AHS-2 Environmental Nutrition

Dataset

- File path: `M:\Groups\Nutrition\Environmental Nutrition\AHS-2 Environment and Health`
- File Name: `baseline-environmental-data-per-subject-20210824.csv`
- Includes $n = 88008$ subjects and
- 187 variables:
  - Demographics:
    - Age at baseline: `agein`
    - BMI: `bmi`
    - Education, 3 levels: `edu3cat`
    - Gender: `female`
    - Race (Black/Non-Black): `black`
  - Total intake in kcal, gram and servings per day
  - 28 food groups in:
    - kcal/day: `*_kcal`
    - gram/day: `*_gram`
    - standard servings/day: `*_srv`
    - GWP (kg CO2-eq): `*_gw_kg`
    - land use (m^2a): `*_lu_m2`
    - water consumption (m^3): `*_wc_m3`
    - (replace * with food group name – see below)
- There are 28 food groups:

```
##  [1] "fruit"      "fvjuice"    "veg"        "potato"     "legumes"
##  [6] "refgrain"   "whlgrain"   "vegmeat"    "nutseed"    "sauce"
## [11] "vegoil"     "eggs"       "dairy"      "dairysub"   "margarine"
## [16] "butter"     "beef"       "procmeat"   "poultry"    "pork"
## [21] "fish"       "water"      "soda"       "cofftea"    "alcbev"
## [26] "dessert"    "snackfoods" "cereal"
```

Issues

- Environmental variables of cereal (`cereal_gw_kg`, `cereal_lu_m2`, `cereal_wc_m3`) have all zero values. Andrew M has been notified.

Changes

- `pork` and `beef` intakes were now separated.
- All food group variables (`*_kcal`, `*_gram`, `*_srv`, `*_gw_kg`, `*_lu_m2`, `*_wc_m3`) were winsorized at the 99.9th percentile of each variable. Total `kcal`, `gram`, `srv`, `gw_kg`, `lu_m2`, and `wc_m3` were recalculated by summing across 28 food groups.

Demographics

```
##
##                     level          Overall
##   n                                88008
##   agein (mean (SD))                58.32 (14.31)
##   bmi (mean (SD))                  27.11 (5.84)
##   edu3cat (%)       Highschool     18627 (21.4)
##                     Some College   34350 (39.5)
##                     College Degree 33914 (39.0)
##   female (%)        Male           30921 (35.1)
##                     Female         57057 (64.9)
##   black (%)         Non-Black      65354 (74.7)
##                     Black          22175 (25.3)
```

Total food intake

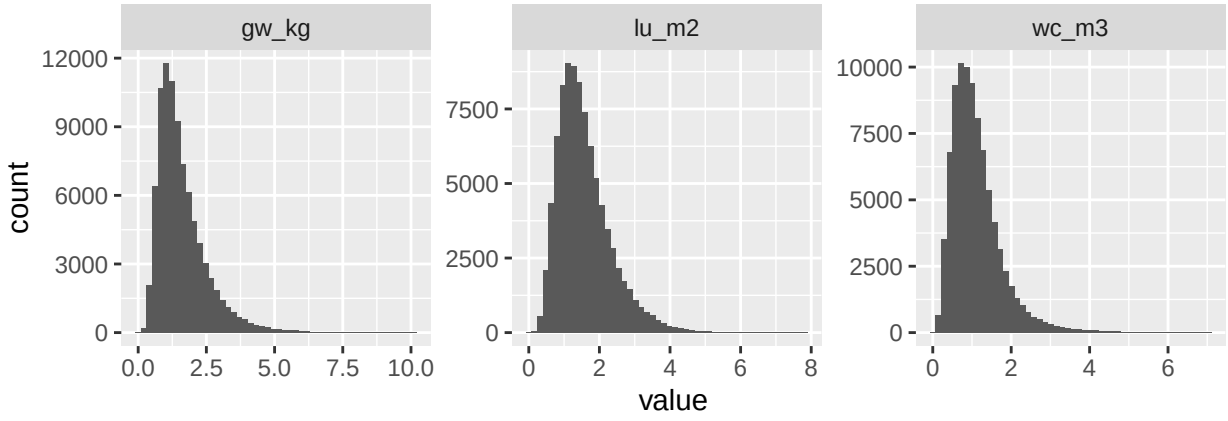
- Distributions of total intake in kcal, gram and servings per day
  - It appears that those with kcal <500 or >4500 are already excluded.
  - The max gram intake became more reasonable after winsorizing data.

```
##         min      Q1  median      Q3     max    mean      sd skew
## kcal 140.75 1234.70 1640.30 2145.19 4474.44 1746.07  703.61 0.80
## gram 200.09 2160.76 2768.07 3448.33 9782.78 2851.89 1031.10 0.62
## srv    1.48   30.87   39.56   49.80  129.16   41.17   14.66 0.65
```

