SUPPLEMENT

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table S1. Background social factors by quintile of energy from free sugars (total sample of children aged 1.5 to 18y)** | | | | | | | | |
|  |  |  |  |  |  |  |  |  |
| Social Factor |  |  | Quintiles of Free Sugars intake (% energy) | | | | | |
|  |  |  | 1 | 2 | 3 | 4 | 5 | Total |
| Sex | Male | N | 118 | 184 | 213 | 255 | 296 | 1066 |
|  |  | % | 48.3 | 52.4 | 49.8 | 51.3 | 52.6 | 51.2 |
|  | Female | N | 115 | 169 | 212 | 249 | 262 | 1007 |
|  |  | % | 51.7 | 47.6 | 50.2 | 48.7 | 47.4 | 48.8 |
| Age group | 1.5-3 years | N | 83 | 76 | 77 | 76 | 74 | 386 |
|  |  | % | 14.9 | 14.5 | 14.9 | 14.6 | 15.2 | 14.8 |
|  | 4-10 years | N | 174 | 149 | 160 | 163 | 157 | 803 |
|  |  | % | 38 | 38 | 38 | 38 | 38 | 38 |
|  | 11-18 years | N | 181 | 172 | 165 | 183 | 183 | 884 |
|  |  | % | 47.2 | 47.5 | 47.1 | 47.0 | 47.0 | 47.2 |
|  | Total | N | 438 | 397 | 402 | 422 | 414 | 2073 |
|  |  | % | 100 | 100 | 100 | 100 | 100 | 100 |
| Ethnic group, | White | N | 351 | 329 | 359 | 375 | 367 | 1781 |
|  |  | % | 79.8 | 80.8 | 87.5 | 87.9 | 86.6 | 84.5 |
|  | Mixed ethnic group | N | 15 | 16 | 6 | 13 | 9 | 59 |
|  |  | % | 3.4 | 4.9 | 1.8 | 3.0 | 1.7 | 3.0 |
|  | Black or Black British | N | 13 | 14 | 15 | 11 | 16 | 69 |
|  |  | % | 3.2 | 3.3 | 4.0 | 3.0 | 4.6 | 3.6 |
|  | Asian or British Asian | N | 43 | 26 | 21 | 17 | 20 | 127 |
|  |  | % | 10.4 | 7.6 | 6.5 | 4.4 | 6.9 | 7.2 |
|  | Any other group | N | 16 | 12 | 1 | 6 | 2 | 37 |
|  |  | % | 3.2 | 3.3 | 0.2 | 1.6 | 0.3 | 1.7 |
| Social Class | Higher professional‎  /managerial | N | 58 | 57 | 61 | 68 | 66 | 310 |
|  | % | 12.7 | 13.8 | 15.3 | 17.2 | 15.7 | 14.9 |
|  | Lower professional‎/managerial | N | 109 | 106 | 114 | 120 | 109 | 558 |
|  | % | 25.4 | 25.8 | 27.9 | 27.8 | 24.6 | 26.3 |
|  | Intermediate‎/small employers | N | 84 | 81 | 70 | 80 | 77 | 392 |
|  |  | % | 18.9 | 21.0 | 17.5 | 19.7 | 18.9 | 19.2 |
|  | manual‎/semi-routine‎/routine | N | 161 | 129 | 133 | 136 | 144 | 703 |
|  |  | % | 38.5 | 36.1 | 33.7 | 32.6 | 36.8 | 35.5 |
|  | not working | N | 18 | 11 | 15 | 10 | 11 | 65 |
|  |  | % | 4.6 | 3.3 | 5.5 | 2.7 | 3.9 | 4.0 |
| Economic Status | school or college full-time | N | 299 | 287 | 285 | 319 | 301 | 1491 |
|  | % | 83 | 87 | 85 | 89 | 84 | 86 |
|  | full or part-time employment | N | 9 | 11 | 7 | 7 | 12 | 46 |
|  |  | % | 2.4 | 2.7 | 2.2 | 2.1 | 3.5 | 2.6 |
|  | not working at present | N | 61 | 48 | 52 | 44 | 53 | 258 |
