**Supplementary material**

**Public Health Nutrition**

**Healthful grain foods consumption by São Paulo residents: a 12-year analysis and future trends**

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# **Supplementary Table 1.** Demographic and socioeconomic characteristics of the population of São Paulo aged 12 years or more based on the Health Survey of São Paulo, 2003, 2008 and 2015.

|  |  |  |  |
| --- | --- | --- | --- |
| **Characteristics** | **2003 (n=2398)** | **2008 (n=1662)** | **2015 (n=1741)** |
| **n** | **%**‡ | **95% CI** | **n** | **%** | **95% CI** | **n** | **%** | **95% CI** |
| Age group, years |  |  |  |  |  |  |  |  |  |
| 12-19 | 811 | 18.9 | 17.0-21.1 | 560 | 25.0 | 21.9-28.5 | 553 | 23.2 | 20.9-25.7 |
| 20-59 | 756 | 68.2 | 66.0-70.3 | 585 | 61.7 | 58.1-65.2 | 643 | 54.1 | 51.5-56.8 |
| ≥ 60 | 831 | 12.9 | 11.3-14.7 | 517 | 13.3 | 11.1-15.8 | 545 | 22.7 | 19.9-25.7 |
| Sex |  |  |  |  |  |  |  |  |  |
| Male | 1186 | 46.1 | 43.4-48.8 | 718 | 45.2 | 42.8-47.7 | 837 | 50.0 | 47.2-52.9 |
| Female | 1212 | 53.9 | 51.2-56.6 | 944 | 54.8 | 52.3-57.2 | 904 | 50.0 | 47.1-52.8 |
| Education level \* |  |  |  |  |  |  |  |  |  |
| < High school graduate | 1594 | 55.7 | 52.1-59.2 | 1431 | 78.7 | 72.7-83.7 | 980 | 50.8 | 47.0-54.7 |
| High school graduate | 366 | 19.2 | 17.1-21.5 | 82 | 8.2 | 6.0-11.1 | 366 | 22.4 | 20.1-24.9 |
| College or some college | 411 | 25.1 | 21.7-28.9 | 138 | 13.1 | 9.2-18.3 | 358 | 26.8 | 23.1-30.8 |
| Family income *per capita* \* ‡ |  |  |  |  |  |  |  |  |  |
| ≤ 1 minimum wage | 977 | 37.2 | 33.2-41.3 | 731 | 36.9 | 31.6-42.5 | 757 | 42.1 | 37.2-47.1 |
| > 1 and ≤ 3 minimum wages | 844 | 35.3 | 31.5-39.4 | 647 | 41.0 | 36.5-45.7 | 528 | 33.3 | 29.4-37.5 |
| > 3 minimum wages | 442 | 23.6 | 18.4-29.7 | 161 | 13.9 | 10.0-19.0 | 124 | 9.7 | 7.0-13.2 |
| Do not know | 99 | 3.9 | 2.8-5.6 | 119 | 8.2 | 5.7-11.6 | 257 | 14.9 | 10.6-20.6 |
| Ethnicity \* |  |  |  |  |  |  |  |  |  |
| White and yellow | 1559 | 67.0 | 63.2-71.0 | 986 | 60.9 | 54.7-66.8 | 865 | 51.1 | 47.4-54.8 |
| Black, brown and indigenous | 828 | 33.0 | 29.3-36.8 | 674 | 39.1 | 33.2-45.3 | 863 | 48.9 | 45.2-52.7 |

CI, confidence interval

\* Numbers may not sum to the total number of participants due to missing data

† Minimum wage was BRL 480.77 (USD 119.28) in 2003, BRL 640.81 (USD 158.98) in 2008, and BRL 839.03 (USD 208.16) in 2015

‡Percentages and 95% confidence intervals were survey weighted

# **Supplementary Table 2.** Prevalence of population consuming total grain foods and grain foods meeting the ≤10:1-ratio\* by Health Survey of São Paulo edition 2003, 2008 and 2015

|  |  |  |  |
| --- | --- | --- | --- |
| **Consumers** | **2003** | **2008** | **2015** |
| **n** | **%** † | **95% CI**  | **n** | **%** | **95% CI**  | **n** | **%** | **95% CI**  |
| Total grain foods |  |  |  |  |  |  |  |  |  |
| Yes | 2380 | 99.1 | 98.5-99.5 | 1657 | 99.7 | 99.2-99.9 | 1734 | 99.6 | 98.8-99.8 |
| No | 18 | 0.9 | 0.5-1.5 | 5 | 0.3 | 0.1-0.8 | 7 | 0.4 | 0.2-1.2 |
| Grain foods meeting the ≤10:1-ratio |
| Yes | 184 | 8.7 | 6.6-11.4 | 191 | 11.8 | 9.7-14.4 | 255 | 15.8 | 13.5-18.4 |
| No | 2214 | 91.3 | 88.6-93.4 | 1471 | 88.2 | 85.7-90.3 | 1486 | 84.2 | 81.7-86.5 |

CI, confidence interval

\* Participants that reported the intake of at least one grain food meeting the ≤10:1 carbohydrate to fiber ratio in the 24-h dietary recall

† Percentages and 95% confidence intervals were survey weighted

# **Supplementary Table 3.** Features associated with the intake of grain foods meeting the ≤10:1-ratio in the population of São Paulo aged 12 years or more, Health Survey of São Paulo 2003, 2008 and 2015.

