Report on the Contribution of Dairy Foods to the Nutritional Quality of the Diet in Older Irish Adults (Aged 65 years and older)

Analysis conducted by IUNA, based on information from the National Adult Nutrition Survey (NANS)

Irish Universities Nutrition Alliance (IUNA)

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The Irish Universities Nutrition Alliance (IUNA) is a formal association of the academic nutrition units at University College Dublin, Trinity College Dublin, University College Cork and the University of Ulster. The IUNA is committed to joint initiatives in research and teaching.

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Key Points

This report describes dairy consumption by Irish adults aged 65 years and over.

- There were 226 adults aged 65 years or greater (106 males, 120 females). General analysis identified 21% to be normal weight, 53% to be overweight and 25% to be obese. Physical activity levels were generally low with 66% classified as sedentary. Almost 50% were classified as having systolic hypertension, while almost 20% displayed diastolic hypertension. Overall, 38% of this population group were supplement users (females: 43%, males: 31%).

- For the total population within this cohort, mean daily total dairy consumption (all milk, cheese and yogurt) was 293g/day, with intakes slightly higher in females (306g/day) compared with males (278g/day).

- Overall, 99.1% of Irish adults aged ≥65years were consumers of dairy with a mean daily intake of 296g/day. 97.8% were milk consumers (249g/day), 60.2% cheese consumers (19.8g/day) and 45.1% were consumers of yogurt (83g/day).

- The dairy group 'whole milk' had the highest consumer rates of all dairy foods for both males (89%) and females (82%) and across age groups (65-69y = 90%; 70-74y = 79%; ≥75y = 84%). Intakes of semi-skimmed milk and skimmed milks were broadly similar between males and females; however, there was a slightly higher intake of yogurts in females (54% consumers, females: 88g/day) than males (35%, 75g/day) and a slightly higher intake of cheese in males (62%, 25g/day) than females (58%, 15g/day).

- The mean daily number of dairy servings was 1.9 servings a day with the majority coming from milk (1.22 servings per day). 15% of the population consumed between 2.5 and 3.49 servings of dairy/day, meeting dairy recommendations, with 10% consuming ≥3.5 servings. The remaining 75% of the population consumed between 0 - 2.49 servings per day. More females (12%) consumed ≥3.5 daily servings of dairy compared with males (9%).

- Dairy provides 9.7% of energy (kcal) in the total population and was a major contributor to protein, fat, saturated and trans fat, retinol, vitamin B12, riboflavin, iodine and calcium intakes. Of the dairy subtypes, whole milk contributed most to protein, carbohydrate, trans fat, iodine, riboflavin, vitamin B12 and calcium intakes, hard cheese contributed to saturated and trans fat while fortified milk contributed most to vitamin D, folate and vitamin E intakes.

- Intakes of micronutrients investigated were typically adequate with the exception of vitamin D, where fewer than 15% of males and 24% of females achieved the estimated average requirement (EAR).

- High consumers of dairy had significantly higher intakes of energy (kcal), and higher percentage energy from carbohydrate, total sugar, the B-vitamins and calcium (per 10MJ) when compared to low consumers. They also had lower intakes of monounsaturated fat (as a percentage of energy) and salt (per 10MJ). There were no differences in intakes of total fat, saturated fat or trans fat (as a percentage of energy intakes) across low, medium or high consumers of dairy. A similar pattern emerged for milk.

- High consumers of cheese had significantly higher mean daily intakes of energy and percentage of energy from saturated fat and trans fat and lower carbohydrate (% energy), however there was no difference in intakes of total fat or salt when compared to non-consumers. Consumers of total yogurt had a significantly higher mean daily intake of carbohydrate, sugar, polyunsaturated fats, riboflavin and potassium when compared to non-consumers.

- Serum folate and riboflavin status (assessed by EGRAC) were higher in high dairy consumers compared to low consumers.

- Over 96% of breakfast consumers consumed dairy at breakfast, with mean daily intakes of dairy at breakfast of 127g/day coming predominantly from milk (114g/day).

- Yogurt was consumed equally across breakfast, lunch and evening meals with a consumer rate of 18-19%. Mean intakes of yogurt were greatest at breakfast (74g) in comparison to lunch and the evening meal (55g and 47g respectively). Yogurts were consumed less frequently as snacks (13% of snack consumers with a mean daily intake of 48g/d at snacks).

- The consumer rate of cheese was greatest at lunch (38%; 15.6g/day at lunch) in comparison to breakfast and evening meals (7%, 21g/day at breakfast and 31%, 12g/day at the evening meal respectively).

- Considering the use of dairy food types at breakfast, the highest usage rates were for whole milk which was consumed by 41.3% of breakfast consumers (or at 39% of all breakfast eating occasions) with a mean weight of 81g and energy contribution of 54kcal.

- Daily intakes of dairy in those aged ≥65 years were comparable with those aged 18-64 years (1.9 servings and 2 servings per day respectively).

- For the total population, adults aged ≥65 years consumed a mean daily dairy intake of 293g/d in comparison to 288g/d consumed by those aged 18-64 years.

- Mean daily intakes of milk was greater in adults ≥65 years (244g) in comparison to 18-64 year olds (237g). For consumers only, there were higher intakes of fortified milk in adults aged ≥65 years (16% consumers, 272g/day) compared to 18-64 year olds (13% consumers, 160g/day). Yogurt intakes were broadly similar with mean daily intakes of 37g versus 32g in those aged ≥65 years and 18-64 years respectively in the total population. Mean daily intakes of cheese were greatest in those aged 18-64 years in comparison to adults aged ≥65years (19g versus 12g). A greater proportion of 18-64 year olds reported eating hard cheese (60.8% consumers) compared to ≥65 year olds (45.6%), however, both groups consumed on average of 19g/d of cheese.

Introduction

The National Adult Nutrition Survey (NANS) was a nationally representative food consumption survey conducted by the Irish Universities Nutrition Alliance (www.iuna.net). NANS collected detailed information on habitual food and beverage consumption between the years 2008 and 2010, in a free-living sample of 1500 Irish adults (740 male, 760 female) aged 18-90 years. It represents the most up-to-date information available on food and nutrient intakes in Ireland.

A previous report on this data, commissioned by the National Dairy Council (NDC report 2012) examined the dairy intakes of 18-64 year olds in NANS. The present report builds on the previous work by exploring the dairy intakes in the older population, aged 65 years and over (226 people, 106 male and 120 female), and it also aims to compare dairy intakes between the two age groups (18-64 year olds versus those aged ≥65years), where relevant.

Survey methodology

In NANS, food and beverage intake was determined using a 4-day semi-weighed food diary. Respondents were asked to record all foods and beverages consumed over a 4-day period (including detailed information regarding the amount, type, and brand where possible). To ensure that the level of detail and accuracy of recording was maintained at a consistently high level, a researcher made three visits to each participant during the 4-day period. Eating times, and location where meals were prepared were also recorded. A quantification protocol that had been established by IUNA for the North/South Ireland Food Consumption Survey (NSIFCS) was adapted for NANS [1, 2]. Food quantification methods included: weighing, a photographic food atlas, manufacturer's information and household measures. Food packaging was also collected. All food and beverage intakes were assessed using WISP© V3.0 (Weighed Intake Software Programme) (Tinuviel Software, Anglesey, UK). WISP© is based on McCance and Widdowson's "The Composition of Foods" and published supplements [3-13]. Updates were made to the database for recipes of composite dishes, supplements and custom Irish foods that were not previously in the software database. The food intake database for the entire NANS cohort comprises 133,068 rows of data that describe each food and drink item consumed by the 1500 respondents at every eating occasion throughout the four recording days, of which 21,412 rows relate to those aged 65 years and over. Each food consumed and recorded in the NANS database has a food code, summing to a total of 2552 food codes, including 233 supplements. More detailed information on the methods of NANS can be found at www.iuna.net.

In order to consider intakes against the Food Pyramid recommendations for the 'milk, yogurt and cheese' food group, calcium fortified non-dairy alternatives were included in this analysis. As a result, the word 'dairy' throughout this report encompasses milk, yogurt and cheese, and calcium fortified non-dairy alternatives to these products, which were consumed by a low percentage of the population (see Tables 2(a) and (2b) for food grouping approach). The contribution of mixed dishes containing these dairy foods was included in mean daily intakes (g/day). Similar to the analysis of the 18-64 year olds [14], dairy containing foods were identified and assigned a dairy content percentage per 100g as described below.

Milk

Milk intakes were calculated in two steps. The first step considered milk consumed as beverages, milk added to tea/coffee, milk on breakfast cereal and milk in a milk based drink. The second step included milk used in mixed composite dishes. In order to include milk from the composite dishes, all milk-containing dishes/recipes which had been eaten by respondents were identified, and the milk content of each dish was calculated. Only recipes where the milk content was greater than 5% were considered. Milk intakes from dishes containing 5% milk or more, and milk consumed as a beverage (described above) were then summed. From these values, mean daily milk intakes from all sources were calculated (g/day), both for the total population, and for consumers only. Examples of milk-containing dishes identified include milk puddings, milk based sauces, soups, other puddings, egg dishes and desserts and other miscellaneous sources. To fully investigate the type of milk consumed, all milks identified were further categorised into one of the following; whole milk, semi-skimmed milk, skimmed milk, fortified milk and non-dairy milk alternatives (calcium fortified). Mean daily milk intakes from all sources for each subtype were calculated (g/day). To calculate the percentage nutrient contribution from milk, milk intakes from all sources (i.e. milk as a beverage, milk added to tea/coffee, milk on breakfast cereal, but excluding recipes) were used. In this analysis all sources of nutrients from foods are included; supplements however are excluded. (Supplements were included only in the analysis that examined overall nutrient adequacy).

Cheese

Similarly, cheese intakes were calculated in a two-step approach. The first step identified cheese eaten outside of mixed dishes or retail products, e.g. cheese in sandwiches or cheese in salads. The second step aimed to further include cheese from mixed dishes. To do this, all cheese-containing dishes/recipes recorded by respondents were identified. A wide variety of dishes/recipes contained cheese, including pasta recipes, quiches, omelettes, meat dishes, poultry dishes, fish dishes, puddings, vegetable dishes and potato dishes. Retail products containing cheese were also identified based on the researchers' knowledge of the products recorded, ingredients labels and the Irish National Food Ingredient Database [15]. The cheese content of other retail products (e.g. pizza, lasagne) was estimated from recipes in McCance and Widdowson's 'The Composition of Foods'. Cheese intakes from mixed dishes and retail products containing 5% or more cheese were calculated and combined with cheese intakes from above to calculate mean daily cheese intakes (g/day) from all sources of cheese. All cheese consumed were categorised into the following types; hard cheese, soft cheese, cottage cheese or processed cheese. Mean daily cheese intake (g/day) are presented for the total population and for consumers only. The contribution of total cheese (i.e. cheese intakes from all sources, but excluding recipes) to nutrient intakes was calculated. In this analysis, all sources of nutrients from foods are included; supplements however are excluded.

Yogurt

Yogurt intakes from potted yogurts and yogurt drinks were calculated for the total population. All yogurt eaten was categorised into one of the following groups; yogurt, drinking yogurt and non-dairy yogurt alternatives (calcium fortified). Fromage frais was categorised as 'yogurt'. The brand names of products were recorded by the respondents, which allowed yogurts to be distinguished from potted desserts. The yogurt content of mixed dishes were identified and included e.g. a small number of dishes/recipes contained yogurt, e.g. curries and raita. Yogurt intakes from mixed dishes containing 5% yogurt or more were calculated and combined with the yogurt intakes calculated in step 1 to calculate total mean daily yogurt intakes (g/day) from all sources of yogurt. These results are presented for the total population and for consumers only. The contribution of total yogurt (i.e. yogurt intakes from all sources, excluding recipes) to nutrient intakes was calculated. In this analysis, all sources of nutrients from foods are included, however supplements are excluded.

Dairy Analysis

The contribution of milk, cheese and yogurt from all food sources to total nutrient intakes is presented for the total population. The number of dairy servings, milk servings, cheese servings and yogurt servings were also calculated using recommendations for various serving sizes from the 2012 Department of Health Food pyramid [16]: 1 serving equates to: 200 ml milk, fortified milk and yogurt drinks, 25g hard cheese, 50g soft cheese and 35g processed cheese, 75g cottage cheese, 125g whole yogurt, or equivalent calcium-fortified non-dairy alternatives.

Anthropometric, lifestyle and blood pressure analysis

Anthropometric measurements were collected from each participant in the survey, where possible. Weight, percentage body fat, height, waist and hip circumference were measured by trained fieldworkers according to standard operating procedures. Weight and percentage body fat was measured in duplicate using a

Tanita® SC-331S body composition analyser. Weight was measured to the nearest 0.1kg. Height was measured using the Leicester portable height measure, to the nearest 0.1cm. Waist and hip circumference was measured in duplicate using a non-stretch tape, to the nearest 0.1cm.

Body mass index (BMI) was used to indirectly assess adiposity and was calculated as weight (kg) divided by height squared (m^2). The World Health Organization (WHO) BMI cut off-points were used to estimate levels of underweight (<18.5kg/m^2), normal (18.5-24.9kg/m^2), overweight (25.0-29.9kg/m^2) and obese (≥30kg/m^2) [17,18].

A validated Physical Activity Questionnaire developed by the Medical Research Councils Epidemiology Unit, Cambridge for the European Prospective Investigation into Cancer and Nutrition (EPIC) was used [19]. The questionnaire examined the respondents amount and intensity of their daily physical activity (occupational activity, activities of daily living and leisure time activities) over the previous twelve months. Each activity was assigned a metabolic equivalent of task (MET) score that is the amount of energy expended during an activity multiplied by hours per week. MET scores were used to classify the total population (n=1500) into quartiles of physical activity, labelled as sedentary, low active, active and very active.

Blood pressure was measured while each subject was at rest, three consecutive times during five minute intervals using an Omron Series 5 blood pressure monitor, from which an average was calculated. The WHO blood pressure guidelines were used where cut offs were described as optimal if less than 120/80 mmHg, normal if between 120-129.99 mmHg and 80-84.99 mmHg, high normal if between 130-139.99mmHg and 85-89.99 mmHg and hypertension if 140/90 mmHg or above [20].

Blood sampling and analysis procedures

A blood sample was obtained from 1137 respondents (76% of the total sample aged 18-90 years). Where it was not possible to obtain a sufficient volume of blood for the full range of analytes, the assays were carried out in an order of priority, and thus not all assays were carried out on all samples. Following removal of outliers, blood biochemistry for the analytes in this report, data was available for n=95 of those aged 65 and over. The biochemistry methods used for the analytes described in this report are described below;

Red Cell Folate and serum folate

Red cell folate and serum folate were analysed by a microbiogical assay, using a chloramphenicol resistant strain of *Latcobacillus casei* [21]. Quality control procedures comprised of internal pooled samples, intra- and inter-assay coefficients of variation were ≤10.9% for serum folate and ≤13.8% for red cell folate.

Serum Vitamin B12

Serum vitamin B12 were analysed by a microbiogical assay, using a colistin sulphate resistant strain of *Lactobacillus leichmannii* [22]. Quality control procedures comprised of internal pooled samples, intra- and inter-assay coefficients of variation were ≤11.0%.

Erythrocyte glutathione reductase activation coefficient (EGRAC)

Riboflavin status was determined by using EGRAC a functional assay that measures the activity of the enzyme glutathione reductase before and after in vitro reactivation with its prosthetic group FAD; EGRAC is calculated as the ratio of FAD-stimulated to unstimulated enzyme activity, with values ≥1.3 generally indicative of suboptimal riboflavin status [23]. This assay required washed red blood cells, which were prepared from a fresh EDTA sample. After centrifugation once the plasma and buffy layers were removed, the remaining red blood cells were washed 3 times with phosphate-buffered saline. The saline and buffy layers were removed after each centrifugation, and the resultant washed red blood cells were stored. Quality control procedures comprised of internal low and high controls, intra- and inter-assay coefficients of variation for EGRAC were ≤2.2%.

Plasma Pyridoxal-5'-Phosphate

A reverse-phrase high performance liquid chromatograph (HPLC) method was used in the measurement of pyridoxal 5'-phosphate is based on the conversion of pyridoxal 5'-phosphate to 4-pyridoxic acid 5'-phosphate by cyanide in alkaline medium, followed by a high pressure liquid chromatographic separation, with fluorescence detection at acid pH [24]. Quality control procedures comprised of low and high controls, intra- and inter-assay coefficients of variation for plasma pyridoxal 5'-phosphate were ≤5.6%.

Serum 25-hydroxyvitamin D

The 25(OH)D concentrations were measured using an ELISA (OCTEIAw 25-Hydroxy Vitamin D, ImmunoDiagnostic Systems Limited). This ELISA assay is used for the quantitative determination of serum/plasma 25(OH)D. The quality and accuracy of serum 25(OH)D analysis in the laboratory were assured on an on-going basis by participation in the Vitamin D External Quality Assessment Scheme (DEQAS, Charing Cross Hospital, London, UK). A comparison of the performance of the present ELISA assay with that of liquid chromatography–MS in relation to DEQAS (n 20) samples in 2008 showed a high correlation (ELISA = 1·0258 x liquid chromatography–MS = 3·0351; r 0·96). Intra- and inter-assay coefficients of variation for the present analysis were ≤6.6%.

Serum calcium and parathyroid hormone (PTH)

Serum calcium values were assessed using a clinical bioanalyzer (RX Daytona; Randox Laboratories), using the O-Cresolphthalein complexone, without deproteinization method [25]. Serum intact parathyroid hormone (iPTH) was measured by ELISA, (intact PTH; MD Biosciences Inc, St Paul, MN). Intra- and inter assay coefficients of variation for both markers were ≤6.6%.

Meal Analysis

During NANS, participants were requested to record each eating occasion as a meal type. The meal type was self-defined by the respondent and was subsequently aggregated to breakfast, lunch, evening meal, snacks and beverages.

Intake of total dairy (i.e. dairy from all sources, including recipes; g/d) was firstly examined for consumers only of these foods at each meal type. Similar comparisons were made for total milk, total cheese and total yogurt. Secondly, the mean daily intake (g/d) of the 11 food groups studied in this report (see section 2) as consumed at each meal type by consumers only is shown, highlighting the role of dairy at meals in conjunction with the range of other foods consumed.

Thirdly, as dairy foods were most heavily consumed at breakfast, analysis was completed to explore the intakes of dairy foods at breakfast alongside ready to eat breakfast cereals (RTEBC). The number of consumers of each of the dairy food groups and RTEBC at breakfast and the percentage of these to total breakfast consumers is shown. To show the frequency of consumption of dairy and RTEBC at breakfast, the number of eating occasions that each dairy food and RTEBC was consumed, and the percentage of these to total breakfast eating occasions is also shown. The mean daily intake (g/d) of each dairy food group and of RTEBC is presented, along with the % contribution to energy at breakfast time. Values presented are for consumers only, i.e., only for people who ate that food group at breakfast during the reporting period.

Data Analysis

Data analysis was carried out using SPSS Statistics, Version 22.0 for Mac TM (SPSS Inc. Chicago, IL, USA). Descriptive statistics, including means and standard deviation were calculated for the daily intake of total dairy and for each dairy group, for the total population and for consumers only, and are presented by gender and by age group (65-69 years, 70-74 years, ≥75 years).

One way analysis of variance (ANOVA) including post hoc tests (Bonferroni) were used to test for statistically significant differences ($p<0.05$) in mean daily intakes of total energy and macronutrients (g/day), percentage energy from macro and micronutrients and fibre per 10MJ per day, across tertiles of total dairy, total milk, total cheese and total yogurt consumption.

Trend analysis was conducted across the tertiles of dairy, milk, cheese and yogurt intake, to identify statistically significant patterns in macro and micronutrient intakes using the linear polynomial contrast function.

RESULTS

Section 1: General characteristics of Irish adults aged ≥65years

1.1 Anthropometric data

Body mass index (BMI) data was available for 90% of Irish adults aged ≥65 years, and was calculated as body weight (kg) divided by height (m) squared (Table 1a). Mean BMI was 27.6kg m^{-2}; males: 27.9kg m^{-2}; females: 27.4kg m^{-2}. Mean (±SD) waist circumference (WC) was 95.9cm (±12.8) for the total population. For males, mean (±SD) WC was 102.5cm (±11.6), and for females WC was 90.5cm (±11.1). Mean percentage of body fat was 32.8% (±7.5%); males: 28.6% (±6.3); females: 36.7% (±6.2) (Table 1a).

Using standard weight categories as defined by the World Health Organisation [17,18], 1.1% of Irish adults aged ≥65 years were classified as 'underweight'; 21% were classified as 'normal weight', 53% as 'overweight' and 25% as 'Obese'. When assessed by gender, fewer males in comparison to females were classified as having a 'normal' BMI (15% versus 26%), and more males were deemed to be 'overweight' in comparison to females (59% versus 49%) (Table 1b).

1.2 Blood Pressure

Mean systolic blood pressure (BP) values were 140/81 mmHg for the total population, with males having slightly higher BP in comparison to females (males: 143/82 mmHg; females: 137/80 mmHg (Table 1c).

1.3 Supplement Use

Over 37% of those aged ≥65 years were supplement users; males: 31%; females: 43%.

1.4 Physical Activity

Physical activity levels in those ≥65 years were generally low, with 66% of the population classified as 'sedentary', 22% classified as 'low active', 9% classified as 'active' and 2% classified as 'very active'. Females were less active than males, with 76% of females described as 'sedentary' and 17% described as 'low active', compared with 56% and 22% of males respectively.

Table 1(a): Mean, standard deviation (SD) of anthropometric measures for Irish adults aged ≥ 65 years and by gender

	Total population			**Male**			**Female**		
	n	Mean	SD	*n*	Mean	SD	*n*	Mean	SD
Body Mass Index (BMI) (kg m^{-2})	207	27.6	4.1	95	27.9	4.1	112	27.4	4.1
Waist Circumference (cm)	172	95.9	12.8	78	102.5	11.6	94	90.5	11.1
Body Fat (%)	163	32.8	7.5	78	28.6	6.3	85	36.7	6.2

n - number; SD - standard deviation

Table 1(b): Descriptive overview of Irish adults aged ≥ 65 years according to WHO weight categories * and by gender

	Total population		Males		Females	
	n 188	%	*n* 85	%	*n* 103	%
Underweight	2	1.1	1	1.2	1	1.0
Normal	40	21.3	13	15.3	27	26.2
Overweight	100	53.1	50	58.8	50	48.5
Obese	46	24.5	21	24.7	25	24.3

n - number; SD - standard deviation

*Categories based on WHO cut-offs [17, 18]

Table 1(c): Mean, standard deviation (SD) blood pressure (BP) Irish adults aged ≥ 65 years and percentage (%) in each BP category* for the total population and according to gender

	Total population *n* 187		Males *n* 86		Females *n* 101	
	Mean	SD	Mean	SD	Mean	SD
Systolic BP mmHg	139.6	20.5	142.5	21.8	137.1	19
BP Category (mmHg)	*n*	%	*n*	%	*n*	%
Optimal (<120)	27	14.4	10	11.6	17	16.8
Normal (120-129.99)	29	15.5	10	11.6	19	18.8
High normal (130-139.99)	39	20.9	21	24.4	18	17.8
Hypertension (140+)	92	49.2	45	52.3	47	46.5
	Mean	SD	Mean	SD	Mean	SD
Diastolic BP mmHg	80.9	11.6	81.5	12.4	80.4	10.9
BP Category (mmHg)	*n*	%	*n*	%	*n*	%
Optimal (<80)	90	48.1	38	44.2	52	51.5
Normal (80-84.99)	30	16.0	15	17.4	15	14.9
High normal (85-89.99)	33	17.6	14	16.3	19	18.8
Hypertension (90+)	34	18.2	19	22.1	15	14.9

n - number; SD - standard deviation

*Categories based on WHO cut-offs [20]

Table 1 (d): Percentage (%) of Irish adults aged ≥65 years consuming at least one daily nutritional supplement and according to gender

Supplements consumed	*n*	Total population (%)	*n*	Males (%)	*n*	Females (%)
≥1	85	37.6	33	31	52	43
None	141	62.4	73	69	68	57

n - number

Table 1 (e): Descriptive overview of level of physical activity* achieved for Irish adults aged ≥65 years and according to gender

	n	Total population (%)	*n*	Males (%)	*n*	Females (%)
Sedentary	114	66.3	45	55.6	69	75.8
Low active	38	22.1	18	22.2	15	16.5
Active	16	9.3	13	16.0	4	4.4
Very active	4	2.3	5	6.2	3	3.3

n – number

*Physical activity levels based on quartiles of MET total scores

Section 2: Dairy Intakes

2.1 Dairy food groups

2.1.1 Dairy food group consumption

All foods and beverages consumed by participants in NANS were allocated to one of 68 food groups in the database. For the purpose of the present analysis, these food groups were reduced to 11 groups (Table 2a). To investigate dairy consumption in greater detail, the ‘dairy’ food group was broken down into 12 sub-groups of dairy foods (Table 2b).

