



Research



# Dietary intake and eating behaviour: examples from Brazil and Switzerland

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# Fundamental Research at Nestlé

## Nestlé Research Center



- Nutrition & Health Research
- Public Health Nutrition
- Food Science & Technology
- Taste & Behavioural Sciences
- Food Safety & Quality
- Analytical Sciences
- Clinical Development

## Nestlé Institute of Health Sciences (EPFL, Lausanne Campus)



- Brain, Metabolic and Gastro Intestinal Health
- Ageing Care
- Personalized (Medical) Nutrition
- Biomarkers, Mechanism of Action
- Systems Biology – Omics Technologies and Computational Sciences

# Nestlé Research Center Locations

Staff of

600

including...



Over 250  
Scientists from



Over 50  
nationalities

## St. Louis (US)

- Pet care research



## Lausanne (CH)

- Food Safety & Integrity
- First 1'000 Days & Healthy Kids
- Healthy Ageing
- Healthy Pleasure
- Sustainable Nutrition



## Beijing (CN)

- Brain Development
- Ageing
- Metabolic Health
- Cardiovascular Health
- Traditional Chinese Medicine



## Tokyo (JP)

- Ageing
- Health  
*Biomarkers*



	2006	2007	2008	2009	2010	2011	2012	2013	2014
Scientific publications	237	260	220	221	213	200	200	156	128
Patent applications	31	37	66	68	81	92	95	87	78

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Research



# Swiss FFQ Development Project

Colleen Fogarty Draper



# Diet Intake and Assessment Tools

What are they? What do they do? What is the situation?

- 24 hour recall
- Diet diary
- Food Frequency Questionnaire

**Web-Enabled and Improved Software Tools and Data Are Needed to Measure Nutrient Intakes and Physical Activity for Personalized Health Research<sup>1-3</sup>**

Phyllis J. Strumbo,<sup>4\*</sup> Rick Weiss,<sup>5</sup> John W. Newman,<sup>6</sup> Jean A. Pennington,<sup>7</sup> Katherine L. Tucker,<sup>8</sup> Paddy L. Wiesenfeld,<sup>9</sup> Anne-Kathrin Illner,<sup>10</sup> David M. Klurfeld,<sup>11</sup> and Jim Kaput<sup>12</sup>

- 
- Capture data
  - Analyze food to nutrients
  - Report results
  - Compare to requirements
  - Score results

Foods	Consumption frequency							Subtotal (*)
	Per day			Per week				
	Once	Twice	3 or + times	Once or twice	3 or 4 times	5 or 6 times	Never / almost never	
French Fries or Potato Chips (100g)	48	96	144	10	24	38	0	
Beef or roasted meat (1 average unit)	50	100	150	11	25	39	0	
Cookies (50g)	21	42	63	4.5	10.5	16.5	0	
Cakes or pies (1 slice)	16	32	48	3.5	8	12.5	0	
Whole-fat milk (1 glass)	24	48	72	5	12	19	0	
Hamburger (1 unit)	25	50	75	5	12.5	20	0	
Cheese (1 slice)	10	20	30	2	5	8	0	
Butter or margarine (1 dessert spoon)	2	4	6	0.5	1	1.5	0	
Sausage (1 unit)	4	8	12	1	2	3	0	

(\*) The subtotal column corresponds to the sum of values mentioned in the consumption frequency column

# Sample 3 Day Diet Diary

	Breakfast	Morning snack	Lunch	Afternoon snack	Diner
DAY 1	Standard 1/2c protein flour 1/2c orange juice	1/2 small grain bread 1/2c orange juice 1/2c water	1/2c standard sauce + 1/2c with 1/2c + tomato	2x clementine	250 small cottage cheese 1/2c long grain
Date:	04-11-2014	1/2c orange honey 2x <del>small</del> <del>protein</del> flour	+ 100ml water	+ 2c <del>protein</del> with 1/2c + 1/2c protein + 1/2c protein	1/2c long grain (1/2c) 2x 100ml water 1/2c long grain
				1/2c 1/2c small dairy	1/2c long grain + 1/2c long grain
	Hour: 8:30 am	Hour: 12 pm	Hour: 1:45 pm	Hour: 4 pm	Hour: 8:30 pm
DAY 2	standard 1/2c protein flour + 1/2c orange juice + 2c water	protein flour Almonds 2x 1/2c water	Tofu 1/2c 1/2c protein flour 1/2c water 1/2c water	1/2c protein flour + 1/2c protein flour + 1/2c protein flour	1x clementine 2x 100ml water 1/2c long grain
Date:	05-11-2014	Clementine 1/2c 1/2c	Almonds 2x 1/2c water 1/2c water	1/2c protein flour + 1/2c protein flour + 1/2c protein flour	1/2c long grain 1/2c long grain 1/2c long grain