|  |  |  |
| --- | --- | --- |
| **Characteristics** | **Multivariable model**† | **Multivariable model + energy** ‡ |
| **OR** |  **95% CI** | **OR** | **95% CI** |
| Age group, years |  |  |  |  |
| 12-19 | 1.00 | - | 1.00 | - |
| 20-59 | 1.08 | 0.82-1.41 | 1.18 | 0.90-1.55 |
| ≥ 60 | 1.79 | 1.39-2.30 | 2.12 | 1.63-2.75 |
| Sex  |  |  |  |  |
| Male | 1.00 | - | 1.00 | - |
| Female | 1.28 | 1.02-1.59 | 1.46 | 1.15-1.86 |
| Education level |  |  |  |  |
| < High school graduate | 1.00 | - | 1.00 | - |
| High school graduate | 1.59 | 1.18-2.14 | 1.56 | 1.15-2.12 |
| College or some college | 2.38 | 1.74-3.26 | 2.36 | 1.72-3.24 |
| Family income *per capita* \* |  |  |  |  |
| ≤ 1 minimum wage | 1.00 | - | 1.00 | - |
| > 1 and ≤ 3 minimum wages | 1.12 | 0.84-1.48 | 1.09 | 0.82-1.44 |
| > 3 minimum wages | 2.35 | 1.55-3.56 | 2.30 | 1.51-3.50 |
| Do not know | 1.64 | 1.11-2.43 | 1.69 | 1.14-2.52 |
| Ethnicity |  |  |  |  |
| White and yellow | 1.00 | - | 1.00 | - |
| Black, brown and indigenous | 0.70 | 0.56-0.87 | 0.70 | 0.56-0.87 |
| Year |  |  |  |  |
| 2003 | 1.00 | - | 1.00 | - |
| 2008 | 1.89 | 1.37-2.59 | 1.86 | 1.35-2.56 |
| 2015 | 2.18 | 1.61-2.95 | 2.16 | 1.60-2.91 |

OR, *odds* ratio; CI, confidence interval

\* Minimum wage was BRL 480.77 (USD 119.28) in 2003, BRL 640.81 (USD 158.98) in 2008, and BRL 839.03 (USD 208.16) in 2015.

† Values obtained from multivariable logistic regression models including the consumption of grain foods meeting the ≤10:1-ratio as dependent variable, and age group, sex, education level, family income per capita, ethnicity, and year as independent variables. Models included 5617 participants with complete data.

‡ Multivariable logistic regression model further adjusted for total energy intake (kcal/day).

# **Supplementary Table 4.** Features associated with the intake of grain foods meeting the ≤10:1-ratio in the population of São Paulo aged 12 years or more by Health Survey of São Paulo edition 2003, 2008, and 2015.

|  |  |  |  |
| --- | --- | --- | --- |
| **Characteristics** | **2003 (n=2327)** † | **2008 (n=1645)** | **2015 (n=1645)** |
| **OR** ‡ | **95% CI** | **OR**  | **95% CI** | **OR**  | **95% CI** |
| Age group, years |  |  |  |  |  |  |
| 12-19 | 1.00 | - | 1.00 | - | 1.00 | - |
| 20-59 | 0.80 | 0.52-1.24 | 1.18 | 0.69-2.02 | 1.37 | 0.92-2.06 |
| ≥ 60 | 1.51 | 1.03-2.19 | 2.16 | 1.33-3.52 | 1.98 | 1.25-3.12 |
| Sex |  |  |  |  |  |  |
| Male | 1.00 | - | 1.00 | - | 1.00 | - |
| Female | 1.31 | 0.88-1.96 | 1.14 | 0.74-1.75 | 1.44 | 1.07-1.93 |
| Education level |  |  |  |  |  |  |
| < High school graduate | 1.00 | - | 1.00 | - | 1.00 | - |
| High school graduate | 2.23 | 1.35-3.67 | 1.05 | 0.52-2.13 | 1.48 | 0.95-2.32 |
| College or some college | 4.06 | 2.42-6.81 | 1.90 | 0.85-4.25 | 1.69 | 1.14-2.51 |
| Family income *per capita* \* |  |  |  |  |  |  |
| ≤ 1 minimum wage | 1.00 | - | 1.00 | - | 1.00 | - |
| > 1 and ≤ 3 minimum wages | 1.16 | 0.61-2.21 | 1.08 | 0.68-1.72 | 1.10 | 0.75-1.62 |
| > 3 minimum wages | 1.83 | 0.86-3.90 | 2.46 | 1.13-5.39 | 2.74 | 1.45-5.19 |
| Do not know | 0.82 | 0.21-3.19 | 2.38 | 1.09-5.19 | 1.55 | 0.99-2.43 |
| Ethnicity |  |  |  |  |  |  |
| White and yellow | 1.00 | - | 1.00 | - | 1.00 | - |
| Black, brown and indigenous | 0.59 | 0.37-0.96 | 0.56 | 0.36-0.87 | 0.91 | 0.67-1.24 |

OR, *odds ratio;* CI, confidence interval

\* Minimum wage was BRL 480.77 (USD 119.28) in 2003, BRL 640.81 (USD 158.98) in 2008, and BRL 839.03 (USD 208.16) in 2015.

† Models included participants with complete data.

‡ Values obtained from multivariable logistic regression models including consumption of grain foods meeting the ≤10:1-ratio as dependent variable, and age group, sex, education level, family income per capita, and ethnicity as independent variables.



# **Supplementary Figure 1.** Flow diagram of the study participants.

HSSP, Health Survey of São Paulo; y, years