

Report on protein intake in the general population and in relevant subgroups in the Lifelines cohort, on behalf of the report Gezonde Eiwittransitie of the Health Council of The Netherlands

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lifelines 

Inhoud

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Methods

Study population

The Lifelines cohort study is a multidisciplinary general population-based cohort study. The participants were recruited from the three Northern provinces of the Netherlands between 2006 and 2013 (Baseline). A detailed description of the Lifelines cohort study can be found elsewhere (1, 2). Adult participants (≥ 18 years) were asked to complete several questionnaires regarding various aspects, including demographics, lifestyle (such as dietary intake and dietary behaviors), medication use, and disease conditions. Collection of biosamples and other objective medical measurements were also conducted for biomedical assessments. Only adult participants with complete data on dietary intake, dietary behavior, and disease conditions were included in this report.

Vegetarian and vegan status

The vegetarian and vegan status were categorized based on self-reported questionnaires. Firstly, adult participants were asked “were you on a diet based on certain beliefs/convictions (e.g., vegetarian or macrobiotic)?” where they could choose from “yes, always”, “yes, sometimes”, and “no”. Subsequently, they were asked “if you follow a diet based on certain beliefs/convictions, which belief/conviction is this?” where they could choose vegetarian (defined as meat less than 1x per week) or vegan (no animal products at all). When the answer was “yes, always” vegetarian/vegan, we considered the participant being vegetarian/vegan; while “yes, sometimes” vegetarian/vegan was considered semi-vegetarian/vegan. A participant was categorized as non-vegetarian/vegan when they answered “no”. Those who did not answer the question both the first and subsequent questions were categorized as missing data on vegetarian/vegan status.

True body weight, Reference body weight and Protein intake

True body weight was measured without shoes, wearing light clothing with empty pockets, by trained staff at baseline assessment. The reference body weight in adults was derived from the Dutch health council and was calculated by squaring the average height (in meters) of Dutch people (in 2009-2010) and multiplying it by a body mass index of 22 kg/m² for adults aged 18-50, 23 for adults aged 50-70 and 24 for adults aged 70 and over (3).

A semi-quantitative self-reported food frequency questionnaire (FFQ) was used to assess the intake of 110 food items over the last month; this FFQ was developed and validated by Wageningen University & Research (4, 5). Frequency categories range from 'not this month' to '6-7 days per week', with an indication of the portion size and household measurements units. Habitual dietary protein intake was estimated from the FFQ by using the 2011 Dutch food composition database (NEVO) (6). The reliability of FFQ data was assessed according to Schofield equation, which demonstrated the ratio of reported energy intake and basal metabolic rate (7). Based on Goldberg cutoff method, the participants with a ratio below 0.87 or above 2.75 were excluded during dietary assessment (8). In Lifelines-MINUTHE, one of the sub-cohorts (with a relatively old subpopulation) of Lifelines, the protein intake measured by the FFQ was correlated with protein intake measured from 24h urine with a correlation coefficient of 0.37. Dietary protein intake was further calculated into gram per kilogram true/reference body weight per day (g/kg/d). Subsequently, three categories were categorized based on the estimated average intake (EAR) (0.66 g/kg/d) and recommended intake (0.83 g/kg/d) for adults from the Dutch health council (3).

Disease domains and healthy groups

Identification of disease groups was based on a combination of self-reported questionnaires and objective examinations and measurements performed at baseline assessment. Diabetes (IV-E10/E11/E12/E14) was identified from self-reported diabetes, use of oral anti-diabetics and/or insulin, fasting glucose levels >6.99 mmol/L, or non-fasting glucose level >11.0 mmol/L. Hypertension (IX-I10) was present if blood pressure > 140/90mmHG or use of anti-hypertensive medication.

Cardiovascular disease was present if one of the following disease symptoms was present: heart failure, atrial fibrillation, pacemaker, vascular disease, or heart transplant. Heart failure (IX-I50) was present if self-reported disease and use of (any) heart failure-related medication (diuretics, ACE-I, aldosteronantagonist, betablocker, angiotensin receptor blocker). Atrial fibrillation (IX-I48) was present if self-reported, 'diagnosed by MD' and use of vitamin K antagonists, or atrial fibrillation on Electrocardiogram (ECG) and use of vitamin K antagonists, or CHADVASC <2 and atrial fibrillation on

ECG. Pacemaker (XXI-Z95.0) was self-reported. Vascular disease (IX-I21, IX-I25.2, IX-I64) was present if self-reported myocardial infarction, stroke, PCI & CABG, and use of vitamin K antagonists or aspirin/acetylsalicylic acid or clopidogrel. Heart transplant (XXI-Z94.1) was self-reported.

Kidney disease (XIV-N19) was present if eGFR ≥ 60 ml/min/1.73m² with albuminuria (24h albumin >30) or eGFR <60 ml/min/1.73m². Lung disease was present if one of the following disease was present: asthma, chronic obstructive pulmonary disease (COPD), chronic mucus hypersecretion, or chronic bronchitis. Asthma (X-J45) was present if doctors diagnosed asthma, or 2 or more self-reported symptoms of wheeze, attacks at rest, woken by an attack and use of asthma /COPD medication, or self-reported asthma and use of asthma/COPD medication. COPD (X-J44) was present if spirometry data is available (COPD_GOLD classification: I-IV) or not available (self-reported COPD & use of asthma/COPD medication & age>40). Chronic mucus hypersecretion (X-J42) was present if pleghm production during day or night or immediately after waking up during at least 3 months/year. Chronic bronchitis (X-J40) was present if coughing/ pleghm production during the day or night or immediately after waking up during at least 3 months/year.

Individuals were classified into healthy group when none of the disease domains was present. Individuals could be classified into several disease subgroups depending on the prevalence of diseases.

Results in tables and figures

Information on protein intake stratified by vegetarian status

Table 1: Characteristics stratified by vegetarian status

Diet	Number	Age, years Mean, sd	Gender %female	BMI, kg/m2 Mean, sd	Total protein intake, g/kg/d Mean, sd / Median, IQR*	Total protein intake, g/d Mean, sd
Vegetarian	2,390	44 ± 13	77.7	24.0 ± 3.8	0.87 (0.74-1.04)	63.4 ± 16.9
Semi-vegetarian	3,221	48 ± 13	77.4	24.9 ± 4.0	0.96 ± 0.2	69.2 ± 17.9
Non-vegetarian	118,225	44 ± 13	57.1	26.1 ± 4.3	1.0 ± 0.3	78.7 ± 19.7

*IQR = inter quartile range. Total protein intake (g/kg/d) in the vegetarian group was not normally distributed so median and IQR are presented here.

Figure 1: Categories of total protein intake (g/kg/d) of total study population (n=115,610), based on **true body weight**, stratified by vegetarian status

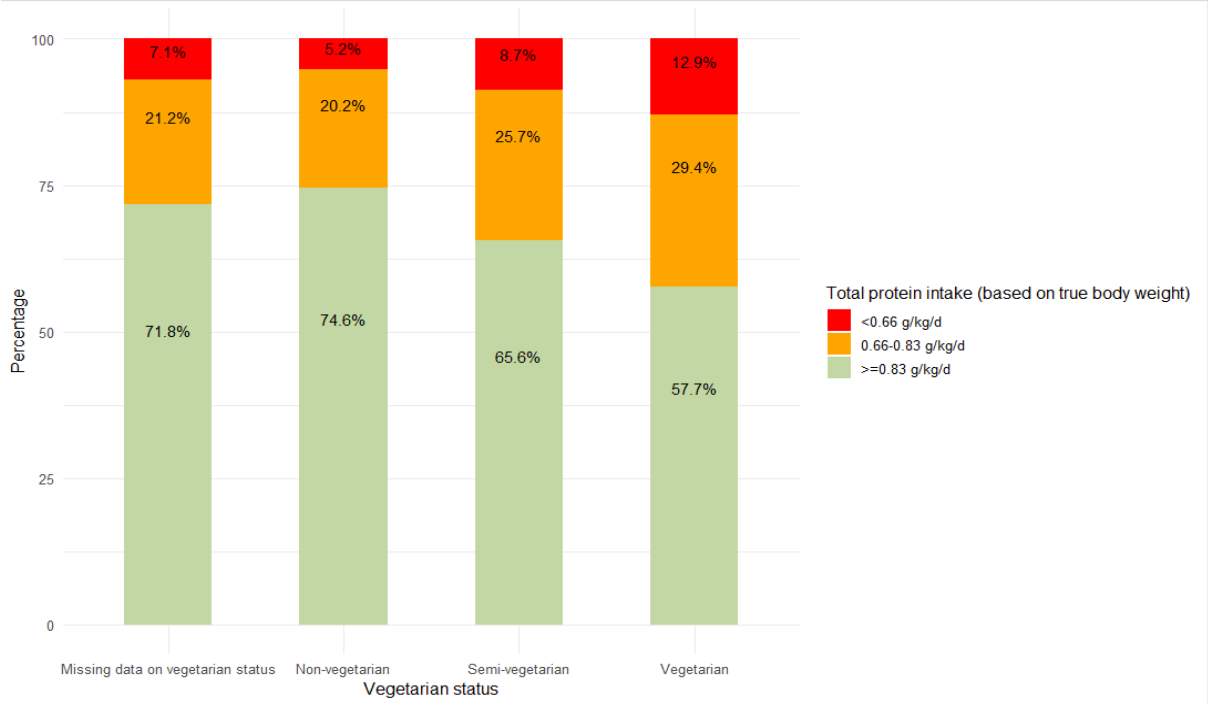


Figure 2: Categories of total protein intake (g/kg/d) of females (n=67,694) based on **true body weight**, stratified by vegetarian status

