# Professor David Cameron-Smith

Biochemist

Liggins Institute and University of Auckland

Auckland

## Friday, June 9, 2017

8:05 - 8:30 Black Holes in Space and Time - How What We Eat Affects Our Health

# **Black holes in space and time** – how what we eat affects our health

Professor David Cameron-Smith
University of Auckland

# Conflicts of Interest

**Present**

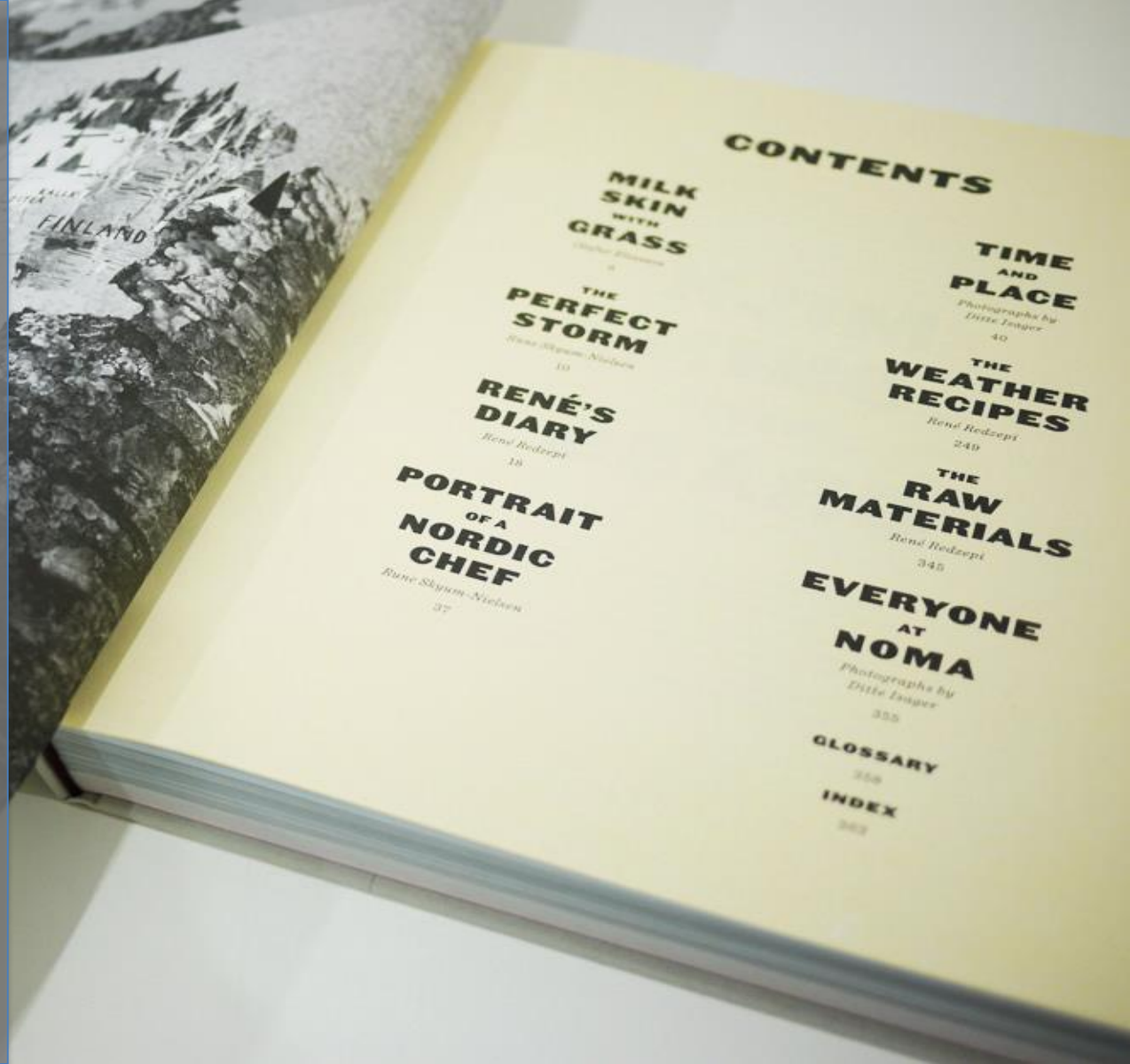
- A2Milk Company
- Dairy Goat Cooperative
- Fonterra
- Nestle
- Yashili Dairy
- AgResearch, MBIE, National Science Challenge (High-Value Nutrition), MPI, HRC.

**Past**

- Murray Goulburn Cooperative (Australia)
- Dairy Australia
- Meat & Livestock Australia
- Palm Oil Board of Malaysia
- NHMRC, ARC

# MENU

1. When, why & what is eaten?
2. The objective truth?
3. ‘Missing’ food and health.
4. Lets get personal.



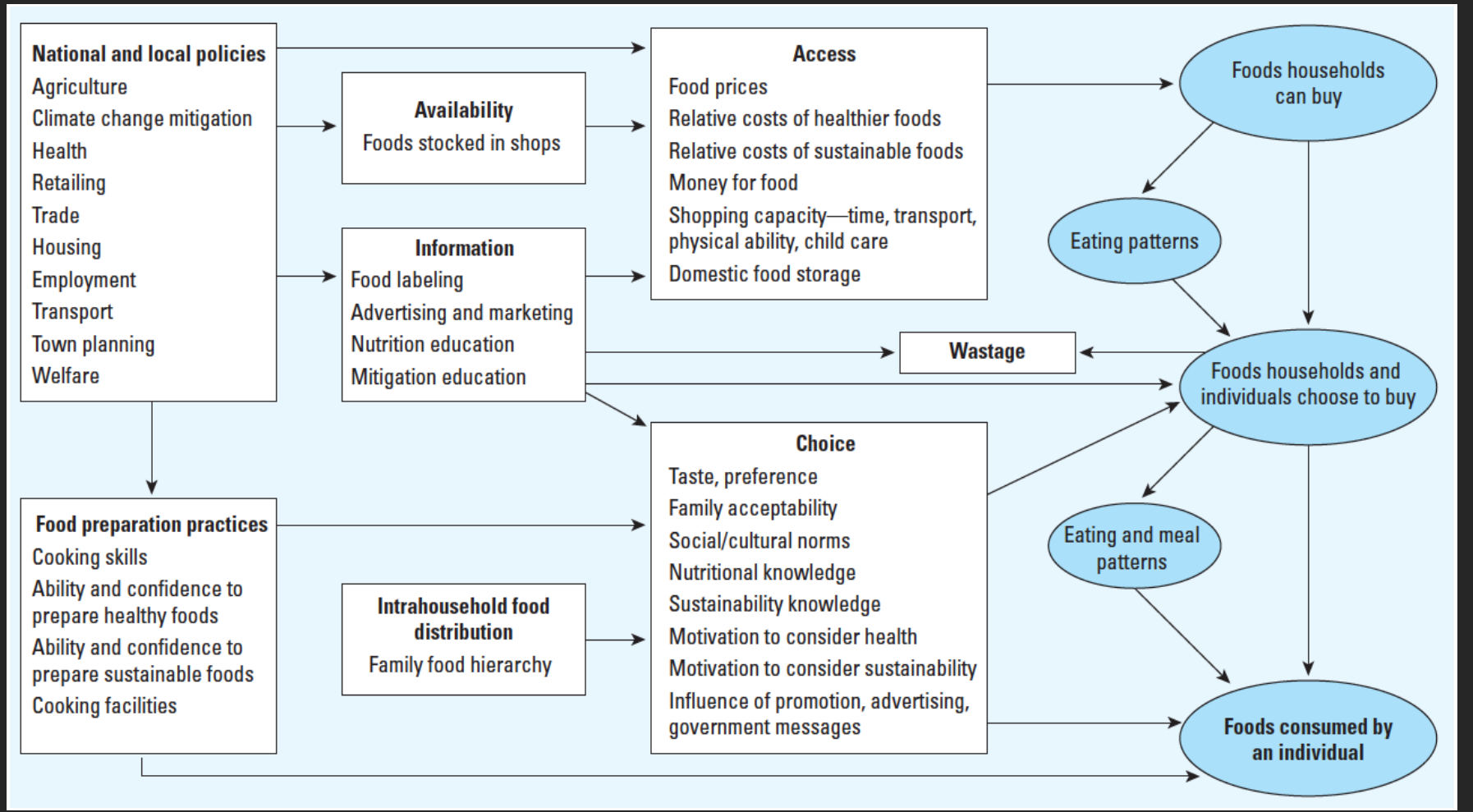

FOOD
the
most important
determinant of
health


SPLENDOUR
IN THE GRASS

# US average annual expenditure on selected major components (2015)

| Item | Married couple | Married couple with children |
|---|---|---|
| **Food** | **11.8** | **13.1** |
| Housing | 31.3 | 31.2 |
| Transportation | 16.6 | 17.6 |
| Healthcare | 10.2 | 6.8 |
| Insurance & super.. | 11.6 | 13.3 |

