## Supplementary Methods

## The Health Star Rating System

In summary, a six step process is used based mostly on the [Health Star Rating Guide for Industry](http://www.ahmac.gov.au/cms_documents/Guide%20to%20the%20Health%20Star%20Rating%20Calculator.DOCX):

## Step 1: Determine the HSR category of the food

Each food item is assigned to one of six categories:

Category 1 Beverages other than dairy beverages

Category 1D Dairy beverages

Category 2 All foods other than those included in Category 1, 1D, 2D, 3 or 3D

Category 2D Dairy foods other than those included in Category 1D or 3D

Category 3 Oils and spreads

Category 3D Cheese and processed cheese (with calcium content >320mg/100g)

*Category 1D*: milk and dairy based beverages and dairy beverage analogues derived from legumes and cereals. Note that this differs slightly from the Health Star Rating Guide to Industry as calcium content was determined at a food category level as opposed to an individual food product level.

## Step 2: Determine the form of the food for the HSR

The HSR was derived based on the nutrient values presented in the Nutrition Information Panel of the product. As a general rule, nutrient values are entered into the database as follows:

* If nutrient values for both “as sold” and “as prepared” are provided, the nutrient values for “as sold” are entered and the product is flagged as “Unprepared” in the database.
* If nutrient values are only provided “as prepared” or “as consumed” then these values are entered and are flagged as “Prepared” in the database.

## Step 3: Calculate HSR baseline points

HSR baseline points are calculated for the average quantity of energy, saturated fat, total sugars and sodium in 100g or 100mL of the food (based on the units used in the Nutrition Information Panel). HSR Baseline Points are given in the table below for determining the HSR of a food, with a maximum of 30 points assigned to some components.

Table 1: HSR Baseline Points for Category 1, 1D, 2 or 2D Foods

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Baseline points | Energy content (kJ) per 100g or 100mL | Saturated fatty acids (g) per 100g or 100mL | Total sugars (g) per 100g or 100mL | Sodium (mg) per 100g or 100mL |
| 0 | ≤335 | ≤1.0 | ≤5.0 | ≤90 |
| 1 | >335 | >1.0 | >5.0 | >90 |
| 2 | >670 | >2.0 | >9.0 | >180 |
| 3 | >1005 | >3.0 | >13.5 | >270 |
| 4 | >1340 | >4.0 | >18.0 | >360 |
| 5 | >1675 | >5.0 | >22.5 | >450 |
| 6 | >2010 | >6.0 | >27.0 | >540 |
| 7 | >2345 | >7.0 | >31.0 | >630 |
| 8 | >2680 | >8.0 | >36.0 | >720 |
| 9 | >3015 | >9.0 | >40.0 | >810 |
| 10 | >3350 | >10.0 | >45.0 | >900 |
| 11 | >3686 | >11.2 | >49.0 | >1005 |
| 12 |  | >12.5 | >54.0 | >1121 |
| 13 |  | >13.9 | >58.0 | >1251 |
| 14 |  | >15.5 | >63.0 | >1397 |
| 15 |  | >17.3 | >67.0 | >1559 |
| 16 |  | >19.3 | >72.0 | >1740 |
| 17 |  | >21.6 | >76.0 | >1942 |
| 18 |  | >24.1 | >81.0 | >2168 |
| 19 |  | >26.9 | >85.0 | >2420 |
| 20 |  | >30.0 | >90.0 | >2701 |
| 21 |  | >33.5 | >94.0 | >3015 |
| 22 |  | >37.4 | >99.0 | >3365 |
| 23 |  | >41.7 |  | >3756 |
| 24 |  | >46.6 |  | >4192 |
| 25 |  | >52.0 |  | >4679 |
| 26 |  | >58.0 |  | >5223 |
| 27 |  | >64.7 |  | >5829 |
| 28 |  | >72.3 |  | >6506 |
| 29 |  | >80.6 |  | >7262 |
| 30 |  | >90 |  | >8106 |