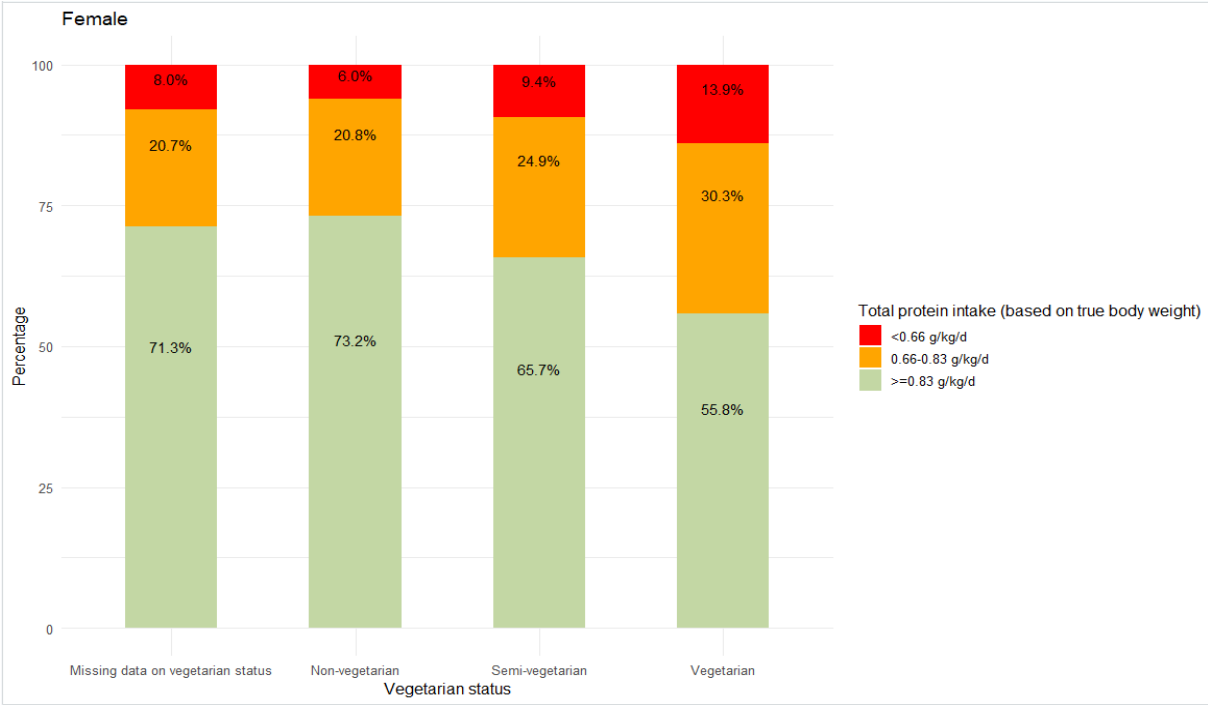


Figure 3: Categories of total protein intake (g/kg/d) of males (n=47,916) based on **true body weight**, stratified by vegetarian status

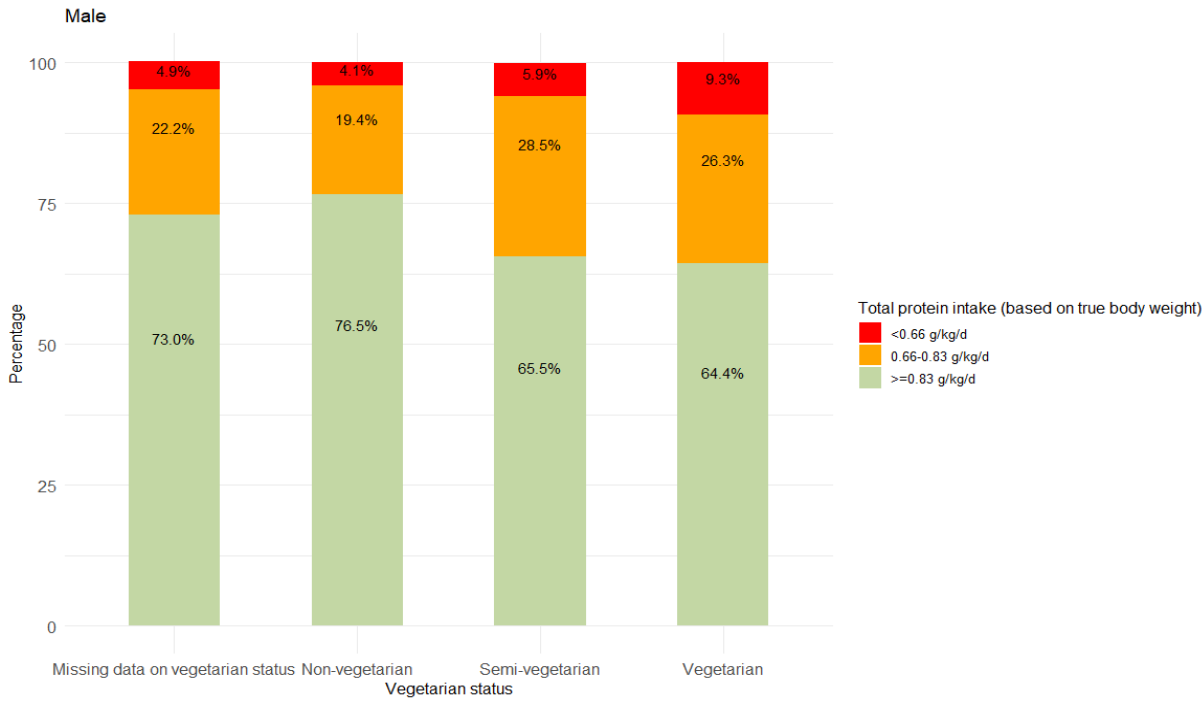


Figure 4: Categories of total protein intake (g/kg/d) of total study population (n=115,610) based on **reference body weight**, stratified by vegetarian status

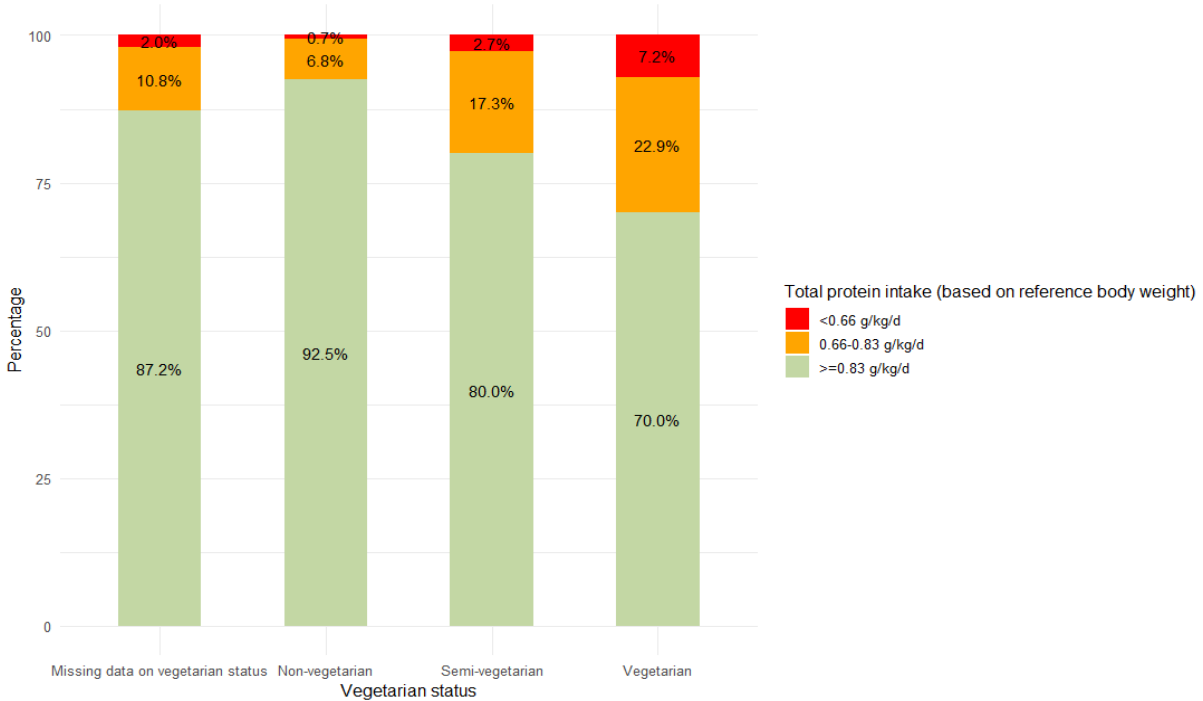


Figure 5: Categories of total protein intake (g/kg/d) of females (n=67,694) based on **reference body weight**, stratified by vegetarian status

