**Table 1**. Participants’ characteristics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Total participants n = 777  n (%) | Chinese participants n = 440  n (%) | Indian participants n = 144  n (%) | Malay participants n = 193  n (%) |
| Maternal characteristics |  |  |  |  |
| Maternal age at 1st trimester pregnancya |  |  |  |  |
| < 40 years | 738 (95.0) | 418 (95.0) | 140 (97.2) | 180 (93.3) |
| ≥ 40 years | 29 (5.0) | 22 (5.0) | 4 (2.8) | 13 (6.7) |
| Household income |  |  |  |  |
| ≥ SGD 6000 | 215 (29.6) | 170 (41.7) | 35 (26.3) | 10 (5.4) |
| SGD 2000 - SGD 5999 | 401 (55.1) | 197 (48.3) | 76 (57.2) | 128 (68.8) |
| < SGD 2000 | 111 (15.3) | 41 (10.0) | 22 (16.5) | 48 (25.8) |
| Maternal education level |  |  |  |  |
| Tertiary-level | 547 (71.1) | 331 (75.9) | 112 (78.9) | 104 (54.5) |
| Secondary-level or below | 222 (28.9) | 105 (24.1) | 30 (21.1) | 87 (45.5) |
| Marital status |  |  |  |  |
| Married | 735 (96.6) | 418 (96.8) | 136 (97.8) | 181 (95.3) |
| Single/divorced | 26 (3.4) | 14 (3.2) | 3 (2.2) | 9 (4.7) |
|  |  |  |  |  |
| Children’s characteristics |  |  |  |  |
| Sex |  |  |  |  |
| Girls | 376 (48.4) | 215 (48.9) | 73 (50.7) | 88 (45.6) |
| Boys | 401 (51.6) | 225 (51.1) | 71 (49.3) | 105 (54.4) |
| Ethnicity |  |  |  |  |
| Chinese | 440 (56.6) | 440 (100.0) | 0 (0.0) | 0 (0.0) |
| Indian | 144 (18.5) | 0 (0.0) | 144 (100.0) | 0 (0.0) |
| Malay | 193 (24.8) | 0 (0.0) | 0 (0.0) | 193 (100.0) |
| Birth order |  |  |  |  |
| First-born | 348 (44.8) | 220 (50.0) | 52 (36.1) | 76 (39.4) |
| Second- or subsequent-born | 429 (55.2) | 220 (50.0) | 92 (63.9) | 117 (60.6) |
| Overweight at year-5b |  |  |  |  |
| No | 584 (81.7) | 338 (86.2) | 102 (75.0) | 144 (77.0) |
| Yes | 131 (18.3) | 54 (13.8) | 34 (25.0) | 43 (23.0) |
|  |  |  |  |  |
| Diet-related questions at year-5 |  |  |  |  |
| Parent as primary caregiver |  |  |  |  |
| Yes | 534 (68.7) | 286 (65.0) | 105 (72.9) | 143 (74.1) |
| No | 243 (31.3) | 154 (35.0) | 39 (27.1) | 50 (25.9) |
| Parent as food decision-maker |  |  |  |  |
| Yes | 586 (75.4) | 295 (67.1) | 128 (88.9) | 163 (84.5) |
| No | 191 (24.6) | 145 (32.9) | 16 (11.1) | 30 (15.5) |
| Parent read food label when purchasing food |  |  |  |  |
| Yes | 321 (41.3) | 148 (33.6) | 87 (60.4) | 86 (44.5) |
| Sometimes | 183 (23.6) | 113 (25.7) | 28 (19.4) | 42 (21.8) |
| No | 273 (35.1) | 179 (40.7) | 29 (20.1) | 65 (33.7) |
| Parent read Healthier Choice Symbolsc when purchasing food |  |  |  |  |
| Yes | 376 (48.4) | 193 (43.9) | 90 (62.4) | 93 (48.2) |
| Sometimes | 187 (24.1) | 106 (24.1) | 27 (18.8) | 54 (28.0) |
| No | 214 (27.5) | 141 (32.0) | 27 (18.8) | 46 (23.8) |

a Mean ± SD of 31.1 ± 5.2 years

b Based on WHO age- and sex-specific classification, overweight defined as Body Mass Index > 1 SD

c Healthier Choice Symbols are displayed in food items that meet certain guidelines set by the Singapore Health Promotion Board

Missing data: Overweight at year-5 = 62; Household income = 50; Marital status = 16; Maternal age = 10; Maternal education = 8

