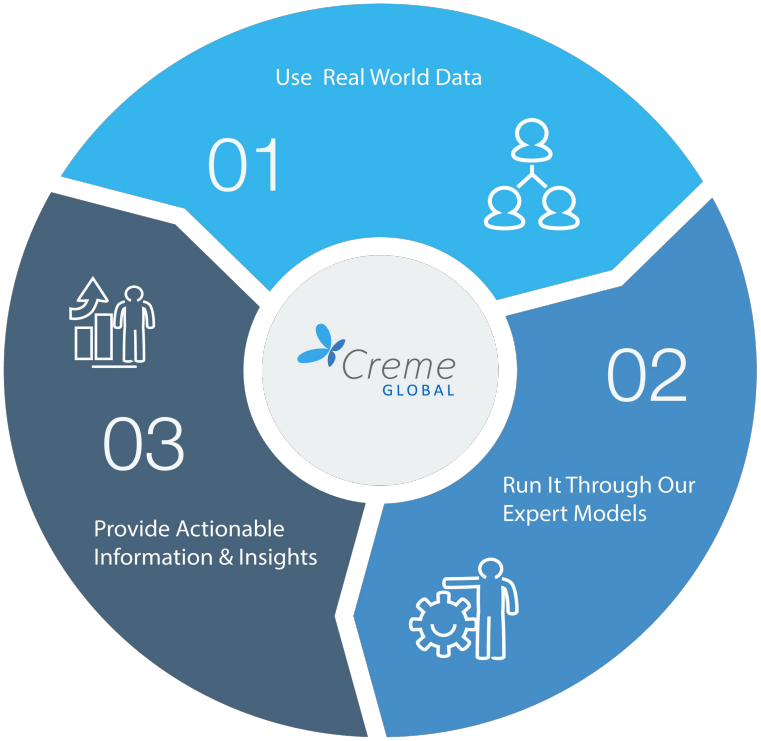
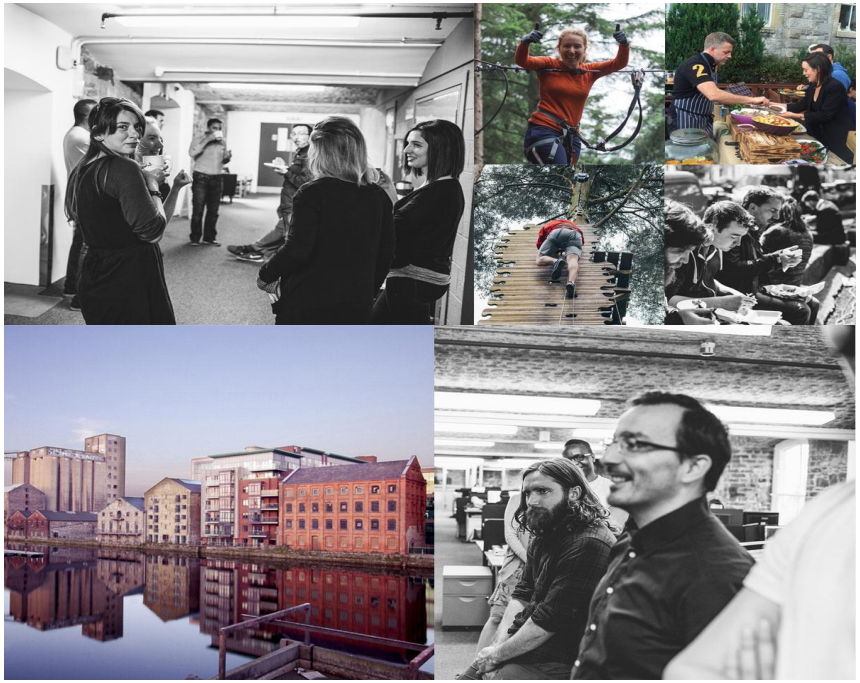
Public and commercial data to model intakes, health and risk in consumers

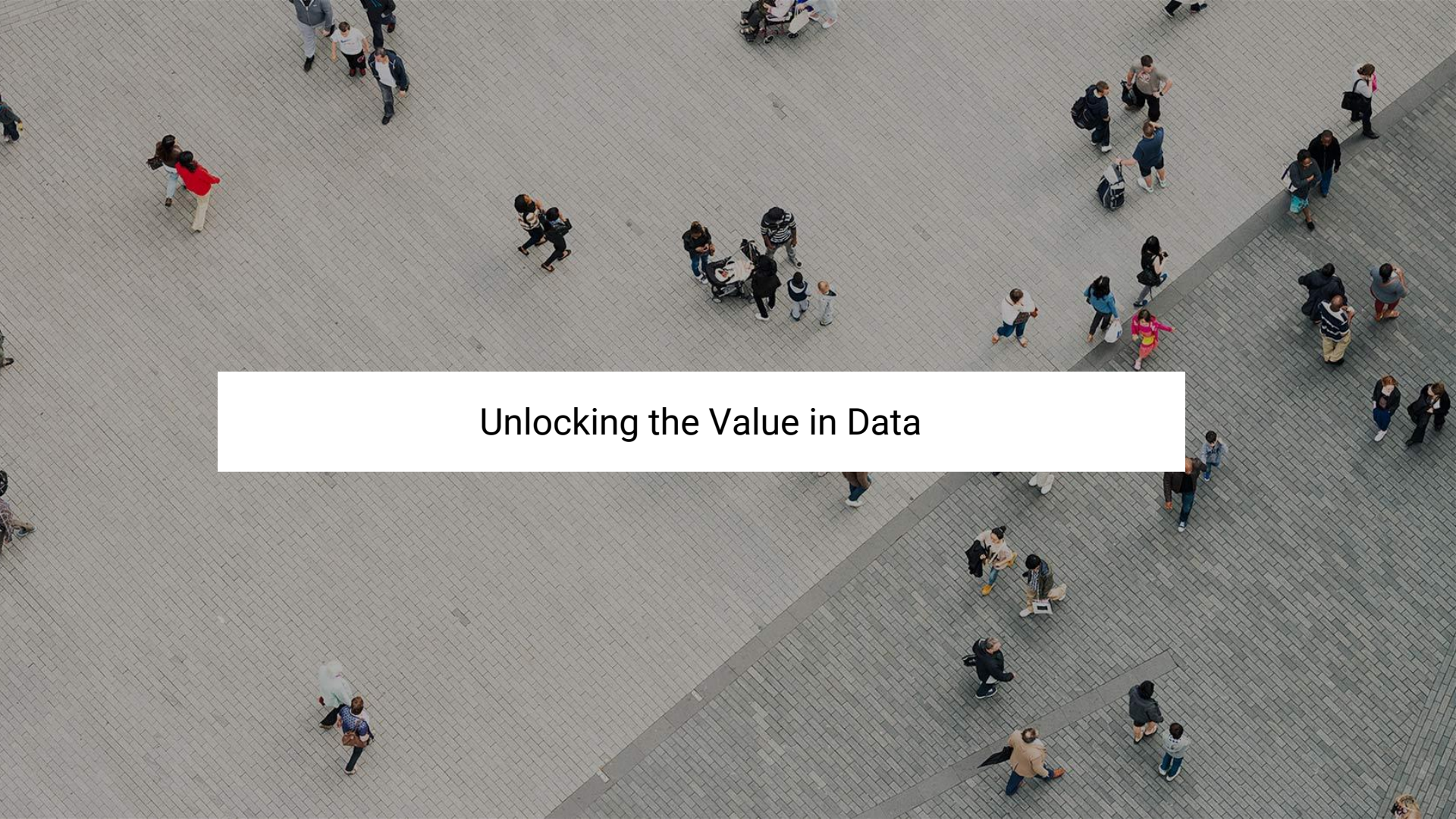
Sandrine Pigat – Head of Food & Nutrition