USA Consumer Expenditures 2015, Bureau of Labour Statistics

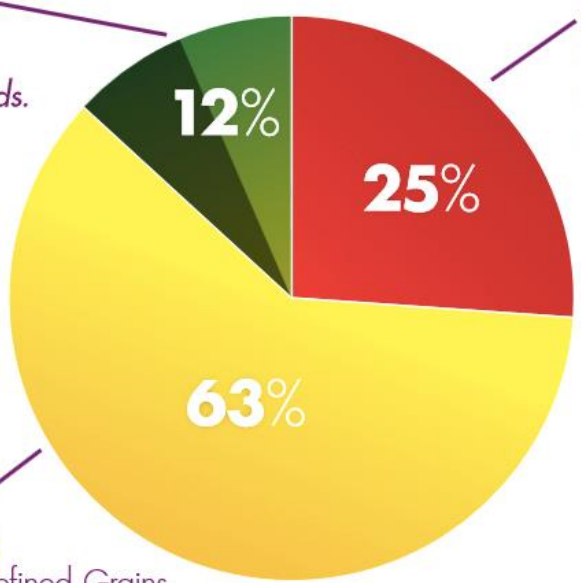

National and local policies
Agriculture
Climate change mitigation
Health
Retailing
Trade
Housing
Employment
Transport
Town planning
Welfare
Availability
Foods stocked in shops
Information
Food labeling
Advertising and marketing
Nutrition education
Mitigation education
Food preparation practices
Cooking skills
Ability and confidence to prepare healthy foods
Ability and confidence to prepare sustainable foods
Cooking facilities
Intrahousehold food distribution
Family food hierarchy
Access
Food prices
Relative costs of healthier foods
Relative costs of sustainable foods
Money for food
Shopping capacity—time, transport, physical ability, child care
Domestic food storage
Wastage
Choice
Taste, preference
Family acceptability
Social/cultural norms
Nutritional knowledge
Sustainability knowledge
Motivation to consider health
Motivation to consider sustainability
Influence of promotion, advertising, government messages
Foods households can buy
Eating patterns
Foods households and individuals choose to buy
Eating and meal patterns
Foods consumed by an individual


WALKERS
Kellogg's
Andrex
Quilts
Ribena
Chocolate
Mousse
PLAIN
FLOUR
BREEZER
Butter
Ambrosia
PG
Coca-Cola

# U.S. FOOD CONSUMPTION
## AS A % OF CALORIES

**PLANT FOOD:**
Vegetables, Fruits, Legumes, Nuts & Seeds, Whole Grains
***Fiber** is found only in plant foods.*

**NOTE:** Up to half of this category may be processed, for example almonds in candy bars, apples in apple pies or spinach in frozen spinach soufflé, and of course these would not be healthy choices. The focus should be on whole unprocessed vegetables, fruits, legumes, nuts and seeds and whole grains.




**ANIMAL FOOD:**
Meat, Dairy, Eggs, Fish, Seafood
***Cholesterol** is found only in animal foods. Animal foods are the PRIMARY source of saturated fat.*

**PROCESSED FOOD:**
Added Fats & Oils, Sugars, Refined Grains

**GUIDE TO HEALTHY EATING:**

Much easier to understand than the USDA Food Pyramid, with no food industry influence.

Eat **LESS** from the animal and processed food groups and **MORE** whole foods from the plant food group.

In general, food from the animal and processed food group contribute to disease, while **WHOLE** foods from the plant group contribute to good health.

Source: USDA Economic Research Service, 2009; www.ers.usda.gov/publications/EIB33; www.ers.usda.gov/Data/FoodConsumption/FoodGuideIndex.htm#calories
New York Coalition for Healthy School Food * www.healthyschoolfood.org
Special thanks to Joel Fuhrman, MD, author of ***Disease Proof Your Child: Feeding Kids Right*** * Graphics by MichelleBando.com

# 5P'S OF FOOD MARKETING

PRODUCT

PACKAGING

PLACEMENT

PORTABILITY

PRICE

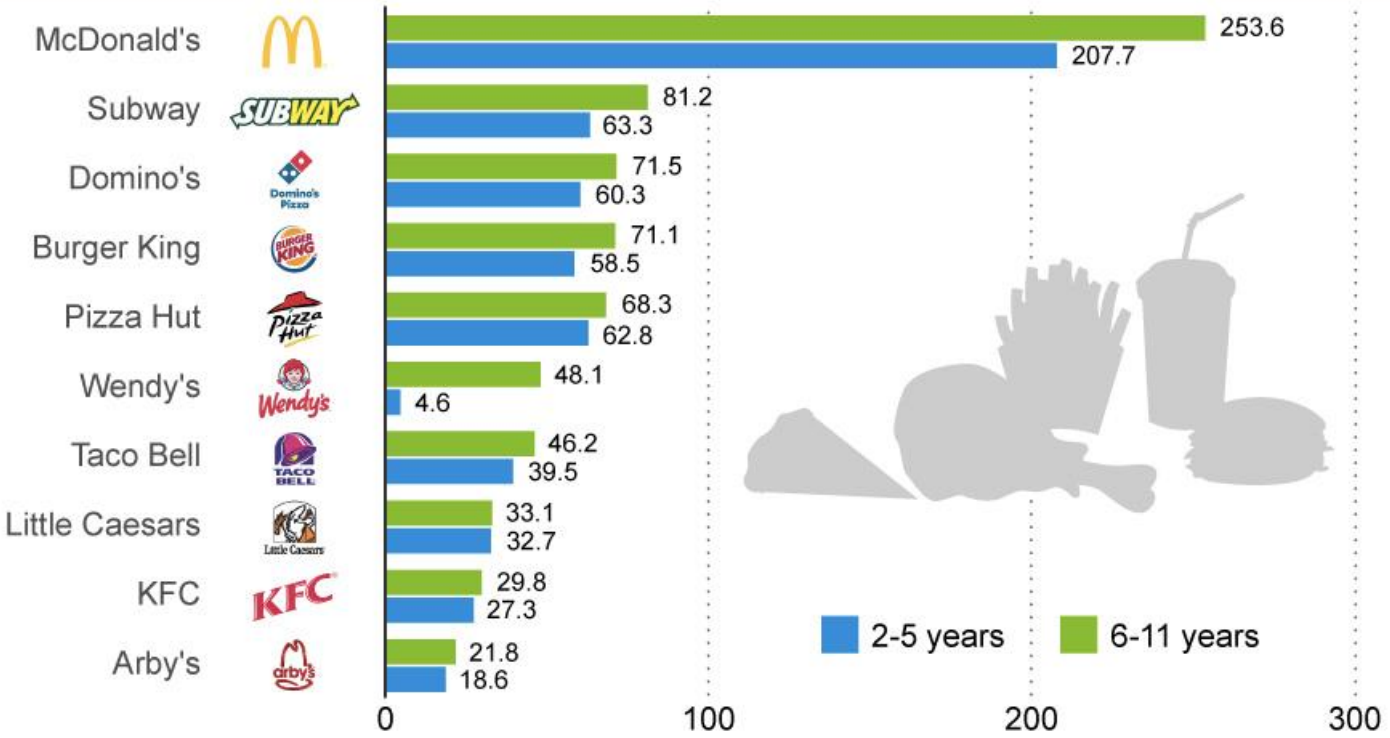
# TASTE AND PRICE
## DRIVE FOOD AND BEVERAGE CHOICES
# MORE OFTEN THAN HEALTHFULNESS

HOW MUCH OF AN IMPACT THE FOLLOWING HAVE ON CONSUMERS DECISION TO BUY FOODS AND BEVERAGES:


About **four in ten consumers** regularly purchase **locally-sourced** or **recyclable** food and beverage products.