Table 2: HSR Baseline Points for Category 3 and 3D Foods

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Baseline points | Energy content (kJ) per 100g or 100mL | Saturated fatty acids (g) per 100g or 100mL | Total sugars (g) per 100g or 100mL | Sodium (mg) per 100g or 100mL |
| 0 | ≤ 335 | ≤1.0 | ≤ 5.0 | ≤ 90 |
| 1 | >335 | >1.0 | >5.0 | >90 |
| 2 | >670 | >2.0 | >9.0 | >180 |
| 3 | >1005 | >3.0 | >13.5 | >270 |
| 4 | >1340 | >4.0 | >18.0 | >360 |
| 5 | >1675 | >5.0 | >22.5 | >450 |
| 6 | >2010 | >6.0 | >27.0 | >540 |
| 7 | >2345 | >7.0 | >31.0 | >630 |
| 8 | >2680 | >8.0 | >36.0 | >720 |
| 9 | >3015 | >9.0 | >40.0 | >810 |
| 10 | >3350 | >10.0 | >45.0 | >900 |
| 11 | >3685 | >11.0 |  | >990 |
| 12 |  | >12.0 |  | >1080 |
| 13 |  | >13.0 |  | >1170 |
| 14 |  | >14.0 |  | >1260 |
| 15 |  | >15.0 |  | >1350 |
| 16 |  | >16.0 |  | >1440 |
| 17 |  | >17.0 |  | >1530 |
| 18 |  | >18.0 |  | >1620 |
| 19 |  | >19.0 |  | >1710 |
| 20 |  | >20.0 |  | >1800 |
| 21 |  | >21.0 |  | >1890 |
| 22 |  | >22.0 |  | >1980 |
| 23 |  | >23.0 |  | >2070 |
| 24 |  | >24.0 |  | >2160 |
| 25 |  | >25.0 |  | >2250 |
| 26 |  | >26.0 |  | >2340 |
| 27 |  | >27.0 |  | >2430 |
| 28 |  | >28.0 |  | >2520 |
| 29 |  | >29.0 |  | >2610 |
| 30 |  | >30.0 |  | >2700 |

## Step 4: Calculate HSR modifying points

HSR Modifying Points were given for the amount of fruits, nuts, vegetables and legumes (FVNL) in a food and in some cases, the amount of protein and dietary fibre. Note that for FVNL and calcium this was done at the food category level and not the food product level.

Table 3: HSR V Points

|  |  |  |
| --- | --- | --- |
| Points | % concentrated fruit or vegetables  | % FVNL |
| 0 | <25 | ≤40 |
| 1 | ≥25 | >40 |
| 2 | ≥43 | >60 |
| 3 | ≥52 | >67 |
| 4 | ≥63 | >75 |
| 5 | ≥67 | >80 |
| 6 | ≥80 | >90 |
| 7 | ≥90 | >95 |
| 8\* | =100 | =100 |

\*For the purposes of HSRC a food that is >99.5% FVNL counts as 100% FVNL where food additives or fortificants have been added, e.g. pure fruit juice with added vitamin C

**HSR Protein and fibre points**

Table 4: HSR Protein (P) and Fibre (F) Points

|  |  |  |
| --- | --- | --- |
| Points | Protein (g) per 100g or 100mL | Dietary fibre (g) per 100g or 100mL |
| 0 | ≤1.6 | ≤0.9 |
| 1 | >1.6 | >0.9 |
| 2 | ≥3.2 | >1.9 |
| 3 | >4.8 | >2.8 |
| 4 | >6.4 | >3.7 |
| 5 | >8.0 | >4.7 |
| 6 | >9.6 | >5.4 |
| 7 | >11.6 | >6.3 |
| 8 | >13.9 | >7.3 |
| 9 | >16.7 | >8.4 |
| 10 | >20.0 | >9.7 |
| 11 | >24.0 | >11.2 |
| 12 | >28.9 | >13.0 |
| 13 | >34.7 | >15.0 |
| 14 | >41.6 | >17.3 |
| 15 | >50.0 | >20.0 |

##

## Step 5: Calculate the final HSR score

We calculated the final HSR score using the following formula –

Final HSR Score = baseline points – (V points) – (P points) – (F points)

## Step 6: Assignment of a rating to food based on the final HSR score

The HSR score was assigned a rating based on Table 5, depending on which of the six categories of food in the HSRC it was classified in.