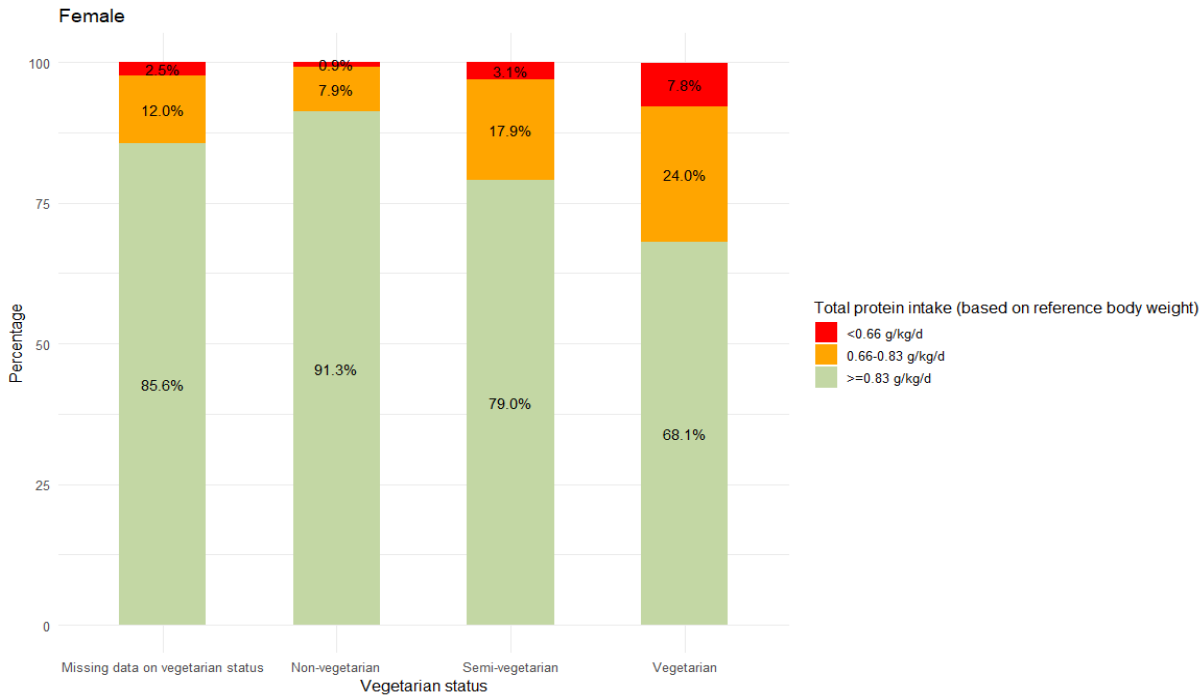
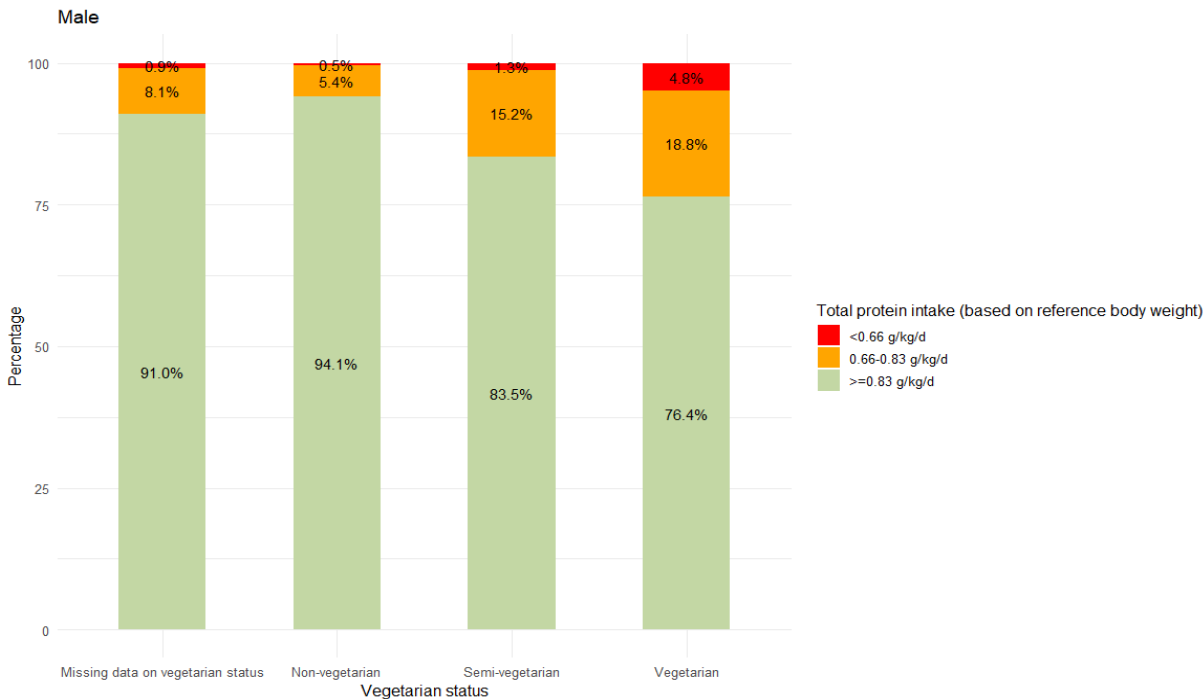


Figure 6: Categories of total protein intake (g/kg/d) of males (n=47,916) based on **reference body weight**, stratified by vegetarian status



Information on protein intake stratified by vegan status

Table 2: Characteristics stratified by vegan status

Diet	Number	Age, years Mean, sd	Gender (%female)	BMI, kg/m2 Mean, sd	Total protein intake, g/kg/d Median, IQR*	Total protein intake, g/d Mean, sd
Vegetarian	160	46 ± 14	74.4	24.5 ± 3.8	0.78 (0.67-0.91)	58.7 ± 16.2
Semi-vegetarian	61	47 ± 14	75.4	25.5 ± 4.1	0.89 (0.80-1.03)	68.5 ± 30.0
Non-vegetarian	118,795	45 ± 13	57.2	26.1 ± 4.3	0.97 (0.82-1.15)	78.7 ± 19.7

*IQR = inter quartile range. Total protein intake (g/kg/d) was not normally distributed so median and IQR are presented here.

Figure 7: Categories of total protein intake (g/kg/d) of total study population (n=1115,610), based on true body weight, stratified by vegan status

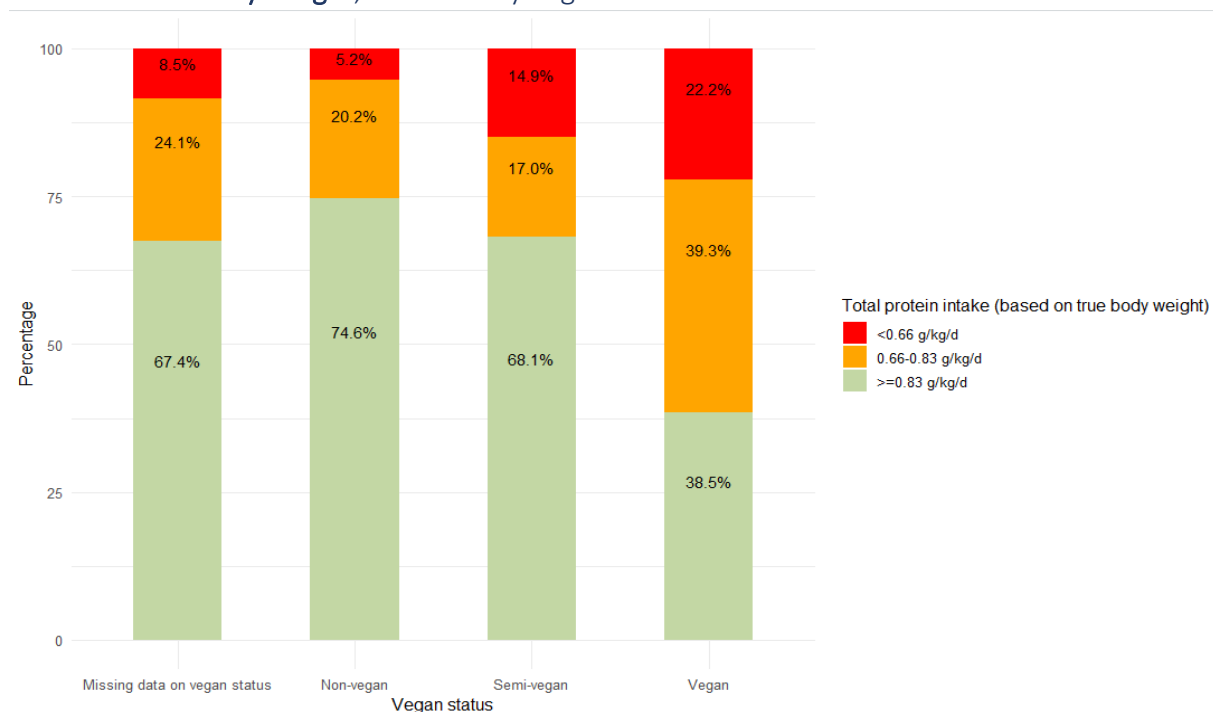


Figure 8: Categories of total protein intake (g/kg/d) of females (n=67,694) based on **true body weight**, stratified by vegan status