Total environmental impact

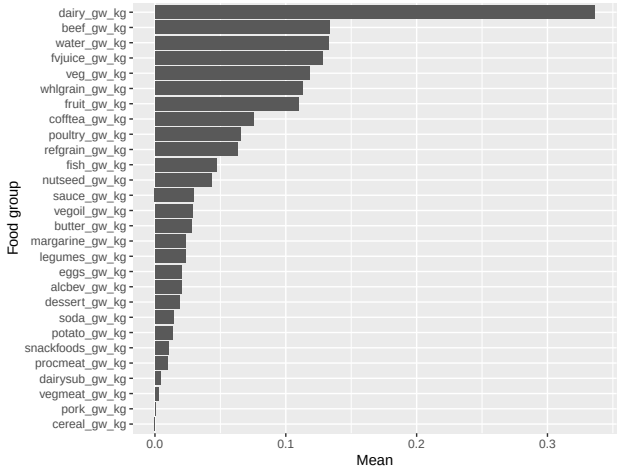
- Distributions of total GWP, land use and water consumption are right-skewed:

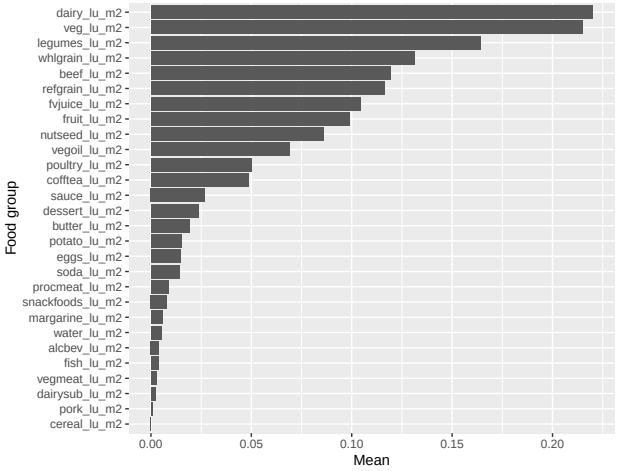
```
##        min   Q1 median   Q3   max mean   sd skew
## gw_kg 0.01 0.97   1.38 2.00 10.11 1.61 0.93 1.79
## lu_m2 0.00 1.04   1.43 1.96  7.81 1.58 0.76 1.24
## wc_m3 0.01 0.67   0.99 1.39  7.04 1.12 0.66 1.87
```

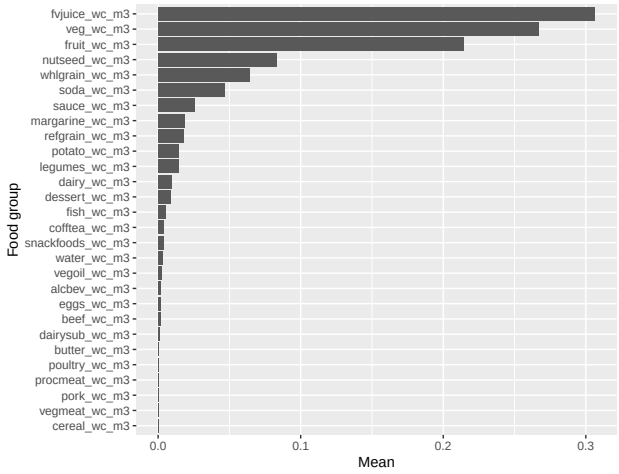


Mean plots of environmental impact by food group

- Mean GWP by food group: The consumption of `dairy` contributes to the largest GWP, followed by `beef` and `water`, among 28 food groups.
- Mean land use by food group: `dairy` followed by `veg`, `legumes` and `whlgrain`.
- Mean water consumption by food group: `fvjuice`, followed by `veg` and `fruit`.