**Table 5: Final scores used to assign Heath Star Ratings**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Health Star Rating | Food Category1 | Food Category1D | Food Category2\* | Food Category2D† | Food Category3 | Food Category3D |
| 5 | ≤ -6 | ≤ -2 | ≤ -11 | ≤ -2 | ≤ 13 | ≤ 22 |
| 4½ | -5 | -1 | -10 to -7 | -1 | 14 to 16 | 23 to 24 |
| 4 | -4 | 0 | -6 to -2 | 0 | 17 to 20 | 25 to 26 |
| 3½ | -3 | 1 | -1 to 2 | 1 | 21 to 23 | 27 to 28 |
| 3 | -2 | 2 | 3 to 6 | 2 | 24 to 27 | 29 to 30 |
| 2½ | -1 | 3 | 7 to 11 | 3 | 28 to 30 | 31 to 32 |
| 2 | 0 | 4 | 12 to 15 | 4 | 31 to 34 | 33 to 34 |
| 1½ | 1 | 5 | 16 to 20 | 5 | 35 to 37 | 35 to 36 |
| 1 | 2 | 6 | 21 to 24 | 6 | 38 to 41 | 37 to 38 |
| ½ | ≥3 | ≥7 | ≥25 | ≥7 | ≥42 | ≥39 |

\*All foods other than dairy not in Category 1 or 3

† All dairy foods not in Category 1D or 3D

## Missing data logic rules

1. ***HSR Fibre (F) points*** Note that only partial data were available for dietary fibre in the database as it is not a required nutrient to declare on the Nutrition Information Panel. As such, products in a food category known not to contain fibre (eg, eggs) were assigned 0 fibre points; products with data available were assigned individual fibre points; and products with no data but in a category of foods known to contain fibre were assigned an imputed value. The imputed value was the average for all products in the category with data.
2. ***HSR V points*** In the database, it was not possible to determine V points at an individual product level, hence proxy values were assigned at the food category level using the following strategy:
	1. Products in food categories known not to contain appreciable amounts of fruit and vegetables (eg, dairy milk) were assigned 0 V points;
	2. Products in food categories known to contain fruit and vegetables were assigned imputed V points based on the mean V points of a random sample of product ingredient lists from each food category (note there are a total of ~700 categories in the database).

## Supplementary Table 1. Overview of Major Manufacturers and Number of Gluten Free and Non-Gluten Free Products According to Food Category