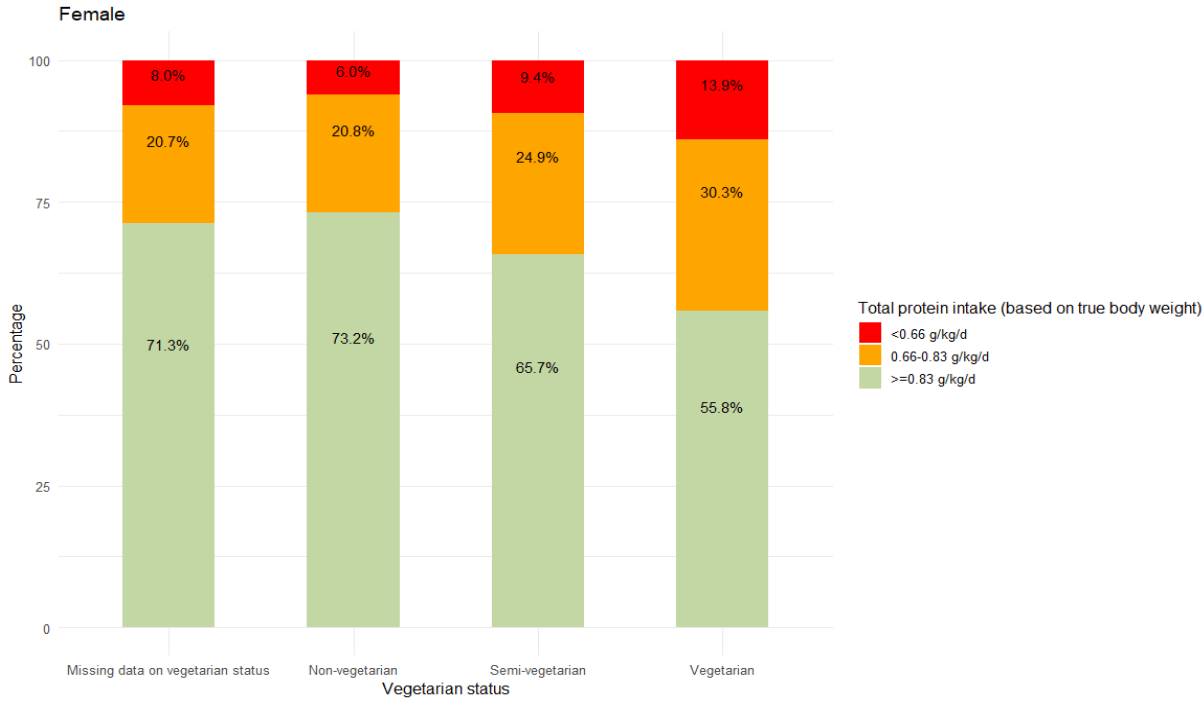


Figure 9: Categories of total protein intake (g/kg/d) of males (n=47,916) based on **true body weight**, stratified by vegan status

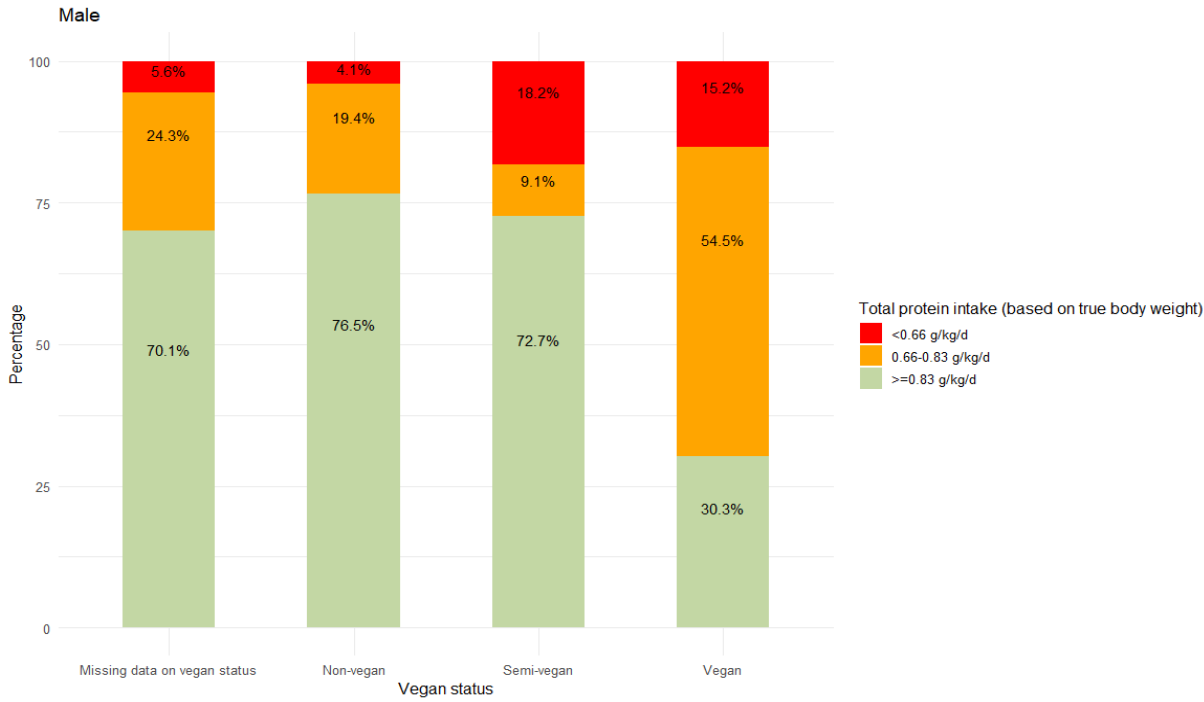


Figure 10: Categories of total protein intake (g/kg/d) of total study population (n=115,610) based on **reference body weight**, stratified by vegan status

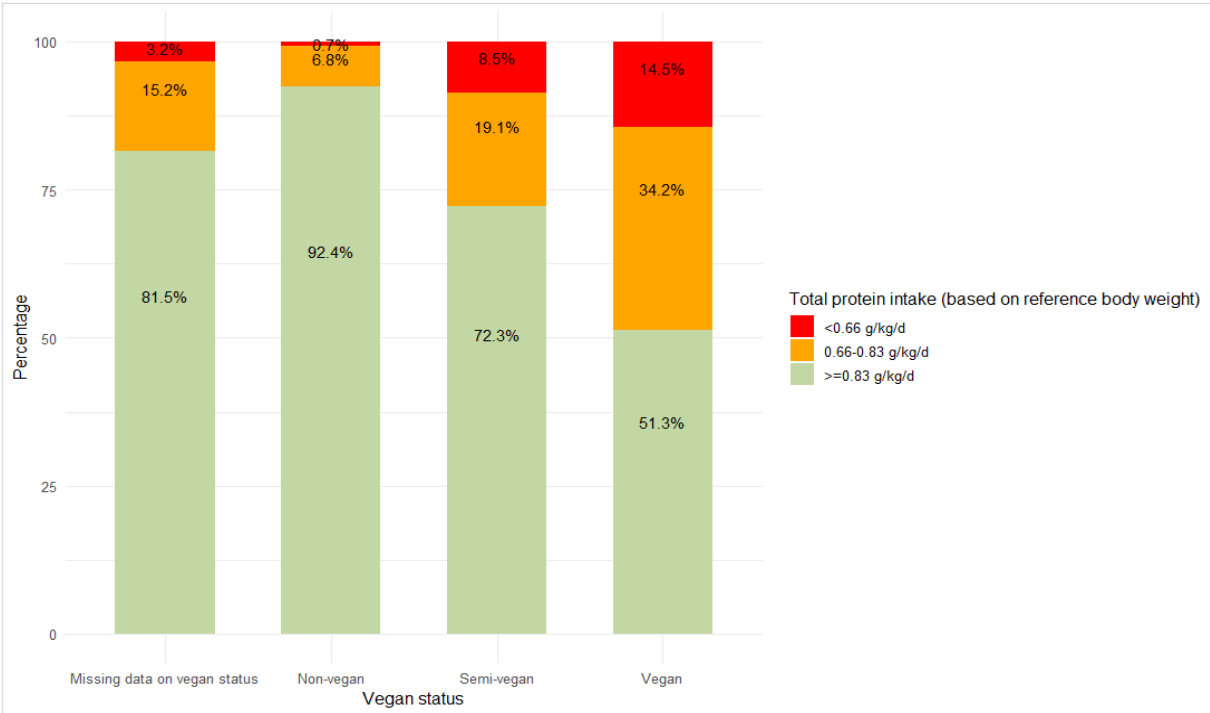


Figure 11: Categories of total protein intake (g/kg/d) of females (n=67,694) based on **reference body weight**, stratified by vegan status