EuroFIR Food Forum - 5th April 2017, Brussels, Belgium

What we do


Use Real World Data
01
02
Run It Through Our Expert Models
03
Provide Actionable Information & Insights
Creme GLOBAL




Unlocking the Value in Data

Assess Population Intakes

Methods to assess population intakes:

- National food supply data (Food balance sheets)
- Gross estimates/average per capita calculations
- Based on food availability
- Household data
- Food availability in various communities
- Individual data on dietary intakes

Assess Population Intakes

Methods to assess population intakes:

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- Food availability in various communities
- **Individual data on dietary intakes**

Food Consumption Surveys

- (Nationally) representative - continuous or sporadic
- Food safety exposure assessments – additives, pesticides, food toxins etc.
- Assess health and nutritional status of a population
- Public Health Nutrition: healthy eating guidelines, lifestyle, portion sizes, diet quality, diet related diseases
- Benefits and safety – food fortification, dietary supplements
- Industry – inform consumer intakes, new product development

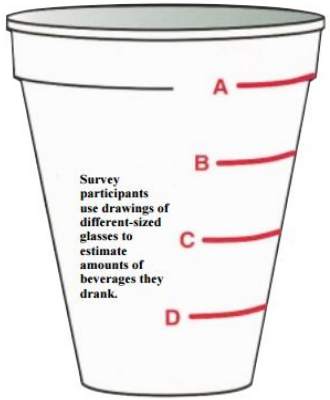
Food Consumption Surveys

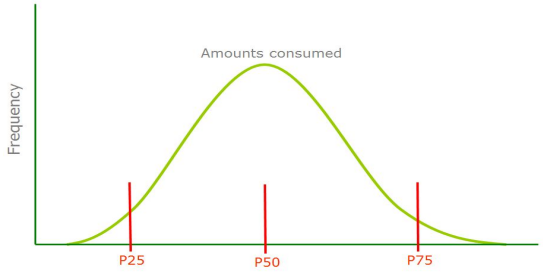
Food record/diaries	does not rely on memory easy to quantify amounts open-ended	high participation burden requires literacy may alter intake behaviour
24 hour recall	little respondent burden no literacy requirement does not alter intake behaviour	relies on memory requires skilled interviewer difficulty to estimate amounts
Food frequency questionnaire (FFQ)	relatively inexpensive preferable method for nutrients with very high day variability does not alter intake behaviour	relies on memory requires complex calculations requires literacy limited flexibility for describing foods
Diet history	no literacy requirement does not alter intake behaviour open-ended	relies on memory requires highly trained interviewer difficulty to estimate amounts
Food habit	rapid and low cost does not alter intake behaviour open-ended	may rely on memory questionnaires may require a trained interviewer

Food Consumption Surveys

Individual data

- Subject information: Sex, Age
- Anthropometrics
- Socio-demographics
- Time, survey day, meal
- Food consumed and amount
- Classification of foods
- Biomarker data
- Survey sample weighting





Concentration Data

Source

Survey data

Publications

Proprietary data

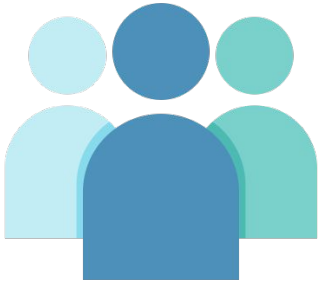
Other databases/reports:

- Linked to the survey
- Not linked to the survey

Type

- Point estimates – at food or food group level
- Known ranges
- Empirical distributions (e.g. a set of analytical determinations)
- Parametric distributions (derived from a set of data)
- Presence Probability

Food Consumption Surveys



Subject Data

Individual foods

14298

1271

4673

Food Codes

Energy (kcal): 37 g/100g
Vitamin C: 0.054 g/100g
Fat: 0.1g/100g
Protein: 1.1 g/100g

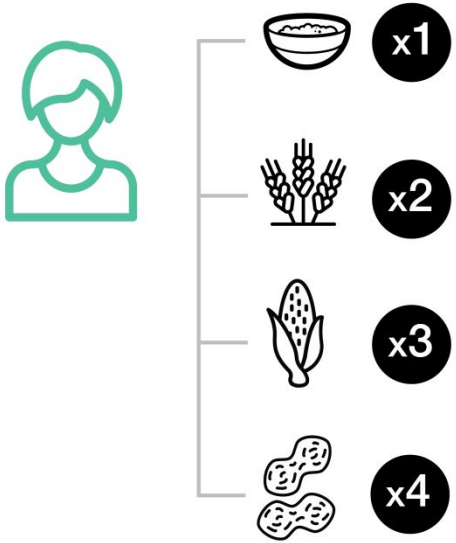
Energy (kcal): 243 g/100g
Calcium: 0.11 g/100g
Starch: 47.5g/100g
Protein: 8.8 g/100g

Energy (kcal): 41 g/100g
Carbohydrate: 10.9g/100g
Iron: 0.03g/100g
Calcium: 0.005 g/100g

Food Groups
(E.g. Citrus Fruits, White Bread & Rolls, Carbonated Beverages)