# U.S. Kids Watch Hundreds of Fast Food Ads Per Year

Fast food brands most advertised to U.S. children aged 2-11 (average # of ads viewed in 2012)



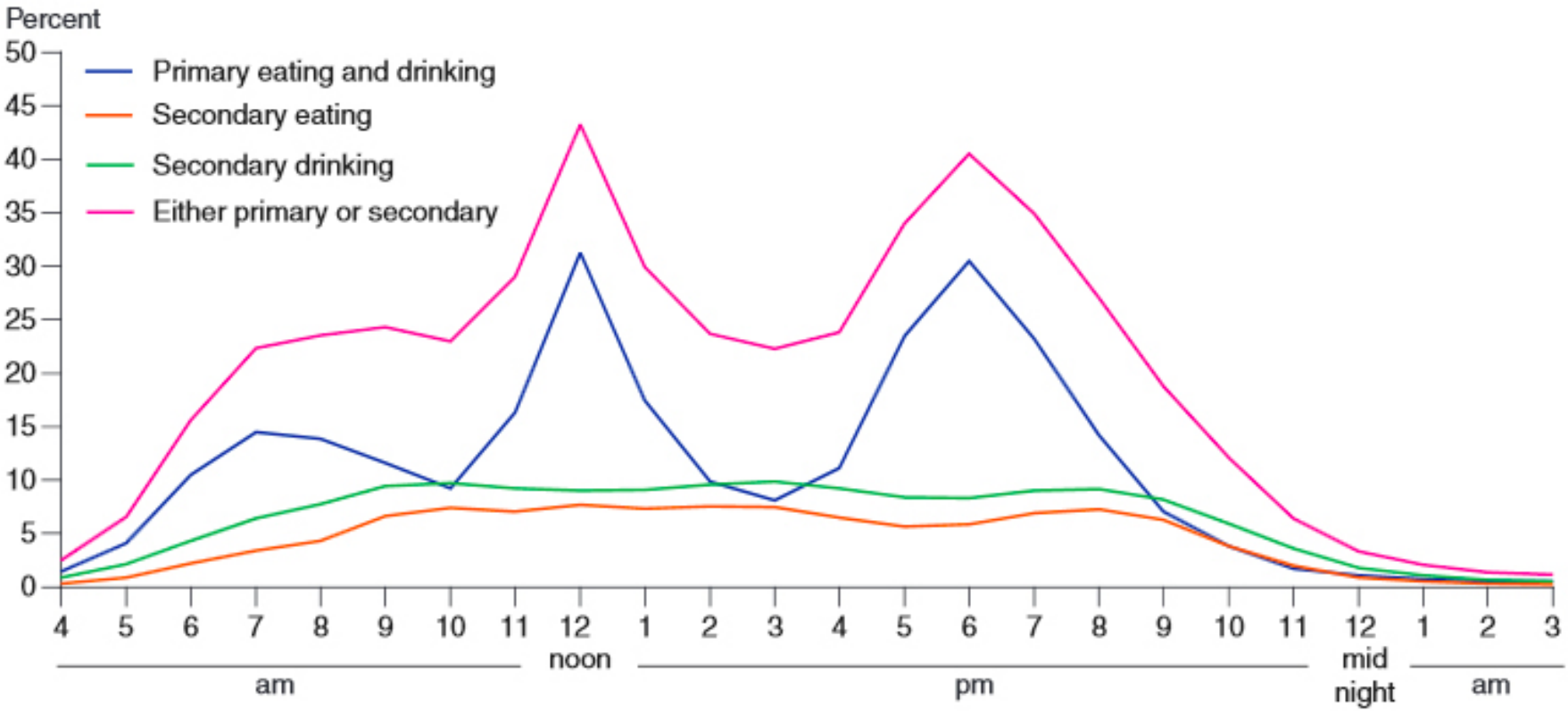

statista The Statistics Portal

Mashable

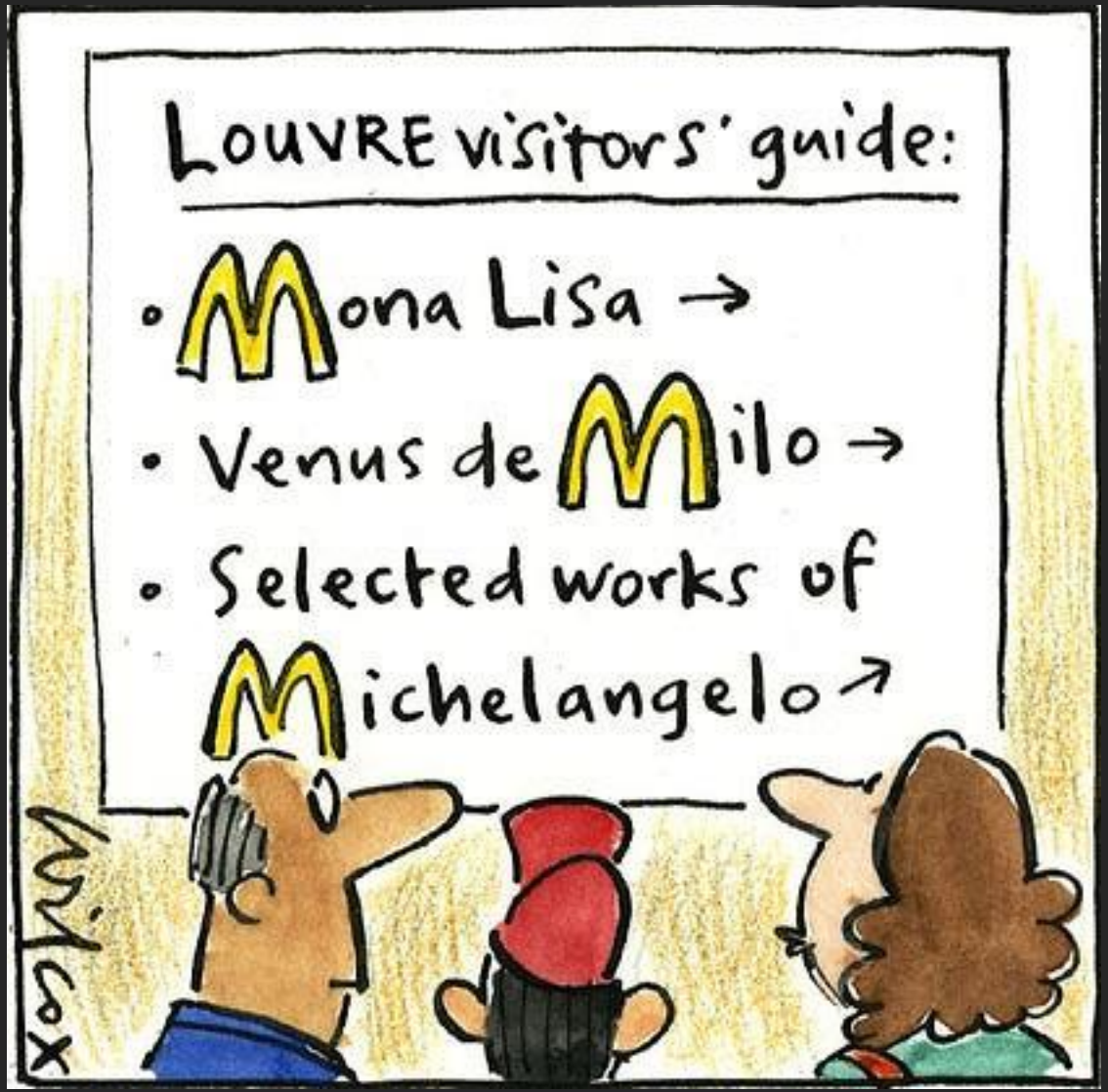
Sources: Nielsen, Yale Rudd Center for Food Policy