Overall, mean daily total dairy consumption, which included all milk, cheese and yogurt reported during the 4-day reporting period, including that from composite dishes, was 293g/day for the total population (*n* 226) rising to 700g/day at the 97.5th percentile (Table 2c). Milk and milk products were the main source of dairy intake (243.6g), followed by total yogurt (37.4g) and total cheese (11.9g). When consumers only were considered (i.e. only those individuals who reported consuming dairy in the 4-day reporting period) (99%), mean daily total dairy intake rose to 295.6g/day (Table 2d). Mean daily total milk intakes for consumers only were 249.1g/day (97.8% consumers), total cheese intakes were 19.8g/day (60.2% consumers), and total yogurt intakes were 83g/day (45% consumers).

2.1.2 Dairy intakes by gender

Table 2(e) presents the mean daily dairy intakes across the genders for both the total population and consumer only data. In the total population, mean daily intakes of total dairy were 278.3g/day for males and 306g/day for females.

For both genders, whole milk was the main contributor to dairy intakes within the total population data: 117.5g/day for males and 106.9g/day for females, followed by semi-skimmed milk: 71.1g/day for males and 81.2g/day for females. Males had greater mean daily intakes of total cheese at a total population level, (15.4g versus 8.9g) while the reverse was true for yogurt, with females consuming more daily yogurt (47.4g versus 26.2g /day), in comparison to males.

Consumers only

89% of males and 82% of females consumed whole milk, with mean daily intakes of 132.5g/day and 130.9g/day, respectively, for consumers only, while 42 and 46% of males and females were consumers of semi-skimmed milk (171g per day in males and 177.2 g per day in females). 62 and 58% of males and females were consumers of cheese, 24.8 and 15.2g/day, respectively, for consumers only. 35 and 54% of males and females were consumers of yogurt. In the consumers of yogurt, mean daily intakes were 75g/day in males and 88g/day in females.

2.1.3 Dairy intakes by age

Dairy food intakes were also examined across three age groups (65-69, 70-74 and ≥75 years). Slightly differences in intakes of dairy foods were seen across age groups. Adults aged 65-69y in the total population consumed 307g of total dairy/day, those aged 70-74y consumed 278g/day and adults aged ≥75y consumed 291g/day, broadly reflecting changes in milk consumption. Intakes of total cheese and total yogurt were similar across age groups (65-69y; cheese, 13.5 g/day and yogurt, 37.4g/day; 70-74 y, cheese, 12.8g/day and yogurt, 37g/day; ≥75y, cheese 9.5g/day and yogurt 38g/day

Consumers only

98.8% of those aged 65-69y were consumers of dairy, and mean intakes were 311g total dairy/day in the consumers. Consumption rates were 100% in the 70-74 age group (mean intake 278g/day) and 98.7% in the ≥75 age group (mean intakes of 295g/day). Dairy consumption was mainly driven by milk intake across each age group (Table 2f).

2.2 Dairy servings in Irish Older Adults

2.2.1 Dairy servings by gender

The mean daily servings of dairy consumed for the total population aged ≥65 years and according to gender are shown in Table 2g. The mean daily servings of total dairy were similar for the total population, all males and all females, with an average of 1.9 daily servings for all. Both males and females consumed an average of 1.2 servings daily of total milk, with similar amounts of whole milk (males: 0.6 servings; females: 0.5 servings), semi-skimmed milk (0.4 servings for both males and females); skimmed milk (0.1 servings skimmed milk for both) and fortified milk (0.2 servings males; females 0.3 servings) being consumed.

2.2.2 Dairy servings by age

Table 2h compares mean daily servings of dairy across the age groups for those aged ≥65 years. The younger age category, i.e. those aged 65-69 years, consumed 2.03 mean daily dairy servings in comparison to 1.88 in those aged 70-74 years and 1.82 in those aged ≥75 years. Compared to the 65-69y group (1.28 servings), mean daily servings of total milk decreased slightly in the 70-74y group (1.14) and then increased again slightly in those aged ≥75 years, to 1.22 mean daily servings. The number of total yogurt servings was similar across the age groups (0.27, 0.28 and 0.28), while the number of cheese servings decreased with age (0.49 versus 0.46 versus 0.33 across the age groups respectively).

2.2.3 Percentage meeting dairy serving recommendations

For the total population (≥65years), 15% consumed between 2.5 and 3.49 servings of dairy daily, meeting recommendations. 75% consumed less than 2.49 servings of dairy daily, while 10% consumed ≥3.5 servings of dairy daily.

Overall, there was little difference between gender; 15% of both met dairy recommendations by consuming between 2.5 and 3.49 servings daily, while 75% of males and 74% of females consumed less than 2.49 servings daily, and 9% of males and 12% of females consumed greater than 3.5 servings of dairy daily (Table 2i).

Age appeared to influence the percentage of those meeting dairy recommendations with the number of servings decreasing from 18% to 13% from the youngest to oldest age group.

Table 2 (a): Description of the foods included in each of the 11 food groups*

Food group	Foods included
1. Rice, grains, breads & cereals	Rice, pasta, flours, grains and starches, white and wholemeal breads and rolls, scones, bagels and pittas, ready-to-eat breakfast cereals, other breakfast cereals
2. Biscuits, cakes & pastries	Biscuits, cakes, pastries and buns
3. Savoury snacks & confectionary	Savoury snacks (including crisps, pretzels, prawn crackers, bread sticks, nuts), chocolate and non-chocolate confectionary, sugars, syrups, preserves and sweeteners
4. Beverages	Carbonated beverages, diet carbonated beverages, fruit juice, bottled water, squash/still drinks with sugar, squash/still drinks without sugar, dilutables with sugar, dilutables without sugar, sports drinks, energy drinks, functional shots, teas, coffees, tap water, alcoholic beverages
5. Potato & potato products	Potatoes boiled, processed and homemade potato products, chipped, fried and roasted potatoes
6. Fruit & vegetables	Vegetable and pulse dishes, peas, beans and lentils, green vegetables, carrots, salad vegetables, other vegetables, tinned or jarred vegetables, bananas, other fruits, citrus fruits, tinned fruits
7. Meat fish & their dishes	Fish, fish products, bacon, ham, beef, veal, lamb, pork, chicken, turkey, game, offal, and their dishes, burgers (beef and pork), sausages, meat pies
8. Other foods	Soups, sauces and miscellaneous foods, savouries, eggs and egg dishes, butter, low fat spreads, other spreading fats, oils, hard cooking fats, nuts, seeds, herbs and spices
9. Dairy	Whole, semi-skimmed, skimmed and fortified milks, non-dairy milk alternatives, hard, soft, cottage and processed cheeses, yogurts, yogurt drinks and non-dairy yogurt alternatives
10. Dairy containing recipes	Dairy containing recipes e.g. lasagne
11. Other dairy	Creams, ice creams, puddings & chilled desserts

*Supplements excluded

Table 2 (b): Description of the dairy foods included in each of the 12 dairy groups

	Dairy Group	Example of foods included
Total Milk	Inclusive of the following:	
	1. Whole milk	Full fat milk (3.5% fat)
	2. Semi-skimmed milk	Low fat milk (1.5% fat)
	3. Skimmed milk	Fat free milk (0.5% fat)
	4. Fortified milk	All milk types fortified with vitamins and minerals*
	5. Non-dairy milk alternatives	Oat drinks, soya drinks, rice drinks
Total cheese	Inclusive of the following:	
	6. Hard cheese	Cheddar, cheshire, double gloucester, edam, emmental, gouda, gruyere, hard cheese, leicester, parmesan, stilton blue, stilton white, wensleydale
	7. Soft cheese	Brie, camembert, cream cheese, Danish blue, feta, full fat soft cheese, goat's milk soft cheese, mozzarella, ricotta
	8. Cottage cheese	Soft unripened cottage cheese
	9. Processed cheese	Cheese spread, flavoured cheese spreads, processed cheese products, smoked processed cheese, spreadable cheese
Total Yogurt	Inclusive of the following:	
	10. Yogurt	Full fat yogurt, low fat yogurt, fat free yogurt, flavoured yogurt, fruit yogurt
	11. Yogurt drinks	Fortified yogurt drinks
	12. Non-dairy yogurt alternatives	Soya yogurt alternative

*Vitamins and minerals added to milk as a fortification rather than for restoration purposes.

Table 2 (c): Mean and median daily intakes (g/day), standard deviation (SD) and intakes at the 97.5th percentile of dairy foods for Irish adults, aged ≥65 years in the total population

Total Population	Adults ≥65 years, *n*226			
	Mean	SD	Median	97.5
Total Dairy	293.0	188.2	258.4	699.9
Total milk	243.6	175.1	204.0	634.4
Whole milk	175.8	193.8	74.7	638.2
Semi-skimmed milk	118.7	189.0	0.0	607.4
Skimmed milk	12.0	45.4	0.0	116.5
Fortified milk	42.2	116.1	0.0	407.1
Non-dairy milk alternative	1.1	10.4	0.0	0.0
Total cheese	11.9	17.1	6.9	56.0
Hard Cheese	8.8	16.2	0.0	56.0
Soft cheese	1.1	3.8	0.0	14.4
Cottage cheese	0.2	3.3	0.0	0.0
Processed cheese	1.8	6.1	0.0	24.4
Total Yogurt	37.4	16.0	0.0	57.1
Yogurt	28.3	49.9	0.0	181.9
Drinking yogurt	9.0	25.9	0.0	100.0
Non-dairy yogurt alternatives	1.06	9.9	0.0	0.0

n - number; SD - standard deviation; 97.5 – 97.5th percentile

Table 2 (d): Mean and median daily intakes (g/day), standard deviation (SD) and intakes at the 97.5th percentile for Irish adults aged ≥65 years based on consumer only data

Dairy consumers only	Adults ≥65 years *n* 224					
	N	% Cons	Mean	SD	Median	97.5
Total Dairy	224	99.1	295.6	187.0	259.9	701.1
Total milk	221	97.8	249.1	173.1	206.7	637.3
Whole milk	192	85.0	179.8	194.2	81.3	640.4
Semi-skimmed milk	99	43.8	270.9	200.8	250.0	725.0
Skimmed milk	41	18.1	66.1	89.1	35.0	429.5
Fortified milk	35	15.5	272.3	157.2	251.5	-
Non-dairy milk alternative	3	1.3	82.5	46.8	97.5	-
Total cheese	136	60.2	19.8	18.1	14	72.3
Hard Cheese	103	45.6	19.3	19.4	12.8	78.9
Soft cheese	29	12.8	35.4	27.3	30.7	-
Cottage cheese	1	0.4	50.0	-	50.0	50.0
Processed cheese	31	13.6	13.1	8.75	-	-
Total Yogurt	102	45.1	83.0	58.6	70.5	247.8
Yogurt	85	37.6	75.1	55.6	62.5	222.6
Drinking yogurt	31	13.7	65.3	35.2	75.0	-
Non-dairy yogurt alternatives	3	1.3	80.1	39.7	66.0	-

% Cons - % consumers, *n* - number; SD - standard deviation; 97,5 - 97.5th percentile

Table 2 (e): Mean and median daily intakes (g/day), standard deviation (SD) and intakes at the 97.5th percentile for Irish adults (≥65years), analysed by gender

		Total Population				Consumers only					
		Mean	SD	Median	97.5	*n*	% cons	Mean	SD	Median	97.5
Males *n* 106	Total dairy	278.3	175.9	250.7	671.4	105	99.1	281.0	174.6	252.5	673.0
	Total milk	236.7	172.7	198.3	632.5	104	98.1	241.2	171.2	202.4	633.8
	Whole milk	117.5	127.7	64.1	487.9	94	88.7	132.5	128.1	84.6	489.3
	Semi-skimmed milk	71.1	124.5	0	472.2	44	41.5	171.4	142.3	136.6	518.2
	Skimmed milk	13.6	39.7	0	154.7	21	19.8	68.6	65.7	43.2	.
	Fortified milk	33.6	97.7	0	404.1	14	13.2	254.1	129.7	267.4	.
	Non-dairy milk alternatives	0.9	9.5	0	0.0	1	0.9	97.5	-	97.5	97.5
	Total cheese	15.4	21.4	9.1	78.5	66	62.3	24.8	22.5	19.5	101.4
	Hard cheese	11.2	21.2	0	78.5	48	45.3	24.8	25.7	17.2	128.8
	Soft cheese	1.5	4.7	0	21.8	15	14.2	10.9	7.7	10.0	.
	Cottage cheese	0.0	-	-	-	0	-	-	-	-	-
	Processed cheese	2.7	7.5	0	30.5	18	17	15.6	11.3	11.6	.
	Total Yogurt	26.2	46.3	0	174.2	37	34.9	75.0	50.0	65.8	.
	Yogurt	20.6	43.1	0	164.2	77	72.6	75.3	4.7	64.8	.
	Drinking yogurt	5.1	19.1	0	83.12	10	9.4	54.2	36.3	38.4	.
	Non-dairy yogurt alternative	0.9	9.5	0	0.0	1	0.94	97.5	.	97.5	97.5

(see overleaf)

Table 2 (e) continued:

		Total Population				Consumers only					
		Mean	SD	Median	97.5	*n*	% cons	Mean	SD	Median	97.5
Females *n* 120	Total dairy	306.0	198.3	267.8	750.3	119	99.2	308.6	197.1	269.1	751.8
	Total milk	249.8	177.6	205.8	678.5	117	97.5	256.2	175.2	211.1	682.5
	Whole milk	106.9	147.2	35.0	540.0	98	81.7	130.9	153.0	60.7	569.4
	Semi-skimmed milk	81.2	136.4	0.0	486.1	55	45.8	177.2	153.8	133.1	573.1
	Skimmed milk	10.6	50.0	0.0	109.0	20	16.7	63.4	110.2	22.2	.
	Fortified milk	49.8	130.1	0.0	576.1	21	17.5	284.4	175.1	225.0	.
	Non-dairy milk alternatives	1.3	11.3	0.0	0.0	2	1.7	75.0	63.6	75.0	.
	Total cheese	8.9	11.4	5.0	42.0	70	58.3	15.2	11.3	12.0	51.1
	Hard cheese	6.6	9.6	0.0	32.4	55	45.8	14.4	9.3	12.5	46.0
	Soft cheese	0.8	2.7	0.0	10.3	14	11.7	6.7	5.2	5.3	.
	Cottage cheese	0.4	4.6	0.0	0.0	1	0.8	50.0	.	50.0	50.0
	Processed cheese	1.0	4.4	0.0	10.0	13	10.8	9.6	10.2	6.3	.
	Total Yogurt	47.4	63.7	25.4	224.1	65	54.2	87.6	63.0	72.5	288.9
	Yogurt	35.0	54.4	0.0	189.9	56	46.7	75.0	57.9	62.5	258.4
	Drinking yogurt	10.8	26.4	0.0	100	21	17.5	61.8	28.7	68.0	.
	Non-dairy yogurt alternative	1.3	11.3	0.0	0.0	2	1.7	75.0	63.6	75.0	.

% cons= % consumers, *n* = number; SD = standard deviation, 97.5- 97.5th percentile

Table 2 (f): Mean and median daily intakes (g/day), standard deviation (SD) and intakes at the 97.5th percentile values (g/day) of dairy consumption across dairy foods in Irish adults aged ≥65years, analysed by age group for total population and consumer only data

		Total Population				Consumers only					
		Mean	SD	Median	97.5	*n*	% cons	Mean	SD	Median	97.5
Age 65-69 *n* 82	Total dairy	307.1	207.8	252.1	831.2	81	98.8	310.9	206.2	252.5	833.4
	Total milk	256.2	189.5	204.0	725.6	80	97.6	262.6	187.4	209.6	731.0
	Whole milk	307.1	207.8	252.1	831.2	74	90.2	136.8	156.0	73.2	612.1
	Semi-skimmed milk	75.9	126.0	0.0	454.4	37	45.1	168.2	140.5	131.3	.
	Skimmed milk	14.3	56.1	0.0	211.8	18	22.0	65.1	107.1	22.1	.
	Fortified milk	42.2	120.9	0.0	565.1	13	15.9	266.1	184.7	198.8	.
	Non-dairy milk alternatives	0.4	3.3	0.0	0.0	1	1.2	30.0	.	30.0	30.0
	Total cheese	13.5	20.1	8.9	57.9	52	63.4	21.4	21.7	14.0	115.2
	Hard cheese	10.5	19.5	1.1	57.5	41	50.0	21.0	23.3	14.0	138.3
	Soft cheese	1.2	3.1	0.0	11.5	14	17.1	7.0	3.9	7.6	.
	Cottage cheese	0.6	5.5	0.0	0.0	1	1.2	50.0	.	50.0	50.0
	Processed cheese	1.2	4.9	0.0	25.9	8	9.8	12.6	10.9	9.4	.
	Total Yogurt	37.4	58.7	0.0	207.0	36	43.9	85.2	61.6	75.0	.
	Yogurt	27.4	46.3	0.0	177.1	31	37.8	72.7	48.9	62.6	.
	Drinking yogurt	9.1	24.7	0	98.9	12	14.6	62.0	30.1	66.5	.
	Non-dairy yogurt alternative	0.4	3.3	0	0	1	1.2	30.0	.	30.0	30.0

(see overleaf)

Table 2 (f) continued:

		Total Population				Consumers only					
		Mean	SD	Median	97.5	*n*	% cons	Mean	SD	Median	97.5
Age 70-74 *n* 67	Total dairy	278.1	169.9	251.5	659.2	67	100.0	278.1	169.9	251.5	659.2
	Total milk	228.3	157.6	185.3	615.2	67	100.0	228.3	157.6	185.3	615.2
	Whole milk	92.6	119.2	49.4	464.0	53	79.1	117.0	122.9	74.6	499.9
	Semi-skimmed milk	92.9	149.6	0.0	550.4	33	49.3	188.7	165.9	146.3	.
	Skimmed milk	6.1	18.2	0.0	81.0	10	14.9	40.9	29.1	33.7	.
	Fortified milk	35.0	95.0	0.0	395.2	10	14.9	234.2	119.6	238.3	.
	Non-dairy milk alternatives	1.8	14.7	0.0	36.0	1	1.5	120.0	.	120.0	120.0
	Total cheese	12.8	15.7	10.0	70.7	43	64.2	19.9	15.5	15.0	80.1
	Hard cheese	9.4	15.0	0.0	70.7	32	47.8	19.8	16.5	15.7	.
	Soft cheese	1.3	4.7	0.0	21.9	8	11.9	11.0	9.1	7.9	.
	Cottage cheese	0.0	0.0	0.0	0.0	0	0.0	.	.	.	.
	Processed cheese	2.0	6.6	0.0	32.9	9	13.4	15.1	11.7	11.3	.
	Total Yogurt	37.0	50.8	0.0	173.7	32	47.8	77.4	47.5	70.3	.
	Yogurt	30.0	47.7	0	164.1	27	40.3	77.5	48.3	64.8	.
	Drinking yogurt	6.2	19.8	0	85.1	9	13.4	46.4	33.5	25	.
	Non-dairy yogurt alternative	1.8	14.7	0	36	1	1.5	120.0	.	120.0	120.0

(see overleaf)

Table 2 (f) continued:

		Total population				Consumers only					
		Mean	SD	Median	97.5	*n*	% cons	Mean	SD	Median	97.5
Age ≥75 *n 77*	Total dairy	291.1	182.7	260.5	723.9	76	98.7	294.9	180.8	263.5	728.2
	Total milk	243.6	174.7	211.1	688.1	74	96.1	253.5	171.0	218.3	700.4
	Whole milk	116.4	136.3	42.5	486.5	65	84.4	137.9	138.0	75.0	487.2
	Semi-skimmed milk	62.8	117.5	0.0	466.2	29	37.7	166.8	139.8	101.3	.
	Skimmed milk	14.6	49.2	0.0	264.3	13	16.9	86.7	92.7	54.6	.
	Fortified milk	48.4	128.1	0.0	443.3	12	15.6	310.8	156.4	311.1	.
	Non-dairy milk alternatives	1.3	11.1	0.0	4.9	1	1.3	97.5		97.5	97.5
	Total cheese	9.5	14.6	1.9	55.9	41	53.2	17.8	16.0	12.5	75.9
	Hard cheese	6.4	13.1	0.0	55.9	30	39.0	16.4	16.7	11.4	.
	Soft cheese	0.9	3.7	0.0	15.7	7	9.1	10.0	8.5	10.0	.
	Cottage cheese	0.0	0.0	0.0	0.0	0	0.0	.	.	.	.
	Processed cheese	2.2	6.7	0.0	24.2	14	18.2	12.2	11.5	7.3	.
	Total Yogurt	38.0	61.1	0.0	229.1	34	44.2	86.0	65.8	68.3	.
	Yogurt	27.5	55.6	0	227.9	27	35.1	78.6	69.9	62.5	.
	Drinking yogurt	8.8	25.0	0	100.0	10	13.0	67.8	28.7	71.5	.
	Non-dairy yogurt alternative	1.3	11.1	0.0	4.9	1	1.5	120.0	.	120.0	120.0

% cons= % consumers, *n* = number; SD = standard deviation, 97.5- 97.5th percentile

Table 2 (g): Mean daily servings of dairy for Irish adults aged ≥65years and analysed by gender

	Total population (n 226)		Males (n 106)		Females (n 120)	
	Mean	SD	Mean	SD	Mean	SD
Total Dairy	1.92	1.2	1.93	1.2	1.90	1.1
Total milk	1.22	0.88	1.18	0.9	1.25	0.9
Whole milk	0.56	0.69	0.59	0.6	0.53	0.7
Semi-skimmed milk	0.38	0.65	0.36	0.6	0.41	0.7
Skimmed milk	0.06	0.23	0.07	0.2	0.05	0.3
Fortified milk	0.21	0.58	0.17	0.5	0.25	0.7
Non-dairy milk alternatives	0.01	0.05	0.00	0.0	0.01	0.1
Total cheese	0.43	0.65	0.55	0.8	0.31	0.4
Hard cheese	0.35	0.65	0.45	0.8	0.26	0.4
Soft cheese	0.02	0.08	0.03	0.1	0.02	0.1
Cottage cheese	0.00	0.04	0.00	0.0	0.01	0.1
Processed cheese	0.05	0.17	0.07	0.2	0.03	0.1
Total Yogurt	0.27	0.43	0.20	0.4	0.34	0.5
Yogurt	0.23	0.40	0.16	0.3	0.28	0.4
Drinking yogurt	0.04	0.12	0.03	0.1	0.05	0.1
Non-dairy yogurt alternative	0.01	0.08	1.91	0.1	1.90	0.1

, n = number; SD = standard deviation

Table 2 (h): Mean daily servings of dairy in Irish adults aged ≥65years by age group

	65-69 y (*n* 82)		70-74 y (*n 67*)		≥75 y (*n* 77)	
	Mean	SD	Mean	SD	Mean	SD
Total dairy	2.03	1.29	1.88	1.10	1.82	1.1
Total milk	1.28	0.95	1.14	0.79	1.22	0.87
Whole milk	0.62	0.77	0.46	0.60	0.58	0.68
Semi-skimmed milk	0.38	0.63	0.46	0.75	0.31	0.59
Skimmed milk	0.03	0.09	0.03	0.09	0.07	0.25
Fortified milk	0.17	0.47	0.17	0.47	0.24	0.64
Non-dairy milk alternatives	0.00	0.02	0.01	0.07	0.01	0.06
Total cheese	0.49	0.78	0.46	0.60	0.33	0.55
Hard cheese	0.42	0.78	0.38	0.60	0.26	0.52
Soft cheese	0.02	0.06	0.03	0.09	0.02	0.07
Cottage cheese	0.01	0.07	0.00	0.00	0.00	0.00
Processed cheese	0.04	0.14	0.06	0.19	0.06	0.19
Total Yogurt	0.27	0.42	0.28	0.40	0.27	0.46
Yogurt	0.22	0.37	0.24	0.38	0.22	0.45
Drinking yogurt	0.05	0.12	0.03	0.10	0.04	0.12
Non-dairy yogurt alternative	0.00	0.02	0.01	0.07	0.01	0.06

n = number; SD = standard deviation,

Table 2(i): Number (n) and percentage (%) of Irish adult's aged≥65years achieving the recommended 3 servings of total dairy per day. Data presented for the total population, by gender and age groups

		Number of daily servings*					
		0 - 2.49		2.5- 3.49		≥3.5	
	Total n	*n*	%	*n*	%	*n*	%
Total population	226	169	74.8	34	15.0	23	10.2
Gender:							
Males	106	80	75.5	17	16.0	9	8.5
Females	120	89	74.2	17	14.2	14	11.7
Age group:							
65-69 years	82	57	69.5	15	18.2	10	12.2
70-74 years	67	51	76.1	9	13.4	7	10.4
≥75 years	77	61	79.2	10	13.0	6	7.8

*Based on recommendations from the Department of Health [16]
n - number, % - percent of total population

Section 3: Contribution of Dairy foods to Energy, Nutrient Intakes and Nutritional status

3.1.1 Contribution of food groups and dairy food groups to nutrient intakes in Irish adults aged ≥65 years

The percentage contribution of food groups, including milk, cheese and yogurt to energy and to various macronutrients and micronutrients are shown in Figures 1a – 1y.