Diary Day 1

FREQUENCY



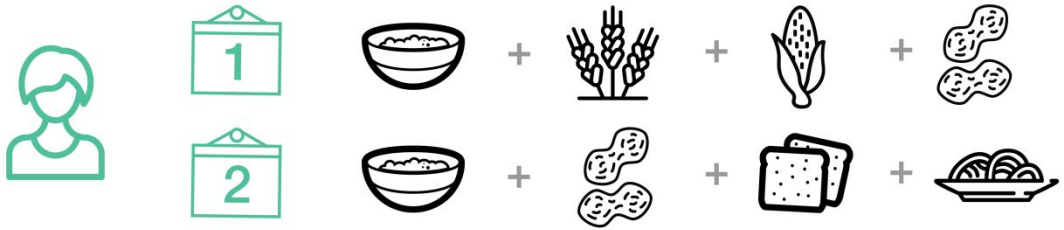
Diary Day 1

	FREQUENCY	AMOUNT
	x1	40 g
	x2	500 g
	x3	100 g
	x4	200 g

Diary Day 1

FREQUENCY	AMOUNT	SUBSTANCE CONCENTRATION
x1	40 g	0.6 %
x2	500 g	0.02 %
x3	100 g	1.5 %
x4	200 g	0.007 %


1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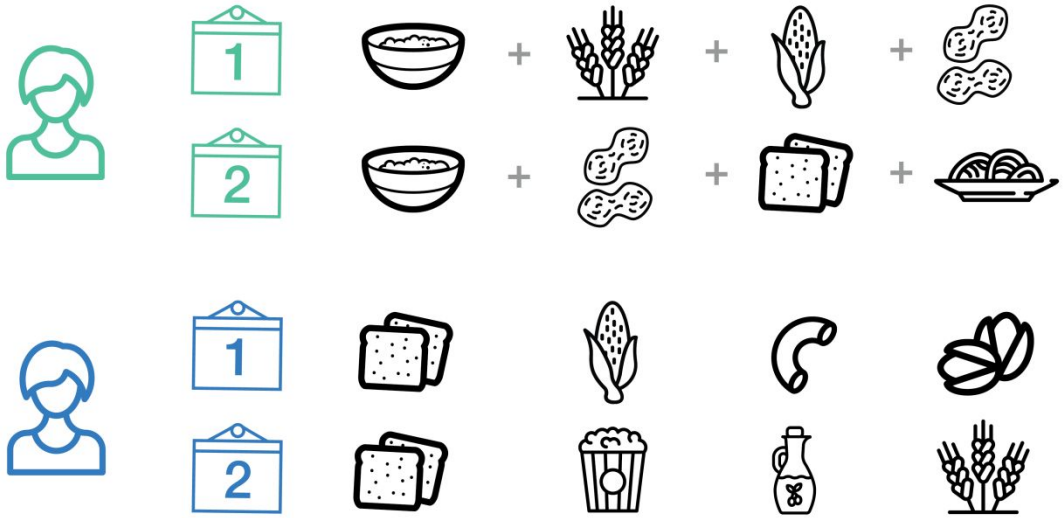