Figure 8

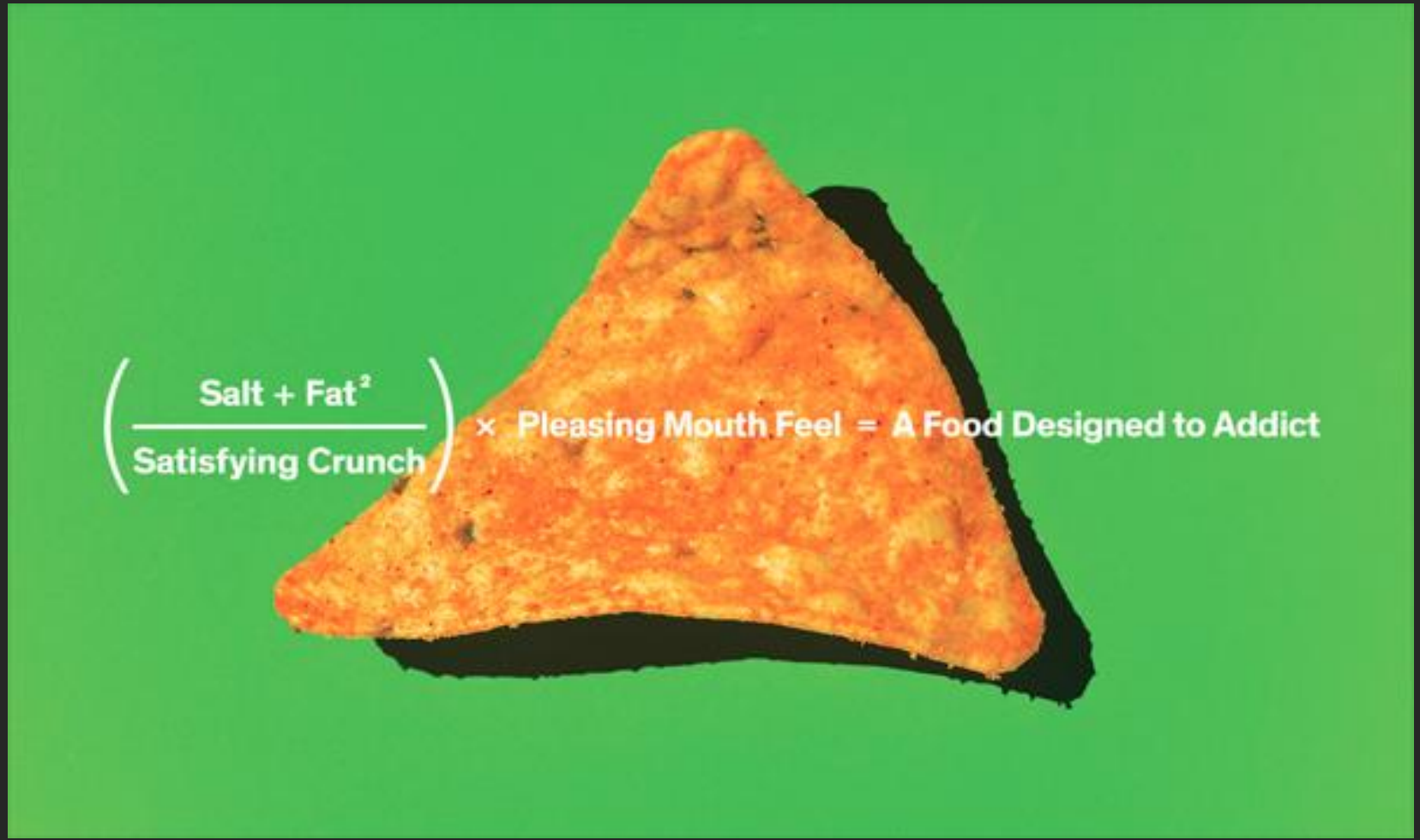
**Percentage of Americans engaged in eating and drinking by time of day, 2006-08, age 15+**




Source: 2006-08 Bureau of Labor Statistics American Time Use Survey and ERS Eating & Health Module data.


LOUVRE visitors' guide:
• Mona Lisa →
• Venus de Milo →
• Selected works of Michelangelo →
Wilcox


How America Eats
SNACKING OUR WAY THROUGH THE DAY
snacks represent 50 percent of all eating occasions
65% of snacking occurs after lunch
17% of snacking occurs in the early morning
18% of snacking occurs in the mid-morning
28% of snacking occurs in the afternoon
24% of snacking occurs after dinner
13% of snacking occurs in the late night
hartman GROUP
Source: Modern Eating: Cultural Roots, Daily Behaviors 2013 report, The Hartman Group, Inc.
©2014 The Hartman Group, Inc.
www.hartman-group.com


$\left(\frac{\text{Salt} + \text{Fat}^2}{\text{Satisfying Crunch}}\right) \times \text{Pleasing Mouth Feel} = \text{A Food Designed to Addict}$