|  |  | % | 14.7 | 9.9 | 12.8 | 9.3 | 12.7 | 11.9 |

No significant differences were observed for any of the background factors

Table S2 Energy and macronutrient intake by quintile of free sugars (%energy), by age group

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Macro by age |  | 1.5-3 years | | | | | | 4-10 years | | | | | | | 11-18 years | | | | | |
|  | Free sugars (% energy) Quintiles | | | | | | Free sugars (% energy) Quintiles | | | | | | | Free sugars (% energy) Quintiles | | | | | |
|  | 1 | 2 | 3 | 4 | 5 | P trend | 1 | 2 | 3 | 4 | 5 | P trend | 1 | | 2 | 3 | 4 | 5 | P trend |
| N | 83 | 76 | 77 | 76 | 74 |  | 174 | 149 | 160 | 163 | 157 |  | 181 | | 172 | 165 | 183 | 183 |  |
| Total energy (kJ) | Mean | 4464.6 | 4798.5 | 4749.3 | 4756.8 | 5064.7 | 0.090 | 5871.3a | 6506.3 | 6498.1 | 6765.0b | 6681.7b | <0.001 | 6880.8a | | 7439.6 | 7660.4 | 7842.0b | 7819.0 | 0.003 |
| SE | 204.0 | 202.1 | 267.2 | 204.1 | 189.9 |  | 164.2 | 184.2 | 148.9 | 169.4 | 165.5 |  | 229.1 | | 193.7 | 225.1 | 266.2 | 265.9 |  |
| Total energy (kcal) | Mean | 1058.7 | 1137.8 | 1125.2 | 1127.6 | 1200.0 | 0.090 | 1393.8a | 1544.0 | 1541.9 | 1605.2b | 1584.5b | <0.001 | 1635.3a | | 1767.6 | 1819.7 | 1862.1b | 1855.0 | 0.003 |
| SE | 48.4 | 48.0 | 63.1 | 48.6 | 45.1 |  | 39.1 | 43.7 | 35.4 | 40.3 | 39.3 |  | 54.5 | | 46.1 | 53.6 | 63.2 | 63.2 |  |
| Protein (g) | Mean | 44.4 | 46.7 | 42.2 | 40.2 | 41.3 | 0.057 | 54.0 | 57.4 | 55.2 | 56.0 | 52.1 | 0.333 | 68.3a | | 69.6a | 67.6 | 65.3 | 58.4b | 0.001 |
| SE | 2.1 | 2.1 | 2.5 | 1.7 | 1.8 |  | 1.7 | 1.8 | 1.4 | 1.7 | 1.7 |  | 2.9 | | 2.1 | 2.1 | 2.5 | 2.1 |  |
| Fat (g) | Mean | 43.2 | 44.3 | 42.2 | 43.6 | 42.5 | 0.803 | 55.2 | 59.4 | 57.7 | 59.9 | 55.3 | 0.902 | 64.8 | | 68.5 | 71.2 | 70.3 | 63.3 | 0.883 |
| SE | 2.4 | 2.6 | 3.1 | 2.3 | 2.3 |  | 2.2 | 2.1 | 1.9 | 2.0 | 1.7 |  | 2.5 | | 2.2 | 2.6 | 2.8 | 2.4 |  |
| Saturated fatty acids (g) | Mean | 18.6 | 19.7 | 18.3 | 18.8 | 18.1 | 0.639 | 21.5 | 23.1 | 23.1 | 23.8 | 22.1 | 0.488 | 23.3 | | 25.2 | 26.6 | 26.0 | 24.2 | 0.423 |
| SE | 1.3 | 1.5 | 1.7 | 1.1 | 1.1 |  | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 |  | 1.0 | | 0.9 | 1.1 | 1.3 | 1.0 |  |
| Monounsaturated fatty acids (g) | Mean | 14.5 | 14.4 | 14.0 | 15.0 | 14.5 | 0.858 | 19.7 | 21.5 | 20.6 | 21.5 | 19.8 | 0.880 | 24.6 | | 25.4 | 26.5 | 26.9 | 23.5 | 0.868 |
| SE | 0.9 | 0.9 | 1.0 | 0.9 | 0.9 |  | 0.9 | 0.8 | 0.7 | 0.7 | 0.7 |  | 1.0 | | 0.9 | 1.0 | 1.2 | 0.9 |  |