3.1.1 Energy

Figure 1(a) presents the percentage energy intake from the 11 different food groups (Table 2a) for the total population aged 65 years and over. 'Meat, fish and their dishes made the greatest contribution to overall energy (kcal) intake at 19.7 %. The contribution of dairy to energy (kcal) was 9.7%, within this whole milk was the highest contributing dairy group at 2.9%.

3.1.2 Carbohydrate

Figure 1(b) presents the percentage of carbohydrate intake from the 11 food groups. Rice, grains, breads and cereals made the greatest contribution to carbohydrate intakes at 32.4%. The contribution of dairy foods to carbohydrate intake was 6.7 %, within this whole milk was the highest contributing dairy group with 1.8%.

3.1.3 Protein

Figure 1(c) presents the percentage of protein intake from the 11 food groups. Meat, fish and their dishes made the greatest contribution to protein intake at 45.4%. The contribution of dairy foods to protein intake was 13.2%, within this whole milk was the highest contributing dairy group with 3.5%.

3.1.4 Total fat

Figure 1(d) presents the percentage of total fat intake from the 11 food groups. Meat, fish and their dishes made the greatest contribution to total fat intakes at 27.9%. The contribution of dairy foods to total fat intake was 12.4%, within this whole milk was the highest contributing dairy group with 4.1%.

3.1.5 Saturated Fat

Figure 1(e) presents the percentage of saturated fat intake from the 11 food groups. Meat, fish and their dishes made the greatest contribution to saturated fat intake at 25.1%. The contribution of dairy foods to saturated fat intake was 18.6%, within this hard cheese was the highest contributing dairy group with 5.2%.

3.1.6 Monounsaturated Fat

Figure 1(f) presents the percentage of monounsaturated fat intake from the 11 food groups. Meat, fish and their dishes made the greatest contribution to monounsaturated fat intake at 33.1%. The contribution of dairy foods to monounsaturated fat intake was 10.3%, within this equally hard cheese and whole milk was the highest contributing dairy groups with both proving 3.1%.

3.1.7 Polyunsaturated fat

Figure 1(g) presents the percentage of polyunsaturated fat intake from the 11 food groups. Meat, fish and their dishes made the greatest contribution to polyunsaturated fat intake at 28.9%. The contribution of dairy foods to polyunsaturated fat intake was 2.5%, within this hard cheese was the highest contributing dairy group with 1.2%.

3.1.8 Trans fats

Figure 1(h) presents the percentage of trans fats intake from the 11 food groups. Dairy made the greatest contribution to trans fat intakes with 38.3%. Whole milk was the highest contributing dairy group with 11.8%, closely followed by cheese at 11%.

3.1.9 Starch

Figure 1(i) presents the percentage of starch intake from the 11 food groups. Rice, grains, breads and cereals made the greatest contribution to starch intake at 49.5%. The contribution of dairy foods to starch intake was 0.2%, within this yogurt was the only contributing dairy group by 0.2%.

3.1.10 Pantothenic acid

Figure 1(j) presents the percentage of pantothenic acid intake from the 11 food groups. Meat, fish and their dishes made the greatest contribution to pantothenic acid intake at 26.6%. The contribution of dairy foods to pantothenic acid intake was 20.6%, within this whole milk was the highest contributing dairy group with 8.2%.

3.1.11 Potassium

Figure 1(k) presents the percentage of potassium intake from the 11 food groups. Meat, fish and their dishes made the greatest contribution to potassium intake at 20.3%. The contribution of dairy foods to potassium intake was 12.0%, within this whole milk was the highest contributing dairy group with 4.5%.

3.1.12 Iron

Figure 1(l) presents the percentage of iron intake from the 11 food groups. Rice, grains, breads and cereals made the greatest contribution to iron intakes at 34.7%. The contribution of dairy foods to iron intake was 1.3%, within this hard cheese was the highest contributing dairy group with 0.4%.

3.1.13 Iodine

Figure 1(m) presents the percentage of iodine intake from the 11 food groups. Dairy made the greatest contribution to iodine intake at 43.5%. Whole milk was the highest contributing dairy group with 17.1%.

3.1.14 Folate

Figure 1(n) presents the percentage of folate intake from the 11 food groups. Rice, grains, breads and cereals made the greatest contribution to folate intake at 22.5%. The contribution of dairy foods to folate intake was 13.1%, within this fortified milk was the highest contributing dairy group with 5.5%.

3.1.15 Thiamin

Figure 1(o) presents the percentage of thiamin intake from the 11 food groups. Rice, grains, breads and cereals made the greatest contribution to thiamin intake at 27.3%. The contribution of dairy foods to thiamin intake was 6.2%, within this whole milk was the highest contributing dairy group with 1.7%.

3.1.16 Vitamin B12

Figure 1(p) presents the percentage of vitamin B12 intake from the 11 food groups. Meat, fish and their dishes made the greatest contribution to vitamin B12 intake at 41.6%. The contribution of dairy foods to vitamin B12 intake was 31.7%, within this whole milk was the highest contributing dairy group with 13.4%.

3.1.17 Zinc

Figure 1(q) presents the percentage of zinc intake from the 11 food groups. Meat, fish and their dishes made the greatest contribution to zinc intake at 37.6%. The contribution of dairy foods to zinc intake was 13.5%, within this whole milk was the highest contributing dairy group with 3.9%.

3.1.18 Calcium

Figure 1(r) presents the percentage of calcium intake from the 11 food groups. Dairy made the greatest contribution to calcium intakes with 39%. Whole milk was the highest contributing dairy group with 11%.

3.1.19 Magnesium

Figure 1(s) presents the percentage of magnesium intake from the 11 food groups Rice, grains, breads and cereals made the greatest contribution to magnesium intakes at 23.2%. The contribution of dairy foods to magnesium intake was 10.7%, within this whole milk was the highest contributing dairy group with 3.6%.

3.1.20 Riboflavin

Figure 1(t) presents the percentage of riboflavin intake from the 11 food groups. Dairy made the greatest contribution to riboflavin intakes at 30.1%. Within this, whole milk was the highest contributing dairy group with 10.6%.

3.1.21 Vitamin D

Figure 1(u) presents the percentage of Vitamin D intake from the 11 food groups. Meat, fish and their dishes made the greatest contribution to Vitamin D intakes at 42.9%. The contribution of dairy foods to Vitamin D intake was 9.7%, within this fortified milk was the highest contributing dairy group with 5.8%.

3.1.22 Vitamin E

Figure 1(v) presents the percentage of Vitamin E intake from the 11 food groups. 'Other foods' made the greatest contribution to Vitamin E intakes, at 29.7%. The contribution of dairy foods to Vitamin E intake was 7.6%, within this fortified milk was the highest contributing dairy group with 4.7%.

3.1.23 Phosphorus

Figure 1(w) presents the percentage of phosphorus intake from the 11 food groups. Meat, fish and their dishes made the greatest contribution to phosphorus intakes at 27.3%. The contribution of dairy foods to phosphorus intake was 20.1%, within this whole milk was the highest contributing dairy group with 5.9%.

3.1.24 Retinol

Figure 1(x) presents the percentage of retinol intake from the 11 food groups. Other foods made the greatest contribution to retinol intakes at 40.4%. The contribution of dairy foods to retinol intake was 31.7%, within this whole milk was the highest contributing dairy group with 7.5%.

3.1.25 Salt

Figure 1(y) presents the percentage of salt intake from the 11 food groups. Meat, fish and their dishes made the greatest contribution to salt intakes at 30%. The contribution of dairy foods to salt intake was 8.6%, within this hard cheese was the highest contributing dairy group with 2.7%.

Figure 1 (a): Percentage contribution of food groups to energy (kcal) intake in Irish adults (≥65years)

Food Groups:

			%
■	1	Rice, grains, breads & cereals	19.5
■	2	Biscuits, cakes & pastries	5.5
■	3	Savoury snacks & confectionary	4.1
■	4	Beverages	3.8
■	5	Potato & potato products	7.1
■	6	Fruit & vegetables	8.0
■	7	Meat, fish & their dishes	19.7
■	8	Other foods	10.4
■	9	Dairy	9.7
■	10	Dairy recipes	8.9
■	11	Other dairy	1.9

Dairy (9.7%) comprised:	**%**
Whole milk	2.9
Semi skimmed milk	1.6
Skimmed milk	0.1
Fortified milk	1.1
Non-dairy milk alternatives	0.0
Hard cheese	1.7
Soft cheese	0.1
Cottage cheese	0.0
Processed cheese	0.2
Yogurt	1.6
Yogurt drinks	0.3
Non-dairy yogurt alternative	0.0

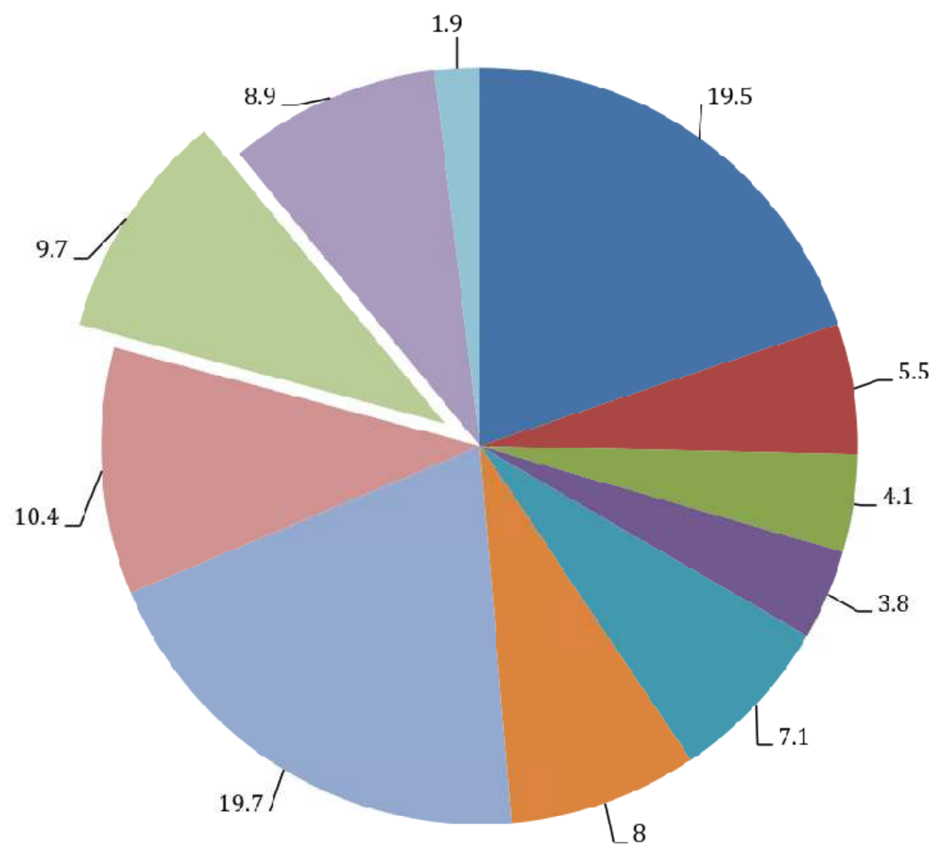


Figure 1(b): Percentage contribution of food groups to carbohydrate intake in Irish adults (≥65years)

Food Groups:

	Food group	%
1	Rice, grains, breads & cereals	32.4
2	Biscuits, cakes & pastries	7.0
3	Savoury snacks & confectionary	7.7
4	Beverages	1.9
5	Potato & potato products	11.8
6	Fruit & vegetables	13.2
7	Meat, fish & their dishes	4.1
8	Other foods	1.7
9	Dairy	6.7
10	Dairy recipes	10.6
11	Other dairy	1.8

Dairy (6.7%) comprised:	**%**
Whole milk	1.8
Semi skimmed milk	1.3
Skimmed milk	0.2
Fortified milk	0.9
Non-dairy milk alternatives	0.0
Hard cheese	0.0
Soft cheese	0.0
Cottage cheese	0.0
Processed cheese	0.0
Yogurt	1.9
Yogurt drinks	0.5
Non-dairy yogurt alternative	0.0

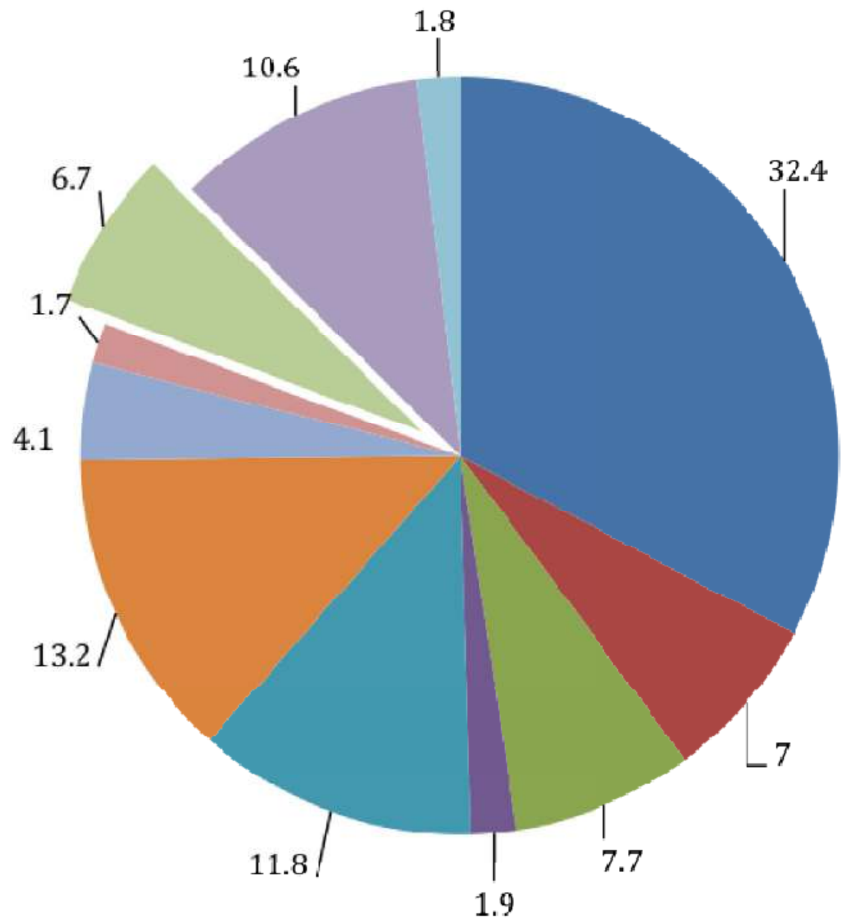


Figure 1(c): Percentage contribution of food groups to protein intake in Irish adults (≥65years)

Food Groups:

		%
1	Rice, grains, breads & cereals	15.2
2	Biscuits, cakes & pastries	1.9
3	Savoury snacks & confectionary	0.5
4	Beverages	1.5
5	Potato & potato products	11.8
6	Fruit & vegetables	4.4
7	Meat, fish & their dishes	45.4
8	Other foods	4.4
9	Dairy	13.2
10	Dairy recipes	7.3
11	Other dairy	0.7

Dairy (13.2%) comprised:	**%**
Whole milk	3.5
Semi skimmed milk	2.7
Skimmed milk	0.3
Fortified milk	1.6
Non-dairy milk alternatives	0.0
Hard cheese	2.6
Soft cheese	0.1
Cottage cheese	0.0
Processed cheese	0.3
Yogurt	1.7
Yogurt drinks	0.3
Non-dairy yogurt alternative	0.0

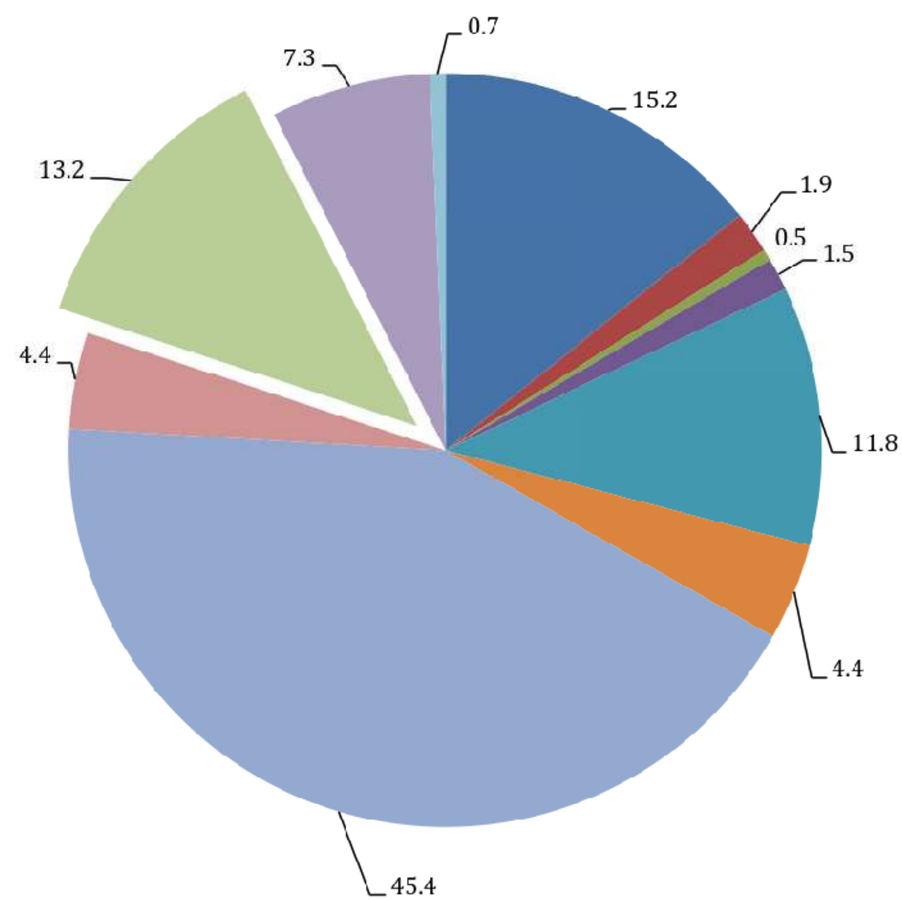
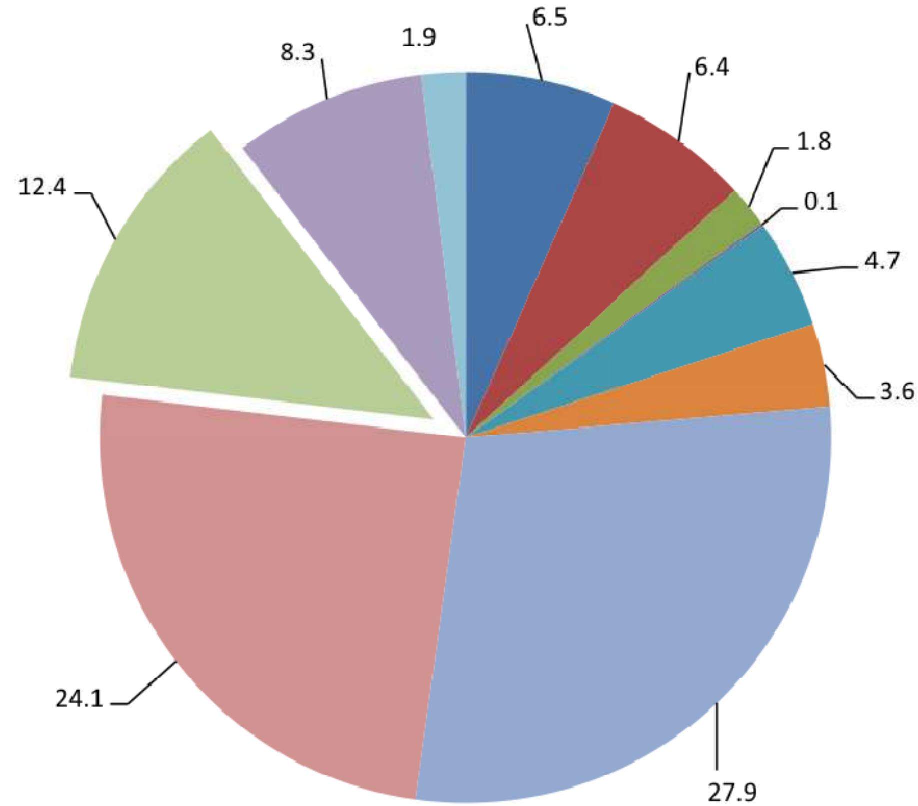


Figure 1 (d): Percentage contribution of food groups to total fat intake in Irish adults (≥65years)

Food Groups:

		%
1	Rice, grains, breads & cereals	6.5
2	Biscuits, cakes & pastries	6.4
3	Savoury snacks & confectionary	1.8
4	Beverages	0.1
5	Potato & potato products	4.7
6	Fruit & vegetables	3.6
7	Meat, fish & their dishes	27.9
8	Other foods	24.1
9	Dairy	12.4
10	Dairy recipes	8.3
11	Other dairy	1.9



Dairy (12.4%) comprised:	**%**
Whole milk	4.1
Semi skimmed milk	1.6
Skimmed milk	0.0
Fortified milk	0.9
Non-dairy milk alternatives	0.0
Hard cheese	3.7
Soft cheese	0.1
Cottage cheese	0.0
Processed cheese	0.5
Yogurt	1.2
Yogurt drinks	0.2
Non-dairy yogurt alternative	0.0

Figure 1 (e): Percentage contribution of food groups to saturated fat intakes in Irish adults (≥65years)

Food Groups:

			%
■	1	Rice, grains, breads & cereals	5.1
■	2	Biscuits, cakes & pastries	7.3
■	3	Savoury snacks & confectionary	2.2
■	4	Beverages	0.2
■	5	Potato & potato products	3.4
■	6	Fruit & vegetables	1.9
■	7	Meat, fish & their dishes	25.1
■	8	Other foods	21.8
■	9	Dairy	18.6
■	10	Dairy recipes	9.2
■	11	Other dairy	3.8

Dairy (18.6%) comprised:	**%**
Whole milk	2.5
Semi skimmed milk	3.9
Skimmed milk	0.5
Fortified milk	1.5
Non-dairy milk alternatives	0.0
Hard cheese	5.2
Soft cheese	0.2
Cottage cheese	0.0
Processed cheese	0.8
Yogurt	2.0
Yogurt drinks	1.8
Non-dairy yogurt alternative	0.1