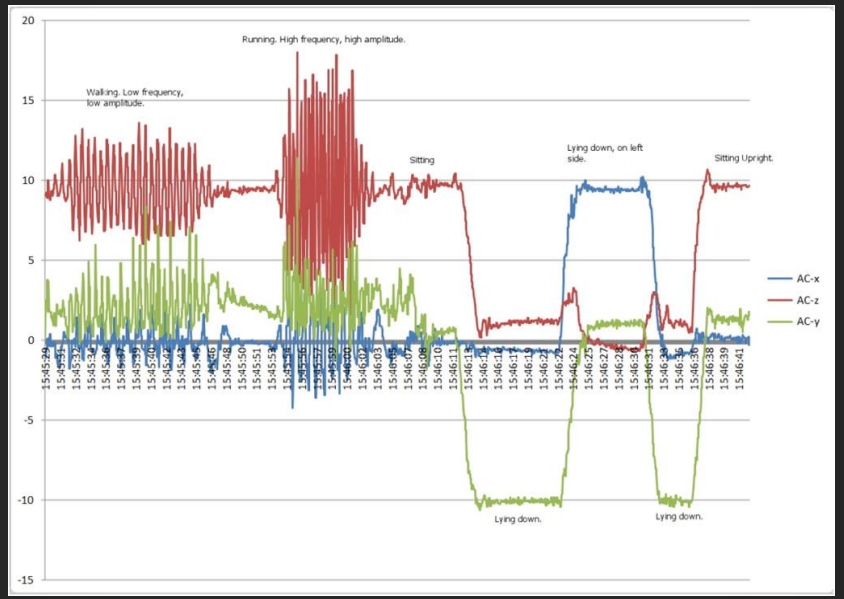

SELF SELECTION

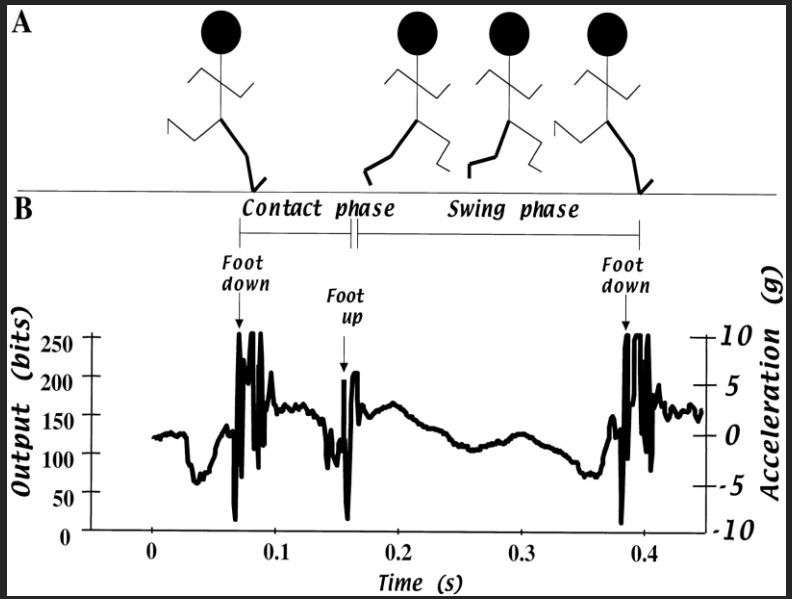
# FOOD & BEVERAGE

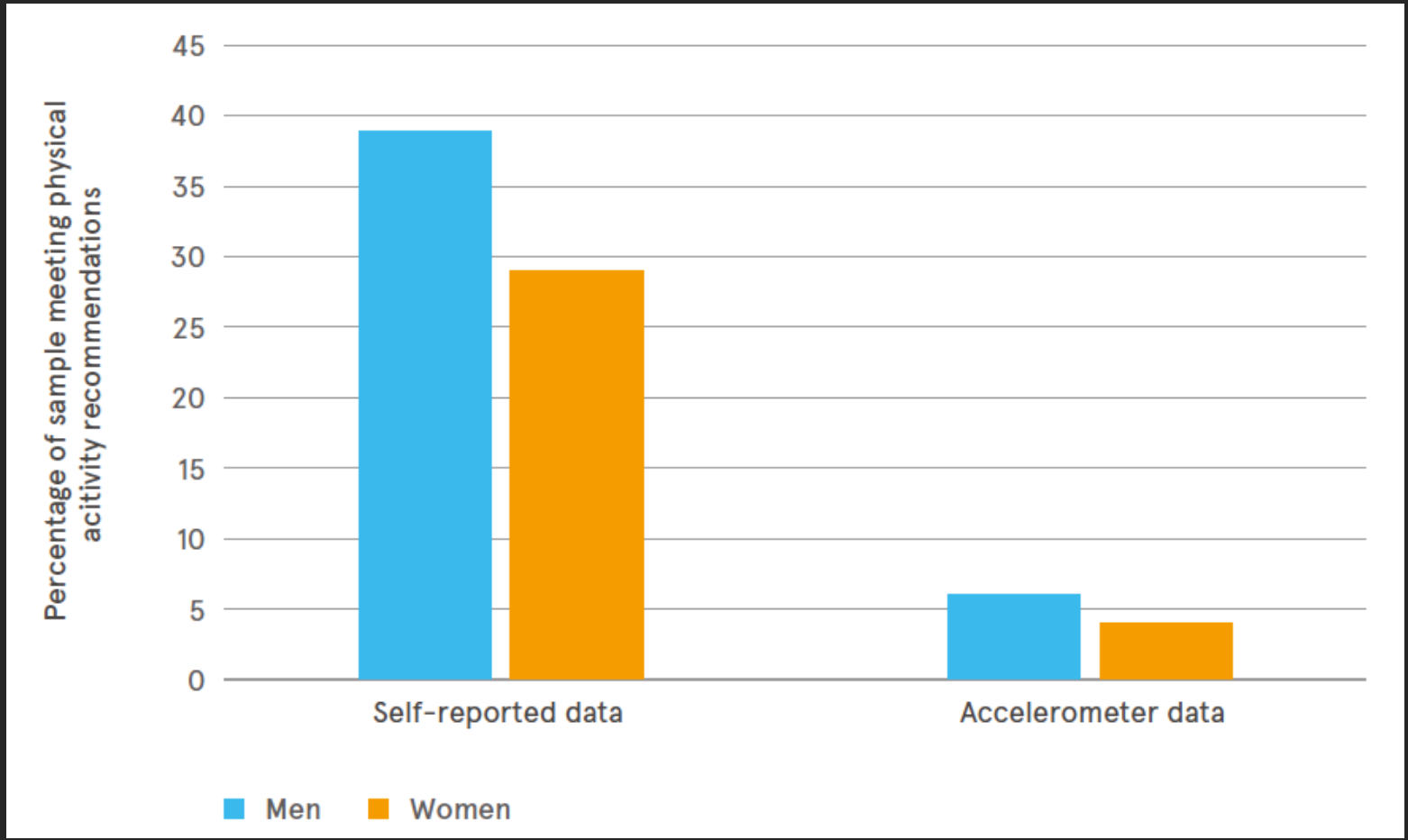
- Biggest
- Insightful
- Extensive
- Expensive

Marketing to **YOU**

# Physical Activity – Macro & Micro




Percentage of sample meeting physical acitivity recommendations
45
40
35
30
25
20
15
10
5
0
Self-reported data
Accelerometer data
Men
Women