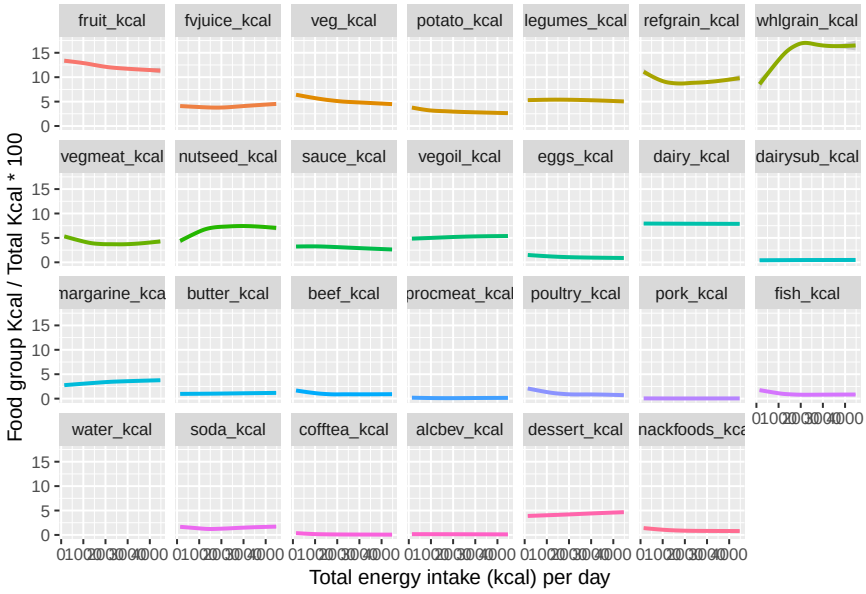




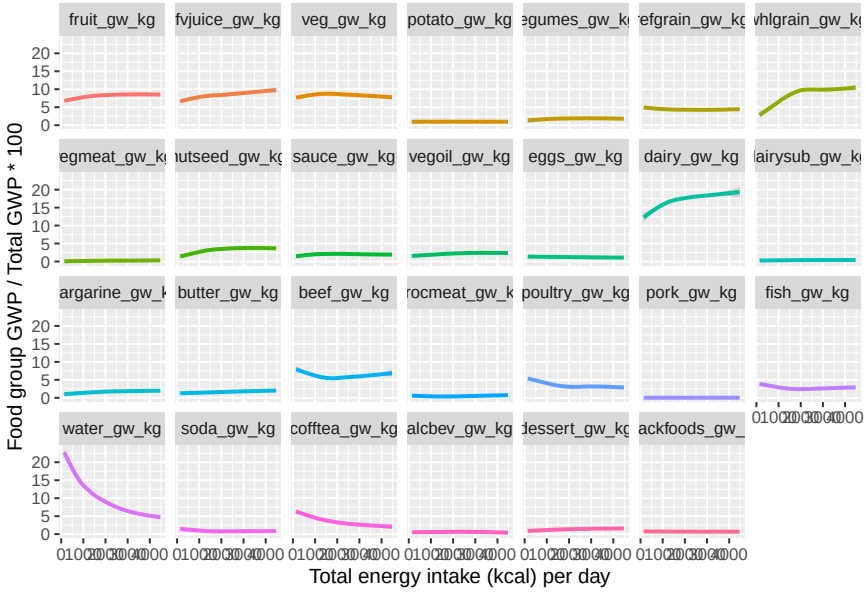


Contribution of food groups (%) over total energy intake

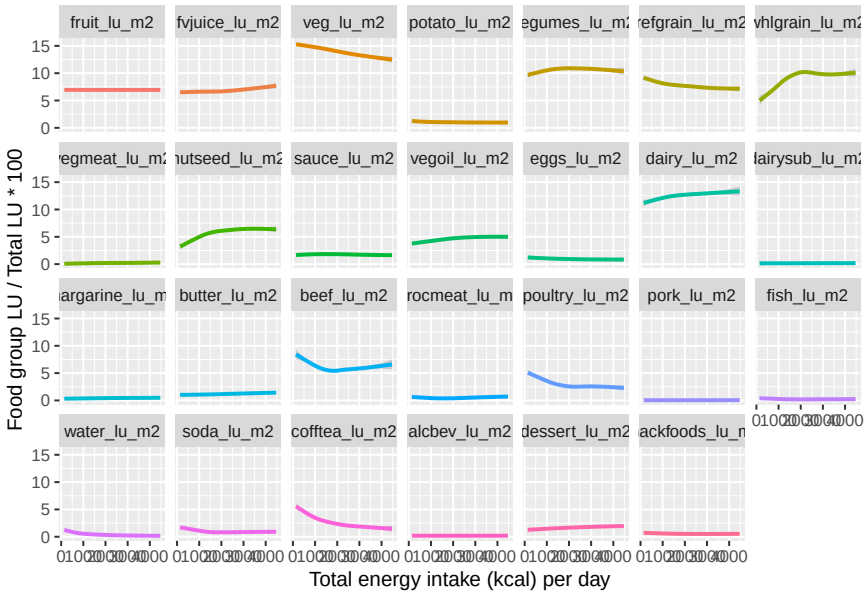
- Percent contribution of food groups, in terms of kcal, GWP, land use, and water consumption, was calculated for each subjects and plotted against the total energy intake. Graphs below show a smoothed trend over the total kcal for each food group.
- Kcal: `fruit` intake explains >10% of the total energy intake. However, as the total energy increases, % kcal from `whlgrain` increases to >15%. The proportion of `dairy` in terms of kcal remains constant at ~7.5%.



- GWP: Again, you see the GWP of `dairy` intake is the highest among all food groups. Although % kcal of `dairy` is constant, its GWP appears to be positively associated with total kcal, plateauing around 18% of total GWP. The GWP of `water` quickly declines as kcal increases.



- Land use: Again, you see the land uses of `dairy`, `veg`, and `legumes` are higher than other food groups.



- Water consumption: Again, you see the water consumptions of `fruit`, `fvjuice`, and `veg` are higher than other food groups. For other food groups, water consumption remains very low.