after fortification were estimated. Subjects Iodine intake before and after fortification was estimated based on dietary intake data from 4,124 randomly selected Danish subjects. Main results Approximately 98% of the rye breads and 90% of the wheat breads were iodized. The median iodine intake from bread increased by 25 (13-43) μg/day and the total median iodine intake increased by 63 (36-104) μg/day. Conclusions The fortification of bread and salt has resulted in a desirable increase in iodine intake, and the current fortification level of salt (13 ppm) seems reasonable.

General information
Publication status: Published
Organisations: Division of Nutrition, National Food Institute, Division of Food Chemistry
Pages: 231-239
Publication date: 2007
Peer-reviewed: Yes

Publication information
Journal: International Journal of Food Sciences and Nutrition
Volume: 58
Issue number: 3
ISSN (Print): 0963-7486
Ratings:
Component based input of composite foods in selfadminstered dietary intakes recordings

General information
Publication status: Published
Organisations: Division of Nutrition, National Food Institute
Contributors: Christensen, T., Biltoft-Jensen, A. P.
Publication date: 2006
Event: Poster session presented at The 6th International Conference on Dietary Assessment Methods, Copenhagen, Denmark.
Source: orbit
Source-ID: 238412
Research output: Contribution to conference › Poster – Annual report year: 2006 › Research

Probabilistic dietary exposure assessment of Danish consumers to dithiocarbamate residues in food

General information
Publication status: Published
Organisations: Division of Food Chemistry, National Food Institute, Division of Nutrition
Contributors: Jensen, B. H., Petersen, A., Andersen, J. H., Christensen, T.
Publication date: 2006
Event Information
Event: European Pesticide Residue Workshop 2006
Location: Corfu
Source: orbit
Source-ID: 238975
Research output: Non-textual form › Sound/Visual production (digital) – Annual report year: 2006 › Research

Forslag til retningslinjer for sund kost i skoler og institutioner

General information
Publication status: Published
Organisations: Division of Nutrition, National Food Institute
Contributors: Biltoft-Jensen, A. P., Ygil, K. H., Christensen, L. M., Christensen, S. M., Christensen, T.
Number of pages: 97
Publication date: Aug 2005
Publication information
Place of publication: Søborg
Publisher: Danmarks Fødevareforskning
ISBN (Print): 87-91587-11-5
Original language: Danish
Source: orbit
Source-ID: 238430
Research output: Book/Report › Report – Annual report year: 2005 › Research

Danskernes kostvaner 2000-2002: Hovedresultater

General information
Publication status: Published
Organisations: Division of Nutrition, National Food Institute
Number of pages: 168
Mad på arbejde - Metode, forløb og evaluering af projektet

General information
Publication status: Published
Organisations: Division of Nutrition, National Food Institute
Number of pages: 48
Publication date: 2005

Vitamin D intake and status of Pakistani immigrants in Denmark

General information
Publication status: Published
Organisations: Division of Nutrition, National Food Institute, Division of Food Chemistry
Contributors: Andersen, R., Brot, C., Christensen, T., Hermansen, B., Jakobsen, J., Mølgaard, C., Møller, A., Ygil, K. H., Ovesen, L.
Publication date: 2004
Peer-reviewed: No
Source: orbit
Source-ID: 246061
Research output: Contribution to conference → Conference abstract for conference – Annual report year: 2004 → Research

Vitamin D intake in Danish pubertal girls

General information
Publication status: Published
Organisations: Division of Nutrition, National Food Institute
Contributors: Hermansen, B., Andersen, R., Christensen, T., Lamberg-Allardt, C., Michaelsen, K. F., Møller, A., Ygil, K. H., Mølgaard, C.
Publication date: 2004
Peer-reviewed: No
Source: orbit
Source-ID: 246057
Research output: Contribution to conference → Conference abstract for conference – Annual report year: 2004 → Research

Helhedssyn på fisk og fiskevarer

General information
**Projects:**

**Modelling allergenic risk**
Briot, S., PhD Student, Department of Mathematics
Brockhoff, P. B., Main Supervisor
Christensen, T., Supervisor
Madsen, C. B., Supervisor
Rootzén, H., Examiner
Ersbøll, A. K., Examiner
Ersbøll, A. K., Examiner, Department of Informatics and Mathematical Modeling
Godefroy, S., Examiner

Anden EU-finansiering
01/09/2013 → 18/01/2017

Award relations: Modelling allergenic risk
Project: PhD

**The role of dairy products in future healthy and sustainable diets**
The project aims at modeling Danish dietary patterns following the food based dietary guidelines from 2013 and the Nordic Nutrition Recommendations 2012, and at the same time are optimized with regard to the climate impact in terms of the Carbon Footprint (CO2 equivalents) of the diets.
The project will describe the combination of foods of these future sustainable diets, especially focusing on the role of various dairy products.
Trolle, E., Project Participant, National Food Institute, Division of Risk Assessment and Nutrition
Knudsen, V. K., Project Participant, National Food Institute, Research group for Risk Benefit
Thorsen, A. V., Project Participant
Christensen, T., Project Participant, National Food Institute, Division of Risk Assessment and Nutrition
Ygil, K. H., Project Participant, National Food Institute, Division of Risk Assessment and Nutrition
DANSDA: The Danish National Survey on Diet and Physical Activity
Diet and physical activity influence the incidence of widespread diseases such as cardiovascular diseases and diabetes. In order to launch focused prevention initiatives and monitor developments in the population's health-related lifestyle we need to systematically gather knowledge about and map population dietary and activity habits.