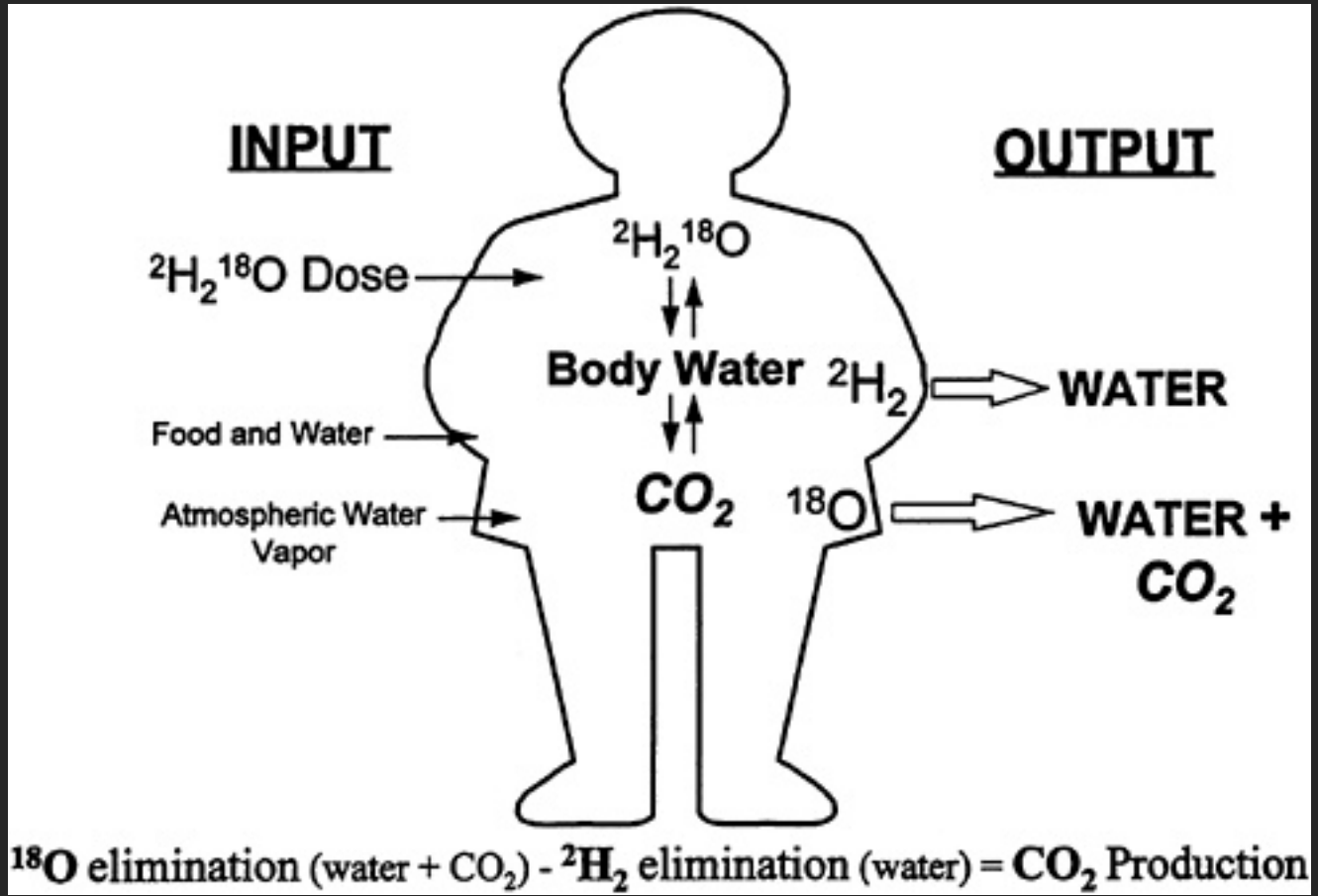
# PHYSICAL ACTIVITY

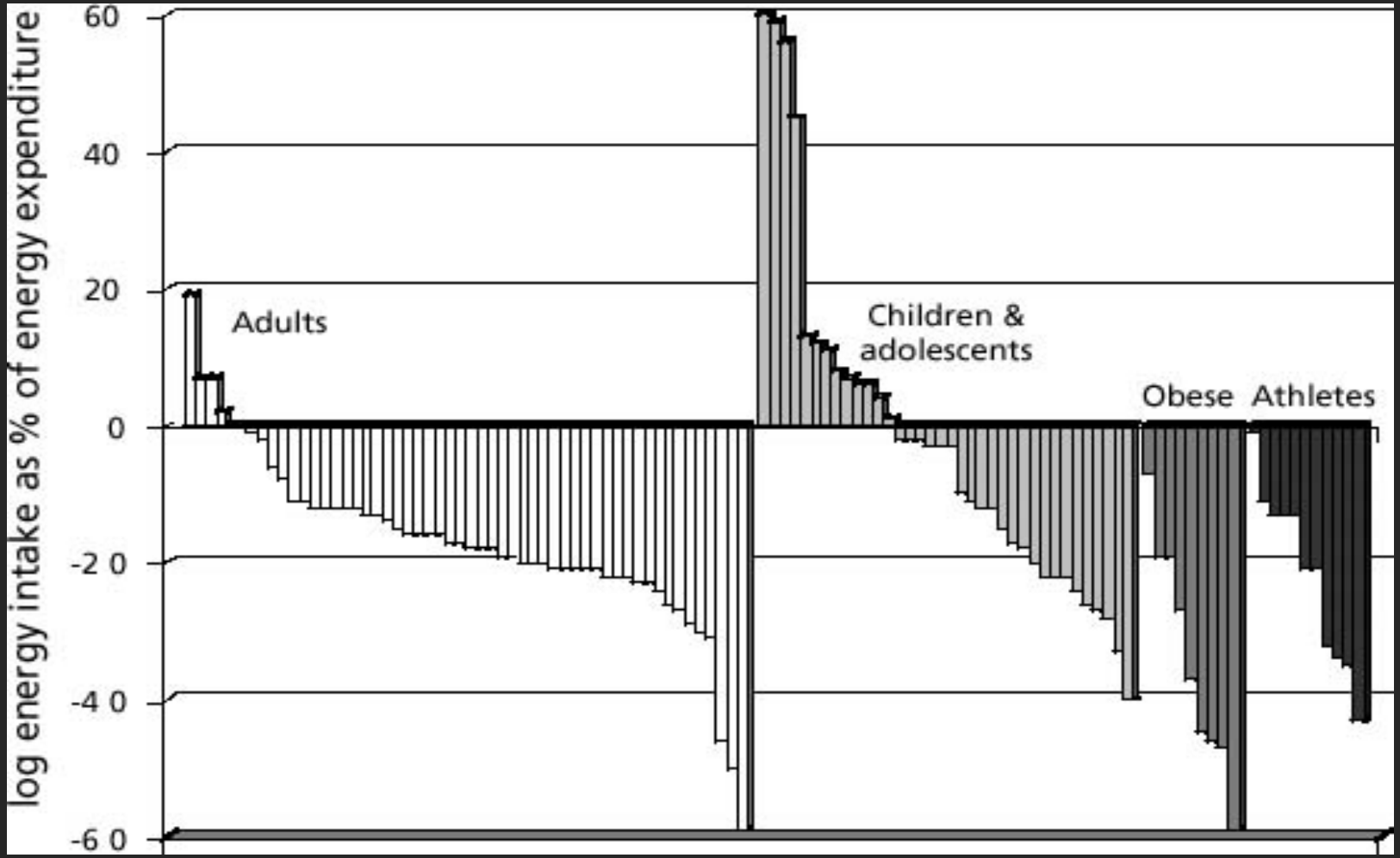
Large
Over-estimated

Work &
Recreation

# Nutritional Assessment

- 24 hr dietary recall
- Food frequency questionnaire (FFQ)
- Food diary (inc. weighing)
- Observed food consumption
- Diet history interview


INPUT
OUTPUT
$^2H_2{}^{18}O$ Dose
$^2H_2{}^{18}O$
Body Water
$^2H_2$
WATER
Food and Water
Atmospheric Water Vapor
$CO_2$
$^{18}O$
WATER + $CO_2$
$^{18}O$ elimination (water + $CO_2$) - $^2H_2$ elimination (water) = $CO_2$ Production


log energy intake as % of energy expenditure
60
40
20
0
-2 0
-4 0
-6 0
Adults
Children &
adolescents
Obese
Athletes