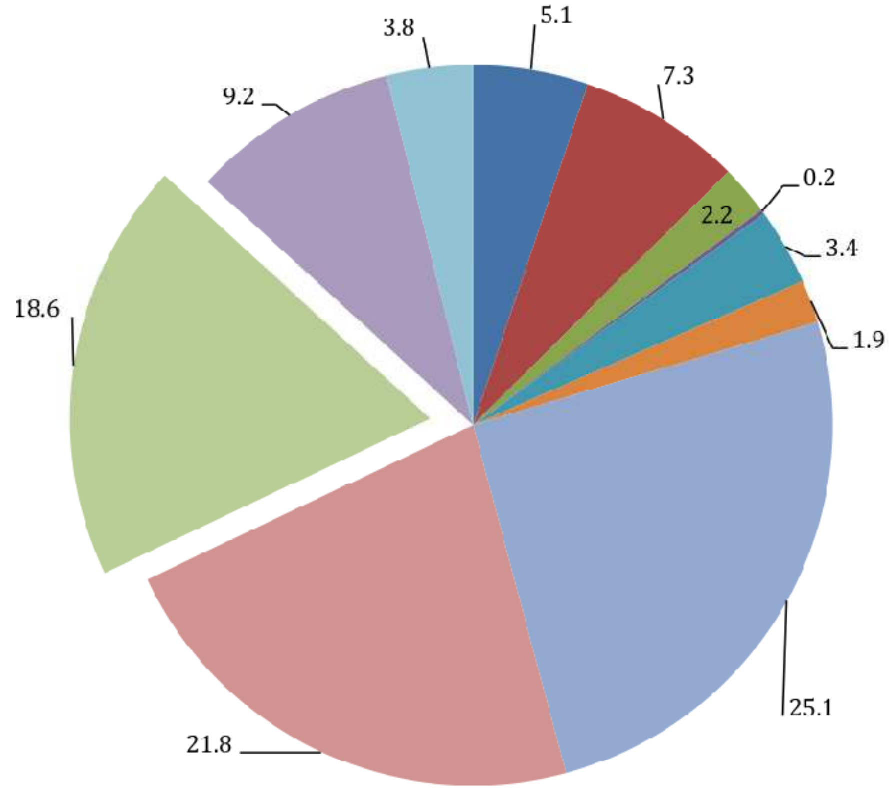
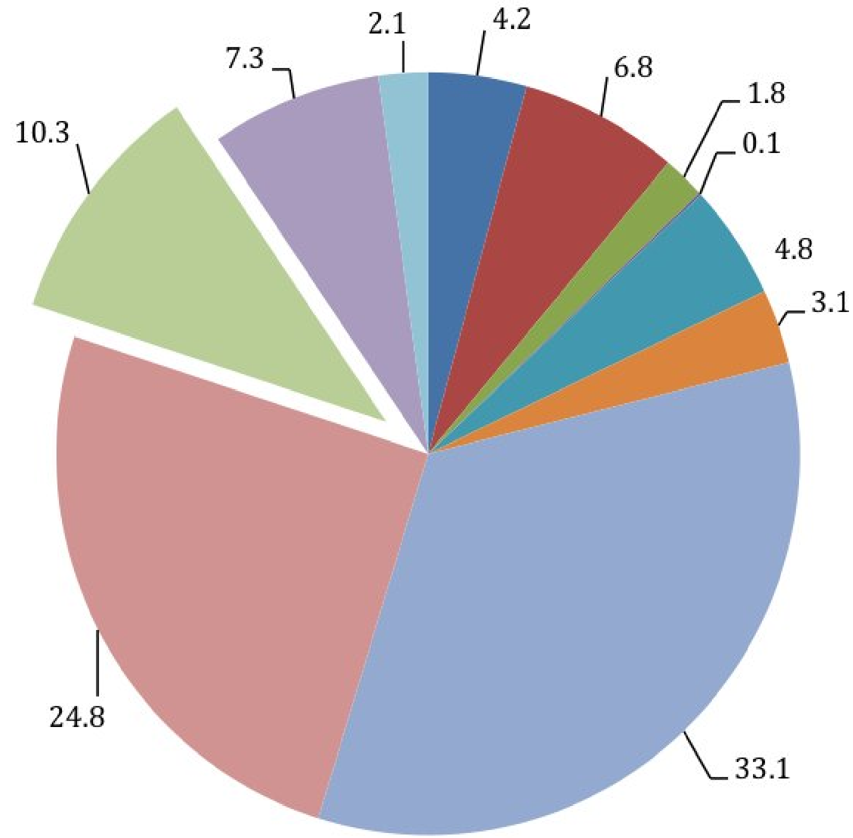


Figure 1 (f): Percentage contribution of food groups to monounsaturated fat intakes in Irish adults (≥65years)

Food Groups:

		%
1	Rice, grains, breads & cereals	4.2
2	Biscuits, cakes & pastries	6.8
3	Savoury snacks & confectionary	1.8
4	Beverages	0.1
5	Potato & potato products	4.8
6	Fruit & vegetables	3.1
7	Meat, fish & their dishes	33.1
8	Other foods	24.8
9	Dairy	10.3
10	Dairy recipes	7.3
11	Other dairy	2.1



Dairy (10.3%) comprised:	**%**
Whole milk	3.1
Semi skimmed milk	1.5
Skimmed milk	0.0
Fortified milk	0.9
Non-dairy milk alternatives	0.0
Hard cheese	3.1
Soft cheese	0.0
Cottage cheese	0.4
Processed cheese	1.1
Yogurt	0.0
Yogurt drinks	0.0
Non-dairy yogurt alternative	0.0

Figure 1 (g): Percentage contribution of food groups to polyunsaturated fat intakes in Irish adults (≥65years)

Food Groups:

		%
1	Rice, grains, breads & cereals	8.6
2	Biscuits, cakes & pastries	4.9
3	Savoury snacks & confectionary	1.4
4	Beverages	0.0
5	Potato & potato products	7.6
6	Fruit & vegetables	7.2
7	Meat, fish & their dishes	28.9
8	Other foods	28.0
9	Dairy	2.5
10	Dairy recipes	8.2
11	Other dairy	0.9

Dairy (2.5%) comprised :	**%**
Whole milk	0.8
Semi skimmed milk	0.0
Skimmed milk	0.0
Fortified milk	0.0
Non-dairy milk alternatives	0.0
Hard cheese	1.2
Soft cheese	0.0
Cottage cheese	0.1
Processed cheese	0.2
Yogurt	0.1
Yogurt drinks	0.1
Non-dairy yogurt alternative	0.0

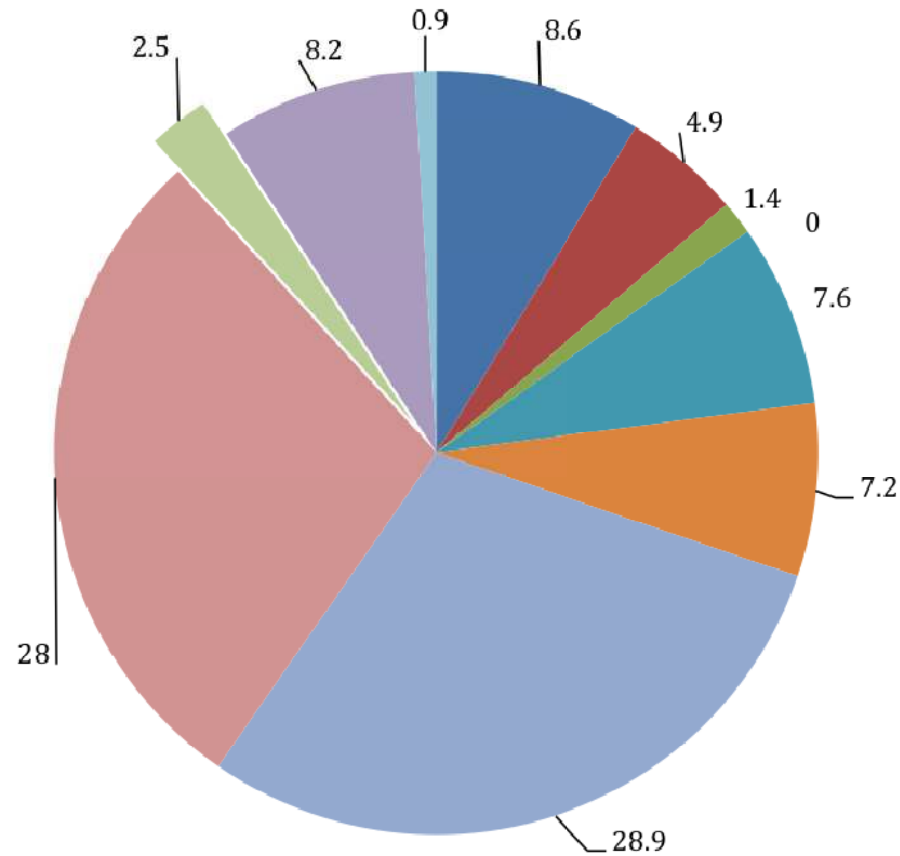


Figure 1 (h): Percentage contribution of food groups to trans fat intakes in Irish adults (≥65years)

Food Groups:

			%
■	1	Rice, grains, breads & cereals	1.2
■	2	Biscuits, cakes & pastries	5.5
■	3	Savoury snacks & confectionary	1.9
■	4	Beverages	0.0
■	5	Potato & potato products	2.2
■	6	Fruit & vegetables	0.5
■	7	Meat, fish & their dishes	29.7
■	8	Other foods	9.4
■	9	Dairy	38.3
■	10	Dairy recipes	4.6
■	11	Other dairy	5.2

Dairy (38.3%) comprised:	**%**
Whole milk	11.8
Semi skimmed milk	6.4
Skimmed milk	0.0
Fortified milk	0.4
Non-dairy milk alternatives	0.0
Hard cheese	11.0
Soft cheese	0.4
Cottage cheese	0.0
Processed cheese	3.3
Yogurt	3.8
Yogurt drinks	1.2
Non-dairy yogurt alternative	0.0

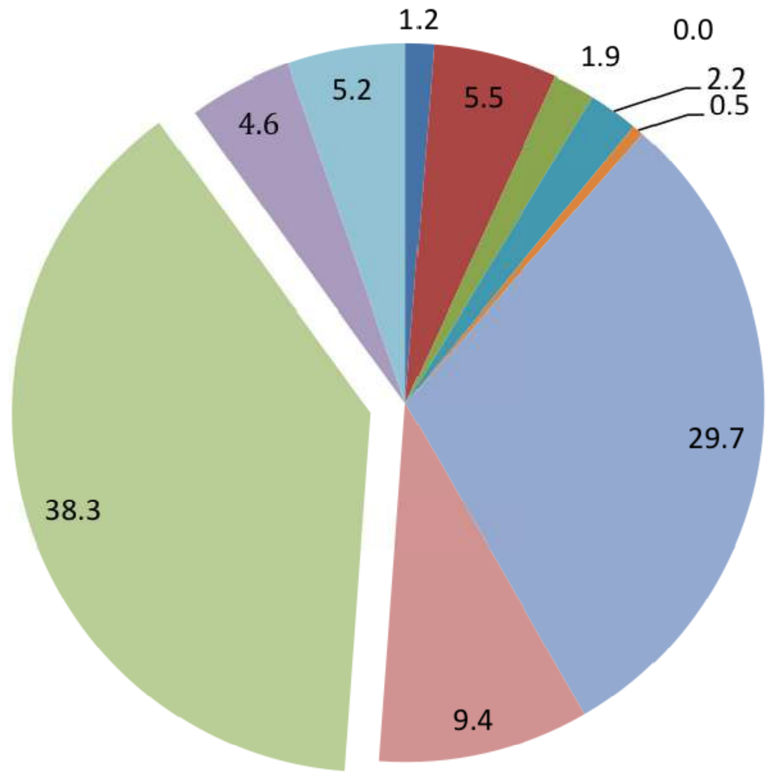


Figure (i): Percentage contribution of food groups to starch intakes in Irish adults (≥65years)

		Food Groups:	%
■	1	Rice, grains, breads & cereals	49.5
■	2	Biscuits, cakes & pastries	6.6
■	3	Savoury snacks & confectionary	0.9
■	4	Beverages	0
■	5	Potato & potato products	19.0
■	6	Fruit & vegetables	2.5
■	7	Meat, fish & their dishes	5.3
■	8	Other foods	1.6
■	9	Dairy	0.2
■	10	Dairy recipes	12.9
■	11	Other dairy	0.6

Dairy (0.2%) comprised of:	**%**
Whole milk	0.0
Semi skimmed milk	0.0
Skimmed milk	0.0
Fortified milk	0.0
Non-dairy milk alternatives	0.0
Hard cheese	0.0
Soft cheese	0.0
Cottage cheese	0.0
Processed cheese	0.0
Yogurt	0.2
Yogurt drinks	0.0
Non-dairy yogurt alternative	0.0

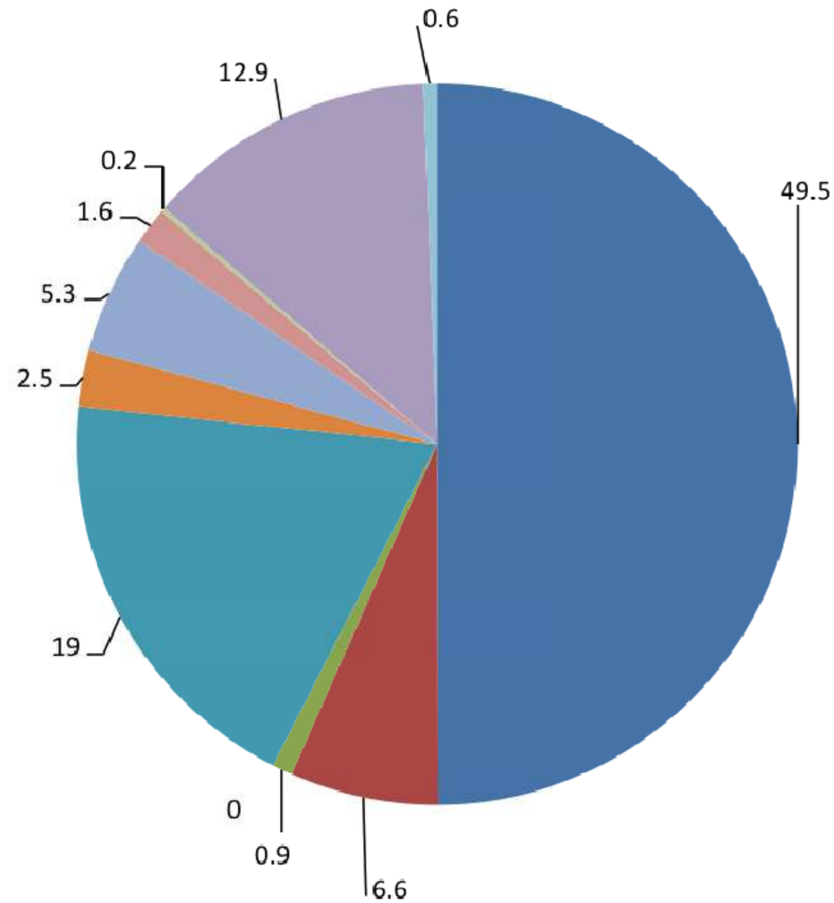
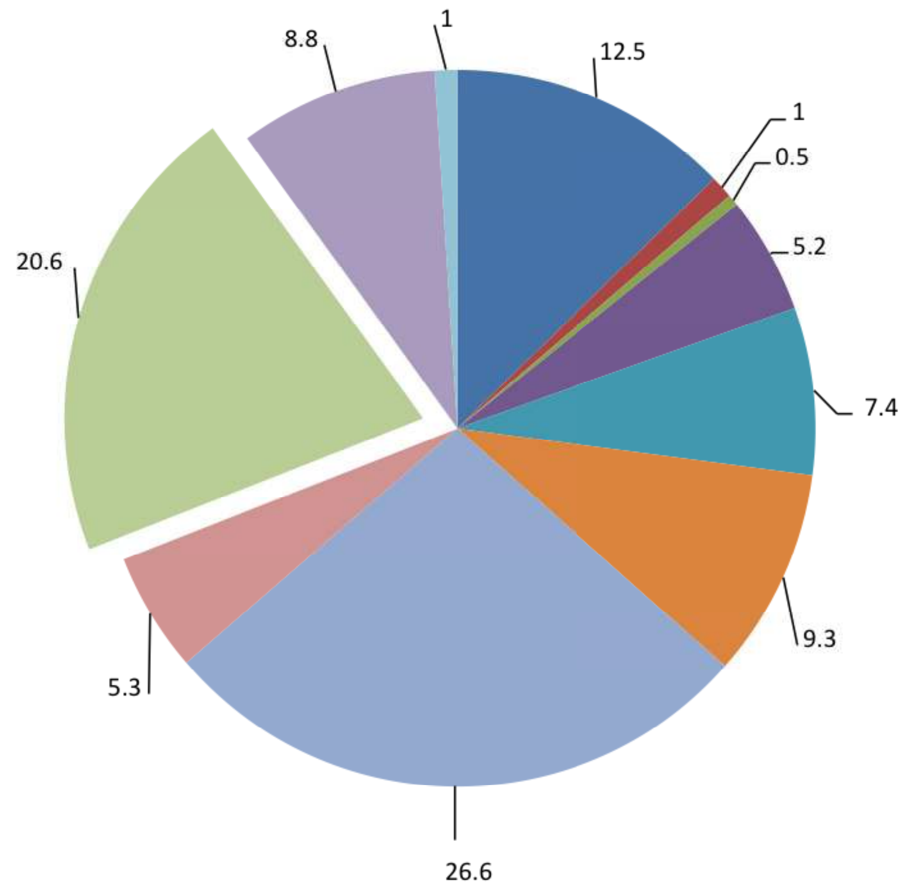


Figure 1(j): Percentage contribution of food groups to pantothenic acid intakes in Irish adults (≥65years)

Food Groups:

			%
■	1	Rice, grains, breads & cereals	12.5
■	2	Biscuits, cakes & pastries	1.0
■	3	Savoury snacks & confectionary	0.5
■	4	Beverages	5.2
■	5	Potato & potato products	7.4
■	6	Fruit & vegetables	9.3
■	7	Meat, fish & their dishes	26.6
■	8	Other foods	5.3
■	9	Dairy	20.6
■	10	Dairy recipes	8.8
■	11	Other dairy	1.0

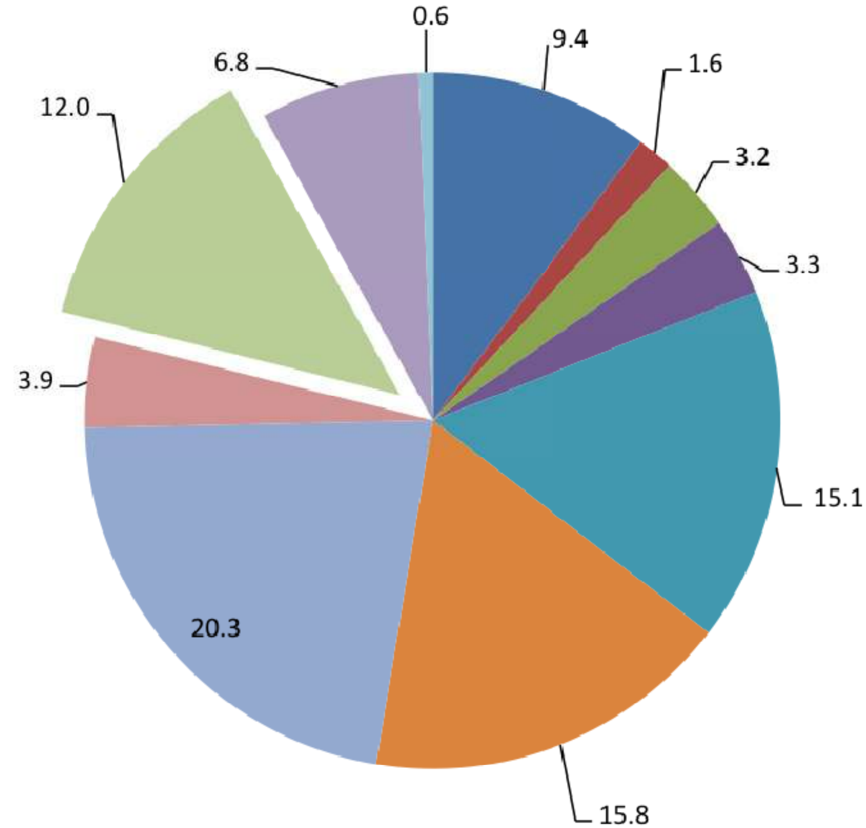


Dairy (20.6%) comprised:	**%**
Whole milk	8.2
Semi skimmed milk	6.3
Skimmed milk	0.5
Fortified milk	2.4
Non-dairy milk alternatives	0.0
Hard cheese	0.5
Soft cheese	0.0
Cottage cheese	0.0
Processed cheese	0.2
Yogurt	2.1
Yogurt drinks	0.4
Non-dairy yogurt alternative	0.0

Figure 1(k): Percentage contribution of food groups to potassium intakes in Irish adults (≥65years)

Food Groups:

		Food group	%
■	1	Rice, grains, breads & cereals	9.4
■	2	Biscuits, cakes & pastries	1.6
■	3	Savoury snacks & confectionary	3.2
■	4	Beverages	3.3
■	5	Potato & potato products	15.1
■	6	Fruit & vegetables	15.8
■	7	Meat, fish & their dishes	20.3
■	8	Other foods	3.9
■	9	Dairy	12.0
■	10	Dairy recipes	6.8
■	11	Other dairy	0.6



Dairy (12%) comprised :	**%**
Whole milk	4.5
Semi skimmed milk	3.0
Skimmed milk	0.3
Fortified milk	1.9
Non-dairy milk alternatives	0.0
Hard cheese	0.2
Soft cheese	0.0
Cottage cheese	0.0
Processed cheese	0.1
Yogurt	2.0
Yogurt drinks	0.3
Non-dairy yogurt alternative	0.0

Figure 1(l): Percentage contribution of food groups to iron intakes in Irish adults (≥65years)

Food Groups:

			%
■	1	Rice, grains, breads & cereals	34.7
■	2	Biscuits, cakes & pastries	4.3
■	3	Savoury snacks & confectionary	1.3
■	4	Beverages	4.3
■	5	Potato & potato products	5.8
■	6	Fruit & vegetables	11.3
■	7	Meat, fish & their dishes	19.7
■	8	Other foods	6.1
■	9	Dairy	1.3
■	10	Dairy recipes	8.2
■	11	Other dairy	0.5

Dairy (1.3%) comprised:	**%**
Whole milk	0.2
Semi skimmed milk	0.1
Skimmed milk	0.0
Fortified milk	0.1
Non-dairy milk alternatives	0.0
Hard cheese	0.4
Soft cheese	0.0
Cottage cheese	0.0
Processed cheese	0.0
Yogurt	0.3
Yogurt drinks	0.1
Non-dairy yogurt alternative	0.0

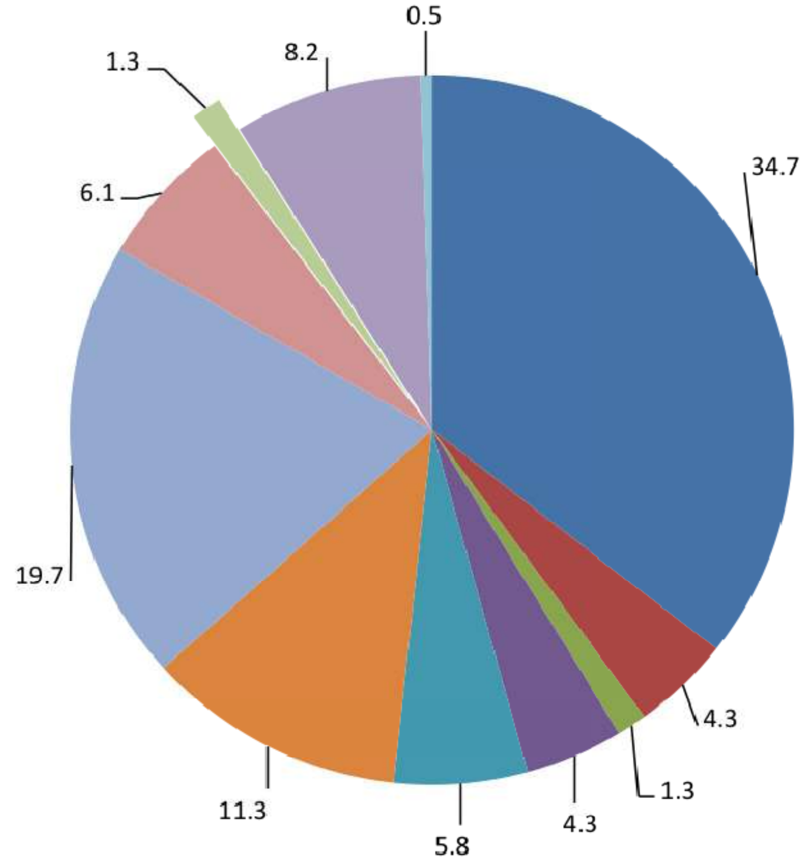


Figure 1 (m): Percentage contribution of food groups to iodine intakes in Irish adults (≥65years)

Food Groups:

		%
1	Rice, grains, breads & cereals	5.5
2	Biscuits, cakes & pastries	1.8
3	Savoury snacks & confectionary	1.0
4	Beverages	0.2
5	Potato & potato products	3.6
6	Fruit & vegetables	4.8
7	Meat, fish & their dishes	17.2
8	Other foods	9.2
9	Dairy	43.5
10	Dairy recipes	10.1
11	Other dairy	1.8

Dairy (43.5%) comprised:	**%**
Whole milk	17.1
Semi skimmed milk	11.6
Skimmed milk	1.3
Fortified milk	6.1
Non-dairy milk alternatives	0.0
Hard cheese	1.2
Soft cheese	0.1
Cottage cheese	0.0
Processed cheese	0.4
Yogurt	5.6
Yogurt drinks	0.0
Non-dairy yogurt alternative	0.0