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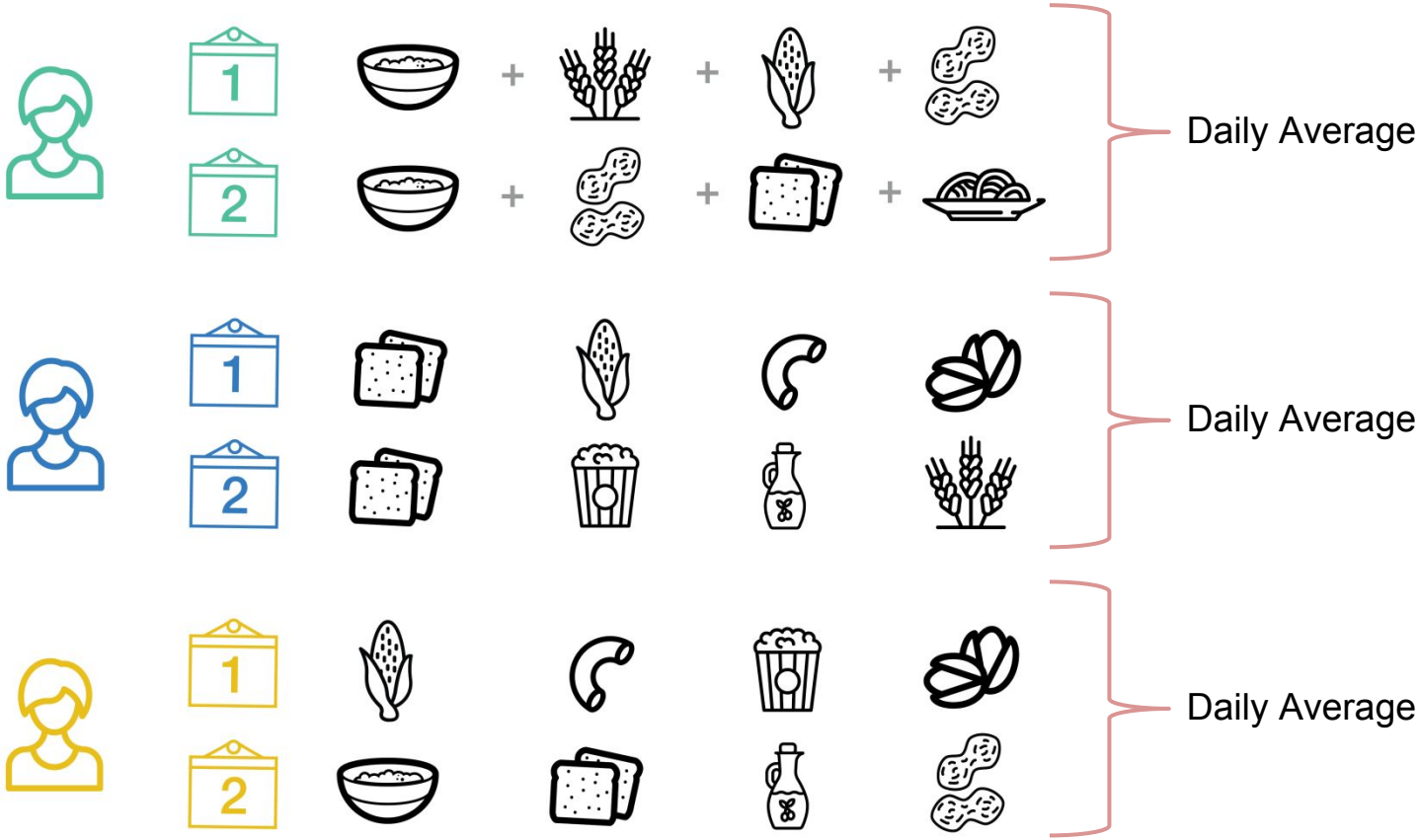
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Daily Average
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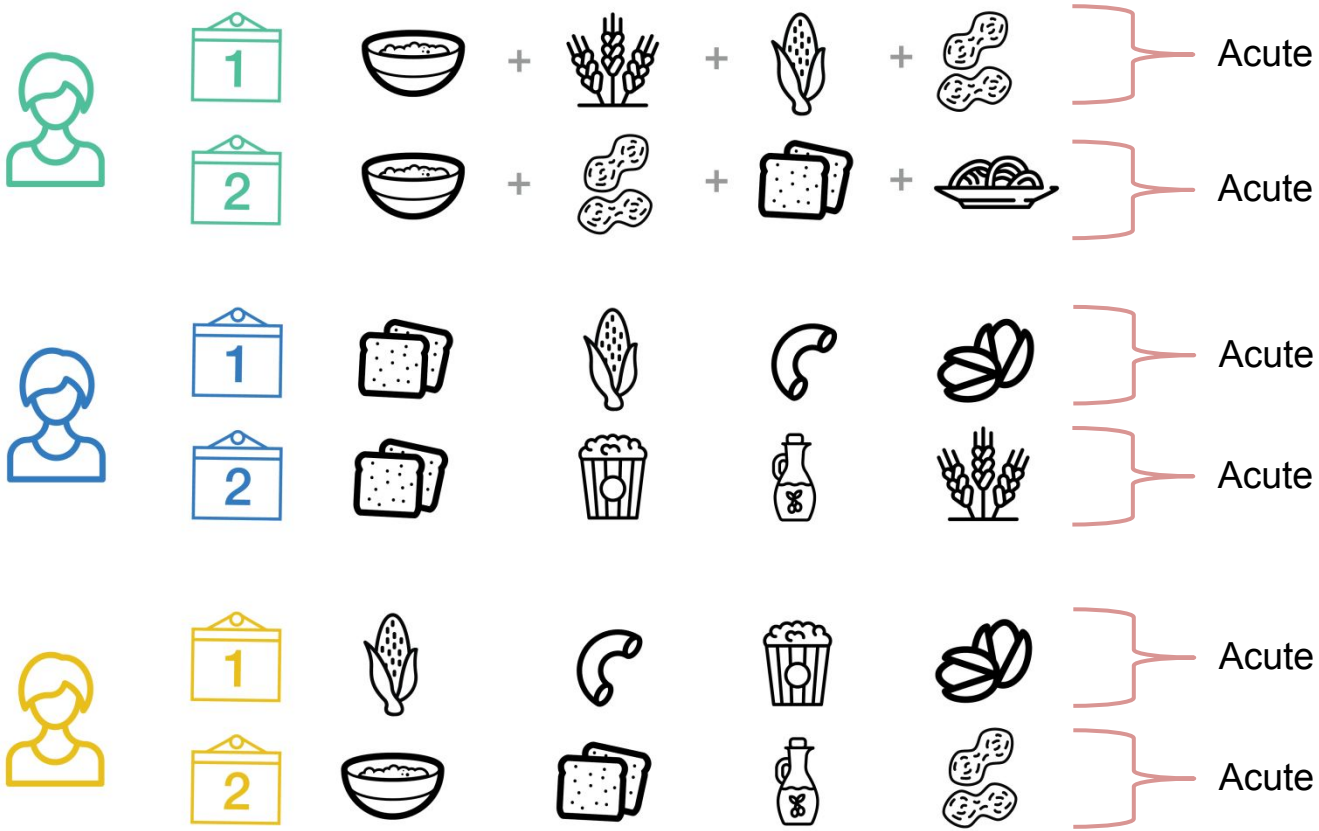
Daily Average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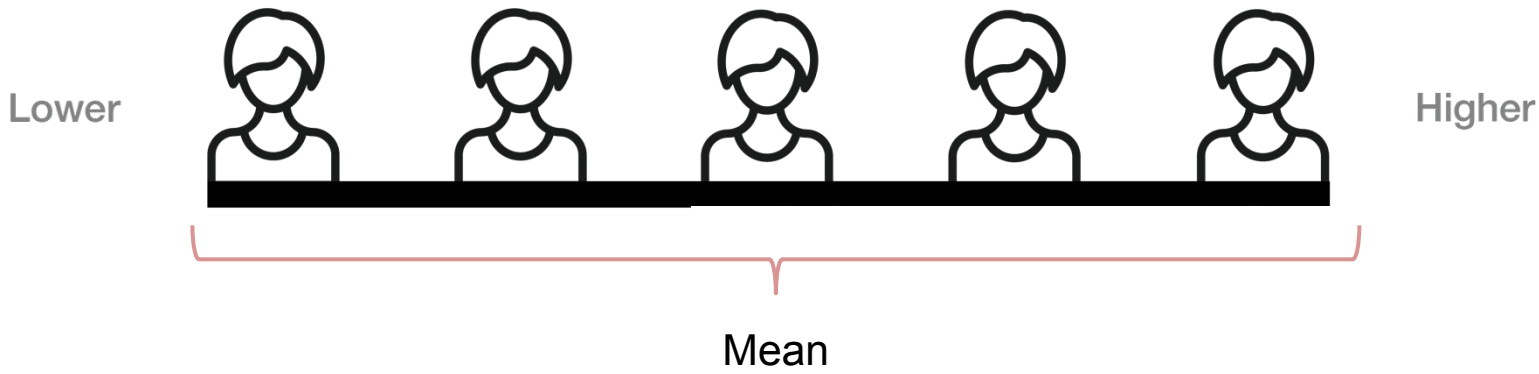
Population Exposure