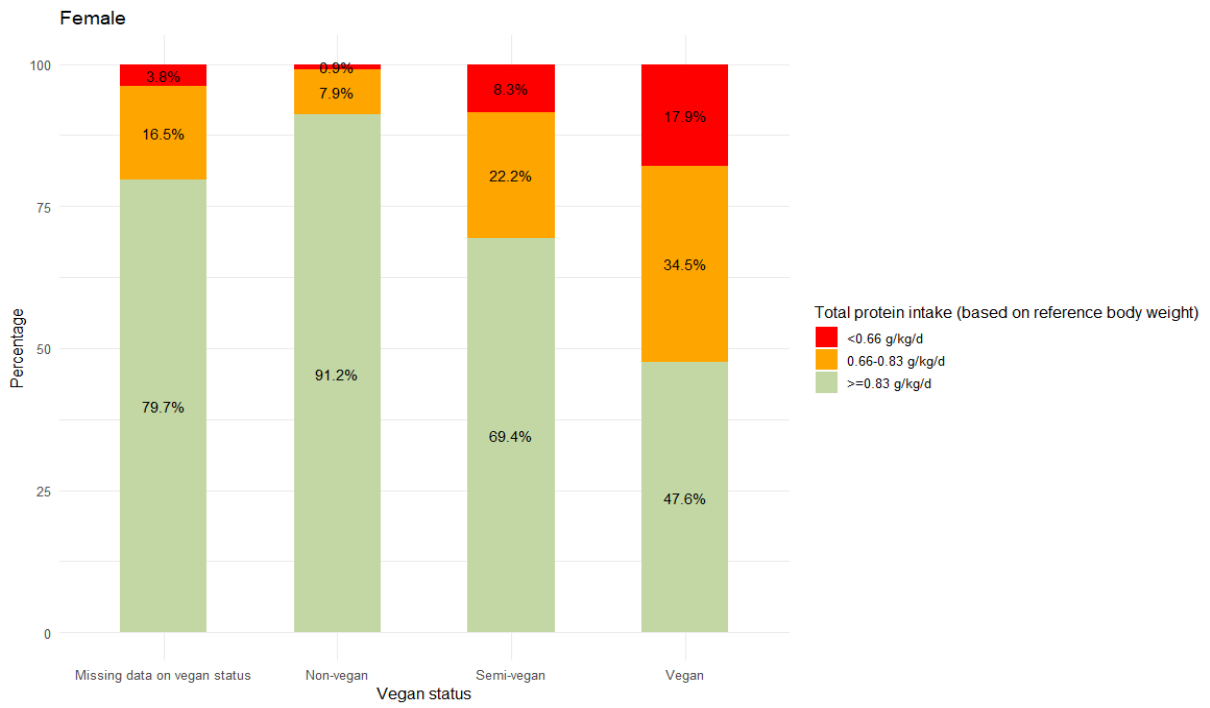
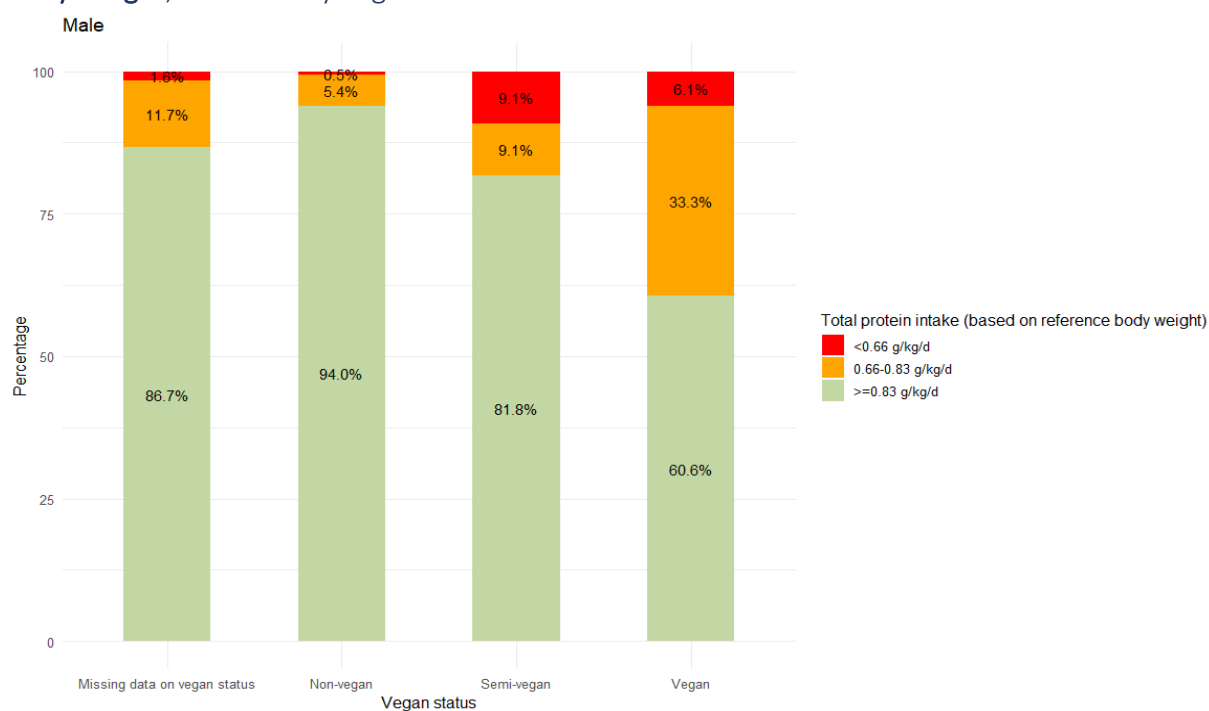


Figure 12: Categories of total protein intake (g/kg/d) of males (n=47,916) based on **reference body weight**, stratified by vegan status



Information on protein intake of people with diabetes

Table 3: Categories of total protein intake (g/kg/d), of females and males with diabetes (n=4,291), based on **true body weight**

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	315	17 (5.4)	60 (19.1)	238 (75.5)
30-39	450	26 (5.8)	105 (23.3)	319 (70.9)
40-49	1,096	122 (11.1)	302 (27.6)	672 (61.3)
50-59	856	88 (10.3)	233 (27.2)	535 (62.5)
60-64	618	60 (9.7)	188 (30.4)	370 (59.9)
65-69	525	55 (10.5)	171 (32.6)	299 (56.9)
70-74	266	27 (10.1)	83 (31.2)	156 (58.7)
75-79	127	10 (7.9)	34 (26.8)	83 (65.3)
>=80	38	2 (5.3)	16 (42.1)	20 (52.6)

Table 4: Categories of total protein intake (g/kg/d), of females with diabetes (n=2,239), based on **true body weight**

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	172	12 (7.0)	44 (25.6)	116 (67.4)
30-39	257	17 (6.6)	74 (28.8)	166 (64.6)
40-49	600	87 (14.5)	180 (30.0)	333 (55.5)

50-59	454	53 (11.7)	126 (27.7)	275 (60.6)
60-64	310	27 (8.7)	99 (31.9)	184 (59.4)
65-69	239	32 (13.4)	73 (30.5)	134 (56.1)
70-74	126	14 (11.1)	45 (35.7)	67 (53.2)
75-79	65	7 (10.8)	19 (29.2)	39 (60.0)
>=80	16	2 (12.5)	4 (25.0)	10 (62.5)

Table 5: Categories of total protein intake (g/kg/d), of males with diabetes (n=2,052), based on true body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	143	5 (3.5)	16 (11.2)	122 (85.3)
30-39	193	9 (4.7)	31 (16.0)	153 (79.3)
40-49	496	35 (7.1)	122 (24.6)	339 (68.3)
50-59	402	35 (8.7)	107 (26.6)	260 (64.7)
60-64	308	33 (10.7)	89 (28.9)	186 (60.4)
65-69	286	23 (8.0)	98 (34.3)	165 (57.7)
70-74	140	13 (9.3)	38 (27.1)	89 (63.6)
75-79	62	3 (4.8)	15 (24.2)	44 (71.0)
>=80	22	0 (0.0)	12 (54.5)	10 (45.5)