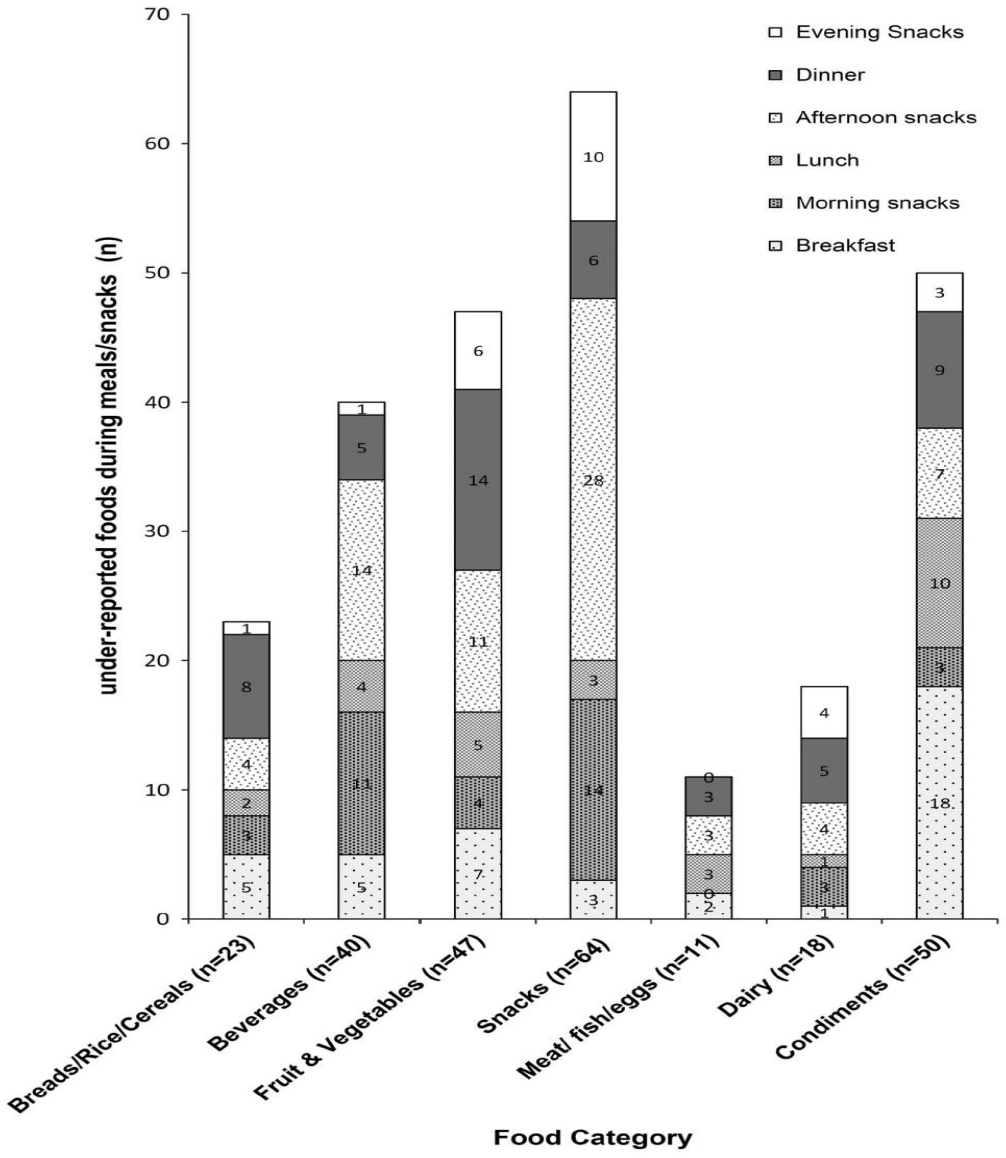
**ORIGINAL ARTICLE**

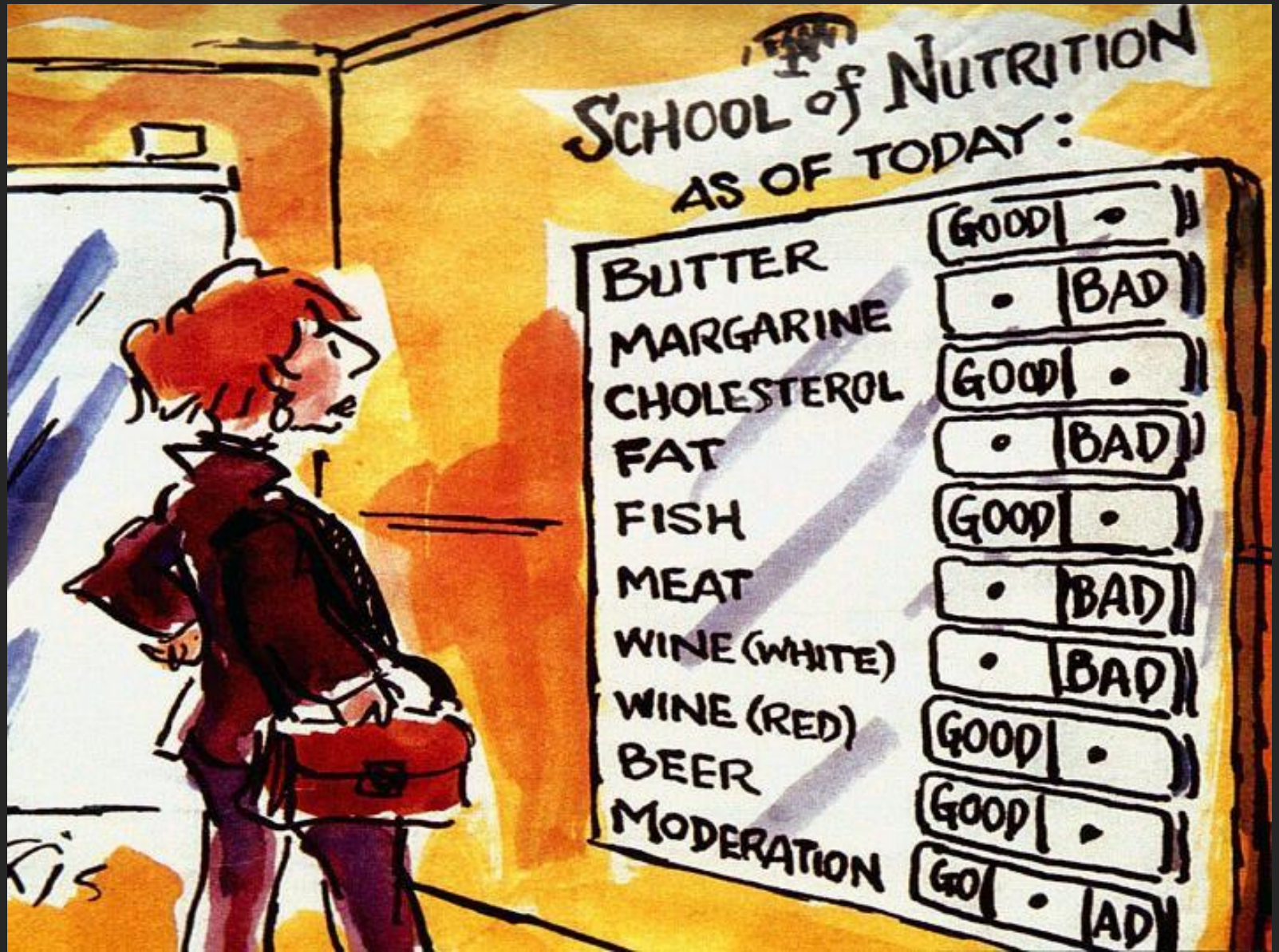
# Under-reporting remains a key limitation of self-reported dietary intake: an analysis of the 2008/09 New Zealand Adult Nutrition Survey

L Gemming[1], Y Jiang[1], B Swinburn[2], J Utter[2] and C Ni Mhurchu[1]

**BACKGROUND/OBJECTIVES:** The most recent New Zealand Adult Nutrition Survey 2008/09 (ANS 08/9) revealed a decrease in reported energy intakes (EIs) compared with the previous 1997 National Nutrition Survey (NNS97). Conversely, measured body weights increased over the same period. We conducted an analysis on the ANS 08/9 data sets to evaluate reported EIs.
**SUBJECTS/METHODS:** Analysis was conducted on data from 3919 (1715 men and 2204 women aged $\geqslant$15 years) survey participants who completed the 24-h dietary recall in the ANS 08/9. Under-reporting was assessed using the ratio of reported EI to estimated resting metabolic rate (EI:$RMR_{est}$), and a cutoff limit of $<0.9$ (EI:$RMR_{est}$) was used to identify low energy reporters (LERs). Results were examined by gender, body size, age and ethnicity.
**RESULTS:** The mean EI:$RMR_{est}$ (s.e.m.) was 1.34 (0.02) for men, and 1.23 (0.02) for women. Overall, 21% of men and 25% of women were classified as LERs. There was a greater prevalence of LERs among people with overweight (25%), or obesity (30%) than people with normal body weight (16%, $P<0.001$). The oldest age group ($\geqslant$65 years) had a greater prevalence of LERs (33%) compared with all other age groups (19–24%, $P<0.001$). Pacific people had a greater prevalence of LERs (33%) compared with Maori (26%, $P=0.007$) and European (23%, $P<0.001$). Compared with the NNS97, a substantial increase in the prevalence of LERs was evident in most subgroups.
**CONCLUSIONS:** Under-reporting of EI will continue to be a major limitation of nutrition surveys without technological innovation. Care should be taken when interpreting EI data.

*European Journal of Clinical Nutrition* (2014) **68,** 259–264; doi:10.1038/ejcn.2013.242; published online 4 December 2013


Evening Snacks
Dinner
Afternoon snacks
Lunch
Morning snacks
Breakfast
under-reported foods during meals/snacks (n)
70
60
50
40
30
20
10
0
Breads/Rice/Cereals (n=23)
Beverages (n=40)
Fruit & Vegetables (n=47)
Snacks (n=64)
Meat/ fish/eggs (n=11)
Dairy (n=18)
Condiments (n=50)
Food Category