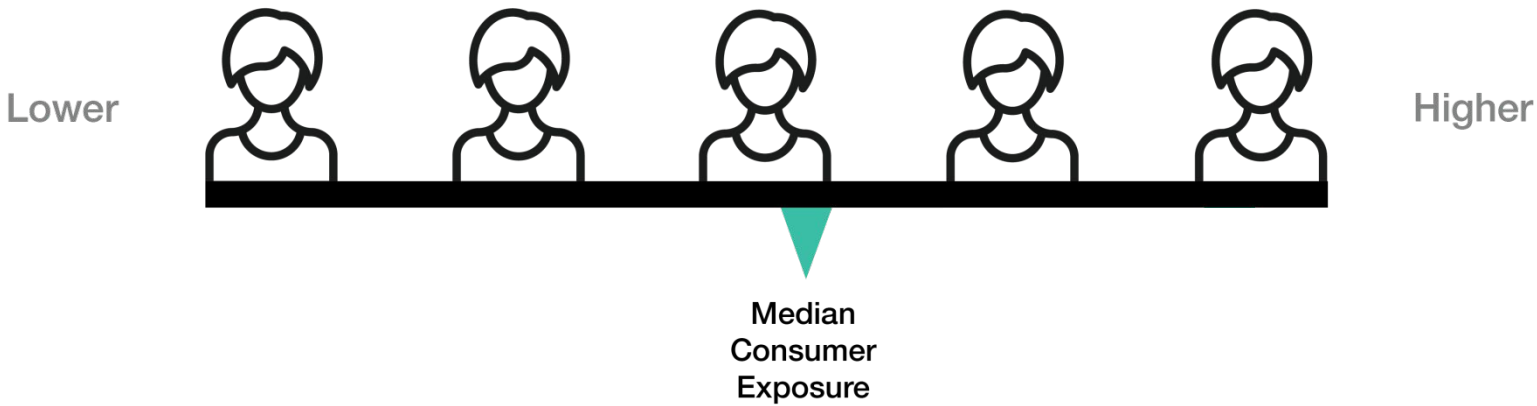
Lower

Higher

Population Exposure

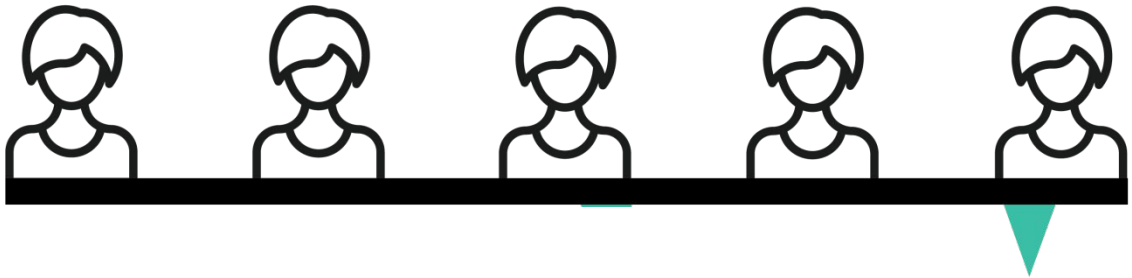


Population Exposure



Population Exposure

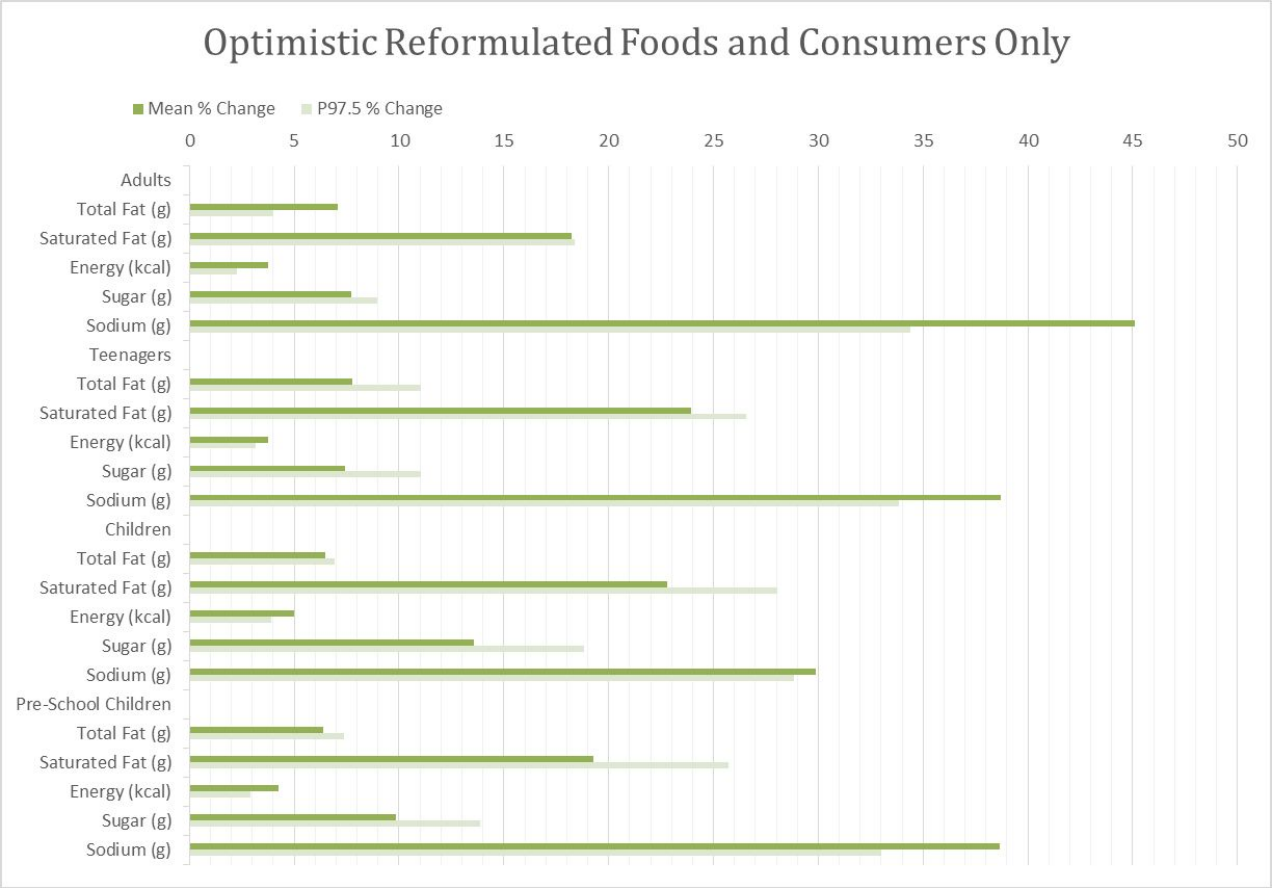
Lower



Higher

95th Percentile Consumer Exposure

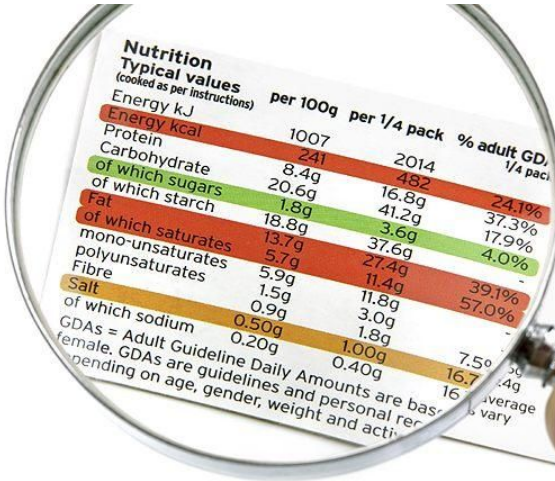
Impact and quantification of voluntary reformulation on Irish population



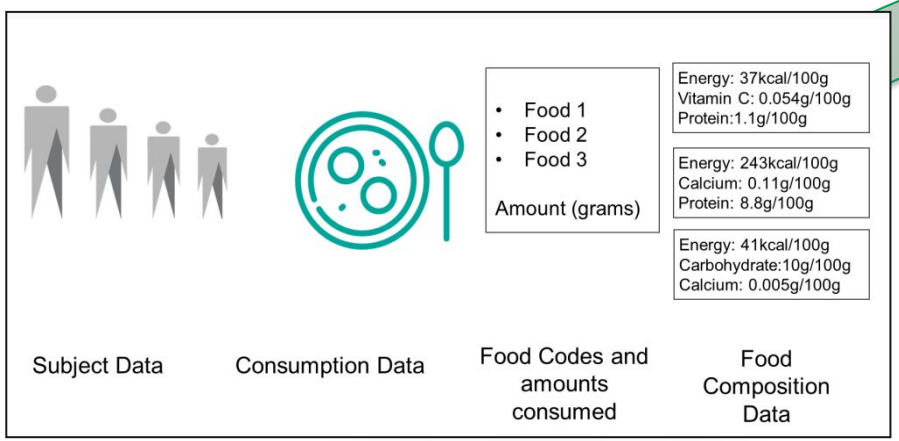
Impact and quantification of voluntary reformulation on Irish population

- 14 companies – data on reformulated 600 products
- Product Name and Description
- Composition data for the 2 time points in kcal/100g and g/100g per product as consumed
- Food Groups Represented by Reformulated Foods:

- Beverages (excl. Milk)
- Biscuits, Cakes & Confectionery
- Breakfast Cereals
- Meat, Fish & Egg Dishes
- Milk & Dairy Products
- Rice, Pasta & Savouries
- Soups, Sauces & Misc. Foods
- Savoury Snacks (incl. Crisps)
- Spreading Fats