The National Food Institute is behind the Danish National Survey of Diet and Physical Activity. The Institute conducted national dietary surveys in 1985, 1995, 2000-2008 and 2011-2013. The survey has included physical activity in the two latest surveys, which is treated in a dietary context as well as an independent research field.

The survey is representative, multidisciplinary and maps the diet, physical activity and overweight of the Danish population as well as their determinants. It is a tool for assessing population nutrient intake as well as the degree to which official health policy objectives are met. It thus contributes with knowledge about the four key lifestyle factors: Diet, smoking, alcohol and physical activity in the Danish population.

The survey results have been published in several reports and in a wide range of journals and articles. The National Food Institute uses the results for consulting and research within nutrition, for example about enrichment of foods, assessment of new ingredients, in relation to dietary recommendations and to target nutritional information at the general population. Data from the dietary studies also constitute an important element in risk assessments. The National Food Institute cooperate with a wide range of Danish and international stakeholders on improving methodologies and conducting other dietary surveys.

The National Food Institute also collects supplementary dietary data for describing developments – for example through statistics data on the provision of foods.

IFAAM: Integrated Approaches to Food Allergen and Allergy Risk Management

The project will

a. investigate how maternal diet and infant feeding practices (including weaning) modulate the patterns and prevalence of allergies across Europe.

b. Establish risk factors for the development of severe reactions to food and identify associated biomarkers

c. Develop a clinically-validated tiered risk assessment and evidence-based risk management approach for food allergens for allergens in the food chain

d. Develop clinically-relevant multi-analyte methods of analysis suited to allergen management across the food chain

DTU FOOD is actively involved in c. where we work with intake data for food allergy risk assessment and models for risk assessment together with DTU Compute

Madsen, C. B., Project Participant, National Food Institute, Division of Toxicology and Risk Assessment
Christensen, T., Project Participant, National Food Institute, Division of Nutrition
Brockhoff, P. B., Project Participant, Department of Applied Mathematics and Computer Science, Statistics and Data Analysis
**Dietary Exposure Assessments for Children in Europe – EXPOCHI**

The overall objective of the project is to create a relational network of different individual food consumption databases in children, representative for diverse regions/countries within Europe, covering different geographical areas and to use those data for specific exposure assessment case studies in children. The specific objectives of the call are to provide individual food consumption data for children for different Member States, and to carry out an independent exposure assessment study in children for food colours, selenium, chromium and lead.

At present, there is no harmonised approach for the data collection of food consumption data in childhood populations. However, the data included in this project are representative at a national (or large regional) level: 14 regions covering 13 countries. Only data derived from 24-h dietary recalls and dietary records collected on at least two (non)consecutive days per individual are included in the project. EFSA provides the required occurrence data for the substances under study. The outcome is estimated distribution of long term dietary exposure levels in the relevant population group, based statistical models for long term exposure, using the Monte Carlo Risk Assessment (MCRA) software, developed by RIKILT – Institute of Food Safety (The Netherlands).

**The European Food Information Resource Network, EUROFIR**

EuroFIR, the world-leading European Network of Excellence on Food Composition Databank systems is a partnership between 46 universities, research institutes and small-to-large sized enterprises (SMEs) from 25 European countries.

EuroFIR aims to develop and integrate a comprehensive, coherent and validated databank providing a single, authoritative source of food composition data in Europe.

**Activities:**

**Assessment of iodine fortification strategies**

Period: 1 Feb 2019 → 1 Jul 2019

Gitte Ravn-Haren (Main supervisor)

Tue Christensen (Supervisor)

Research group for Risk Benefit

National Food Institute

Research group for Nutrition and Health Promotion

**Description**

Bachelor project

Activity: Examinations and supervision › Supervisor activities

**The New version of Danish food composition database FRIDA including a case study on recipe calculation compared to a chemical analysis.**

Period: 16 May 2016 → 18 May 2016
Anja Pia Biltoft-Jensen (Other)
Tue Christensen (Other)
National Food Institute
Division of Risk Assessment and Nutrition

Abstract. 39th National Nutrient Databank Conference. 16-18 May, Washington

Related external organisation

NATIONAL NUTRIENT DATABANK CONFERENCE COMMITTEES
Activity: Talks and presentations › Conference presentations

Press clippings:

Proteinbarer
Tue Christensen
05/12/2017
National Food Institute, Division of Risk Assessment and Nutrition

Media coverage (1)

Næringsindhold i proteinbarer
05/12/2017
TV2.dk, Denmark
Christian Sejer Rasmussen
Tue Christensen
National Food Institute, Division of Risk Assessment and Nutrition
Press/Media: Press / Media

Næringsindhold i fødevarer
Tue Christensen
01/06/2012
National Food Institute, Division of Nutrition

Media contribution (1)

Næringsindhold i fødevarer
01/06/2012
DR, Web
Lene Mebjerg Toft
Tue Christensen
National Food Institute, Division of Nutrition
Press/Media: Press / Media