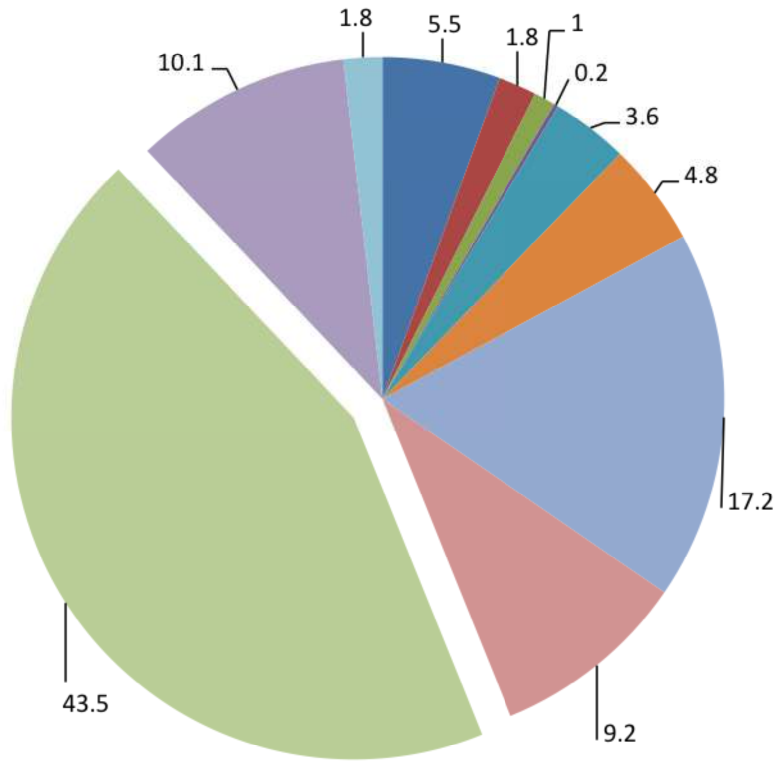
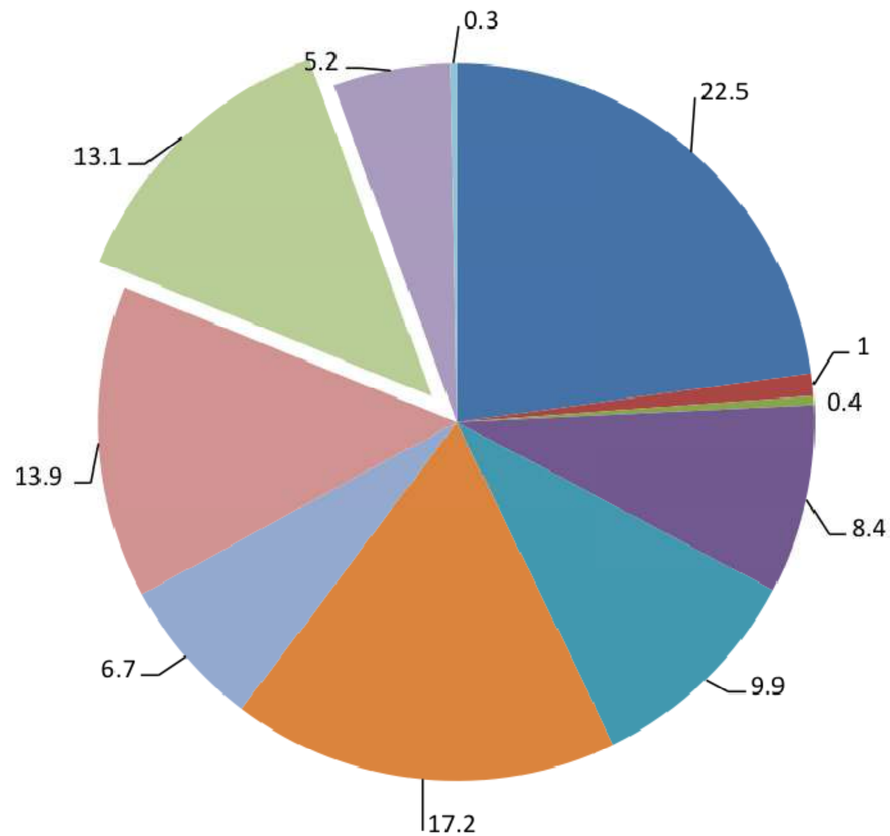


Figure 1 (n): Percentage contribution of food groups to folate intakes in Irish adults (≥65years)

Food Groups:

		Food Groups	%
■	1	Rice, grains, breads & cereals	22.5
■	2	Biscuits, cakes & pastries	1.0
■	3	Savoury snacks & confectionary	0.4
■	4	Beverages	8.4
■	5	Potato & potato products	9.9
■	6	Fruit & vegetables	17.2
■	7	Meat, fish & their dishes	6.7
■	8	Other foods	13.9
■	9	Dairy	13.1
■	10	Dairy recipes	5.2
■	11	Other dairy	0.3



Dairy (13.1%) comprised:	**%**
Whole milk	2.5
Semi skimmed milk	1.8
Skimmed milk	0.2
Fortified milk	5.5
Non-dairy milk alternatives	0.0
Hard cheese	0.7
Soft cheese	0.1
Cottage cheese	0.0
Processed cheese	0.1
Yogurt	1.4
Yogurt drinks	0.7
Non-dairy yogurt alternative	0.1

Figure 1 (o): Percentage contribution of food groups to thiamin intakes in Irish adults (≥65years)

Food Groups:

		Food group	%
■	1	Rice, grains, breads & cereals	27.3
■	2	Biscuits, cakes & pastries	1.9
■	3	Savoury snacks & confectionary	0.5
■	4	Beverages	0.1
■	5	Potato & potato products	13.3
■	6	Fruit & vegetables	12.2
■	7	Meat, fish & their dishes	23.6
■	8	Other foods	4.5
■	9	Dairy	6.2
■	10	Dairy recipes	7.9
■	11	Other dairy	0.6

Dairy (6.2%) comprised:	**%**
Whole milk	1.7
Semi skimmed milk	1.1
Skimmed milk	0.1
Fortified milk	0.9
Non-dairy milk alternatives	0.0
Hard cheese	0.2
Soft cheese	0.0
Cottage cheese	0.0
Processed cheese	0.1
Yogurt	1.8
Yogurt drinks	0.3
Non-dairy yogurt alternative	0.1

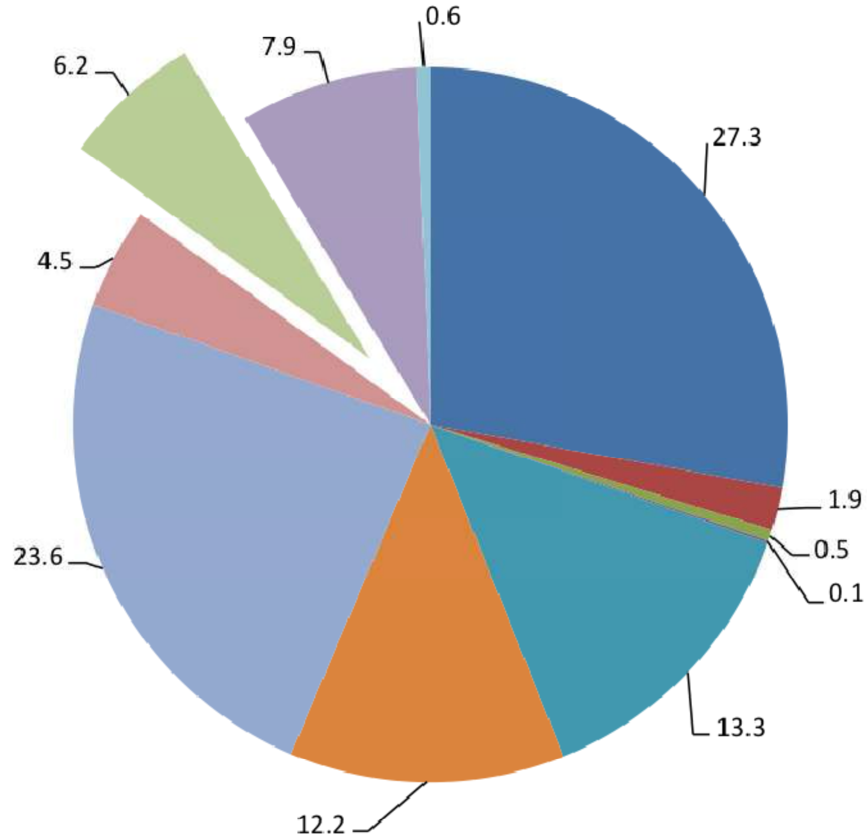


Figure 1 (p): Percentage contribution of food groups to vitamin B12 intakes in Irish adults (≥65years)

Food Groups:

		Food group	%
	1	Rice, grains, breads & cereals	1.6
	2	Biscuits, cakes & pastries	0.6
	3	Savoury snacks & confectionary	0.2
	4	Beverages	0.1
	5	Potato & potato products	0.1
	6	Fruit & vegetables	0.4
	7	Meat, fish & their dishes	41.6
	8	Other foods	10.5
	9	Dairy	31.7
	10	Dairy recipes	8.5
	11	Other dairy	0.7

Dairy (31.7%) comprised:	**%**
Whole milk	13.4
Semi skimmed milk	9.5
Skimmed milk	0.8
Fortified milk	3.4
Non-dairy milk alternatives	0.0
Hard cheese	2.1
Soft cheese	0.1
Cottage cheese	0.0
Processed cheese	0.3
Yogurt	1.7
Yogurt drinks	0.3
Non-dairy yogurt alternative	0.0

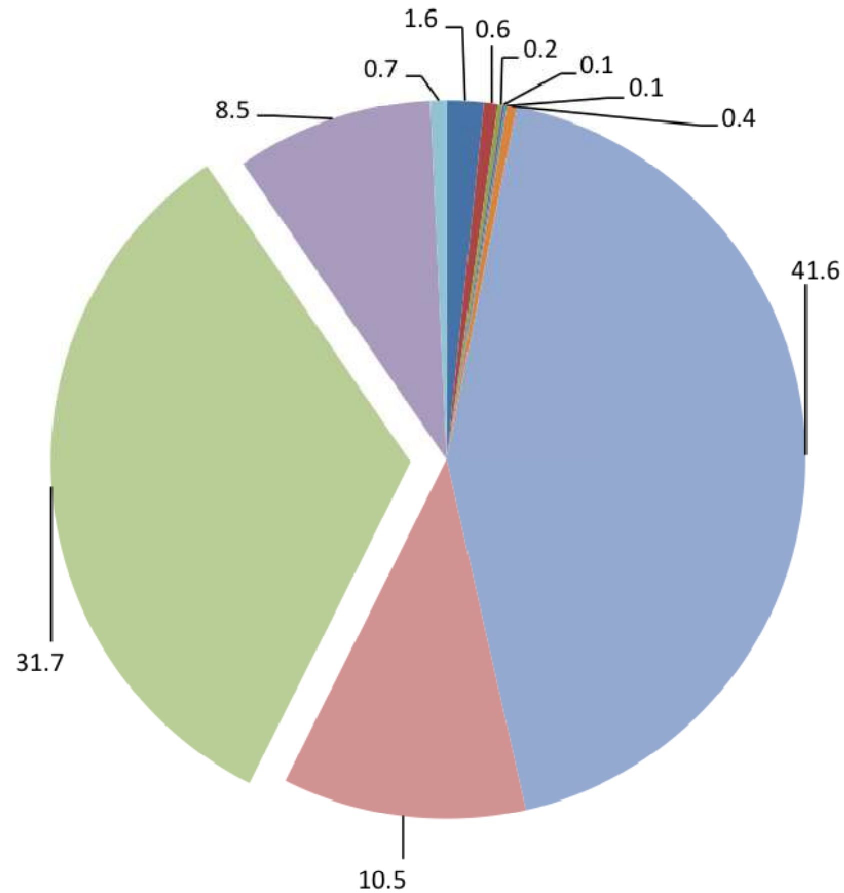


Figure 1 (q): Percentage contribution of food groups to zinc intakes in Irish adults (≥65years)

Food Groups:

			%
■	1	Rice, grains, breads & cereals	18.2
■	2	Biscuits, cakes & pastries	1.9
■	3	Savoury snacks & confectionary	1.1
■	4	Beverages	0.5
■	5	Potato & potato products	4.7
■	6	Fruit & vegetables	5.7
■	7	Meat, fish & their dishes	37.6
■	8	Other foods	4.6
■	9	Dairy	13.5
■	10	Dairy recipes	9.7
■	11	Other dairy	0.5

Dairy (13.5%) comprised:	**%**
Whole milk	3.9
Semi skimmed milk	2.7
Skimmed milk	0.3
Fortified milk	1.7
Non-dairy milk alternatives	0
Hard cheese	2.1
Soft cheese	0.1
Cottage cheese	0
Processed cheese	0.5
Yogurt	1.7
Yogurt drinks	0.5
Non-dairy yogurt alternative	0

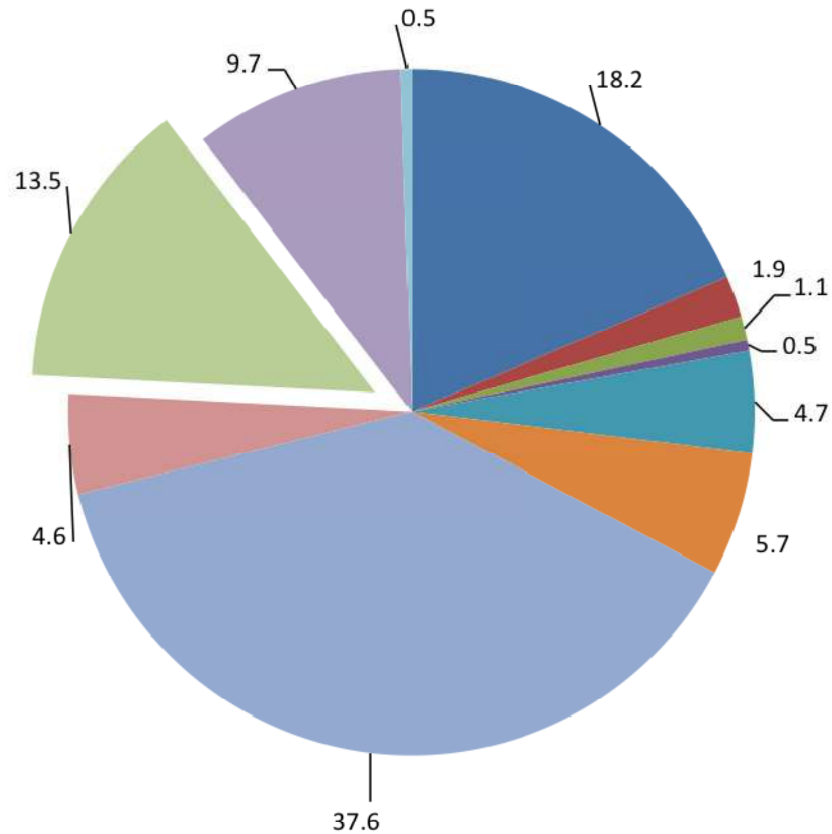


Figure 1 (r): Percentage contribution of food groups to calcium intakes in Irish adults (≥65years)

Food Groups:

		Food group	%
■	1	Rice, grains, breads & cereals	22.1
■	2	Biscuits, cakes & pastries	2.5
■	3	Savoury snacks & confectionary	1.1
■	4	Beverages	1.5
■	5	Potato & potato products	1.2
■	6	Fruit & vegetables	6.9
■	7	Meat, fish & their dishes	6.7
■	8	Other foods	2.9
■	9	Dairy	39.0
■	10	Dairy recipes	13.6
■	11	Other dairy	1.5

Dairy (39%) comprised:	**%**
Whole milk	11.0
Semi skimmed milk	8.3
Skimmed milk	0.8
Fortified milk	5.5
Non-dairy milk alternatives	0.1
Hard cheese	6.4
Soft cheese	0.1
Cottage cheese	0.0
Processed cheese	1.1
Yogurt	4.5
Yogurt drinks	0.9
Non-dairy yogurt alternative	0.1

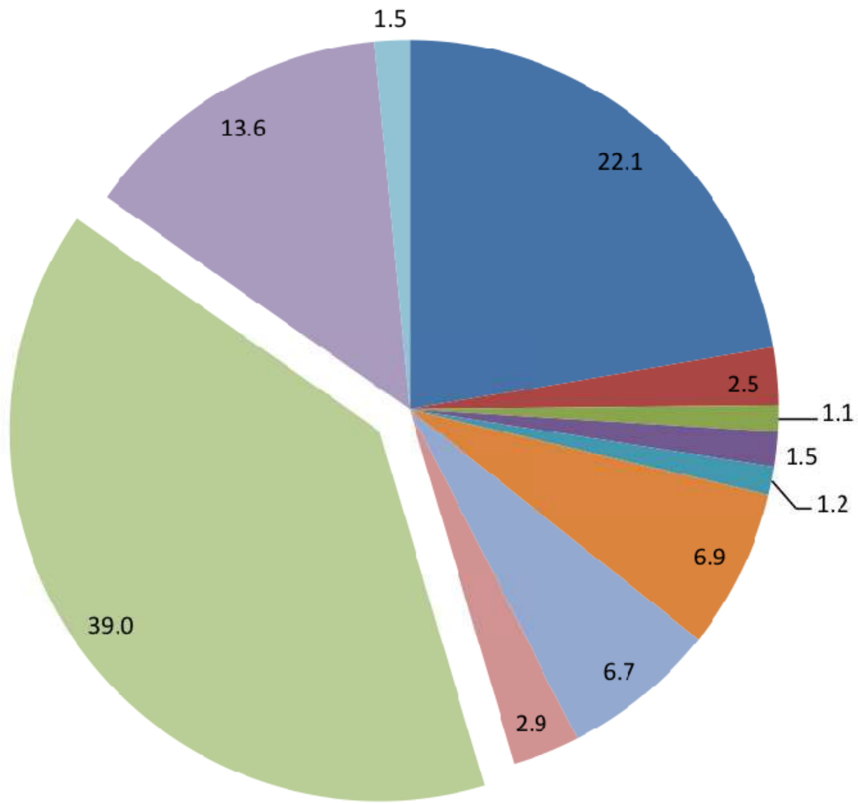
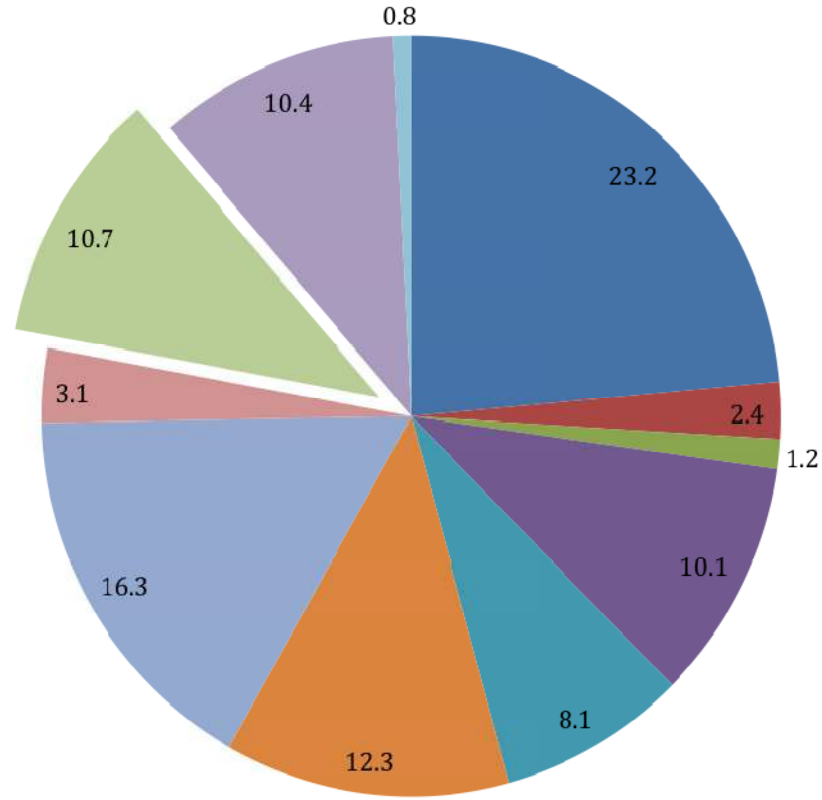


Figure 1 (s): Percentage contribution of food groups to magnesium intakes in Irish adults (≥65years)

Food Groups:

		%
1	Rice, grains, breads & cereals	23.2
2	Biscuits, cakes & pastries	2.4
3	Savoury snacks & confectionary	1.2
4	Beverages	10.1
5	Potato & potato products	8.1
6	Fruit & vegetables	12.3
7	Meat, fish & their dishes	16.3
8	Other foods	3.1
9	Dairy	10.7
10	Dairy recipes	10.4
11	Other dairy	0.8

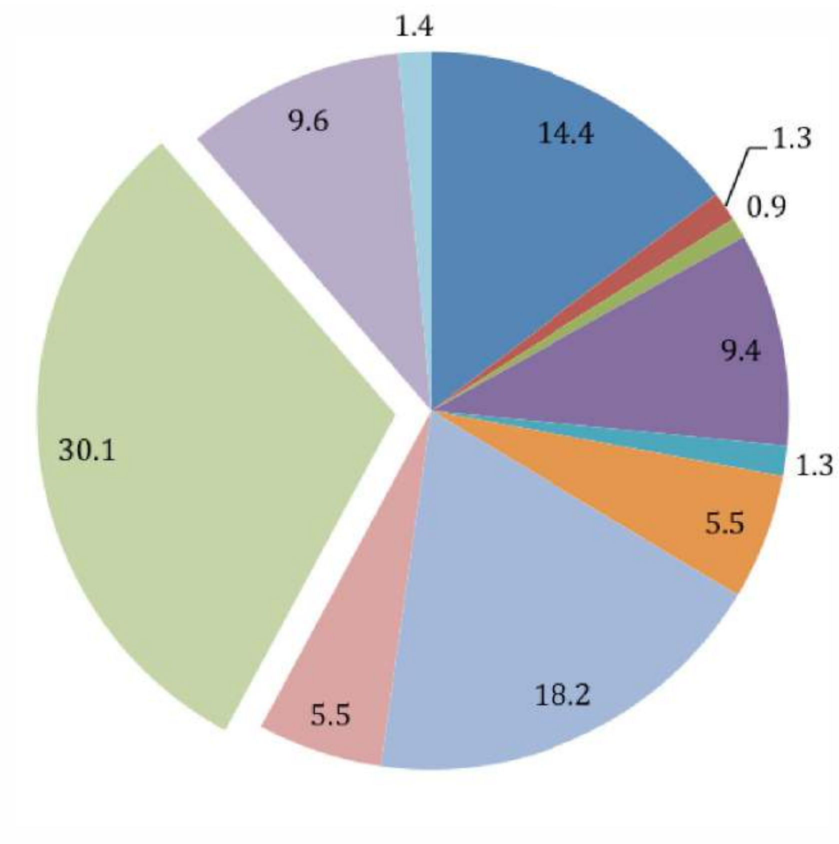


Dairy (10.7%) comprised:	**%**
Whole milk	3.6
Semi skimmed milk	2.4
Skimmed milk	0.2
Fortified milk	1.5
Non-dairy milk alternatives	0.0
Hard cheese	0.8
Soft cheese	0.0
Cottage cheese	0.0
Processed cheese	0.2
Yogurt	1.6
Yogurt drinks	0.3
Non-dairy yogurt alternative	0.0

Figure 1 (t): Percentage contribution of food groups to Riboflavin intakes in Irish adults (≥65years)

Food Groups:

		%
1	Rice, grains, breads & cereals	14.4
2	Biscuits, cakes & pastries	1.3
3	Savoury snacks & confectionary	0.9
4	Beverages	9.4
5	Potato & potato products	1.3
6	Fruit & vegetables	5.5
7	Meat, fish & their dishes	18.2
8	Other foods	5.5
9	Dairy	30.1
10	Dairy recipes	9.6
11	Other dairy	1.4



Dairy (30.1%) comprised:	**%**
Whole milk	10.6
Semi skimmed milk	7.4
Skimmed milk	0.6
Fortified milk	4.4
Non-dairy milk alternatives	0.0
Hard cheese	2.4
Soft cheese	0.1
Cottage cheese	0.0
Processed cheese	0.3
Yogurt	3.4
Yogurt drinks	0.8
Non-dairy yogurt alternative	0.1

Figure 1 (u): Percentage contribution of food groups to Vitamin D intakes in Irish adults (≥65years)

Food Groups:

		%
1	Rice, grains, breads & cereals	4.3
2	Biscuits, cakes & pastries	3.6
3	Savoury snacks & confectionary	0.0
4	Beverages	0.0
5	Potato & potato products	1.9
6	Fruit & vegetables	0.3
7	Meat, fish & their dishes	42.9
8	Other foods	25.9
9	Dairy	9.7
10	Dairy recipes	7.9
11	Other dairy	1.7