Probabilistic Intake Model

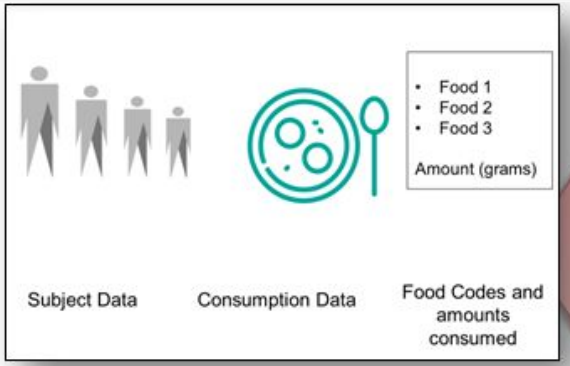


Data on Reformulated Products for the two time points

Kantar Worldpanel Market Share Data

Dietary Intake Modelling Platform (Creme Nutrition®)

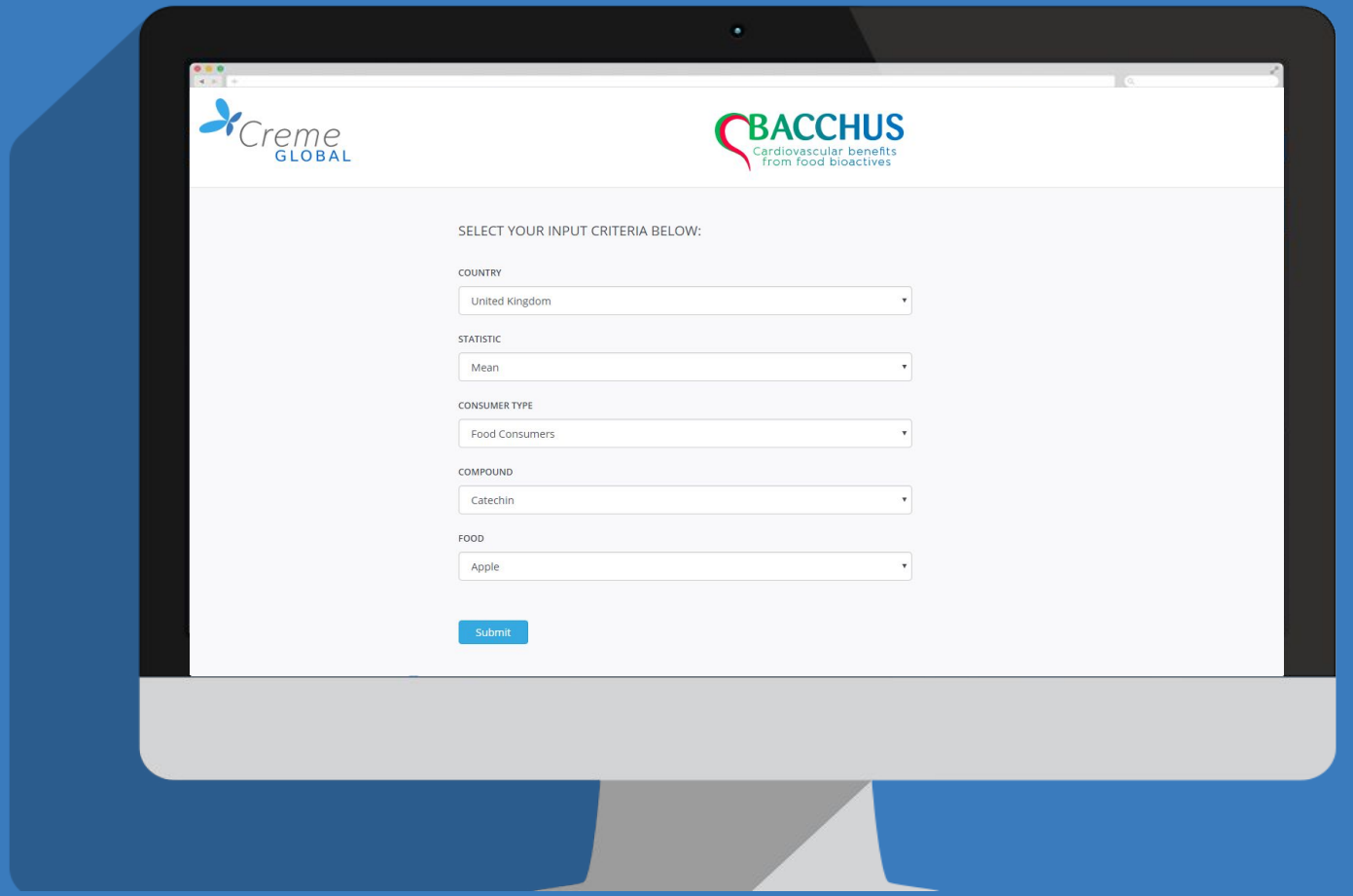
Probabilistic Intake Model to Assess Bioactive Intakes in Europe



eBasis – Bioactive Compound Data

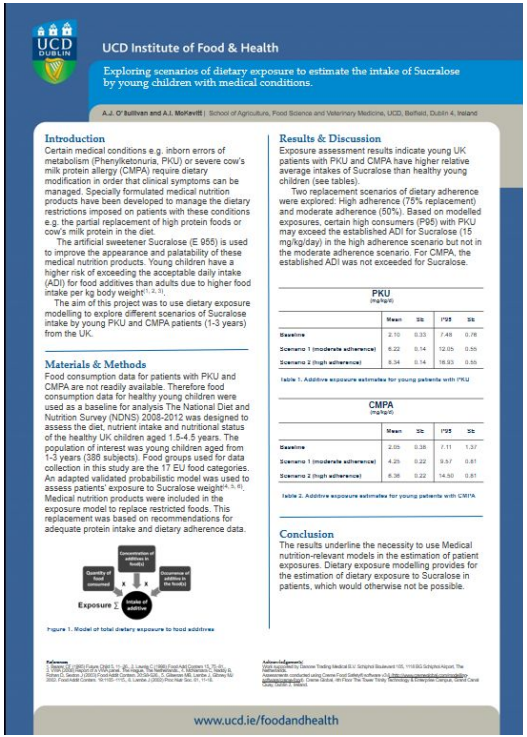
Dietary Intake Modelling Platform Creme Nutrition®

BACCHUS Toolbox: eBasis-Creme Global Exposure Tool


Creme
GLOBAL
BACCHUS
Cardiovascular benefits
from food bioactives
SELECT YOUR INPUT CRITERIA BELOW:
COUNTRY
United Kingdom
STATISTIC
Mean
CONSUMER TYPE
Food Consumers
COMPOUND
Catechin
FOOD
Apple
Submit

Case Study: Modelling Special Intakes

- Patients nutritional needs are different from the normal healthy population.
- Means restricted diets for Cow's Milk Allergy and Inborn errors of protein metabolism (PKU).
- Protein substitutes based on amino acids are prescribed to replace restricted protein containing foods.
- Challenges for estimating exposure to food additives from substitutes and general foods.
- Probabilistic modelling validated for use to estimate in exposures from general foods and prescribed foods.