**Table 2.** Intakes of five-year-old children in the Healthy cluster and Unhealthy cluster over   
a one-month period, presented as gram/1000 kcal per day

|  |  |  |  |
| --- | --- | --- | --- |
| Food groups | Healthy cluster n = 436 median (IQR) | Unhealthy cluster n = 341  median (IQR) | p-valuea |
| White bread | 5.1 (0.6-11.3) | 12.0 (5.2-22.7) | **<0.001** |
| Wholemeal bread | 11.3 (6.9-23.0)\* | 4.2 (0-17.2)\* | **<0.001** |
| Spreadb | 0.9 (0-2.3) | 2.3 (0.8-4.2) | **<0.001** |
| Buns, ethnic bread | 20.0 (9.6-36.9) | 17.1 (9.1-30.7) | 0.189 |
| Oat porridge | 9.8 (0-46.3)\* | 0 (0-24.9)\* | **0.006** |
| Cereal | 0.8 (0-2.5) | 2.3 (0.5-4.8) | **<0.001** |
| Rice, polished | 99.6 (61.5-144.2) | 122.9 (81.0-179.8) | **<0.001** |
| Rice, unpolished | 34.8 (7.2-80.6)\* | 0 (0-1.6)\* | **<0.001** |
| Rice, flavouredc | 11.8 (0-22.2) | 15.2 (8.2-27.6) | **<0.001** |
| Rice porridge | 20.0 (0-47.7) | 4.1 (0-15.9) | **<0.001** |
| Noodles | 23.1 (10.2-41.1) | 12.9 (6.3-26.3) | **<0.001** |
| Pasta | 8.1 (0-21.5) | 0 (0-12.5) | **<0.001** |
| Fries | 2.7 (1.0-5.3) | 4.7 (2.5-8.9) | **<0.001** |
|  |  |  |  |
| Vegetables, starchy | 4.7 (1.2-10.8) | 1.9 (0-5.8) | **<0.001** |
| Vegetables, non-starchyd | 8.8 (3.5-16.8) | 1.8 (0-5.1) | **<0.001** |
| Vegetables, cruciferous, green leafy | 11.9 (5.4-23.5) | 2.1 (0-6.1) | **<0.001** |
| Lentils | 0.8 (0-3.9) | 0 (0-0.7) | **<0.001** |
| Tofu | 4.4 (0.1-10.4) | 1.2 (0-4.1) | **<0.001** |
| Mushrooms | 0.4 (0-1.9) | 0 (0-0.2) | **<0.001** |
| Fruits | 79.3 (46.9-121.5) | 45.3 (22.2-81.7) | **<0.001** |
|  |  |  |  |
| Poultry, non-fried | 6.1 (2.4-13) | 4.3 (1.3-8.9) | **<0.001** |
| Poultry, fried | 0 (0-2.5) | 2.2 (0-5.3) | **<0.001** |
| Red meat, non-friede | 4.3 (0.6-9.1) | 0 (0-2.0) | **<0.001** |
| Processed meat | 8.9 (3.5-15.4) | 14.5 (7.0-26.5) | **<0.001** |
| Fish, non-fried | 7.5 (3.4-14.9) | 2.2 (0-5.5) | **<0.001** |
| Fish, fried | 3.0 (1.3-6.7)\* | 3.7 (2.2-8.8)\* | **<0.001** |
| Seafood | 2.8 (1.7-6.6)\* | 2.1 (0.9-3.8)\* | **0.001** |
| Eggs, boiled | 6.4 (1.5-13.6) | 1.7 (0-5.9) | **<0.001** |
| Eggs, fried | 5.8 (0.9-12.9) | 5.7 (0.8-12.1) | 0.627 |
| Burger and pizza | 2.9 (0-7.4) | 2.6 (0-7.3) | 0.823 |
| Dim sum | 14.9 (7.0-37.1)\* | 0 (0-7.7)\* | **<0.001** |
|  |  |  |  |
| Cake | 4.5 (1.9-10.4) | 5.7 (1.8-13.3) | **0.022** |
| Biscuits | 3.6 (1.7-8.2) | 6.9 (3.2-15.0) | **<0.001** |
| Snacks, fried | 0.4 (0-1.7) | 0.7 (0-2.9) | **0.015** |
| Snacks, sweets | 3.0 (1.0-6.7) | 3.8 (1.7-8.2) | **<0.001** |
| Ice cream | 2.8 (0.3-7.0) | 4.2 (0.6-9.4) | **0.002** |
| Soup-based desserts | 10.6 (4.8-25.8)\* | 3.1 (0-13.0)\* | **<0.001** |
|  |  |  |  |
| Milk | 211.1 (91.5-321.2) | 241.5 (119.7-347.4) | **0.030** |
| Milk, low-fat | 20.5 (0-106.2)\* | 14.0 (0-58.0)\* | 0.320 |
| Malt drinks | 14.7 (0.1-42.1) | 22.4 (7.0-59.8) | **<0.001** |
| Yogurt | 1.0 (0-13.4) | 0 (0-3.3) | **0.002** |
| Cheese | 1.7 (0-5.1) | 0.6 (0-3.8) | **<0.01** |
| Cultured drinks | 11.9 (3.5-26.8) | 8.7 (2.6-21.0) | **0.019** |
| Sugar-sweetened beverages | 20.8 (6.5-45.0) | 23.8 (8.3-48.9) | 0.116 |
| Pure juice | 23.8 (14.2-57.1)\* | 11.7 (4.6-29.1)\* | **<0.001** |
| Low-calorie beveragesf | 4.5 (0-23.3)\* | 11.6 (0-50.4)\* | **0.027** |
| Soymilk | 19.9 (11.8-41.1)\* | 16.0 (7.6-40.1)\* | **0.010** |