Dairy (9.7%) comprised:	**%**
Whole milk	1.1
Semi skimmed milk	0.0
Skimmed milk	0.5
Fortified milk	5.8
Non-dairy milk alternatives	0.1
Hard cheese	0.8
Soft cheese	0.1
Cottage cheese	0.0
Processed cheese	0.2
Yogurt	1.0
Yogurt drinks	0.2
Non-dairy yogurt alternative	0.0

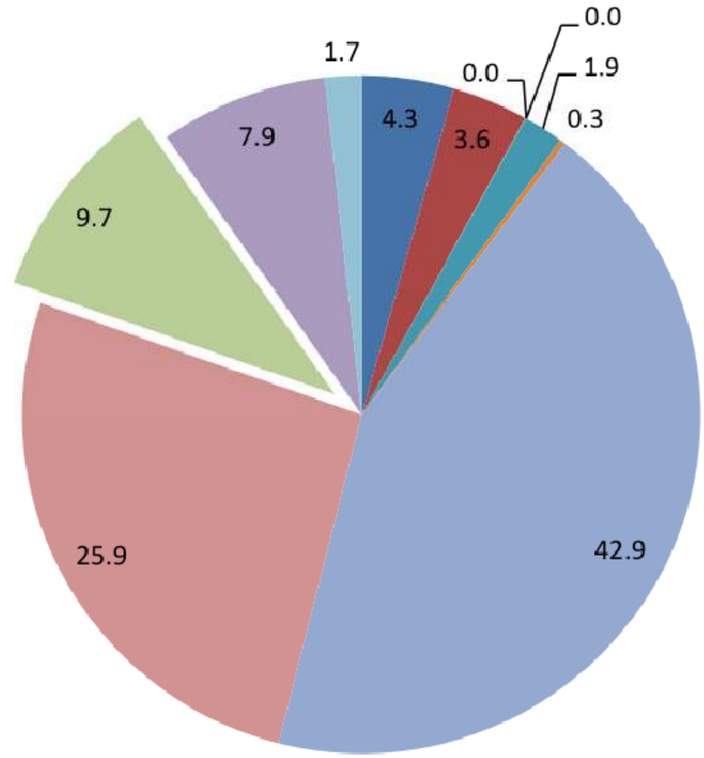


Figure 1 (v) Percentage contribution of food groups to Vitamin E intakes in Irish adults (≥65years)

Food Groups:

		%
1	Rice, grains, breads & cereals	9.4
2	Biscuits, cakes & pastries	6.8
3	Savoury snacks & confectionary	1.1
4	Beverages	0.1
5	Potato & potato products	5.6
6	Fruit & vegetables	16.0
7	Meat, fish & their dishes	12.0
8	Other foods	29.7
9	Dairy	7.6
10	Dairy recipes	8.3
11	Other dairy	1.7

Dairy (7.6%) comprised:	**%**
Whole milk	0.9
Semi skimmed milk	0.3
Skimmed milk	0.0
Fortified milk	4.7
Non-dairy milk alternatives	0.2
Hard cheese	0.5
Soft cheese	0.0
Cottage cheese	0.0
Processed cheese	0.1
Yogurt	0.4
Yogurt drinks	0.2
Non-dairy yogurt alternative	0.1

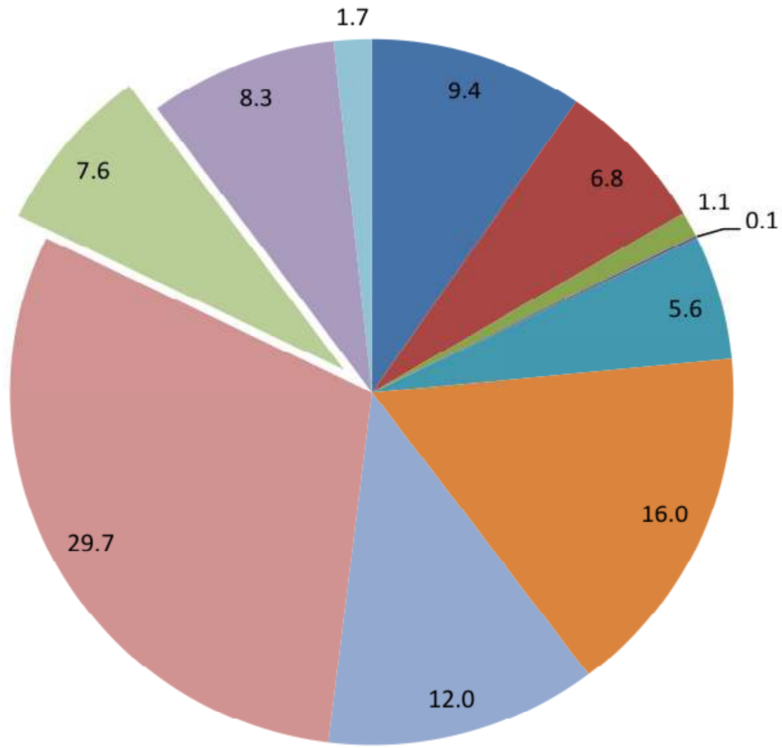
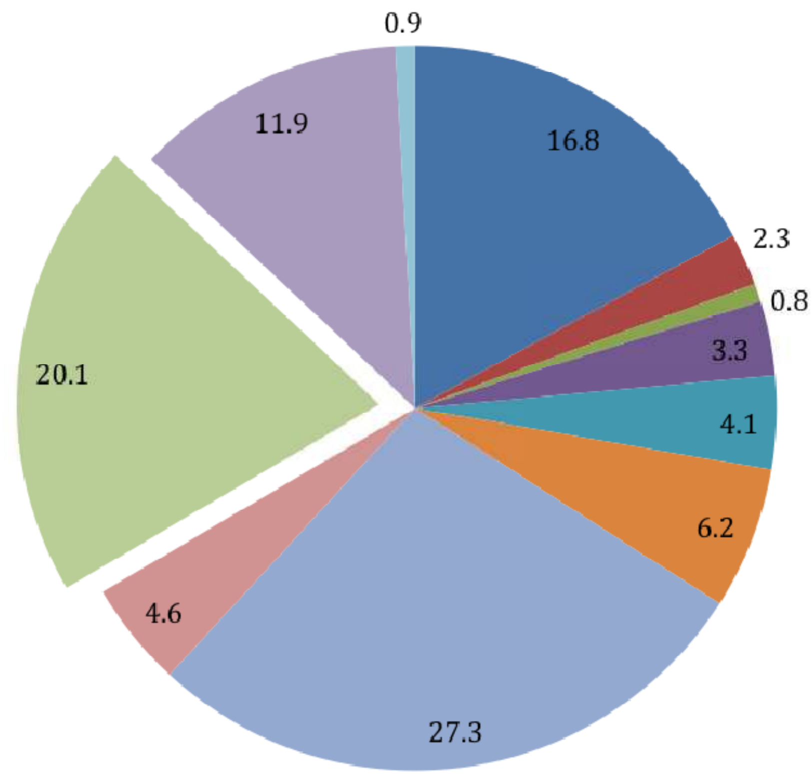


Figure 1 (w) Percentage contribution of food groups to phosphorus intakes in Irish adults (≥65years)

Food Groups:

		%
1	Rice, grains, breads & cereals	16.8
2	Biscuits, cakes & pastries	2.3
3	Savoury snacks & confectionary	0.8
4	Beverages	3.3
5	Potato & potato products	4.1
6	Fruit & vegetables	6.2
7	Meat, fish & their dishes	27.3
8	Other foods	4.6
9	Dairy	20.1
10	Dairy recipes	11.9
11	Other dairy	0.9



Dairy (20.1%) comprised:

Whole milk	5.9
Semi skimmed milk	4.1
Skimmed milk	0.4
Fortified milk	2.5
Non-dairy milk alternatives	0.0
Hard cheese	3.0
Soft cheese	0.1
Cottage cheese	0.0
Processed cheese	0.9
Yogurt	2.6
Yogurt drinks	0.5
Non-dairy yogurt alternative	0.1

Figure 1 (x): Percentage contribution of food groups to retinol intake in Irish adults (≥65years)

Food Groups:

	Food group	%
1	Rice, grains, breads & cereals	1.3
2	Biscuits, cakes & pastries	1.5
3	Savoury snacks & confectionary	0.3
4	Beverages	0.1
5	Potato & potato products	1.6
6	Fruit & vegetables	1.2
7	Meat, fish & their dishes	5.7
8	Other foods	40.4
9	Dairy	31.7
10	Dairy recipes	10.6
11	Other dairy	3.3

Dairy (31.7%) comprised:	**%**
Whole milk	7.5
Semi skimmed milk	4.6
Skimmed milk	0.7
Fortified milk	7.6
Non-dairy milk alternatives	0.0
Hard cheese	6.2
Soft cheese	0.3
Cottage cheese	0.0
Processed cheese	1.5
Yogurt	2.8
Yogurt drinks	0.4
Non-dairy yogurt alternative	0.2

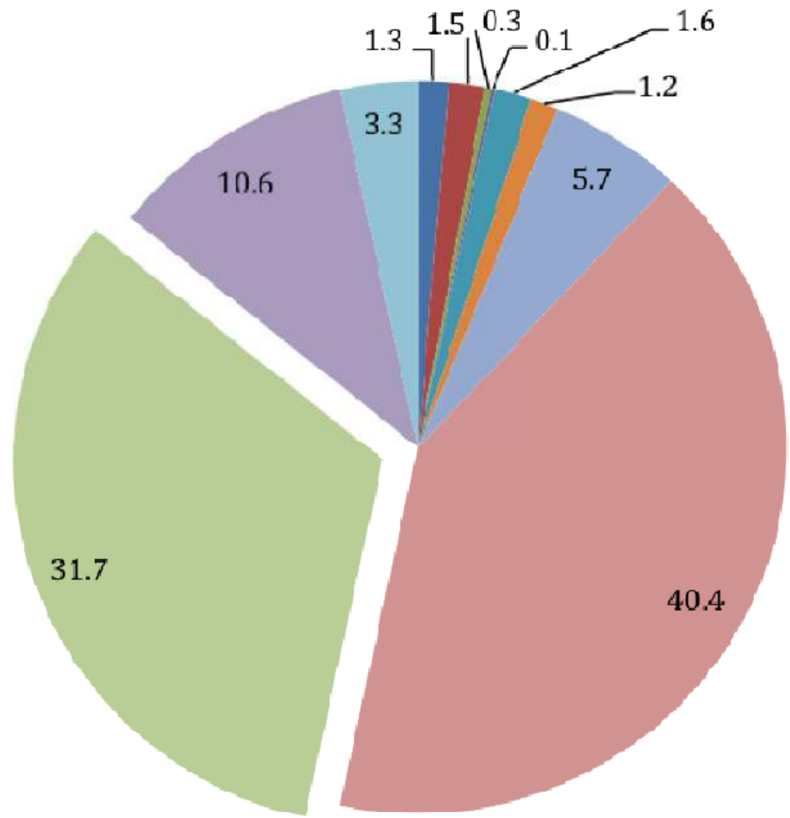
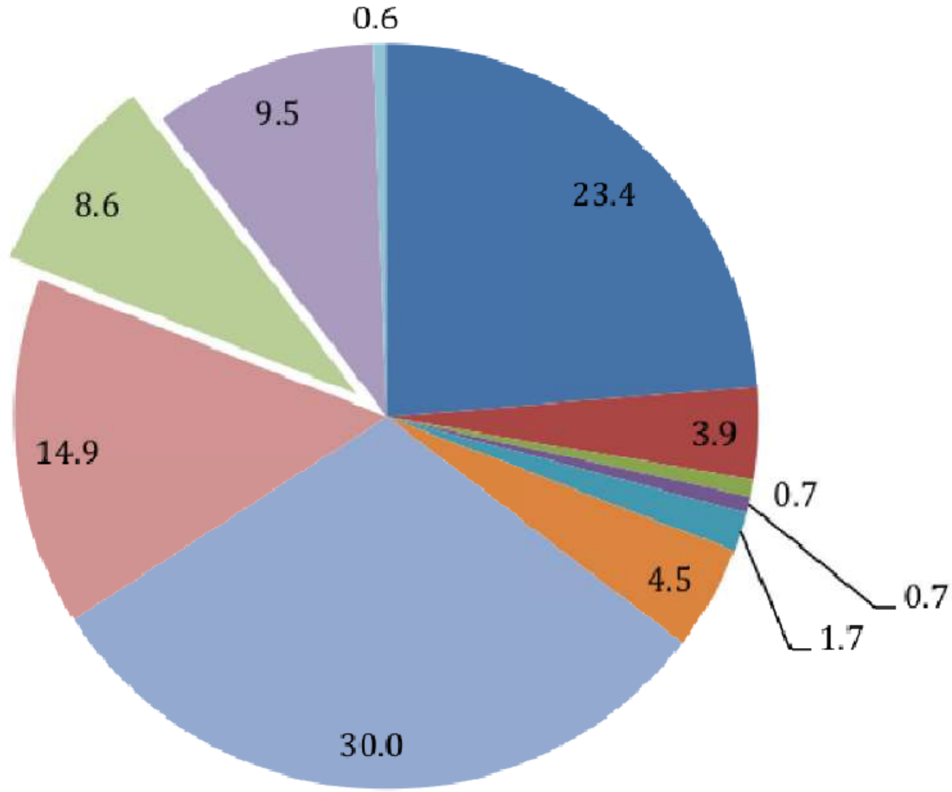


Figure 1 (y): Percentage contribution of food groups to salt intake in Irish adults (≥65years)

			%
■	1	Rice, grains, breads & cereals	23.4
■	2	Biscuits, cakes & pastries	3.9
■	3	Savoury snacks & confectionary	0.7
■	4	Beverages	0.7
■	5	Potato & potato products	1.7
■	6	Fruit & vegetables	4.5
■	7	Meat, fish & their dishes	30.0
■	8	Other foods	14.9
■	9	Dairy	8.6
■	10	Dairy recipes	9.5
■	11	Other dairy	0.6

Dairy (8.6%) comprised:	**%**
Whole milk	1.6
Semi skimmed milk	1.3
Skimmed milk	0.1
Fortified milk	0.8
Non-dairy milk alternatives	0.0
Hard cheese	2.7
Soft cheese	0.1
Cottage cheese	0.0
Processed cheese	0.8
Yogurt	0.9
Yogurt drinks	0.2
Non-dairy yogurt alternative	0.0



3.2 Nutrient Adequacy in Irish adults aged ≥65 years

Table 3(a) presents the current Estimated Average Requirements (EAR) for micronutrients as published by the Department of Health UK [27], and where no UK values were available (Vitamin E), figures published by the Institute of Medicine are shown [29]. Mean daily intakes of these micronutrients for the NANS total population split by gender are presented. Mean daily intakes of vitamin A, B12, riboflavin, folate and calcium were typically adequate with the majority of the population meeting the EAR. Salt requirements were derived from the Scientific Advisory Committee on Nutrition report on 'Salt and Health' [28], 52% of males and 15% of females in the population are over consuming the recommended 6g/day of salt. Slightly lower proportions of the population satisfied the recommendations for potassium (30% males; 18% females) (based on the RNI as an EAR was not available for potassium). Only 14.2% of males and 23.3% females met the EAR for vitamin D. There was no EAR derived for pantothenic acid at the time of the analysis. Mean daily vitamin E intakes were 18.4mg ±54.7 in men and 30.7 ±110 in women, with 37.7% of men and 32.5% of women met the EAR [29] of 12mg daily.

Table 3 (a): The adequacy of nutrient intakes within the total population from food sources and supplements (≥65 years)

Micronutrient	Males (*n*106)				Females (*n*120)			
	EAR[27,29]	Mean	SD	% meeting EAR	EAR[27,29]	Mean	SD	% meeting EAR
Total Vitamin A (µg RE/day)[27]	500	1360.4	825.2	86.8	400	1327.7	945.3	94.2
Vitamin D (µg/day)[27]	10	5.24	4.5	14.2	10	7.68	8.8	23.3
Vitamin B12 (µg/day)[27]	1.25	6.4	4.5	100	1.25	6.53	6.93	97.5
Riboflavin (mg/day)[27]	1.0	1.99	1.43	84.9	0.9	2.98	7.1	84.2
Folate (µg/day)[27]	150	427.3	531.1	90.6	150	345.5	216.5	86.7
Calcium (mg/day)[27]	525	907.7	384.1	87.7	525	994.6	572.7	87.5
Potassium (mg/day)*	3500	3038.4	944.7	30.2	3500	2720.3	751.6	18.3
Salt (g/day)**	6	6.38	2.4	51.9	6	4.8	1.4	15
Pantothenic acid (mg/day)***	-	6.8	2.5	-	-	7.6	8.4	-
Vitamin E (mg/day)[29]	12	18.4	54.7	37.7	12	30.7	110.4	32.5

n - number; SD - standard deviation; RE - Retinol Equivalents; % - percentage
EAR = Estimated average requirement[27, 29]
*No established EAR for potassium therefore the Recommended Nutrient Intake (RNI) used instead
**Salt recommendations according to SACN[28]; percentage values are based on those exceeding the recommendation for salt
***There is no established EAR or RNI for pantothenic acid

3.3 Consumers versus non-consumers of dairy, and dairy tertiles

Tables 3(b), (c), (d) and (e), show a comparison of nutrient intakes between non-consumers and consumers of dairy intake, total milk, total cheese and total yogurt, and across tertiles of dairy intake for adults. Data are compared as a % total energy (macronutrients) or per 10MJ to avoid the confounding effect of energy intakes.

Total Dairy

As 99.1% of the population were consumers of dairy, this table does not include non-consumers. Mean daily intakes of energy (kcal) and percentage energy from carbohydrate, total sugar, vitamin B12, riboflavin, folate, pantothenic acid and calcium (per 10MJ) were significantly higher in high consumers of dairy when compared to low. Intakes of vitamin D were marginally higher in high consumers versus medium and low consumers. However, percentage energy from monounsaturated fat and salt (per 10MJ) were lower in high consumers of dairy. There was no difference in total fat intakes between low and high consumers.

Total milk

As 97.8% of the population were consumers of milk, this table does not include non-consumers. The mean daily intakes of energy (kcal), and percentage energy from carbohydrate, total sugars increased across the tertiles of total milk consumption (Low-High). However, percentage energy from monounsaturated fat and salt intake (per 10MJ) were higher in low consumers of total milk. Mean daily intake of vitamin B12, riboflavin, folate, pantothenic acid and calcium significantly increased across the tertiles of milk consumption (Low-High).

Total cheese

30% of the population were non-consumers of total cheese. Consumers in the highest tertile of cheese consumption had significantly higher mean daily intakes of energy (kcal) compared to non- and low consumers, and had a higher percentage energy from saturated fat and trans fat when compared to non-consumers. However, they had significantly lower percentage energy from carbohydrate and starch when compared to non-consumers. There was no difference in percentage energy from total fat across tertiles of cheese consumption. Mean daily intakes of pantothenic acid were significantly lower in the highest tertile of total cheese consumption than for non-consumers. There were no statistically significant differences in mean daily calcium intake and salt (per 10MJ) across the tertiles of consumption.

Total Yogurt

50% of the population were non-consumers of yogurt. Non-consumers of total yogurt had a significantly lower intake (percentage energy) from carbohydrate and total sugar and polyunsaturated fat when compared to the tertiles of yogurt intakes. There were no significant differences in energy between consumers and non-consumers. Medium and high consumers of yogurt had significantly higher calcium intakes per 10MJ versus low and non-consumers. Consumers in the highest tertile of total yogurt consumption also had a significantly higher mean daily intake of riboflavin and potassium when compared to non-consumers; there were no major differences in intakes per 10MJ of any other micronutrients.

Table 3 (b): Comparison of daily nutrient intakes across tertiles (low, medium and high) of total dairy intake for Irish adults aged ≥65 years

	Tertiles of mean daily intake of total dairy							
	Low (n=74)		Medium (n=75)		High (n=75)		ANOVA	Trend
Male/Female (%)	50/50		44/56		47/53			
	Mean	SD	Mean	SD	Mean	SD	*p*	*p*
Mean age (yrs)	72.1	5.0	73.4	6.0	71.2	5.6	0.33	0.73
Mean daily dairy (g/day)	113.6 [a]	54.5	261.1 [b]	39.9	509.8 [c]	141.6	<0.001	0.637
Energy (kcal)	1543.7 [a]	520.7	1682.8 [ab]	462.7	2032.5 [b]	564.8	<0.001	<0.001
Protein (g)	66.3 [a]	19.0	75.9 [b]	22.3	87.5 [c]	21.0	<0.001	<0.001
Carbohydrate (g)	168.8 [a]	57.9	203.2 [b]	56.8	244.8 [c]	65.4	<0.001	<0.001
Total sugar (g)	62.6 [a]	34.2	80.4 [b]	31.3	109.0 [c]	33.9	<0.001	<0.001
Total starch (g)	103.3 [a]	35.0	117.6 [ab]	37.2	131.4 [b]	45.2	<0.001	<0.001
Fat (g)	61.4 [a]	29.2	62.3 [ab]	25.3	77.2 [b]	28.7	<0.001	0.158
Saturated fat (SFA) (g)	25.3 [a]	16.0	25.4 [ab]	11.6	31.8 [b]	13.6	0.005	0.005
Monounsaturated fat (MUFA)(g)	22.1 [a]	9.8	22.2 [ab]	10.2	26.4 [c]	10.5	0.014	0.100
Polyunsaturated fat (PUFA) (g)	10.0 [a]	4.1	10.2 [ab]	4.8	13.2 [c]	6.4	<0.001	<0.001
Trans fat (g)	0.9 [a]	0.8	1.0 [ab]	0.6	1.3 [c]	1.1	0.011	0.006
% energy from protein	17.7	3.5	18.2	3.2	17.6	3.0	0.423	0.860
% energy from carbohydrate	44.2 [a]	7.5	48 [b].	7.5	48.7 [b]	6.3	<0.001	<0.001
% energy from total sugar	16.1 [a]	6.7	19.5 [b]	6.8	21.8 [b]	4.9	<0.001	<0.001
% energy from starch	27.3	5.9	28.1	5.5	26.0	5.9	0.078	0.180
% energy from fat	35.4	7.8	32.8	7.5	33.8	5.7	0.071	0.170
% energy from SFA	14.4	4.6	13.3	4.1	13.9	3.3	0.280	0.453
% energy from MUFA	12.8 [a]	3.4	11.6 [b]	3.2	11.5 [b]	2.2	0.013	0.008
% energy from PUFA fat	23.8	8.0	21.7	7.9	23.6	11.2	0.308	0.909
% energy from trans fat	0.50	0.33	0.50	0.28	0.57	0.43	0.426	0.259

Table 3 (b) continued:

	Tertiles of mean daily intake of total dairy							
	Low (n=74)		Medium (n=75)		High (n= 75)		ANOVA	Trend
Male/Female (%)	50/50		44/56		47/53			
	Mean	SD	Mean	SD	Mean	SD	*p*	*p*
Retinol (µg/10MJ)	689.4	1027.4	514.8	285.7	725.8	539.1	0.136	0.747
Vitamin D (µg/10MJ)	4.5 [a]	3.2	4.8 [a]	3.0	6.5 [b]	5.3	0.050	0.800
Vitamin B12 (µg/10MJ)	6.4 [a]	4.2	7.9 [a,]	4.5	8.0 [b,]	3.9	<0.001	<0.001
Riboflavin (mg/10MJ)	1.8 [a]	0.6	2.0 [b]	0.6	2.8 [c]	0.7	<0.001	0.421
Folate (µg/10MJ)	380.6 [a]	177.9	441.8 [ab]	163.0	495.5 [b]	206.0	<0.001	0.602
Pantothenic acid (mg/10MJ)	7.1 [a]	2.1	8.0 [b]	1.8	8.5 [b]	2.3	<0.001	0.002
Calcium (mg/10MJ)	928.0 [a]	257.1	1107 [b]	250.1	1434.3 [c]	326.5	<0.001	0.331
Potassium (mg/10MJ)	3855.8	960.1	4026.0	736.1	4078.4	772.2	0.120	0.158
Salt (g/10MJ)	8.1 [a]	2.1	7.6 [ab]	1.8	7.1 [b]	1.6	0.010	0.110
Vitamin E (mg/10MJ)	12.8	7.1	12.1	5.1	13.9	6.5	0.185	0.271

n - number; SD - standard deviation; 10MJ – nutrients per 10MJ. Statistical test used one-way ANOVA with Bonferroni post-hoc test. Different superscript letters indicate significant differences as determined by post-hoc tests (P>0.05). In the case that p=significant, but letters are not shown, differences were no longer significant following post-hoc testing