Table 6: Categories of total protein intake (g/kg/d), of females and males with diabetes (n=4,291), based on reference body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	315	4 (1.3)	42 (13.3)	269 (85.4)
30-39	450	2 (0.4)	29 (6.4)	419 (93.2)
40-49	1,096	7 (0.6)	57 (5.2)	1,032 (94.2)
50-59	856	9 (1.0)	46 (5.4)	801 (93.6)
60-64	618	3 (0.5)	40 (6.5)	575 (93.0)
65-69	525	8 (1.5)	42 (8.0)	475 (90.5)
70-74	266	4 (1.5)	22 (8.3)	240 (90.2)
75-79	127	0 (0.0)	13 (10.2)	114 (89.8)
>=80	38	1 (2.6)	7 (18.4)	30 (79.0)

Table 7: Categories of total protein intake (g/kg/d), of females with diabetes (n=2,239), based on reference body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	172	4 (2.3)	32 (18.6)	136 (79.1)
30-39	257	2 (0.8)	27 (10.5)	228 (88.7)
40-49	600	5 (0.8)	35 (5.8)	560 (93.4)
50-59	454	7 (1.5)	24 (5.3)	423 (93.2)

60-64	310	2 (0.6)	21 (6.8)	287 (92.6)
65-69	239	5 (2.1)	16 (6.7)	218 (91.2)
70-74	126	1 (0.8)	9 (7.1)	116 (92.1)
75-79	65	0 (0.0)	7 (10.8)	58 (89.2)
>=80	16	0 (0.0)	4 (25.0)	12 (75.0)

Table 8: Categories of total protein intake (g/kg/d), of males with diabetes (n=2,052), based on reference body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	143	0 (0.0)	10 (7.0)	133 (93.0)
30-39	193	0 (0.0)	2 (1.0)	191 (99.0)
40-49	496	2 (0.4)	22 (4.4)	472 (95.2)
50-59	402	2 (0.5)	22 (5.5)	378 (94.0)
60-64	308	1 (0.3)	19 (6.2)	288 (93.5)
65-69	286	3 (1.0)	26 (9.1)	257 (89.9)
70-74	140	3 (2.1)	13 (9.3)	124 (88.6)
75-79	62	0 (0.0)	6 (9.7)	56 (90.3)
>=80	22	1 (4.6)	3 (13.6)	18 (81.8)

Information on protein intake of people with hypertension

Table 9: Categories of total protein intake (g/kg/d), of females and males with hypertension (n=16,723), based on true body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	182	4 (2.2)	43 (23.6)	135 (74.2)
30-39	903	87 (9.6)	217 (24.1)	599 (66.3)
40-49	4,461	396 (8.9)	1,193 (26.7)	2,872 (64.4)
50-59	4,273	286 (6.7)	1,117 (26.1)	2,870 (67.2)
60-64	2,806	255 (9.1)	772 (27.5)	1,779 (63.4)
65-69	2,174	198 (9.1)	625 (28.8)	1,351 (62.1)
70-74	1,162	108 (9.3)	355 (30.6)	699 (60.1)
75-79	527	48 (9.1)	143 (27.1)	336 (63.8)
>=80	235	25 (10.6)	72 (30.7)	138 (58.7)

Table 10: Categories of total protein intake (g/kg/d), of females with hypertension (n=8,948), based on true body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	113	2 (1.8)	29 (25.6)	82 (72.6)
30-39	483	60 (12.4)	101 (20.9)	322 (66.7)
40-49	2,442	259 (10.6)	669 (27.4)	1,514 (62.0)

50-59	2,406	191 (7.9)	622 (25.9)	1,593 (66.2)
60-64	1,456	148 (10.2)	382 (26.2)	926 (63.6)
65-69	1,094	116 (10.6)	283 (25.9)	695 (63.5)
70-74	581	48 (8.3)	180 (31.0)	353 (60.7)
75-79	268	28 (10.4)	72 (26.9)	168 (62.7)
>=80	105	15 (14.3)	25 (23.8)	65 (61.9)

Table 11: Categories of total protein intake (g/kg/d), of males with hypertension (n=7,775), based on **true body weight**

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	69	2 (2.9)	14 (20.3)	53 (76.8)
30-39	420	27 (6.4)	116 (27.6)	277 (66.0)
40-49	2,019	137 (6.8)	524 (25.9)	1,358 (67.3)
50-59	1,867	95 (5.1)	495 (26.5)	1,277 (68.4)
60-64	1,350	107 (7.9)	390 (28.9)	853 (63.2)
65-69	1,080	82 (7.6)	342 (31.7)	656 (60.7)
70-74	581	60 (10.3)	175 (30.1)	346 (59.6)
75-79	259	20 (7.7)	71 (27.4)	168 (64.9)
>=80	130	10 (7.7)	47 (36.1)	73 (56.2)

Table 12: Categories of total protein intake (g/kg/d), of females and males with hypertension (n=16,723), based on **reference body weight**

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	182	1 (0.6)	23 (12.6)	158 (86.8)
30-39	903	7 (0.8)	57 (6.3)	839 (92.9)
40-49	4,461	22 (0.5)	261 (5.8)	4178 (93.7)
50-59	4,273	27 (0.6)	257 (6.0)	3989 (93.4)
60-64	2,806	22 (0.8)	219 (7.8)	2565 (91.4)
65-69	2,174	25 (1.2)	196 (9.0)	1953 (89.8)
70-74	1,162	19 (1.6)	139 (12.0)	1004 (86.4)
75-79	527	13 (2.5)	61 (11.6)	453 (85.9)
>=80	235	7 (3.0)	43 (18.3)	185 (78.7)

Table 13: Categories of total protein intake (g/kg/d), of females with hypertension (n=8,948), based on **reference body weight**

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	113	1 (0.9)	18 (15.9)	94 (83.2)
30-39	483	7 (1.4)	42 (8.7)	434 (89.9)
40-49	2,442	14 (0.6)	158 (6.4)	2270 (93.0)

50-59	2,406	21 (0.9)	145 (6.0)	2240 (93.1)
60-64	1,456	15 (1.0)	127 (8.7)	1314 (90.3)
65-69	1,094	14 (1.3)	100 (9.1)	980 (89.6)
70-74	581	5 (0.9)	64 (11.0)	512 (88.1)
75-79	268	5 (1.9)	29 (10.8)	234 (87.3)
>=80	105	4 (3.8)	22 (21.0)	79 (75.2)

Table 14: Categories of total protein intake (g/kg/d), of males with hypertension (n=7,775), based on reference body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	69	0 (0.0)	5 (7.2)	64 (92.8)
30-39	420	0 (0.0)	15 (3.6)	405 (96.4)
40-49	2,019	8 (0.4)	103 (5.1)	1908 (94.5)
50-59	1867	6 (0.3)	112 (6.0)	1749 (93.7)
60-64	1,,350	7 (0.5)	92 (6.8)	1251 (92.7)
65-69	1,080	11 (1.0)	96 (8.9)	973 (90.1)
70-74	581	14 (2.4)	75 (12.9)	492 (84.7)
75-79	259	8 (3.1)	32 (12.3)	219 (84.6)
>=80	130	3 (2.3)	21 (16.2)	106 (81.5)

Information on protein intake of people with cardiovascular diseases

Table 15: Categories of total protein intake (g/kg/d), of females and males with cardiovascular diseases (n=6,195), based on true body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	322	11 (3.4)	43 (13.4)	268 (83.2)
30-39	461	28 (6.1)	82 (17.8)	351 (76.1)
40-49	1,308	95 (7.3)	326 (24.9)	887 (67.8)
50-59	1,211	83 (6.9)	319 (26.3)	809 (66.8)
60-64	1,042	100 (9.6)	298 (28.6)	644 (61.8)
65-69	878	89 (10.1)	274 (31.2)	515 (58.7)
70-74	556	49 (8.8)	167 (30.0)	340 (61.2)
75-79	285	28 (9.8)	62 (21.8)	195 (68.4)
>=80	132	13 (9.8)	41 (31.1)	78 (59.1)

Table 16: Categories of total protein intake (g/kg/d), of females with cardiovascular diseases (n=3,043), based on true body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	194	9 (4.6)	31 (16.0)	154 (79.4)
30-39	297	23 (7.7)	52 (17.5)	222 (74.8)

40-49	723	64 (8.8)	184 (25.5)	475 (65.7)
50-59	640	54 (8.4)	173 (27.1)	413 (64.5)
60-64	452	51 (11.3)	128 (28.3)	273 (60.4)
65-69	355	49 (13.8)	106 (29.9)	200 (56.3)
70-74	226	19 (8.4)	72 (31.9)	135 (59.7)
75-79	109	10 (9.2)	27 (24.8)	72 (66.0)
>=80	47	7 (14.9)	9 (19.1)	31 (66.0)

Table 17: Categories of total protein intake (g/kg/d), of males with cardiovascular diseases (n=3,152), based on **true body weight**