UCD Institute of Food & Health

Exploring scenarios of dietary exposure to estimate the intake of Sucralose by young children with medical conditions.

A.J. O'Sullivan and A.L. McKevitt | School of Agriculture, Food Science and Veterinary Medicine, UCD, Belfield, Dublin 4, Ireland

Introduction

Certain medical conditions e.g. inborn errors of metabolism (Phenylketonuria, PKU) or severe cow's milk protein allergy (CMPA) require dietary modification in order that clinical symptoms can be managed. Specially formulated medical nutrition products have been developed to manage the dietary restrictions imposed on patients with these conditions e.g. the partial replacement of high protein foods or cow's milk protein in the diet.

The artificial sweetener Sucralose (E 955) is used to improve the appearance and palatability of these medical nutrition products. Young children have a higher risk of exceeding the acceptable daily intake (ADI) for food additives than adults due to higher food intake per kg body weight[1, 2, 3].

The aim of this project was to use dietary exposure modelling to explore different scenarios of Sucralose intake by young PKU and CMPA patients (1-3 years) from the UK.

Materials & Methods

Food consumption data for patients with PKU and CMPA are not readily available. Therefore food consumption data for healthy young children were used as a baseline for analysis The National Diet and Nutrition Survey (NDNS) 2008-2012 was designed to assess the diet, nutrient intake and nutritional status of the healthy UK children aged 1.5-4.5 years. The population of interest was young children aged from 1-3 years (388 subjects). Food groups used for data collection in this study are the 17 EU food categories. An adapted validated probabilistic model was used to assess patients' exposure to Sucralose weight[4, 5, 6]. Medical nutrition products were included in the exposure model to replace restricted foods. This replacement was based on recommendations for adequate protein intake and dietary adherence data.

Figure 1. Model of total dietary exposure to food additives

Results & Discussion

Exposure assessment results indicate young UK patients with PKU and CMPA have higher relative average intakes of Sucralose than healthy young children (see tables).

Two replacement scenarios of dietary adherence were explored: High adherence (75% replacement) and moderate adherence (50%). Based on modelled exposures, certain high consumers (P95) with PKU may exceed the established ADI for Sucralose (15 mg/kg/day) in the high adherence scenario but not in the moderate adherence scenario. For CMPA, the established ADI was not exceeded for Sucralose.

PKU (mg/kg/d)

	Mean	Std	P95	Std
Baseline	2.10	0.33	7.49	0.78
Scenario 1 (moderate adherence)	6.22	0.14	12.05	0.55
Scenario 2 (high adherence)	8.34	0.14	16.93	0.55

Table 1. Additive exposure estimates for young patients with PKU

CMPA (mg/kg/d)

	Mean	Std	P95	Std
Baseline	2.05	0.38	7.11	1.37
Scenario 1 (moderate adherence)	4.25	0.22	9.57	0.81
Scenario 2 (high adherence)	6.36	0.22	14.50	0.81

Table 2. Additive exposure estimates for young patients with CMPA

Conclusion

The results underline the necessity to use Medical nutrition-relevant models in the estimation of patient exposures. Dietary exposure modelling provides for the estimation of dietary exposure to Sucralose in patients, which would otherwise not be possible.

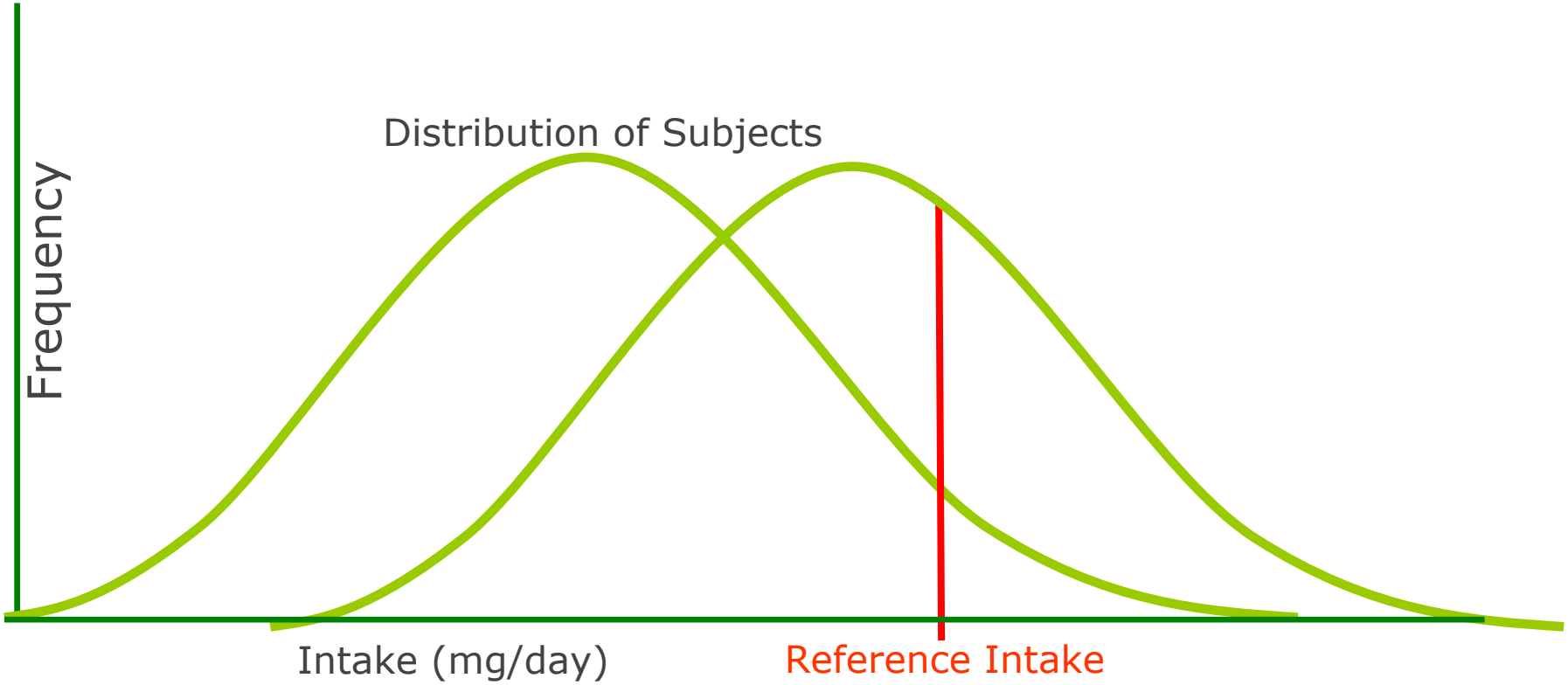
www.ucd.ie/foodandhealth

O'Sullivan et al. 2016. Food Additives & Contaminants: Part A. Vol. 33 , Iss. 11,2016.