| Cis n-6 fatty acids (g) | Mean | 5.0 | 4.9 | 5.1 | 5.0 | 5.0 | 0.907 | 7.4 | 7.9 | 7.6 | 7.8 | 7.0 | 0.412 | 9.2 | | 9.7 | 9.9a | 9.4 | 8.3b | 0.101 |
| SE | 0.4 | 0.3 | 0.4 | 0.4 | 0.4 |  | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 |  | 0.4 | | 0.4 | 0.4 | 0.4 | 0.4 |  |
| Cis n-3 fatty acids (g) | Mean | 0.9 | 0.9 | 0.9 | 0.8 | 0.9 | 0.761 | 1.4 | 1.4 | 1.3 | 1.4 | 1.4 | 0.457 | 1.9 | | 1.8 | 1.8 | 1.8 | 1.6 | 0.034 |
| SE | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |  | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |  | 0.1 | | 0.1 | 0.1 | 0.1 | 0.1 |  |
| Trans fatty acids (g) | Mean | 0.8 | 0.9 | 0.8 | 0.8 | 0.8 | 0.759 | 1.0 | 1.1 | 1.1 | 1.2 | 1.0 | 0.680 | 1.2 | | 1.3 | 1.3 | 1.2 | 1.2 | 0.577 |
| SE | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |  | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |  | 0.1 | | 0.1 | 0.1 | 0.1 | 0.1 |  |
| Carbohydrate (g) | Mean | 131.3a | 147.2 | 153.9 | 153.3 | 173.9b | <0.001 | 181.8a | 208.0b | 213.8b | 224.7b | 234.2b | <0.001 | 205.5a | | 227.4a | 239.4b | 255.4bc | 272.3c | <0.001 |
| SE | 6.7 | 6.0 | 8.0 | 6.7 | 6.6 |  | 4.8 | 5.7 | 4.9 | 5.5 | 5.9 |  | 6.9 | | 6.0 | 6.9 | 8.5 | 9.1 |  |
| Starch (g) | Mean | 74.3 | 78.7 | 79.8 | 73.4 | 76.6 | 0.967 | 113.6 | 121.7 | 118.1 | 115.2 | 106.4 | 0.051 | 141.5b | | 142.2b | 138.2 | 135.1 | 122.5a | 0.002 |
| SE | 4.7 | 4.0 | 4.9 | 4.1 | 3.9 |  | 3.6 | 3.5 | 3.4 | 3.2 | 3.1 |  | 4.7 | | 4.1 | 4.1 | 4.9 | 4.7 |  |
| Total sugars (g) | Mean | 57.0a | 68.5a | 74.0a | 79.9 | 97.3b | <0.001 | 68.2a | 86.2b | 95.7b | 109.5c | 127.8d | <0.001 | 64.1 | | 85.3 | 101.2 | 120.3 | 149.8 | <0.001 |
| SE | 4.0 | 3.8 | 4.7 | 4.2 | 5.0 |  | 2.6 | 2.9 | 2.5 | 3.1 | 3.8 |  | 3.0 | | 2.5 | 3.4 | 4.2 | 5.2 |  |
| Free sugars (g) | Mean | 15.1a | 25.7b | 33.4c | 42.9d | 62.1e | <0.001 | 30.1a | 48.1b | 58.3c | 73.1d | 95.0e | <0.001 | 32.8a | | 55.8b | 71.7c | 90.4d | 123.2e | <0.001 |
| SE | 1.1 | 1.2 | 1.9 | 1.8 | 3.3 |  | 1.2 | 1.4 | 1.3 | 2.0 | 3.1 |  | 1.6 | | 1.6 | 2.2 | 3.1 | 4.6 |  |
| Fibre (g) | Mean | 8.2 | 8.9 | 8.1 | 7.8 | 8.0 | 0.398 | 10.8 | 11.7 | 11.6 | 11.3 | 10.2 | 0.238 | 12.7b | | 12.3b | 12.0b | 11.7 | 10.2a | <0.001 |
| SE | 0.6 | 0.5 | 0.6 | 0.5 | 0.5 |  | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |  | 0.5 | | 0.4 | 0.4 | 0.4 | 0.4 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |

ab Values sharing the same superscript, or none, are not significantly different.