|  |  |  |
| --- | --- | --- |
| Food Category | Sub-categories | Number of Products  |
|  |  | Gluten Free, n (%) | Non-Gluten Free, n (%) |
| Bread | Including flat bread, tortillas, pita bread, Naan, roti, fruit bread, multigrain bread, rye bread, soy & linseed, mixed grain sourdough, bagels, bread rolls, savoury bread, sweet bread, pizza bases, taco shells, croutons, English muffins, garlic bread, and crumpets. | Total 54 (10%)Top 3 manufacturers:Dr Schar 11 (20%)Goodman Fielder 5 (9%)Coles/Gruma Oceania\* 6 (11%) | Total 483 (90%)Top 3 manufacturers:Goodman Fielder 71 (15%)Coles 61 (13%)George Weston Foods 58 (12%) |
| Plain dry pasta | NA | Total 46 (15%)Top 3 manufacturers:Buontempo Enterprises 20 (43%)San Remo Macaroni Company 8 (17%)Coles/D’Lite Food Pty Ltd 6 (13%) | Total 257 (85%)Top 3 manufacturers:San Remo Macaroni Company 73 (29%)Barilla Australia 29 (11%)Coles 25 (10%) |
| Ready to eat cereal | Including brans, flakes, muesli, breakfast biscuits, sweet cereals, puffed cereals, breakfast bites, granola, and breakfast cookies. | Total 73 (22%)Top 3 manufacturers:Freedom Foods 13 (18%)Nature’s Path 8 (11%)Coles 7 (10%) | Total 266 (78%)Top 3 manufacturers:Kellogg Australia 41 (15%)Nestle Australia, 38 (14%)ALDI 34 (13%) |
| Cereal bars | Includes nut-based bars (plain, yoghurt coated, chocolate coated), and cereal-based bars (plain, yoghurt coated, chocolate coated, baked/filled). | Total 60 (25%)Top 3 manufacturers:Go Natural 17 (28%)Manassen Foods 6 (10%)Carman’s Fine Foods/ 15 (25%)Leda Nutrition/Energy Products\* | Total 177 (75%)Top 3 manufacturers:Nestle Australia 25 (14%)Kellogg Australia 20 (11%)ALDI 19 (11%) |
| Cake Mixes/Cakes | Includes pancake mix, cupcake mix, muffin mix, chocolate cake mix, biscuit mix, vanilla/plain cake mix, cheesecake mix, fruit cake mix, carrot cake mix, brownie mix, scone mix, pancakes, cupcakes, chocolate cakes, vanilla/plain cakes, cheese cakes, fruit cakes, carrot cakes, slices, lamingtons, doughnuts, Swiss rolls, brownies, meringues, Bavarians, scones, Christmas cakes and puddings. | Total 59 (12%)Top 3 manufacturersColes 12 (20%)Woolworths 10 (17%)Green’s General Foods 9 (15%) | Total 432 (88%)Top 3 manufacturers:Coles 100 (23%)Woolworths 50 (12%)Goodman Fielder 49 (11%) |
| Sweet biscuits | Includes chocolate-covered sandwich style biscuits, jam filled biscuits, fruit, filled biscuits, wafer-style filled biscuits, choc-chip biscuits, plain sweet unfilled biscuits, chocolate coated biscuits, iced biscuits, shortbread style biscuits, gingerbread biscuits, oatmeal/wheatmeal biscuits, Anzac style biscuits, and fruit and nut chunks biscuits. | Total 63 (12%)Top 3 manufacturers:Buontempo Enterprises/ 14 (22%)Naturally Good\*Kez’s Kitchen/ 20 (32%)Leda Nutrition/Coles/Freedom Foods \* | Total 487 (88%)Top 3 manufacturers:Campbell Arnott’s 89 (18%)ALDI 64 (13%)Coles 37 (8%) |
| Ice cream | NA | Total 25 (12%)Top 3 manufacturers:Weis Frozen Foods 9 (36%)Bulla Dairy Foods 8 (32%)Sanitarium 2 (8%) | Total 192 (88%)Top 3 manufacturers:R&R Ice Cream 61 (31%)Unilever 36 (19%)Coles 31 (16%) |
| Corn and potato chips | NA | Total 56 (36%)Top 3 manufacturers:Gruma Oceania 8 (14%)Woolworths/ 12 (21%)Vege Chip Company  | Total 98 (64%)Top 3 manufacturers:PepsiCo ANZ 26 (27%)Snacks Brands Australia 21 (21%)Woolworths 11 (11%) |
| Cured meats, sausages, and hot dogs | Includes salami, pancetta and prosciutto, kransky, chorizo, cabanossi and twiggy sticks, polish salami, hot dogs, and sausages (beef, chicken, lamb, pork, and kangaroo). | Total 156 (87%)Top 3 manufacturers:Primo Smallgoods 50 (32%)Coles 22 (14%)Woolworths 22 (14%) | Total 23 (13%)Top 3 manufacturers:George Weston Foods 11 (48%)British Sausage Company 7 (30%)Primo Smallgoods 2 (9%) |
| Sugar-based confectionery | Includes licorice, Turkish delight, nougat, mints, marshmallows, sherbet, lollipops, fudge, toffee and related products, and other soft and hard sugar-based confectionery. | Total 45 (22%)Top 3 manufacturers:The Sugarless Co 10 (22%)Allsep’s 4 (9%)ALDI/Double D Products\* 6 (13%) | Total 161 (78%)Top 3 manufacturers:Coles 25 (16%)Mondelez 24 (15%)IGA 21 (13%) |

\*The same number of products were identified from each of these companies.



**Supplementary** **Figure 1.** Dietary fibre levels of Gluten Free (GF, white bars) and non-Gluten Free (Non-GF, black bars) discretionary foods, including cereal bars, cakes mixes/cakes, sweet biscuits, ice creams, corn and potato chips, and sugar based confectioneries. Products were identified from 4 major supermarkets in Sydney, Australia in 2013, and analyses were restricted to products with dietary fibre information available on their nutrition information panel. Although cured meats, sausages and hot dogs were part of the main analyses (see main text), they were excluded from the dietary fibre analyses because no fibre information was available on any of the identified products. Data are presented as mean ± SE, there were no significant differences in mean dietary fibre comparing GF to non-GF products (*P* >0.05 for each), assessed by linear regression.