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	128	2 (1.6)	12 (9.4)	114 (89.0)
30-39	164	5 (3.0)	30 (18.3)	129 (78.7)
40-49	585	31 (5.3)	142 (24.3)	412 (70.4)
50-59	571	29 (5.1)	146 (25.6)	396 (69.3)
60-64	590	49 (8.3)	170 (28.8)	371 (62.9)
65-69	523	40 (7.7)	168 (32.1)	315 (60.2)
70-74	330	30 (9.1)	95 (28.8)	205 (62.1)
75-79	176	18 (10.2)	35 (19.9)	123 (69.9)
>=80	85	6 (7.1)	32 (37.6)	47 (55.3)

Table 18: Categories of total protein intake (g/kg/d), of females and males with cardiovascular diseases (n=6,195), based on **reference body weight**

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	322	7 (2.2)	39 (12.1)	276 (85.7)
30-39	461	5 (1.1)	21 (4.5)	435 (94.4)
40-49	1,308	9 (0.7)	68 (5.2)	1231 (94.1)
50-59	1,211	8 (0.7)	81 (6.7)	1122 (92.6)
60-64	1,042	13 (1.2)	79 (7.6)	950 (91.2)
65-69	878	14 (1.6)	87 (9.9)	777 (88.5)
70-74	556	7 (1.3)	64 (11.5)	485 (87.2)
75-79	285	11 (3.9)	40 (14.0)	234 (82.1)
>=80	132	2 (1.5)	24 (18.2)	106 (80.3)

Table 19: Categories of total protein intake (g/kg/d), of females with cardiovascular diseases (n=3,043), based on **reference body weight**

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	194	5 (2.6)	31 (16.0)	158 (81.4)
30-39	297	5 (1.7)	17 (5.7)	275 (92.6)

40-49	723	6 (0.8)	50 (6.9)	667 (92.3)
50-59	640	6 (0.9)	46 (7.2)	588 (91.9)
60-64	452	5 (1.1)	37 (8.2)	410 (90.7)
65-69	355	8 (2.3)	37 (10.4)	310 (87.3)
70-74	226	1 (0.4)	24 (10.6)	201 (89.0)
75-79	109	3 (2.7)	11 (10.1)	95 (87.2)
>=80	47	0 (0.0)	12 (25.5)	35 (74.5)

Table 20: Categories of total protein intake (g/kg/d), of males with cardiovascular diseases (n=3,152), based on **reference body weight**

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	128	2 (1.6)	8 (6.2)	118 (92.2)
30-39	164	0 (0.0)	4 (2.4)	160 (97.6)
40-49	585	3 (0.5)	18 (3.1)	564 (96.4)
50-59	571	2 (0.4)	35 (6.1)	534 (93.5)
60-64	590	8 (1.4)	42 (7.1)	540 (91.5)
65-69	523	6 (1.1)	50 (9.6)	467 (89.3)
70-74	330	6 (1.8)	40 (12.1)	284 (86.1)
75-79	176	8 (4.5)	29 (16.5)	139 (79.0)
>=80	85	2 (2.4)	12 (14.1)	71 (83.5)

Information on protein intake of people with kidney diseases

Table 21: Categories of total protein intake (g/kg/d), of females and males with kidney diseases (n=1,038), based on **true body weight**

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	170	9 (5.3)	23 (13.5)	138 (81.2)
30-39	158	9 (5.7)	32 (20.3)	117 (74.0)
40-49	262	15 (5.7)	73 (27.9)	174 (66.4)
50-59	157	9 (5.7)	37 (23.6)	111 (70.7)
60-64	100	15 (15.0)	25 (25.0)	60 (60.0)
65-69	76	4 (5.3)	22 (28.9)	50 (65.8)
70-74	50	8 (16.0)	14 (28.0)	28 (56.0)
75-79	31	6 (19.4)	9 (29.0)	16 (51.6)
>=80	34	4 (11.8)	14 (41.2)	16 (47.0)

Table 22: Categories of total protein intake (g/kg/d), of females with kidney diseases (n=509), based on **true body weight**

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	126	8 (6.3)	20 (15.9)	98 (77.8)

30-39	90	8 (8.9)	20 (22.2)	62 (68.9)
40-49	136	11 (8.1)	39 (28.7)	86 (63.2)
50-59	69	3 (4.3)	18 (26.1)	48 (69.6)
60-64	33	9 (27.3)	7 (21.2)	17 (51.5)
65-69	25	3 (12.0)	5 (20.0)	17 (68.0)
70-74	13	2 (15.4)	3 (23.1)	8 (61.5)
75-79	10	3 (30.0)	4 (40.0)	3 (30.0)
>=80	7	1 (14.3)	2 (28.6)	4 (57.1)

Table 23: Categories of total protein intake (g/kg/d), of males with kidney diseases (n=529), based on true body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	44	1 (2.3)	3 (6.8)	40 (90.9)
30-39	68	1 (1.5)	12 (17.6)	55 (80.9)
40-49	126	4 (3.2)	34 (27.0)	88 (69.8)
50-59	88	6 (6.8)	19 (21.6)	63 (71.6)
60-64	67	6 (8.9)	18 (26.9)	43 (64.2)
65-69	51	1 (2.0)	17 (33.3)	33 (64.7)
70-74	37	6 (16.2)	11 (29.7)	20 (54.1)
75-79	21	3 (14.3)	5 (23.80)	13 (61.9)
>=80	27	3 (11.1)	12 (44.4)	12 (44.4)

Table 24: Categories of total protein intake (g/kg/d), of females and males with kidney diseases (n=1,038), based on reference body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	170	7 (4.1)	18 (10.6)	145 (85.3)
30-39	158	4 (2.5)	9 (5.7)	145 (91.8)
40-49	262	0 (0.0)	19 (7.2)	243 (92.8)
50-59	157	0 (0.0)	13 (8.3)	144 (91.7)
60-64	100	2 (2.0)	12 (12.0)	86 (86.0)
65-69	76	2 (2.6)	3 (4.0)	71 (93.4)
70-74	50	1 (2.0)	9 (18.0)	40 (80.0)
75-79	31	0 (0.0)	9 (29.0)	22 (71.0)
>=80	34	1 (2.9)	5 (14.7)	28 (82.3)

Table 25: Categories of total protein intake (g/kg/d), of females with kidney diseases (n=509), based on reference body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	126	7 (5.6)	17 (13.5)	102 (80.9)

30-39	90	3 (3.3)	7 (7.8)	80 (88.9)
40-49	136	0 (0.0)	14 (10.3)	122 (89.7)
50-59	69	0 (0.0)	5 (7.2)	64 (92.3)
60-64	33	1 (3.0)	6 (18.2)	26 (78.8)
65-69	25	2 (8.0)	1 (4.0)	22 (88.0)
70-74	13	0 (0.0)	3 (23.1)	10 (76.9)
75-79	10	0 (0.0)	4 (40.0)	6 (60.0)
>=80	7	0 (0.0)	1 (14.3)	6 (85.7)

Table 26: Categories of total protein intake (g/kg/d), of males with kidney diseases (n=529), based on reference body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	44	0 (0.0)	1 (2.3)	43 (97.7)
30-39	68	1 (1.5)	2 (2.9)	65 (95.6)
40-49	126	0 (0.0)	5 (4.0)	121 (96.0)
50-59	88	0 (0.0)	8 (9.1)	80 (90.9)
60-64	67	1 (1.5)	6 (9.0)	60 (89.5)
65-69	51	0 (0.0)	2 (3.9)	49 (96.1)
70-74	37	1 (2.7)	6 (16.2)	30 (81.1)
75-79	21	0 (0.0)	5 (23.8)	16 (76.2)
>=80	27	0 (0.0)	5 (18.5)	22 (81.5)

Information on protein intake of people with lung diseases

Table 27: Categories of total protein intake (g/kg/d), of females and males with lung diseases (n=27,623), based on true body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	3,249	145 (4.5)	608 (18.7)	2,496 (76.8)
30-39	4,093	283 (6.9)	862 (21.1)	2,948 (72.0)
40-49	8,959	558 (6.2)	1,932 (21.6)	6,469 (72.2)
50-59	5,563	291 (5.2)	1,163 (20.9)	4,109 (73.9)
60-64	2,599	214 (8.2)	592 (22.8)	1,793 (69.0)
65-69	1,714	124 (7.2)	445 (26.0)	1,145 (66.8)
70-74	908	68 (7.5)	215 (23.7)	625 (68.8)
75-79	388	27 (7.0)	99 (25.5)	262 (67.5)
>=80	150	16 (10.7)	51 (34.0)	83 (55.3)