a Mann-Whitney U test, p-values of <0.05 are formatted in bold

b Butter, margarine, peanut butter, kaya spread, hazelnut cocoa spread

c Rice cooked with coconut milk, rice topped with curry-based gravy, fried rice

d Carrot, pumpkin, tomato, cabbage, gourds, stalk vegetables

e Beef, mutton, lamb, pork

f Low-calorie isotonic drinks, low-calorie fruit flavoured drinks, reduced-sugar tea beverages

\*Food groups with median of zero and skewed distribution are displayed as 85th percentile (75th-95th percentile)

**Table 3**. Energy and nutrient intakes of five-year-old children in the Healthy cluster   
and Unhealthy cluster over a one-month period, presented as intakes per day

|  |  |  |  |
| --- | --- | --- | --- |
| Nutrient (unit)a | Healthy cluster n = 436 median (IQR) | Unhealthy cluster n = 341 median (IQR) | p-valueb |
| Energy (kcal) | 1214 (978-1487) | 1593 (1251-2005) | **<0.001** |
| Protein (g) | 34.5 (31.5-37.7) | 30.8 (28.4-34.1) | **<0.001** |
| Carbohydrate (g) | 143.8 (134.9-152.7) | 148.9 (138.6-158.8) | **<0.001** |
| Fibre (g) | 7.2 (5.7-8.6) | 5.7 (4.8-7.0) | **<0.001** |
| Fat (g) | 31.0 (27.5-33.9) | 28.9 (25.5-32.9) | **<0.001** |
| Monounsaturated fatty acids (g) | 9.9 (7.9-11.8) | 8.3 (6.6-10.4) | **<0.001** |
| Polyunsaturated fatty acids (g) | 4.1 (3.4-4.9) | 3.3 (2.8-4.1) | **<0.001** |
| Saturated Fat (g) | 11.4 (9.3-13.5) | 10.7 (8.9-13.4) | 0.062 |
| Cholesterol (mg) | 114 (79-151) | 94 (67-127) | **<0.001** |
| Sodium (mg) | 837 (718-969) | 856 (694-1013) | 0.396 |
| Calcium (mg) | 469 (352-612) | 466 (352-597) | 0.659 |
| Iron (mg) | 7.1 (6.0-8.4) | 7.1 (5.9-8.4) | 0.861 |
| Vitamin A (mcg) | 324 (256-405) | 268 (214-332) | **<0.001** |
| Beta-carotene (µg) | 879 (522-1435) | 344 (148-567) | **<0.001** |

a Nutrient presented as unit/1000 kcal per day. For energy, presented as kcal per day b Mann-Whitney U test, p-values of <0.05 are formatted in bold

**Table 4**. Participants’ characteristics according to their cluster memberships, as well as crude and adjusted odds ratios of children being assigned to the Unhealthy cluster