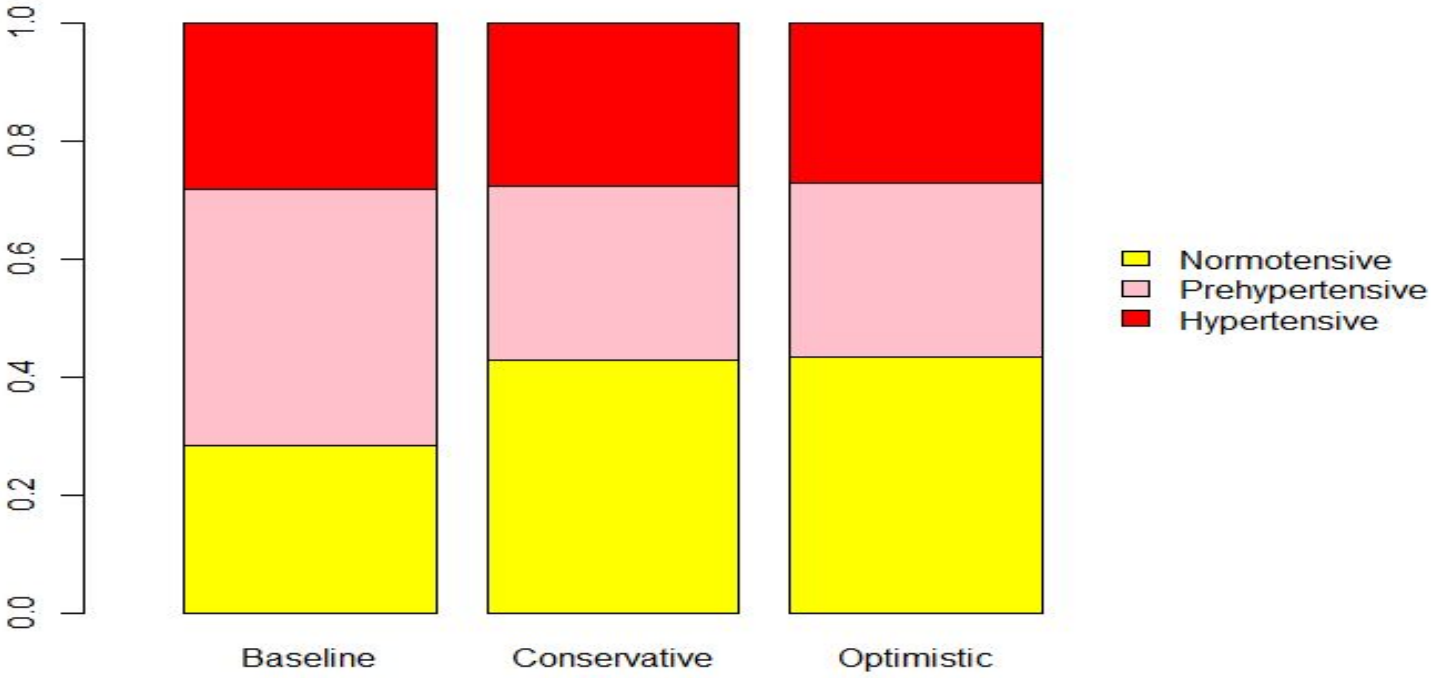
New Products & Predicting Health Outcomes

1. **Define the Target Group - demographic, country, consumer**
2. **Product**: New formulation, high or low in, new product/food
3. **Baseline Population Intakes**: Determine nutritional intake
4. **Carry out Intervention:** Food replacement, introduction of product into the diet
5. **Impact on Population Intakes:** Determine change nutritional intake
6. **Impact of Intervention on Health Parameter**: Biomarker Data, Risk Marker

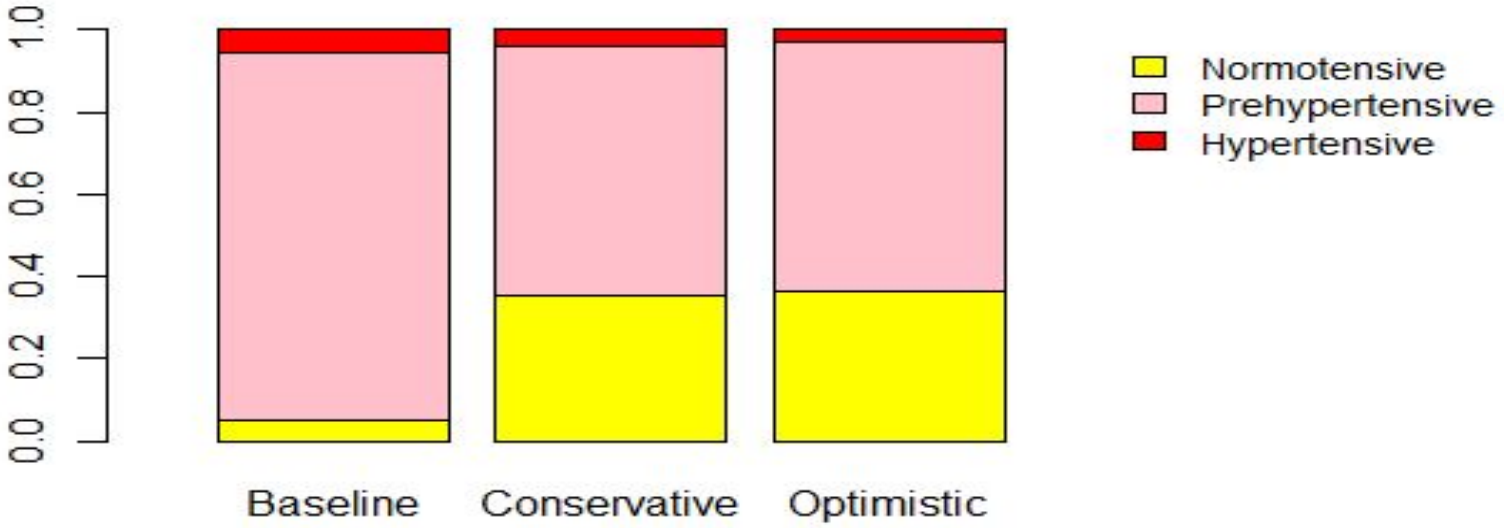
Nutrient Intake before and after Intervention



Impact on SBP in Total Population



Impact on SBP in Product Consumers



ODIN - Food-based solutions for optimal vitamin D nutrition and health through the life cycle

To model the impact of changes in vitamin D content of the food supply on vitamin D intakes and on serum 25OHD in EU citizens accounting for diversity across the European latitude (~34-70°N), sun exposure and habitual diet

Food based solutions to increase vitamin D intakes

- Intake modelling at baseline using up to date and standardised vitamin D data
- Intake modelling using various fortification scenarios to assess impact on adequacy and safety

This project hasreceived funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no. 613977

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

ODIN | FOOD-BASED SOLUTIONS FOR OPTIMAL VITAMIN D NUTRITION AND HEALTH THROUGH THE LIFE CYCLE

Challenges

- ➔ Data availability
- ➔ Data quality
- ➔ Use level data and presence probability (additives)
- ➔ Current data
- ➔ Expertise
- ➔ Harmonisation

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www.cremeglobal.com sandrine.pigat@cremeglobal.com