Table 28: Categories of total protein intake (g/kg/d), of females with lung diseases (n=15,038), based on true body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
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18-29	1,859	112 (6.0)	428 (23.0)	1,319 (71.0)
30-39	2,184	204 (9.4)	501 (22.9)	1,479 (67.7)
40-49	5,004	385 (7.7)	1,149 (23.0)	3,470 (69.3)
50-59	3,114	195 (6.3)	676 (21.7)	2,243 (72.0)
60-64	1,357	122 (9.0)	297 (21.9)	938 (69.1)
65-69	860	74 (8.6)	214 (24.9)	572 (66.5)
70-74	417	30 (7.2)	108 (25.9)	279 (66.9)
75-79	178	13 (7.3)	47 (26.4)	118 (66.3)
>=80	65	6 (9.2)	22 (33.9)	37 (56.9)

Table 29: Categories of total protein intake (g/kg/d), of males with lung diseases (n=12,585), based on true body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	1,390	33 (2.4)	180 (12.9)	1,177 (84.7)
30-39	1,909	79 (4.1)	361 (18.9)	1,469 (77.0)
40-49	3,955	173 (4.4)	783 (19.8)	2,999 (75.8)
50-59	2,449	96 (3.9)	487 (19.9)	1,866 (76.2)
60-64	1,242	92 (7.4)	295 (23.8)	855 (68.8)
65-69	854	50 (5.8)	231 (27.1)	573 (67.1)
70-74	491	38 (7.7)	107 (21.8)	346 (70.5)
75-79	210	14 (6.6)	52 (24.8)	144 (68.6)
>=80	85	10 (11.8)	29 (34.1)	46 (54.1)

Table 30: Categories of total protein intake (g/kg/d), of females and males with lung diseases (n=27,623), based on reference body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	3,249	69 (2.1)	366 (11.3)	2814 (86.6)
30-39	4,093	37 (0.9)	274 (6.7)	3782 (92.4)
40-49	8,959	67 (0.7)	536 (6.0)	8356 (93.3)
50-59	5,563	36 (0.7)	403 (7.2)	5124 (92.1)
60-64	2,599	31 (1.2)	230 (8.8)	2338 (90.0)
65-69	1,714	30 (1.7)	164 (9.6)	1520 (88.7)
70-74	908	16 (1.8)	105 (11.5)	787 (86.7)
75-79	388	13 (3.3)	45 (11.6)	330 (85.1)
>=80	150	6 (4.0)	33 (22.0)	111 (74.0)

Table 31: Categories of total protein intake (g/kg/d), of females with lung diseases (n=15,038), based on reference body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
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18-29	1,859	53 (2.8)	277 (14.9)	1529 (82.3)
30-39	2,184	29 (1.3)	177 (8.1)	1978 (90.6)
40-49	5,004	50 (1.0)	373 (7.4)	4581 (91.6)
50-59	3,114	30 (0.9)	242 (7.8)	2842 (91.3)
60-64	1,357	16 (1.2)	126 (9.3)	1215 (89.5)
65-69	860	14 (1.6)	89 (10.4)	757 (88.0)
70-74	417	6 (1.4)	49 (11.8)	362 (86.8)
75-79	178	7 (3.9)	21 (11.8)	150 (84.3)
>=80	65	4 (6.2)	16 (24.6)	45 (69.2)

Table 32: Categories of total protein intake (g/kg/d), of males with lung diseases (n=12,585), based on reference body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	1,390	16 (1.1)	89 (6.4)	1285 (92.5)
30-39	1,909	8 (0.4)	97 (5.1)	1804 (94.5)
40-49	3,955	17 (0.4)	163 (4.1)	3775 (95.5)
50-59	2,449	6 (0.2)	161 (6.6)	2281 (93.2)
60-64	1,242	15 (1.2)	104 (8.4)	1123 (90.4)
65-69	854	16 (1.9)	75 (8.8)	763 (89.3)
70-74	491	10 (2.0)	56 (11.4)	425 (86.6)
75-79	210	6 (2.9)	24 (11.4)	180 (85.7)
>=80	85	2 (2.4)	17 (20.0)	66 (77.6)

Information on protein intake of healthy people

Table 33: Categories of total protein intake (g/kg/d), of healthy females and males (n=72,740), based on true body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	11,753	385 (3.3)	2,011 (17.1)	9,357 (79.6)
30-39	17,501	977 (5.6)	3,350 (19.1)	13,174 (75.3)
40-49	25,573	1,262 (4.9)	5,006 (19.6)	19,305 (75.5)
50-59	11,355	457 (4.0)	2,077 (18.3)	8,821 (77.7)
60-64	3,610	182 (5.0)	740 (20.5)	2,688 (74.5)
65-69	1,931	115 (6.0)	439 (22.7)	1,377 (71.3)
70-74	742	54 (7.3)	164 (22.1)	524 (70.6)
75-79	220	14 (6.4)	45 (20.4)	161 (73.2)
>=80	55	6 (10.9)	6 (10.9)	43 (78.2)

Table 34: Categories of total protein intake (g/kg/d), of healthy females (n=44,282), based on true body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	7,294	310 (4.2)	1,493 (20.5)	5,491 (75.3)
30-39	10,378	721 (6.9)	2,125 (20.5)	7,532 (72.6)
40-49	15,604	877 (5.6)	3,092 (19.8)	11,635 (74.6)
50-59	6,994	313 (4.5)	1,260 (18.0)	5,421 (77.5)
60-64	2,257	118 (5.2)	425 (18.8)	1,714 (76.0)
65-69	1,154	73 (6.3)	244 (21.2)	837 (72.5)
70-74	438	35 (8.0)	99 (22.6)	304 (69.4)
75-79	133	10 (7.5)	26 (19.6)	97 (72.9)
>=80	30	5 (16.7)	4 (13.3)	21 (70.0)

Table 35: Categories of total protein intake (g/kg/d), of healthy males (n=28,458), based on true body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	4,459	75 (1.7)	518 (11.6)	3,866 (86.7)
30-39	7,123	256 (3.6)	1,225 (17.2)	5,642 (79.2)
40-49	9,969	385 (3.9)	1,914 (19.2)	7,670 (76.9)
50-59	4,361	144 (3.3)	817 (18.7)	3,400 (78.0)
60-64	1,353	64 (4.7)	315 (23.3)	974 (72.0)
65-69	777	42 (5.4)	195 (25.1)	540 (69.5)
70-74	304	19 (6.2)	65 (21.4)	220 (72.4)
75-79	87	4 (4.6)	19 (21.8)	64 (73.6)
>=80	25	1 (4.0)	2 (8.0)	22 (88.0)

Table 36: Categories of total protein intake (g/kg/d), of healthy females and males (n=72,740), based on reference body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	11,753	194 (1.7)	1,342 (11.4)	10,217 (86.9)
30-39	17,501	159 (0.9)	1,101 (6.3)	16,241 (92.8)
40-49	25,573	168 (0.7)	1,493 (5.8)	23,912 (93.5)
50-59	11,355	60 (0.5)	848 (7.5)	10,447 (92.0)
60-64	3,610	40 (1.1)	302 (8.4)	3,268 (90.5)
65-69	1,931	17 (0.9)	195 (10.1)	1,719 (89.0)
70-74	742	22 (3.0)	80 (10.8)	640 (86.2)
75-79	220	6 (2.7)	22 (10.0)	192 (87.3)
>=80	55	3 (5.5)	6 (10.9)	46 (83.6)

Table 37: Categories of total protein intake (g/kg/d), of healthy females (n=44,282), based on reference body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	7,294	153 (2.1)	1,061 (14.5)	6,080 (83.4)
30-39	10,378	131 (1.2)	826 (8.0)	9,421 (90.8)
40-49	15,604	126 (0.8)	1,037 (6.6)	14,441 (92.6)
50-59	6,994	44 (0.6)	556 (8.0)	6,394 (91.4)
60-64	2,257	30 (1.3)	207 (9.2)	2,020 (89.5)
65-69	1,154	14 (1.2)	128 (11.1)	1,012 (87.7)
70-74	438	12 (2.8)	47 (10.7)	379 (86.5)
75-79	133	6 (4.5)	14 (10.5)	113 (85.0)
>=80	30	3 (10.0)	3 (10.0)	24 (80.0)

Table 38: Categories of total protein intake (g/kg/d), of healthy males (n=28,458), based on reference body weight

Age categories, yrs	Number	Total protein intake, <0.66g/kg/d (n, %)	Total protein intake, 0.66-0.83g/kg/d, (n, %)	Total protein intake, >=0.83 g/kg/d, (n, %)
18-29	4,459	41 (0.9)	281 (6.3)	4,137 (92.8)
30-39	7,123	28 (0.4)	275 (3.9)	6,820 (95.7)
40-49	9,969	42 (0.4)	456 (4.6)	9,471 (95.0)
50-59	4,361	16 (0.4)	292 (6.7)	4,053 (92.9)
60-64	1,353	10 (0.8)	95 (7.0)	1,248 (92.2)
65-69	777	3 (0.4)	67 (8.6)	707 (91.0)
70-74	304	10 (3.3)	33 (10.8)	261 (85.9)
75-79	87	0 (0.0)	8 (9.2)	79 (90.8)
>=80	25	0 (0.0)	3 (12.0)	22 (88.0)

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