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Healthy cluster n = 436 n (column %) | Unhealthy cluster  n = 341 n (column %) | Crude  odds ratios (95%CI)a | Adjusted odds ratios (95%CI)a,b |
| Maternal characteristics |  |  |  |  |
| Maternal age at 1st trimester pregnancyc |  |  |  |  |
| < 40 years | 418 (95.9) | 320 (93.8) | Ref. | – |
| ≥ 40 years | 18 (4.13) | 21 (6.2) | 1.52 (0.80-2.91) | – |
| Household income |  |  |  |  |
| ≥ SGD 6000 | 164 (40.3) | 51 (15.9) | Ref. | – |
| SGD 2000 - SGD 5999 | 198 (48.6) | 203 (63.4) | **3.30 (2.28-4.77)d** | – |
| < SGD 2000 | 45 (11.1) | 66 (20.6) | **4.72 (2.88-7.72)d** | – |
| Maternal education level |  |  |  |  |
| Tertiary-level | 345 (79.9) | 202 (59.9) | Ref. | Ref. |
| Secondary-level or below | 87 (20.1) | 135 (40.1) | **2.65 (1.92-3.65)** | **2.19 (1.49-3.24)** |
| Marital status |  |  |  |  |
| Married | 418 (97.7) | 317 (95.2) | Ref. | – |
| Single/divorced | 10 (2.3) | 16 (4.8) | 2.11 (0.94-4.71) | – |
| HEI-SGP scoree |  |  |  |  |
| Highest tertile | 159 (41.1) | 74 (23.6) | Ref. | – |
| Middle tertile | 122 (31.5) | 111 (35.5) | **1.95 (1.34-2.85)d** | – |
| Lowest tertile | 106 (27.4) | 128 (40.9) | **2.59 (1.78-3.78)d** | – |
|  |  |  |  |  |
| Children’s characteristics |  |  |  |  |
| Sex |  |  |  |  |
| Girls | 221 (50.7) | 155 (45.5) | Ref. | – |
| Boys | 215 (49.3) | 186 (54.5) | 1.23 (0.93-1.64) | – |
| Ethnicity |  |  |  |  |
| Chinese | 344 (78.9) | 96 (28.2) | Ref. | Ref. |
| Indian | 69 (15.8) | 75 (22.0) | **3.89 (2.62-5.80)** | **4.03 (2.68-6.06)** |
| Malay | 23 (5.3) | 170 (49.8) | **26.49 (16.21-43.26)** | **25.46 (15.40-42.10)** |
| Birth order |  |  |  |  |
| First-born | 219 (50.2) | 129 (37.8) | Ref. | – |
| Second- or subsequent-born | 217 (49.8) | 212 (62.2) | **1.66 (1.24-2.21)** | – |
| Overweight at year-5f |  |  |  |  |
| No | 333 (84.5) | 251 (78.2) | Ref. | – |
| Yes | 61 (15.5) | 70 (21.8) | **1.52 (1.04-2.23)** | – |
|  |  |  |  |  |
| Diet-related questions at year-5 |  |  |  |  |
| Parent as primary caregiver |  |  |  |  |
| Yes | 302 (69.3) | 232 (68.0) | Ref. | – |
| No | 134 (30.7) | 109 (32.0) | 1.06 (0.78-1.44) | – |
| Parent as food decision maker |  |  |  |  |
| Yes | 112 (74.1) | 79 (23.2) | Ref. | – |
| No | 324 (25.9) | 262 (76.8) | 0.87 (0.63-1.21) | – |
| Parent read food label when purchasing food |  |  |  |  |
| Yes | 164 (41.6) | 132 (37.7) | Ref. | – |
| Sometimes | 99 (25.1) | 68 (21.2) | 0.85 (0.58-1.25) | – |
| No | 131 (33.3) | 121 (37.7) | 1.15 (0.82-1.61) | – |
| Parent read Healthier Choice Symbolsg when purchasing food |  |  |  |  |
| Yes | 192 (48.7) | 153 (47.7) | Ref. | – |
| Sometimes | 94 (23.9) | 81 (25.2) | 1.08 (0.75-1.56) | – |
| No | 108 (27.4) | 87 (27.1) | 1.01 (0.71-1.44) | – |

a Odds ratios of children being assigned to Unhealthy cluster; statistically significant odds ratios are formatted in bold  
b Model with maternal education level and ethnicity  
c Mean ± SD of 31.7 ± 4.7 years for Healthy cluster and 30.2 ± 5.6 years for Unhealthy cluster   
d p-value < 0.001 for linear trend e HEI-SGP: Healthy eating index for pregnant woman in Singapore, categorized as tertiles  
f Based on WHO age- and sex-specific classification, overweight defined as Body Mass Index > 1 SD  
g Healthier Choice Symbols are displayed in food items that meet certain guidelines set by the Singapore Health Promotion Board  
Missing data: Overweight at year-5 = 62; Household income = 50; Marital status = 16; Maternal age = 10; Maternal education = 8