**Table 1**. Participants’ characteristics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Total participantsn = 777n (%) | Chinese participantsn = 440n (%) | Indian participantsn = 144n (%) | Malay participantsn = 193n (%) |
| 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 clustern = 436median (IQR) | Unhealthy clustern = 341median (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 clustern = 436median (IQR) | Unhealthy clustern = 341median (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 clustern = 436n (column %) | Unhealthy cluster n = 341n (column %) | Crude odds ratios (95%CI)a | Adjustedodds 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