Table 3 (c): Comparison of mean daily nutrient intakes across tertiles (low, medium and high) of total milk intake for Irish adults aged ≥65 years

	Tertiles of mean daily intake of total milk							
	Low (n=73)		Medium (n=74)		High (n= 74)		ANOVA	Trend
Male/Female (%)	48/52		50/50		43/56			
	Mean	SD	Mean	SD	Mean	SD	*p*	*p*
Mean age (yrs)	72.1	4.8	73.0	6.3	72.3	5.6	0.757	0.674
Mean daily milk intakes (g/day)	80.8 [a]	42.6	215.9 [b]	38.5	448.4 [c]	131.5	<0.001	<0.001
Energy (kcal)	1514.2 [a]	489.9	1759.6 [b]	541.3	1979.1 [c]	539.1	<0.001	0.711
Protein (g)	65.4 [a]	17.7	78.5 [b]	25.2	85.7 [b]	19.1	<0.001	<0.001
Carbohydrate (g)	169.6 [a]	55.0	207.4 [b]	63.0	240.2 [c]	66.5	<0.001	<0.001
Total sugar (g)	64.1 [a]	31.8	82.1 [b]	35.4	106.1 [c]	35.8	<0.001	<0.001
Total starch (g)	101.9 [a]	34.2	120.3 [b]	40.1	129.9 [b]	43.9	<0.001	<0.001
Fat (g)	61.0 [a]	28.4	65.7 [a,b]	30.9	74.3 [b]	25.1	0.020	0.005
Saturated fat (SFA) (g)	25.1	15.5	26.8	13.8	30.7	12.8	0.050	0.017
Monounsaturated fat (MUFA)(g)	22.2	9.8	23.3	11.4	25.3	9.6	0.180	0.067
Polyunsaturated fat (PUFA)(g)	10.0 [a]	4.2	10.8 [a,b]	5.8	12.6 [b]	5.5	0.007	0.002
Trans fat (g)	0.92	0..81	1.04	0.81	1.2	1.0	0.175	0.063
% energy from protein	17.8	3.4	18.0	3.3	17.7	3.0	0.819	0.972
% energy from carbohydrate	45.1 [a]	7.2	47.8 [a,b]	8.0	48.9 [b]	6.4	0.006	0.002
% energy from total sugar	16.9 [a]	6.8	19.2 [a,b]	7.1	21.5 [b]	5.0	<0.001	<0.001
% energy from starch	27.3 [a]	5.7	27.6 [a,b]	5.5	26.5 [b]	6.1	0.497	0.407
% energy from fat	35.7	7.1	32.9	8.3	33.6	5.5	0.052	0.078
% energy from SFA	14.1	4.4	13.4	4.3	13.8	3.4	0.296	0.326
% energy from MUFA	13.0 [a]	3.0	11.7 [b]	3.6	11.4 [b]	2.1	0.002	0.001
% energy from PUFA	24.0	8.4	21.7	7.4	23.4	11.3	0.285	0.707
%energy from trans fat	0.52	0.33	0.51	0.3	0.54	0.4	0.889	0.771

Table 3 (c) continued

	Tertiles of mean daily intake of total milk							
	Low (n=73)		Medium (n=74)		High (n= 74)		ANOVA	Trend
Male/Female (%)	48/52		50/50		43/56			
	Mean	SD	Mean	SD	Mean	SD	*p*	*p*
Retinol (μg/10MJ)	605.8	783.4	611.8	751.4	706.0	521.2	0.618	0.383
Vitamin D (μg/10MJ)	4.6	3.1	5.0	3.9	6.2	4.8	0.052	0.019
Vitamin B12 (μg/10MJ)	6.2 [a]	2.9	8.3 [b]	5.5	8.6 [b]	3.8	0.001	0.001
Riboflavin (mg/10MJ)	1.8 [a]	0.6	2.5 [b]	0.7	2.8 [c]	0.7	<0.001	<0.001
Folate (μg/10MJ)	390.9 [a]	185.7	424.9 [a]	150.0	501.3 [b]	209.6	<0.001	<0.001
Pantothenic acid (mg/10MJ)	6.9 [a]	1.5	7.9 [b]	1.7	8.7 [c]	2.3	<0.001	<0.001
Calcium (mg/10MJ)	957.1 [a]	272.7	1087.2 [b]	260.7	1423.7 [c]	333.9	<0.001	<0.001
Potassium (mg/10MJ)	3832.6	897.4	4014.7	852.8	4114.8	731.2	0.115	0.040
Salt (g/10MJ)	8.2 [a]	2.0	7.5 [a,b]	2.0	7.2 [b]	1.6	0.005	0.001
Vitamin E (mg/10MJ)	12.6	6.8	11.8	5.1	13.9	6.4	0.100	0.184

n - number; SD - standard deviation; 10MJ – nutrients per 10MJ. Statistical test used one-way ANOVA with Bonferroni post-hoc test. Different superscript letters indicate significant differences as determined by post-hoc tests (P>0.05). In the case that p=significant, but letters are not shown, differences were no longer significant following post-hoc testing

Table 3 (d): Comparison of mean daily nutrient intakes across tertiles (low, medium and high) of total cheese intake for Irish adults (aged ≥65 years)

	Tertiles of mean daily intake of cheese									
	Non-consumers (n=90)		Low (n=45)		Medium (n=45)		High (n=46)		ANOVA	Trend
Male/Female (%)	44/56		36/64		44/56		65/35			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	*p*	*p*
Mean age (yrs)	73.1	5.4	72.6	6.8	71.7	4.6	71.9	5.5	0.478	0.860
Mean cheese intakes (g/day)	-	-	6.4 [a]	3.0	14.8 [b]	3.3	38.0 [c]	20.8	0.450	0.600
Energy (kcal)	1582.1 [a]	471.5	1640.0 [a]	447.7	1818.9 [ab]	552.0	2104.8 [b]	647.6	<0.001	0.710
Protein (g)	71.9 [a]	19.3	70.8 [a]	21.0	79.1 [ab]	22.9	88.6 [b]	24.9	<0.001	0.320
Carbohydrate (g)	191.3 [a]	71.1	200.2 [ab]	57.7	210.4 [ab]	71.2	230.0 [b]	62.7	0.020	0.860
Total sugar (g)	77.1 [a]	36.1	79.3 [ab]	36.6	86.6 [ab]	38.2	98.1 [b]	40.9	0.020	0.830
Total starch (g)	111.2	44.9	113.6	35.9	119.9	42.8	128.2	35.4	0.130	0.960
Fat (g)	57.8 [a]	21.8	61.3 [a]	22.3	71.6 [b]	25.4	84.4 [b]	39.1	<0.001	0.880
Saturated fat (SFA) (g)	22.9 [a]	10.5	24.5 [ac]	9.8	29.9 [bc]	12.8	36.4 [b]	19.8	<0.001	0.830
Monounsaturated fat (MUFA) (g)	20.6 [a]	8.4	21.9 [a]	9.2	25.2 [ab]	9.9	28.9 [b]	13.0	<0.001	0.970
Polyunsaturated fat (PUFA) (g)	10.1 [a]	5.1	10.7 [ab]	4.5	11.2 [ab]	4.4	13.1 [b]	6.9	0.020	0.980
Trans fat (g)	0.8 [a]	0.6	0.8 [ab]	0.5	1.3 [b]	0.9	1.7 [c]	1.3	<0.001	0.530
% energy from protein	18.6	3.5	17.4	3.2	17.7	3.0	17.2	3.1	0.070	0.110
% energy from carbohydrate	47.8 [a,b]	7.8	48.9 [a]	6.3	46.7 [ab]	7.7	44.5 [b]	6.9	0.020	0.220
% energy from total sugar	19.2	6.6	19.3	7.5	19.1	6.0	18.8	6.2	0.990	0.930
% energy from starch	27.9 [a]	6.2	27.9 [ab]	5.9	26.0 [ab]	5.7	24.9 [b]	4.7	0.030	0.560
% energy from fat	32.6	7.0	33.5	7.1	35.7	7.5	35.2	6.7	0.060	0.470
% energy from SFA	12.9 [a,]	4.1	13.3 [ab]	3.1	14.8 [ab]	4.1	15.1 [b]	4.1	0.010	0.710
% energy from MUFA	11.6	3.0	11.9	3.3	12.6	3.3	12.1	2.5	0.370	0.420
% energy from PUFA	22.8	9.7	23.7	8.2	23.0	10.3	22.2	8.1	0.890	0.520
% energy from trans fat	0.43 [c]	0.3	0.45 [ac]	0.3	0.6 [a,b]	0.3	0.7 [b]	0.4	<0.001	0.710

Table 3 (d) continued:

	Tertiles of mean daily intake of cheese									
	Non-consumers (n=90)		Low (n= 45)		Medium (n= 45)		High (n= 46)		ANOVA	Trend
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	*p*	*p*
Retinol (µg/10MJ)	853.9	2260.9	544.0	337.1	664.0	484.1	719.4	539.4	0.700	0.260
Vitamin D (µg/10MJ)	5.1	3.8	4.6	2.9	5.6	4.3	5.6	5.1	0.580	0.520
Vitamin B12 (µg/10MJ)	8.6	6.6	6.8	2.8	7.5	2.8	7.8	5.0	0.230	0.050
Riboflavin (mg/10MJ)	2.5	0.8	2.4	0.8	2.4	0.7	2.3	0.7	0.580	0.610
Folate (µg/10MJ)	432.5	188.4	471.6	171.6	446.3	179.6	410.9	209.0	0.470	0.170
Pantothenic acid (mg/10MJ)	8.5 [a]	2.3	7.7 [ab]	1.9	7.7 [ab]	1.5	7.2 [b]	2.3	0.010	0.120
Calcium (mg/10MJ)	1096.1	367.9	1115.3	280.0	1228.2	386.6	1227.4	327.6	0.070	0.780
Potassium (mg/10MJ)	4124.8	850.9	4054.1	724.4	3954.6	898.7	3728.1	810.2	0.070	0.980
Salt (g/10MJ)	7.6	1.9	7.7	1.9	7.5	1.6	7.5	2.1	0.930	0.930
Vitamin E (mg/10MJ)	12.8	7.2	13.3	6.9	12.6	4.4	12.8	5.5	0.950	0.700

n - number; SD - standard deviation; 10MJ – nutrients per 10MJ. Statistical test used one-way ANOVA with Bonferroni post-hoc test. Different superscript letters indicate significant differences as determined by post-hoc tests (P>0.05). In the case that p=significant, but letters are not shown, differences were no longer significant following post-hoc testing

Table 3(e): Comparison of mean daily nutrient intakes across tertiles (low, medium and high) of total yogurt intake for Irish adults aged ≥65 years

	Tertiles of mean daily intake of total yogurt									
	Non-consumers (n=124)		Low (n= 34)		Medium (n=33)		High (n= 33)		ANOVA	Trend
Male/Female (%)	56/44		41/59		37/63		30/70			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	*p*	*p*
Mean age (yrs)	72.42	5.5	72.2	5.4	73.5	6.5	71.9	5.1	0.680	0.840
Mean daily yogurt (g)	-	-	29.1	9.0	71.5	15.5	150.8	50.5	<0.001	0.530
Energy (kcal)	1735.4	620.8	1793.7	515.1	1721.6	486.0	1770.6	419.9	0.940	0.700
Protein (g)	75.8	25.4	77.1	18.2	75.3	20.9	79.8	16.4	0.820	0.950
Carbohydrate (g)	196.7	73.2	214.0	67.6	213.1	59.2	216.6	55.1	0.280	0.260
Total sugar (g)	76.0	40.7	88.4	34.6	93.6	34.3	97.1	30.0	0.010	0.160
Total starch (g)	118.2	45.3	119.5	37.6	111.1	34.4	115.2	36.3	0.800	0.990
Fat (g)	68.2	32.9	68.2	24.0	60.8	25.1	65.6	18.1	0.590	0.800
Saturated fat (g)	28.8	16.4	27.1	11.0	25.0	12.3	25.0	8.1	0.380	0.590
Monounsaturated fat (g)	23.8	11.4	24.7	9.7	21.4	8.9	22.9	8.4	0.550	0.860
Polyunsaturated fat (g)	10.7	5.7	11.3	4.3	10.0	4.6	13.2	5.6	0.060	0.660
Trans Fat (g)	1.1	0.9	1.02	0.9	1.0	0.8	1.1	0.8	0.930	0.610
% energy from protein	17.9	3.6	17.7	3.1	17.6	2.3	18.4	3.1	0.770	0.520
% energy from carbohydrate	45.5 [a]	7.5	48.1 [ab]	8.0	50.1 [b]	7.0	49.1 [ab]	5.4	<0.001	0.060
% energy from total sugar	17.4 [a]	6.8	19.6 [ab]	4.8	22.1 [b]	6.3	22.2 [b]	5.3	<0.001	0.100
% energy from starch	27.5	6.1	27.2	5.8	26.3	5.9	25.9	4.5	0.440	0.880
% energy from fat	34.8	7.5	34.0	6.8	31.4	7.5	33.3	4.6	0.090	0.330
% energy from SFA	14.5	4.4	13.4	3.5	12.8	4.1	12.6	2.2	0.024	0.230
% energy from MUFA	12.2	3.2	12.3	3.2	11.1	2.8	11.5	2.3	0.150	0.960
% energy from PUFA	22.2 [a]	8.0	22.9 [ab]	6.5	21.2 [a]	9.3	27.6 [b]	13.6	0.020	0.460
% energy from trans fat	0.5	0.4	0.5	0.3	0.5	0.3	0.6	0.3	0.830	0.370

Table 3 (e) continued:

	Tertiles of mean daily intake of total yogurt									
	Non-consumers (n=124)		Low (n= 34)		Medium (n=33)		High (n= 33)		ANOVA	Trend
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	*p*	*p*
Retinol (µg/10MJ)	854.1	1955.5	572.0	306.6	521.7	330.6	626.9	383.2	0.550	0.310
Vitamin D (µg/10MJ)	5.2	4.3	5.2	2.8	4.6	3.0	6.0	4.9	0.500	0.550
Vitamin B12 (µg/10MJ)	7.9	5.8	7.2	2.6	8.5	5.6	7.6	3.2	0.760	0.740
Riboflavin (mg/10MJ)	2.2 [a]	0.8	2.3 [ab]	0.7	2.6 [ab]	0.8	2.8 [b]	0.7	<0.001	0.860
Folate (µg/10MJ)	423.6	196.5	438.7	134.8	438.9	178.0	494.5	207.2	0.300	0.930
Pantothenic acid (mg/10MJ)	7.9	2.4	7.7	1.6	7.8	2.3	8.0	1.6	0.940	0.600
Calcium (mg/10MJ)	1068.0 [a]	342.8	1104.5 [a]	244.5	1250.2 [b]	301.4	1419.0 [b]	379.4	<0.001	0.780
Potassium (mg/10MJ)	3841.8 [a]	844.4	4165.1 [ab]	815.4	4104.3 [ab]	787.8	4287.1 [b]	785.8	0.020	0.130
Sodium (g/10MJ)	7.6	2.1	7.1	1.6	8.1	1.8	7.3	1.5	0.170	0.470
Vitamin E (mg/10MJ)	12.5	6.8	12.7	4.1	12.0	4.1	15.6	7.0	0.050	0.448

n - number; SD - standard deviation; 10MJ – nutrients per 10MJ. Statistical test used one-way ANOVA with Bonferroni post-hoc test. Different superscript letters indicate significant differences as determined by post-hoc tests (P>0.05). In the case that p=significant, but letters are not shown, differences were no longer significant following post-hoc testing

3.4 Markers of nutrient status in Irish Older Adults (≥65 years)

Blood biomarkers were available for a sub-section of the older Irish adult population (approximately *n* 95). Individual numbers available for each biomarker vary slightly due to the removal of outliers. The mean, standard deviation, median and 97.5th percentile for the total population (for which information was available) for each of the biomarkers of interest (serum B12, folate, red cell folate, vitamin B6 (PLP), riboflavin (EGRAC), 25(OH)D, calcium and parathyroid hormone) are shown in Table 3 (f). Mean circulating concentrations were as follows: vitamin B12, 317.8 pmol/L; riboflavin (EGRAC), 1.32; vitamin B6 (PLP), 93.3 nmol/L, serum folate, 35.9 nmol/L; red cell folate, 1088.9nmol/L; 25(OH)D, 1.74 nmol/L, calcium, 2.46 mmol/L and parathyroid hormone 47.3pg/mL.

Table 3 (g) shows the mean concentration for each of the biomarkers examined across the three tertiles (low, medium and high) of mean daily dairy consumption. A significant difference in riboflavin (as measured by EGRAC) was noted when comparing the low dairy consumers (1.41) with the high dairy consumers (1.25) (EGRAC values greater than 1.3 being indicative of inadequate riboflavin status). A significant difference was also noted for serum folate concentrations (p 0.031) with values increasing across the tertiles. There were no differences in status of any of the other micronutrients examined or in PTH across dairy consumption tertiles.

Table 3(h) presents an overview of the B-vitamin and calcium status in the population, total, males and females, and across dairy tertiles, as determined by blood biomarker cut-offs [23-26]. Most people (over 98%) were classed as having adequate or high serum folate levels. Red Cell Folate (RCF) concentrations were adequate or high in over 95% of the population, and broadly similar between genders and across dairy tertiles. Almost 95% of the population had Vitamin B12 levels that were either adequate or high and again these categories were similar between gender, and across tertiles of dairy consumption. Riboflavin levels, measured via EGRAC, were low in over half (52%) of the population. A similar pattern was evident between genders (52% of men and 51% of women were low), while the number of those with low riboflavin levels decreased as dairy consumption increased; 58% had low riboflavin in the low dairy consumer group, 56% in the medium consumers group, and 45% had low riboflavin in the high consumers group.

Vitamin B6 concentrations (assessed as PLP) were generally adequate in those aged 65 years and over, with over 96% of those tested having levels that were adequate or high. Similar patterns were evident for both genders and across tertiles of dairy consumption. Serum calcium levels were also generally adequate, with just one person having a level that was below normal. The percentage of people falling into the normal category was similar between gender (54% and 57% of calcium levels fell into the normal category, in males and females respectively).

Vitamin D concentrations for the 65 and overs were assessed as Serum 25-hydroxyvitamin D. Almost 60% of those tested had levels that were adequate. A stepwise pattern was seen between those achieving adequate vitamin D levels and dairy intakes, rising from 36% in the low dairy tertile group to 64% in the medium group to 72% in the highest tertile group of dairy consumption.

Table 3(f): Biomarkers of nutrient status in Irish Adults aged ≥65 years. Values presented as; mean, median, standard deviations, (SD) and concentrations at the 97.5th centile

	n	Mean	Median	SD	97.5 percentile
B- vitamins					
Vitamin B12 (pmol/L)	93	317.8	273.6	187.5	967.7
Riboflavin (EGRAC)	95	1.32	1.3	0.18	1.9
Vitamin B6/ PLP (nmol/L)	95	93.3	75.1	92.2	415.3
Serum folate (nmol/L)	94	35.9	30.9	24.1	90.6
Red Cell folate (nmol/L)	95	1088.9	990.2	482.9	2249.5
Calcium, vitamin D &Parathyroid hormone					
25 (OH) D (nmol/L)	95	1.74	1.75	0.19	2.11
Calcium (nmol/L)	94	2.46	2.46	0.12	2.71
Parathyroid Hormone (pg/ml)	95	47.3	42.3	26.8	128.0

n = number; SD = standard deviation. Samples included fasting samples (n=75) and non-fasting samples (n=20).
PLP - pyridoxal 5'-phosphate, EGRAC - Erythrocyte glutathione reductase activation coefficient

Table 3 (g): Comparison of circulating concentrations of blood biomarkers across the tertiles of total dairy consumption in Irish Adults aged ≥65 years. Values are presented as mean and standard deviations (SD)*

	Tertile of Dairy Consumption									
	Low *n* 74			Medium *n* 75			High *n* 75			
	n	Mean	SD	*n*	Mean	SD	*n*	Mean	SD	*p*
B-vitamins										
Vitamin B12 (pmol/L)	27	293.9	179.2	28	313.2	155.6	38	338.2	215.2	0.640
Riboflavin (EGRAC)	28	1.41[a]	0.23	28	1.35[ab]	0.16	39	1.25[b]	0.11	0.001
Vitamin B6/(PLP nmol/L)	28	69.2	47.5	28	89.7	87.04	39	113.2	114.9	0.152
Serum folate (nmol/L)	28	27.1[a]	20.13	28	35.6[ab]	22.92	38	42.7[b]	25.9	0.031
Red Cell folate (nmol/L)	28	904.2	417.9	28	1154.8	486.3	39	1174.2	498.9	0.052
Calcium, vitamin D and parathyroid hormone										
Serum Calcium (mmol/L)	27	2.44[a]	0.11	28	2.52[b]	0.93	39	2.43[a]	0.12	0.030
25 (OH) D (nmol/L)	27	293.9	179.2	28	313.2	155.6	38	338.2	215.2	0.157
Parathyroid Hormone (pg/ml)	28	47.48	28.6	28	48.4	23.4	39	46.3	28.4	0.948

n = number; SD = standard deviation. PLP - pyridoxal 5'-phosphate, EGRAC - Erythrocyte glutathione reductase activation coefficient

*There was no difference in across tertiles of dairy consumption for supplement use, gender, age or BMI, therefore unadjusted values are presented.

Table 3(h): Number and percent distribution of nutrient adequacy for blood biomarkers of B-vitamins, Vitamin D and calcium* in Irish Older Adults (≥65 years); presented as total population, by gender, and by tertiles of dairy intakes

	All		Gender				Dairy Tertiles					
			Men		Women		Low		Medium		High	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Serum Folate	157	100	74	100	83	100	40	100	52	100	65	100
Low: ≤4.5	0	0	0	0	0	0	0	0	0	0	0	0
Marginal 4.51-6.8	3	1.9	2	2.7	1	1.2	3	7.5	0	0	0	0
Adequate:6.81-45	62	40	32	43	30	36	19	48	19	37	24	37
High>45	92	59	40	54	52	63	18	45	33	64	41	63
Red Cell Folate (nmol/L)	157	100	74	100	83	100	40	100	52	100	65	100
Low: ≤340	1	0.6	0	0	1	1.2	0	0	0	0	1	1.5
Marginal340.1-453	5	2	3	4.1	2	2.4	3	7.5	1	1.9	1	1.5
Adequate:453.1-2266	150	96	71	96	79	95	37	93	51	98	62	95
High: >2266	1	0.6	0	0	1	1.2	0	0	0	0	1	1.5
Serum Vit B12 (pmol/L)	157	100	74	100	83	100	40	100	52	100	65	100
Low: ≤110	1	0.6	0	0	1	1.2	1	2.5	0	0	0	0
Marginal: 110.1-148	7	4.5	5	6.8	2	2.4	3	7.5	2	3.8	2	3.1
Adequate: 148.1-738	81	52	36	49	45	54	22	55	25	48	34	52
High: >738	68	43	33	45	35	42	14	35	25	48	29	45
Riboflavin (EGRAC)	155	100	73	100	82	100	40	100	50	100	65	100
Low: >1.4	80	52	38	52	42	51	23	58	28	56	29	45
Marginal:1.31-1.4	24	16	10	14	14	17	8	20	8	16	8	12
Adequate: ≤1.3	51	33	25	34	26	32	9	23	14	28	28	43
PLP/Vit B6 (nmol/L)	157	100	74	100	83	100	40	100	52	100	65	100
Low: <20	2	1.3	2	2.7	0	0	1	2.5	1	1.9	0	0
Marginal: 20.1-30	4	2.5	2	2.7	2	2.4	4	10	0	0	0	0
Adequate: 30.1-200	83	53	39	53	44	53	22	55	26	50	35	54
High: >200	68	43	31	42	37	45	13	33	25	48	30	46
Vitamin D	95	100	44	100	51	100	28	100	28	100	39	100
Deficient: ≤30nmol/l	9	9.5	5	11	4	7.8	6	21	1	3.6	2	5.1
Inadequate: >30-≤50nmol/l	30	32	14	32	16	31	12	43	9	32	9	23
Adequate: >50nmol/l	56	59	25	57	31	61	10	36	18	64	28	72
Serum calcium(mmol/L)	157	100	74	100	83	100	40	100	52	100	65	100
Below normal (<2.2):	1	0.6	0	0	1	1.2	0	0	0	0	1	1.5
Normal (2.2-2.6):	87	55	40	54	47	57	25	63	24	46	38	59
Above normal (>2.6):	69	44	34	46	35	42	15	38	28	54	26	40

*Cut-offs to derive status categories are derived from published B-vitamin and calcium reference ranges [21-26]. Adequate and high PLP cut-offs were based on the 90th centile in the NANS cohort.