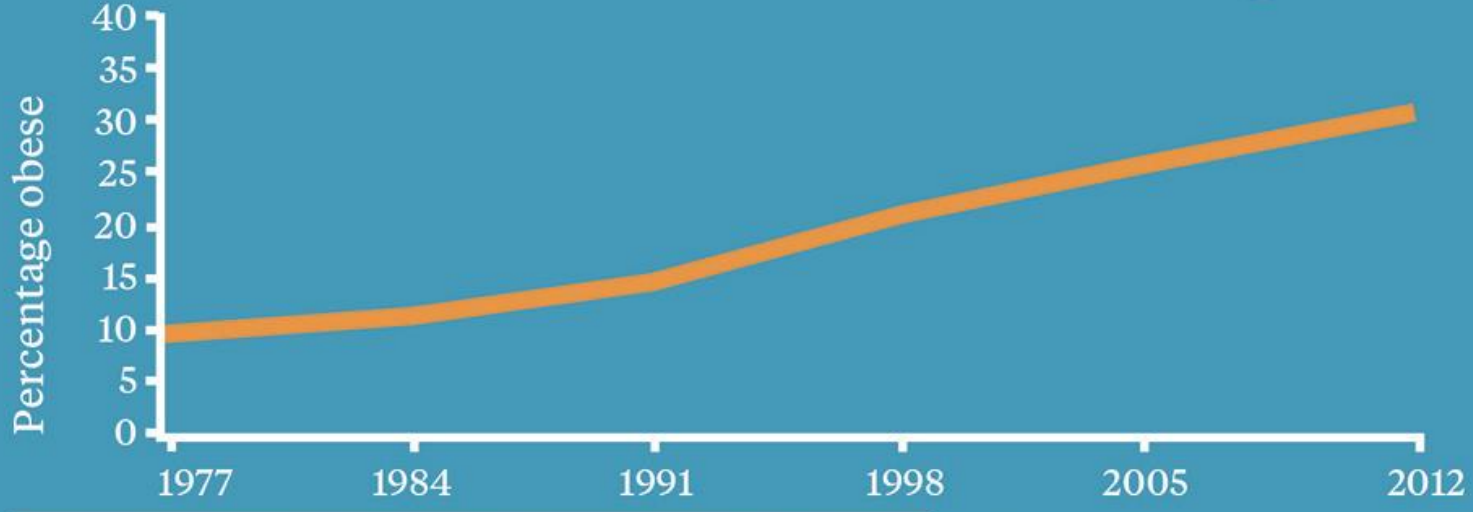

SCHOOL of NUTRITION
AS OF TODAY:
BUTTER
GOOD
MARGARINE
BAD
CHOLESTEROL
GOOD
FAT
BAD
FISH
GOOD
MEAT
BAD
WINE (WHITE)
BAD
WINE (RED)
GOOD
BEER
GOOD
MODERATION
GO
AD

# FOOD INTAKE

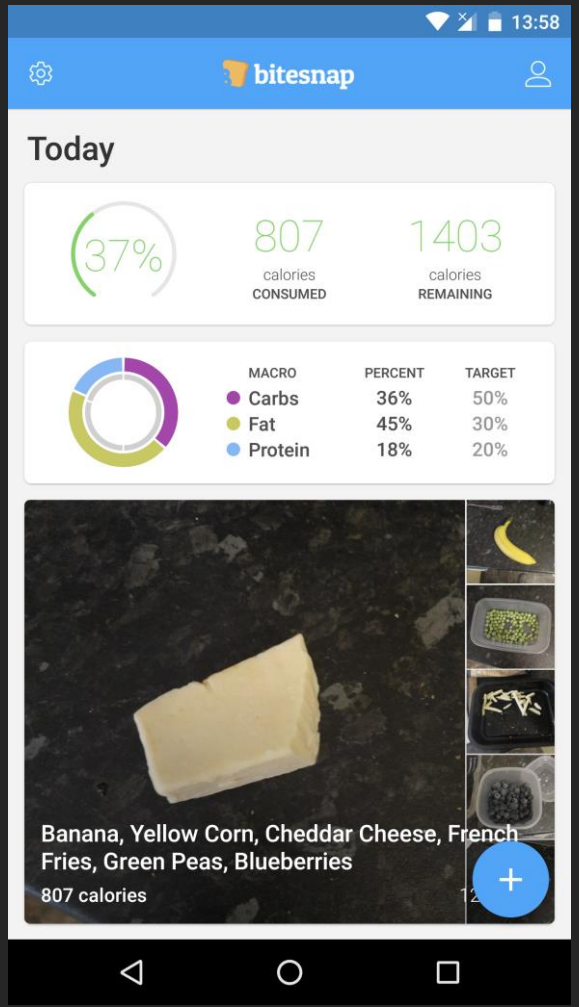
Large Under-estimation

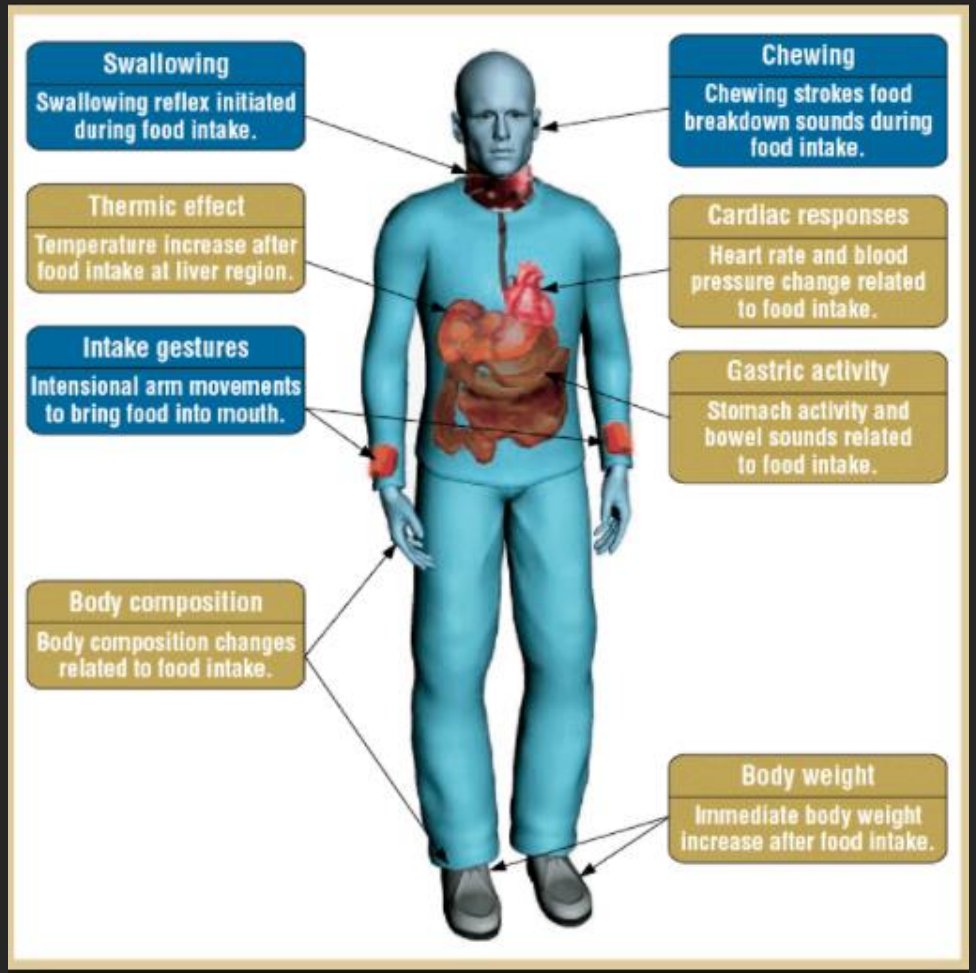
1. Snacks
2. Food outside the home
3. Serving sizes

# New Zealand has the third highest adult obesity rate in the OECD and our rates are rising




Ministry of Health. 2015. *Understanding Excess Body Weight: New Zealand Health Survey*. Wellington: Ministry of Health.


13:58
bitesnap
Today
37%
807
calories
CONSUMED
1403
calories
REMAINING
MACRO
PERCENT
TARGET
Carbs
36%
50%
Fat
45%
30%
Protein
18%
20%
Banana, Yellow Corn, Cheddar Cheese, French Fries, Green Peas, Blueberries
807 calories


Swallowing
Swallowing reflex initiated during food intake.
Thermic effect
Temperature increase after food intake at liver region.
Intake gestures
Intensional arm movements to bring food into mouth.
Body composition
Body composition changes related to food intake.
Chewing
Chewing strokes food breakdown sounds during food intake.
Cardiac responses
Heart rate and blood pressure change related to food intake.
Gastric activity
Stomach activity and bowel sounds related to food intake.
Body weight
Immediate body weight increase after food intake.

# By How Much Do People Under-Report Their Drinking?


**Low-Risk Drinkers** | **Medium-Risk Drinkers** | **High-Risk Drinkers**

Low-Risk = Up to 15 drinks/week for men (10 for women)
Medium-Risk = Up to 30 drinks/week for men (20 for women)
High-Risk = 30+ drinks/week for men (20+ for women)

Source: University of Victoria's Centre for Addictions Research

SCIENCE OF US

Everyone

Yes even you

Incapable of honestly appraising lifestyle

Is far worse than you ever imagined

moderation