Table S3. Micronutrient intakes by quintile of free sugars (% energy), by age group

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Nutrient**  **Intake**  **(per day)**    Vitamin A  (RE) (µg)  Thiamin (mg)    Riboflavin (mg)    Niacin (mg)  Vitamin B6 (mg)    Vitamin B12 (µg)    Folate (µg)    Vitamin C (mg)    Vitamin D (µg)    Vitamin E (mg)    Iron (mg)    Calcium (mg)    Magnesium(mg)    Potassium (mg)    Zinc (mg)    Copper (mg)    Selenium (µg)    Iodine (µg) |  |  | | | | | | | | | | | | | | | | | |
| **1.5-3 years** | | | | |  | **4-10 years** | | | | |  | **11-18 years** | | | | | |
| Free sugars (% energy) Quintiles | | | | |  | Free sugars (% energy) Quintiles | | | | |  | Free sugars (% energy) Quintiles | | | | | |  | Free sugars (% energy) Quintiles |
| **1** | **2** | **3** | **4** | **5** | **P trend** | **1** | **2** | **3** | **4** | **5** | **P trend** | **1** | **2** | **3** | **4** | **5** | **P trend** |
| N | 83 | 76 | 77 | 76 | 74 |  | 174 | 149 | 160 | 163 | 157 |  | 181 | 172 | 165 | 183 | 183 |  |
| Mean | 589.9 | 536.8 | 553.7 | 516.9 | 441.1 | 0.142 | 638.0 | 696.2 | 697.5 | 669.2 | 562.6 | 0.313 | 734.7 | 731.9 | 618.8 | 608.8 | 602.0 | 0.033 |
| SE | 69.1 | 56.9 | 75.7 | 90.8 | 40.1 |  | 51.4 | 68.8 | 63.0 | 49.8 | 36.4 |  | 82.5 | 50.9 | 48.8 | 45.9 | 51.6 |  |
| Mean | 0.9 | 1.0 | 1.0 | 0.9 | 0.9 | 0.607 | 1.2 | 1.3 | 1.3 | 1.3 | 1.2 | 0.275 | 1.4 | 1.5 | 1.4 | 1.4 | 1.3 | 0.112 |
| SE | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 |  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |  | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 |  |
| Mean | 1.5 | 1.6 | 1.4 | 1.3 | 1.3 | 0.075 | 1.4 | 1.6 | 1.5 | 1.5 | 1.4 | 0.296 | 1.4 | 1.5 | 1.4 | 1.5 | 1.4 | 0.910 |
| SE | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |  | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |  | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |  |
| Mean | 20.1 | 20.7 | 18.8 | 17.5 | 18.9 | 0.094 | 24.9 | 27.5 | 26.6 | 27.0 | 24.9 | 0.860 | 32.8 | 34.6 | 32.8 | 32.1 | 31.6 | 0.261 |
| SE | 1.4 | 1.0 | 1.1 | 0.9 | 0.8 |  | 0.9 | 1.1 | 1.0 | 1.0 | 0.9 |  | 1.3 | 1.3 | 1.1 | 1.3 | 1.7 |  |
| Mean | 1.4 | 1.5 | 1.4 | 1.3 | 1.3 | 0.152 | 1.7 | 1.8 | 1.8 | 1.8 | 1.6 | 0.782 | 2.0 | 2.1 | 2.0 | 2.1 | 2.4 | 0.077 |
| SE | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |  | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |  | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 |  |
| Mean | 4.3 | 4.2 | 4.0 | 3.5 | 3.3 | 0.012 | 4.1 | 4.1 | 3.8 | 3.9 | 3.5 | 0.031 | 4.4 | 4.1 | 4.1 | 4.0 | 4.0 | 0.360 |
| SE | 0.4 | 0.4 | 0.4 | 0.3 | 0.2 |  | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |  | 0.3 | 0.2 | 0.2 | 0.2 | 0.3 |  |
| Mean | 147.4 | 161.2 | 151.7 | 138.1 | 149.7 | 0.509 | 186.0 | 198.1 | 206.5 | 200.0 | 186.1 | 0.927 | 213.6 | 223.1 | 204.6 | 215.6 | 193.6 | 0.117 |
| SE | 8.9 | 8.7 | 9.6 | 7.3 | 8.6 |  | 7.7 | 8.1 | 7.7 | 8.5 | 6.9 |  | 10.1 | 9.4 | 8.3 | 10.2 | 9.5 |  |