Section : Insights into Specific Uses regarding Dairy

4.1 Dairy food intakes at meals

Dairy foods were consumed most heavily at breakfast, with an average intake of 127.2g of dairy at breakfast (Table 4a). Most people who reported consuming breakfast (96.4% of the 225 breakfast consumers) consumed dairy at that meal. This was mostly due to milk consumption, (94.7% of breakfast consumers had intakes of 113.9g on average at breakfast), although yogurt also featured, with 18.2% of breakfast consumers eating yogurt at breakfast, and a mean consumption of 73.8g.

Cheese featured less at breakfast, with just 6.7% of the population eating some sort of cheese at breakfast, although the mean intake of cheese for those people was greater (20.9g) compared to intakes at lunch, (15.6g) evening meals (12.1g) and snacks (14.4g). 38% of lunch consumers ate cheese, and just under 31% of evening meal consumers consumed cheese as part of their evening meal. 10.8% of those reporting snack consumption ate cheese as a snack.

Yogurt was consumed by similar numbers of people at breakfast, lunch and evening meals, by 18.2, 19.0 and 18.9% of consumers, respectively. Fewer people reported yogurt as a snack (13.4% of the snack-consumers). Yogurt consumers ate more yogurt at breakfast (73.8g on average) compared to lunch, dinner or snacks (55.3g, 47.1g and 48.0g respectively).

4.2 Food groups intake at meals

At breakfast, (Table 4b) dairy foods were the most frequently consumed of the food groups (excluding beverages), eaten by 209 people (93% of the 225 breakfast consumers), while foods from the rice, grains, breads and cereals group were a close second, consumed by 208 people (92.4% of breakfast consumers). 148 people reported consumption of foods in the savoury snacks and confectionary food group (which included jams and preserves). At lunch, the commonly consumed food groups were ‘Meat, fish and their dishes’ (eaten by 195 people, or 90.3% of the 216 people who reported consuming lunch). ‘Other foods’ were eaten by 192 lunch consumers, followed by ‘Dairy’ (189 people), then fruit and veg (185 people). Food groups consumed as beverages included mainly the beverage food group (70 people) and the dairy food group (40 people).

4.3 Milk and cereal intake at breakfast

Table 4c outlines details of mean daily intake (g) of various milk types and also for Ready to Eat Breakfast Cereals (RTEBC) consumed at breakfast, for consumers only. 41.3% of breakfast consumers had whole milk at breakfast, accounting for a total of 38.5% of all breakfast eating occasions, with a mean food weight of 81.1g/breakfast, and provided a mean daily energy contribution of 53.5kcal/breakfast. Semi-skimmed milk had a slightly lower % consumer rate (34.2%). 46.2% of older adults were consumers of RTEBC at breakfast, accounting for 33.6% of all breakfast eating occasions, and with a food weight of 32.5g/breakfast and an energy contribution of 116.2kcal/breakfast.

Table 4 (a): Descriptive overview of mean daily food weights (g/day) consumed for: Total Dairy, Total Milk, Total Cheese and Total Yogurt at different meals by Irish Adults aged≥65 years. Values relate to total dairy intake i.e. dairy foods consumed as discrete foods and as dairy recipes.

Meal		Total Dairy (g)				Total Milk				Total Cheese				Total Yogurt			
Type	n^*	n^{**}	**% cons**	**Mean**	**SD**	n^{**}	**% cons**	**Mean**	**SD**	n^{**}	**% cons**	**Mean**	**SD**	n^{**}	**% cons**	**Mean**	**SD**
Breakfast	225	217	96.4	127.2	85.6	213	94.7	113.9	79.6	15	6.7	20.9	20.3	41	18.2	73.8	51.1
Lunch	216	202	93.5	67.5	69.2	189	87.5	53.4	66.0	82	38.0	15.6	17.3	41	19	55.3	38.2
Evening Meal	222	199	89.6	62.2	61.5	186	83.8	51.5	56.9	68	30.6	12.1	8.7	42	18.9	47.1	34.0
Snacks	186	162	87.1	69.6	74.6	155	83.3	63.1	68.8	20	10.8	14.4	20.3	25	13.4	48.0	31.0
Beverages (non-alcoholic)	75	42	56.0	31.9	31.9	42	56.0	31.9	31.9	0	0.0	0.0	0.0	0	0.0	0.0	0.0
Beverages (alcoholic)	33	0	0.0	0.0	0.0	0	0.0	0	0	0	0.0	0.0	0.0	0	0.0	0.0	0.0

n^* - number of consumers of each meal type; n^{**}- number of consumers of each dairy food group at each meal type; %cons - % consumers of each meal type; SD - standard deviation.

Table 4 (b): Mean daily intake (g/day) of each food group consumed at each meal type (breakfast, lunch, evening meal and snacks). Values presented are for consumers only, i.e., only for people who ate that food group at that meal during the reporting period

Food group	Breakfast (*n* 225)				Lunch (*n* 216)				Evening meal (*n* 222)				Snacks (*n* 186)			
	n	% cons	Mean	SD	*n*	% cons	Mean	SD	*n*	% cons	Mean	SD	*n*	% cons	Mean	SD
Rice, grains, breads, cereals	208	92.4	95.1	80.6	167	77.3	51.3	36.4	162	73.0	49.2	37.1	78	41.9	144.3	136.5
Biscuits, cakes and pastries	13	5.8	8.3	6.2	81	37.5	19.9	19.4	78	35.1	22.7	20.3	107	57.5	101.3	99.5
Savoury snacks, confectionary	148	65.8	14.8	14.4	87	40.3	6.4	5.6	95	42.8	7.5	7.7	103	55.4	45.6	51.7
Beverages	215	95.6	315.5	192.3	204	94.4	234.0	146.0	211	95.0	290.2	182.6	168	90.3	1099.0	931.6
Potatoes and potato products	-	-	-	-	117	54.2	84.7	72.9	173	77.9	101.7	66.5	4	2.2	115.5	150.5
Fruit & Veg	131	58.2	124.2	89.8	185	85.6	94.6	84.7	207	93.2	106.3	77.3	93	50.0	301.3	312.8
Meat, fish and dishes	29	12.9	33.8	34.3	195	90.3	76.1	60.6	211	95.0	122.5	81.1	29	15.6	76.7	82.1
Other	173	76.9	20.2	33.7	192	88.9	58.1	68.3	187	84.2	33.3	37.2	92	49.5	56.3	95.4
Dairy	209	92.9	103.1	84.9	189	87.5	59.6	66.0	190	85.6	51.2	53.8	154	82.8	232.2	265.3
Dairy-containing recipes	88	39.1	111.5	92.0	87	40.3	57.2	59.2	98	44.1	58.2	53.0	65	34.9	272.3	262.5
Other dairy	8	3.6	6.9	5.4	38	17.6	24.4	16.8	62	27.9	31.9	31.4	20	10.8	82.9	66.9

* All foods eaten were assigned to an eating occasion in NANS. Eating occasions were described as: 'breakfast', 'lunch' (main or light meal),'evening meal' (main or light), 'snacks' (morning, afternoon, evening or night), and 'beverages' (alcoholic and non alcoholic). This table describes the 11 food groups (see table 2a) consumed at meals (breakfast, lunch, evening meals or snacks). Values presented are for consumers only, ie, only for those who reported consuming a particular food group at a particular meal/ eating occasion

n = number of consumers of each food group at each meal type; SD = standard deviation

Table 4 (c):Descriptive overview of the number of consumers and eating occasions of each dairy food group and ready to eat breakfast cereals (RTEBC) at breakfast. Mean daily intakes (g/day) and the contribution to energy intake of each food group at breakfast is also presented. Values presented are for consumers only, i.e., only for people who ate that food group at breakfast during the reporting period.

	Consumers		**Eating occasions (EO) at breakfast**		**Food weight**		**Energy /kcals**	
	*n**	**% breakfast consumers**	*n***	**% of total breakfast EO (n=896)**	**Mean**	**SD**	**Mean**	**SD**
Whole Milk	93	41.3	345	38.5	81.1	73.0	53.5	34.3
Semi skimmed milk	77	34.2	261	29.1	76.4	60.6	35.2	25.9
Skimmed milk	8	3.6	21	2.3	83.3	77.1	31.4	28.5
Fortified milk	34	15.1	118	13.2	120.4	83.2	58.9	40.4
ND milk alternatives	2	0.9	6	0.7	26.3	5.3	12.3	2.5
RTEBC	104	46.2	301	33.6	32.5	23.0	116.2	80.1

*n**= number of consumers of each food group at breakfast; *n***- number of eating occasions of each food group at breakfast SD = standard deviation

Section 5: Comparison of key findings between older and younger adults

5.1 Mean daily servings of dairy in 18-64 year olds versus ≥65 years

Table 5(a) shows the mean daily servings of total dairy, and all dairy sub-types, in the 18-64 year olds and the 65 and over age group. There was little difference between the two groups overall in the amount of dairy consumed. 18-64 year olds consumed a mean daily total of 2.06 servings of total dairy, while those aged ≥65 years consumed slightly less, with a mean daily intake of 1.92 servings of total dairy. The ≥65 year age group consumed slightly more total milk, at 1.22 mean daily servings, while 18-64 year olds consumed 1.18 mean daily servings of milk. The ≥65y age group also consumed more fortified milk, at 0.21 mean daily servings, compared to the mean daily servings of 0.11 in those aged 18-64 years. Cheese consumption was higher in 18-64 year olds, with a mean daily number of 0.63 servings, while in those aged 65 and over, the mean daily cheese consumption was 0.43 servings.

5.2 Mean daily intake (g) of dairy food groups in 18-64 year olds vs ≥65 years

Table 5(b) shows the mean daily (g/day) amounts consumed in the older and younger populations, for the total population, and for consumers only, of total dairy and for each dairy subgroup. Mean daily intakes of total dairy were broadly similar for both age groups in the total population at 288g/day in the 18-64 year olds compared to 293 g/day in ≥65year olds, with the chief contributor being milk (236.8g/d and 243.6g/d). Adults aged 18-64y tended to consume slightly lower amounts of semi-skimmed milk than older adults (70.7g/day vs 118.7g/day) and fortified milks (21.3g.day vs 42.2g/day). Adults aged 18-64y had slightly higher intakes of cheese at 18.9g/day vs 11.9g/day.

For consumers only, the patterns emerging were similar with comparable numbers of consumers in both groups (99.8% and 99.1%, in the 18-64 and ≥65 year old group respectively and with mean daily intakes of 288.5 and 295.6g/day respectively. There were comparable intakes for most other dairy food groups except for hard cheese, where 60.8% of 18-64y olds consumed cheese but it was eaten by only 45.6% of ≥65 year olds. However, where eaten, mean daily intakes were approx. 19g/day for both.

Table 5 (a): Comparison of Mean Daily Dairy Servings in 18-64 year olds and Adults ≥65 years, mean values and standard deviation (SD) in the total population

	Under 65s (*n* 1274)		≥65years (*n* 226)	
	Mean	SD	Mean	SD
Total dairy	2.06	1.30	1.92	1.2
Total milk	1.18	0.96	1.22	0.88
Whole milk	0.62	0.90	0.56	0.69
Semi-skimmed milk	0.35	0.65	0.38	0.65
Skimmed milk	0.08	0.32	0.06	0.23
Fortified milk	0.11	0.37	0.21	0.58
Non-dairy milk alternatives	0.02	0.15	0.01	0.05
Total cheese	0.63	0.70	0.43	0.65
Hard cheese	0.47	0.66	0.35	0.65
Soft cheese	0.09	0.19	0.02	0.08
Cottage cheese	0.00	0.05	0.00	0.04
Processed cheese	0.06	0.12	0.05	0.12
Total Yogurt	0.24	0.39	0.27	0.43
Yogurt	0.21	0.38	0.23	0.40
Drinking yogurt	0.03	0.09	0.04	0.12
Non-dairy yogurt alternative	0.01	0.07	0.01	0.08

n = number; SD = standard deviation

**Erratum*; the previous report [ref]) used a figure of 50g instead of 35g for a serving of processed cheese; resulting in minor changes to mean daily servings of processed and total cheese, and total dairy. For comparison purposes, the amended figures have been presented in this table.

Table 5 (b): Comparison of mean daily dairy intakes (g/day) in adults aged 18-64 year olds vs ≥65years in NANS

	18-64 years						65 and Over					
	Total Population *n* 1274		Consumers only				Total Population *n* 226		Consumers only			
	Mean	SD	n	%cons	Mean	SD	Mean	SD	n	%Cons	Mean	SD
Total Dairy	288	203.7	1272	99.8	288.5	203.6	293	188.2	224	99.1	295.6	187
Total milk	236.8	192.4	1240	97.3	243.3	191	243.6	175.1	221	97.8	249.1	173.1
Whole milk	124.7	179.6	1028	80.6	160.4	155	175.8	193.8	192	85	179.8	194.2
Semi-skimmed milk	70.7	130.1	562	44.1	189.1	160.1	118.7	189	99	43.8	270.9	200.8
Skimmed milk	16.6	64	199	15.6	106.4	129.2	12	45.4	41	18.1	66.1	89.1
Fortified milk	21.3	74.8	169	13.3	160.4	141.3	42.2	116.1	35	15.5	272.3	157.2
ND milk alternative	3.4	29.3	28	2.2	155.4	126.5	1.1	10.4	3	1.3	82.5	46.8
Total cheese	18.9	20.5	998	78.3	24.2	20.2	11.9	17.1	136	60.2	19.8	18.1
Hard Cheese	11.6	16.4	774	60.8	19.1	17.3	8.8	16.2	103	45.6	19.3	19.4
Soft cheese	4.7	9.3	425	33.4	14.2	11.1	1.1	3.8	29	12.8	35.4	27.3
Cottage cheese	0.3	4.0	12	0.9	33.7	24.8	0.2	3.3	1	0.4	50	-
Processed cheese	2.3	6.2	292	22.9	9.9	9.5	1.8	6.1	31	13.6	13.1	8.75
Total Yogurt	32.3	51.4	576	45.2	71.4	55.3	37.4	16	102	45.1	83	58.6
Yogurt	26.2	47.4	491	38.5	68	54.7	28.3	49.9	85	37.6	75.1	55.6
Drinking yogurt	5.4	18.3	130	10.2	52.6	28.3	9	25.9	31	13.7	65.3	35.2
ND yogurt alternatives	0.7	8.4	12	0.9	77	41.4	1.06	9.9	3	1.3	80.1	39.7

% cons= % consumers, *n* = number of consumers; SD = standard deviation. NANS – National Adult Nutrition Survey

Summary

Overall, 99.1% of Irish adults aged ≥65years were consumers of dairy with a mean daily intake of 296g/day; 97.8% were consumers of milk (249g/day), 60.2% consumers of cheese (19.8g/day) and 45.1% were consumers of yogurt (83g/day). The dairy group 'whole milk' had the highest consumer rates of all dairy foods for both males (89%) and females (82%) and across age groups (90%, 79%, 84%). Intakes of semi-skimmed milk and skimmed milks were broadly similar between males and females; however, there was a slightly higher intake of yogurts by females (54%, females: 88g/day; 35% males: 75g/day).

The mean daily number of dairy servings for the total population was 1.9. Total milk contributed 1.2 servings per day, total cheese 0.4 servings per day and total yogurt 0.3 servings per day. The greatest number of servings for any individual dairy type was for whole milk and hard cheese servings at 0.6 and 0.4 servings per day respectively. Within the total population, 15% of the population were consumers of the recommended 3 servings of dairy per day, 75% were under consumers and 10% consumed more than the recommendations. Similar numbers of males and females (16% and 14% respectively) were consumers of 3 servings of dairy per day. Fewer of those aged ≥75 years consumed the recommended 3 servings of dairy per day (13%) in comparison to the 65-69 year olds (18%).

Dairy provides 9.7% of energy (kcal) in the total population and was a major contributor to protein, fat, saturated fat, trans fat, retinol, vitamin B12, riboflavin, iodine and calcium intakes. Of the dairy subtypes, whole milk contributed most to protein, carbohydrate, iodine, riboflavin, vitamin B12 and calcium, hard cheese contributed most to saturated and trans fat while fortified milk contributed most to vitamin D, folate and vitamin E intakes.

Mean daily intakes of energy (kcal) and the percentage energy from carbohydrate, total sugar, the B-vitamins and calcium per 10MJ were significantly higher in high consumers of dairy when compared to low consumers, and salt intakes were lower in high consumers of dairy. There were no differences in total fat, saturated fat or trans fat intakes across groups of dairy consumption, while intakes of monounsaturated fat (as a percentage of energy) were lower in the high dairy consumer group. A similar pattern emerged for total milk. Consumers of cheese had significantly higher mean daily intakes of energy, saturated fat and trans fat (% energy), however there was no difference in intakes of total fat intakes or salt intake. Consumers of total yogurt had a significantly higher mean daily intake of carbohydrate, sugar, poly-unsaturated fatty acids, riboflavin and potassium when compared to non-consumers.

Intakes of micronutrients were typically adequate except for vitamin D, where only 14% of males and 23% of females satisfied the EAR. For salt, 52% of males and 15% of females exceeded the target of 6g/d, while high dairy intake was associated with improved serum folate and riboflavin status.

Over 96% of breakfast consumers consumed dairy at breakfast, with mean daily intakes of dairy at breakfast of 127g/day coming predominantly from milk (114g/day). Yogurt was consumed equally across breakfast, lunch and evening meals with a consumer rate of 18-19%, but was less frequently consumed as snacks (13% consumers with a mean daily intake of 48g/d at snacks). The consumer rate of cheese was greatest at lunch (38%; 15.6g/day at lunch) in comparison to breakfast and evening meals (7%; 21g/day at breakfast and 31%; 12g/day at the evening meal respectively). Looking at usage of dairy food types at breakfast, the highest usage rates were for whole milk which was consumed by 41.3% of breakfast consumers (or at 39% of all breakfast eating occasions) with a mean weight of 81g and energy contribution of 54kcal.

When comparing the current analysis of adults aged ≥65 years to intakes of adults aged 18-64 years within the national adult nutrition survey (NANS), the percentage consumers and intakes of milk were similar. However, adults aged ≥65 years tended to consume slightly higher amounts of fortified milks (16% consumer rate, mean daily intake of 272g/day) compared to 18-64 year olds (13% consumer rate, mean daily intake of 160g/day). Consumer rates of hard cheese were higher in 18-64 year olds (60.8%) than ≥65 year olds (45.6%), however, similar amounts were consumed by both groups (19g/day). Intakes of yogurt were typically the same for both age groups. Finally the number of servings of dairy were slightly higher in the 18-64 year old (2.06 servings) than the ≥65 year olds (1.92 servings).

Data for the above analysis is derived from a large nationally representative study of Irish adults. The extensive information collected in this survey is one of the most comprehensive of its kind in Europe, making it a valuable resource for agencies involved in public health promotion, regulation, consumer protection and the food industry. However, the following must be considered: these surveys are 'one off' or cross sectional in nature and therefore represent a 'snapshot' of the diet at any one time.

In conclusion, this report describes the contribution of dairy produce (milk, cheese and yogurt) to the Irish diet of Irish adults aged ≥65 years and contrasts with comparable information collected for 18-64 year olds.

References

1. Harrington KE et al. (2001). The North/South Ireland Food Consumption Survey: survey Design and Methodology. Public Health Nutr 4, 1037-42.

2. IUNA, National Adult Nutrition Survey. Summary report. 2011. [Online]. Available: www.iuna.net (accessed August 2014)

3. Food Standards Agency. McCance and Widdowson's The Composition of Foods, Sixth summary edition. Cambridge: Royal Society of Chemistry, 2002.

4. Holland B, Welch AA, Unwin ID, Buss DH, Paul AA, Southgate DAT. McCance & Widdowson's The Composition of Foods, 5th ed. London: HMSO, 1995.

5. Chan W, Brown J, Buss DH. Miscellaneous Foods. Fourth Supplement to McCance & Widdowson's The Composition of Foods, 5th ed. London: HMSO, 1994.

6. Chan W, Brown J, Church SM, Buss DH. Meat Products and Dishes. Sixth Supplement to McCance & Widdowson's The Composition of Foods, 5th ed. London: HMSO, 1996.

7. Chan W, Brown J, Lee SJ, Buss DH. Meat, Poultry and Game. Fifth Supplement to McCance & Widdowson's The Composition of Foods, 5th ed. London: HMSO, 1995.

8. Holland B, Unwin ID, Buss DH. Milk Products and Eggs. Fourth Supplement to McCance & Widdowson's The Composition of Foods, 4th ed. London: HMSO, 1989.

9. Holland B, Unwin ID, Buss DH. Vegetables, Herbs and Spices. Fifth Supplement to McCance & Widdowson's The Composition of Foods, 4 ed. London: HMSO, 1991.

10. Holland B, Welch AA, Buss DH. Vegetable Dishes. Second Supplement to McCance & Widdowson's The Composition of Foods, 5th ed. London: HMSO, 1996.

11. Holland B, Brown J, Buss DH. Fish and Fish Products. Third Supplement to McCance & Widdowson's The Composition of Foods, 5th ed. London: HMSO, 1993.

12. Holland B, Unwin ID, Buss DH. Cereal and Cereal Products. Third Supplement to McCance & Widdowson's The Composition of Foods, 4th ed. London: HMSO, 1988.

13. Holland B, Unwin ID, Buss DH. Fruits and Nuts. First Supplement to McCance & Widdowson's The Composition of Foods, 5th ed. London: HMSO, 1992.

14. Report on the Contribution of Dairy Foods to the Nutritional Quality of the Irish Adult Diet; Dairy Specific Analysis of the National Adult Nutrition Survey (18-64 year olds), IUNA, 2012. [Online].Available:

http://www.ndc.ie/health/documents/IUNAReportfortheNationalDairyCouncilOctober2012Final.pdf (Accessed August 2014)

15. Gilsenan MB, Lambe J, Gibney MJ. Irish National Food Ingredient Database: application for assessing patterns of additive usage in foods. Food Additives and Contaminants, 19(12): 1105-15, 2002.

16. Department of Health and the Health Service Executive – Your Guide to Healthy Eating Using the Food Pyramid, 2012 [Online]. Available: https://www.healthpromotion.ie/hp-files/docs/HPM00796.pdf

17. WHO. Physical status: the use and interpretation of anthropometry. Report of a WHO Expert Committee. WHO Technical Report Series 854. Geneva: World Health Organization, 1995.

18. WHO. Obesity: preventing and managing the global epidemic. Report of a WHO Consultation. WHO Technical Report Series 894. Geneva: World Health Organization, 2000.

19. Haftenberger M, Schuit AJ, Tormo MJ *et al.* Physical activity of subjects aged 50-64 years involved in the European Prospective Investigation into Cancer and Nutrition (EPIC). Public Health Nutr 5: 1163-76, 2002

20. Kjeldsen, SE, Erdine S, Farsang C, Sleight P, Mancia G. WHO/ISH Hypertension Guidelines – highlights and ESH update. J Hypertension, 20:153-5, 2002

21. Molloy AM, Scott JM. Microbiological assay for serum, plasma, and red cell folate using cryopreserved, microtiter plate method. Vitamins and Coenzymes, Pt K, 1997:43-53

22. Kelleher BP, Broin SDO. Microbiological assay for vitamin B_{12} performed in 96 well microtitre plates. Journal of Clinical Pathology 1991; 44:592-595

23. Powers HJ, Prentice AM, Lamb WH, Jepson M, Bowman, H. The relative effectiveness of iron and iron with riboflavin in correcting a microcytic anemia in men and children in rural Gambia. Hum Nutr Clin Nutr, 413-425, 1983.

24. Bates CJ, Pentieva KD, Prentice A, Mansoor MA, Finch S. Plasma pyridoxal phosphate and pyridoxic acid and their relationship to plasma homocysteine in a representative sample of British men and women aged 65 years and over. Br J Nutr 1999; 81:191–201

25. Calcium assay information. [Online] Available: http://www.randoxonlinestore.com/Reagents/Calcium

26. Institute of Medicine Food and Nutrition Board. Dietary Reference Intakes for Calcium and Vitamin D. Washington, DC: National Academy Press. 2011

27. Department of Health UK Dietary Reference Values of Food Energy and Nutrients for the United Kingdom. London: HMSO, 1991.

28. Scientific Advisory Committee on Nutrition, Salt and Health. [Online] Available: http://www.sacn.gov.uk/pdfs/sacn_salt_final.pdf

29. Dietary Reference Intakes (DRIs): Estimated Average Requirements, Food and Nutrition Board, Institute of Medicine, National Academies. [Online]. Available: http://iom.edu/Activities/Nutrition/SummaryDRIs/~/media/Files/Activity%20Files/Nutrition/DRIs/EAR%20Table.pdf