| Mean | 56.5 | 61.4 | 63.5 | 71.0 | 83.1 | 0.014 | 62.9a | 76.3ab | 87.3bc | 93.8bc | 108.5c | <0.001 | 63.1a | 68.3a | 83.9 | 88.3b | 95.8b | <0.001 |
| SE | 7.1 | 6.4 | 8.4 | 8.8 | 8.7 |  | 4.3 | 5.1 | 5.7 | 5.6 | 6.7 |  | 5.0 | 4.8 | 6.0 | 6.2 | 7.7 |  |
| Mean | 2.3 | 1.9 | 1.6 | 1.9 | 1.8 | 0.376 | 2.1 | 2.1 | 1.8 | 2.0 | 1.9 | 0.289 | 2.2 | 2.2 | 2.2 | 2.1 | 1.8 | 0.033 |
| SE | 0.5 | 0.4 | 0.2 | 0.4 | 0.3 |  | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |  | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |  |
| Mean | 5.3 | 5.0 | 5.0 | 4.9 | 5.0 | 0.673 | 6.8 | 7.6 | 7.2 | 7.4 | 6.8 | 0.747 | 8.5 | 8.7 | 8.4 | 8.7 | 7.8 | 0.190 |
| SE | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 |  | 0.3 | 0.4 | 0.3 | 0.3 | 0.3 |  | 0.4 | 0.4 | 0.3 | 0.4 | 0.4 |  |
| Mean | 6.1 | 6.7 | 6.1 | 6.2 | 6.6 | 0.700 | 8.0 | 9.2 | 8.8 | 9.0 | 8.4 | 0.631 | 9.8 | 10.0 | 9.7 | 9.7 | 8.7 | 0.032 |
| SE | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 |  | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |  | 0.4 | 0.3 | 0.3 | 0.4 | 0.4 |  |
| Mean | 792.9 | 836.2 | 787.4 | 726.3 | 723.3 | 0.134 | 780.7 | 859.4 | 818.9 | 814.2 | 737.8 | 0.239 | 775.1 | 793.7 | 790.1 | 803.3 | 767.2 | 0.960 |
| SE | 58.9 | 48.0 | 63.3 | 45.2 | 42.0 |  | 34.5 | 46.4 | 28.4 | 31.6 | 30.1 |  | 42.5 | 29.3 | 32.8 | 42.7 | 35.6 |  |
| Mean | 150.7 | 163.2 | 154.3 | 147.4 | 153.4 | 0.684 | 179.7 | 194.5 | 199.3 | 197.4 | 188.7 | 0.265 | 210.2 | 214.0 | 210.2 | 209.9 | 198.3 | 0.237 |
| SE | 7.9 | 6.8 | 9.9 | 7.6 | 6.7 |  | 5.4 | 6.5 | 6.0 | 5.7 | 6.1 |  | 8.4 | 6.7 | 6.9 | 7.7 | 7.3 |  |
| Mean | 1787.4 | 1899.7 | 1810.4 | 1729.1 | 1771.9 | 0.511 | 2039.8 | 2177.9 | 2192.5 | 2218.9 | 2130.7 | 0.278 | 2317.3 | 2360.2 | 2357.1 | 2378.8 | 2174.3 | 0.315 |
| SE | 88.8 | 79.4 | 115.2 | 96.8 | 95.1 |  | 62.4 | 72.2 | 62.0 | 64.4 | 62.7 |  | 91.3 | 72.7 | 76.7 | 93.9 | 80.3 |  |
| Mean | 5.5 | 5.5 | 5.0 | 4.9 | 5.0 | 0.110 | 6.3 | 6.9 | 6.3 | 6.4 | 5.9 | 0.111 | 8.0b | 7.8b | 7.7 | 7.2 | 6.5a | <0.001 |
| SE | 0.3 | 0.2 | 0.3 | 0.3 | 0.3 |  | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 |  | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |  |
| Mean | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 0.488 | 0.7 | 0.8 | 0.8 | 0.8 | 0.7 | 0.900 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.013 |
| SE | 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 | 0.0 | 0.0 |  |
| Mean | 26.4 | 25.8 | 24.2 | 22.5 | 23.6 | 0.115 | 33.3 | 33.1 | 32.7 | 32.5 | 31.2 | 0.246 | 43.5b | 42.7b | 41.7 | 39.6 | 34.8a | <0.001 |
| SE | 2.4 | 1.6 | 1.9 | 1.4 | 1.3 |  | 1.5 | 1.3 | 1.3 | 1.3 | 1.1 |  | 2.4 | 1.6 | 1.8 | 1.7 | 1.4 |  |
| Mean | 153.4 | 151.6 | 142.6 | 131.3 | 118.8 | 0.035 | 140.6 | 137.4 | 139.7 | 133.8 | 122.3 | 0.098 | 125.4 | 130.2 | 125.9 | 121.8 | 119.4 | 0.392 |
| SE | 15.9 | 14.7 | 13.2 | 12.3 | 9.4 |  | 8.1 | 8.2 | 7.4 | 6.9 | 7.2 |  | 8.7 | 7.0 | 7.4 | 7.4 | 7.0 |  |

ab Values sharing the same superscript, or none, are not significantly different.