- 15 days/subject
- Manual data entry
- PRODI food composition database for analysis

	Breakfast	Morning snack	Lunch	Afternoon snack	Diner
DAY 3	Hour: 8:10 am 1/2c standard protein flour + 1/2c orange juice + 1/2c water	Hour: 10:55 am 1/2 clementine 1/2c almonds 1/2c water	Hour: 12:40 pm 1/2c standard sauce + 1/2c with 1/2c + tomato	Hour: 4 pm 1/2c protein flour + 1/2c protein flour + 1/2c protein flour	Hour: 8 pm 1/2c long grain 1/2c long grain 1/2c long grain
Date:	06-11-2014	1/2c almonds 1/2c water	1/2c standard sauce + 1/2c with 1/2c + tomato	1/2c protein flour + 1/2c protein flour + 1/2c protein flour	1/2c long grain 1/2c long grain 1/2c long grain

1:40pm  
1/2c small white bread (not)  
+ pepper + 1/2c  
(not)


# Need to build a system that is:

- Electronic
- Easy to use
- Accurate
- Reliable
- Global
- Comprehensive

Collation du matin	Déjeuner	Collation	Dîner
Heure: 11h <sup>30</sup>	Heure: 11h <sup>50</sup>	Heure: 15h <sup>30</sup>	Heure: 20h <sup>00</sup>
200 ml Eau	150g pain complet		Steack haché 100g
200 ml Eau	20g légumes julienne + patates		broccoli 100g
	100g crème brûlée		Pâtes 120g
	20g pain complet		1 œuf dur
			40g pain blanc
			image pâte de
			image pâte m
			Eau
			à 15
Heure: 2h	Heure:		
2 ballons 40g			
DAY 3 100 ml café	1g fromage		160g Filet po
10g beurre	50g salade		90g Magret
Date: 200 ml jus	20g sauce		100g chou fle
19.02.15 d'orange	50g meussi chocolat		15g Gorgonzola
	200 ml Eau		35g Emmenthal
19.02.15 3:30 ml Eau	200 ml Eau		150g Fraises
" 200 ml Eau			1 ml Eau



Customizable nutrition analysis software and dietary assessment tools



Swiss Electronic FFQ Development Q1 2014-Q3 2015  
(Food4Me = 7 European Countries)

# Food Photography Lab










# VioScreen Diet Assessment

## Mixed Dishes and Pasta

Page 4 of 10

Food selection... Back Next

Select those foods you eat at least once a month.  
Press the "Next" button if you did not eat any of these foods.

 <p>Packaged mixed dishes with soy or tofu</p>	 <p>Stew, pot pies, curries and casseroles with meat and chicken</p>	 <p>Chilli with meat and beans</p>
 <p>Spaghetti, lasagna or other pasta with tomato and meat sauces</p>	 <p>Spaghetti, lasagna or other pasta with tomato sauce (no meat)</p>	 <p>Spaghetti and other pasta with oil, cheese or cream sauce, including macaroni and cheese</p>
 <p>Pizza</p>		

Back Next

# VioScreen Diet Assessment

**Mixed Dishes and Pasta**

Answers: 1 of 29

How often did you eat ... Back Next

Spaghetti, lasagna or other pasta with tomato sauce made without meat?

1 per week | 2-3 per week | 1 per week | **2 per week** | 3-4 per week | 5-6 per week | 1 per day | 2+ per day

Usual portion size?

1 1/2 cup (small bowl) | 1 cup (medium bowl) | **1 1/2 cups (large bowl)** | 2 cups

2 1/2 cups | 3 cups

skip this question (didn't really eat)

Back Next

Done | Internet | Protected/Mode On | 100%

# Swiss electronic FFQ

English and French version

Not yet validated - co-validation?

Ongoing discussion to integrate in the Food4Me program

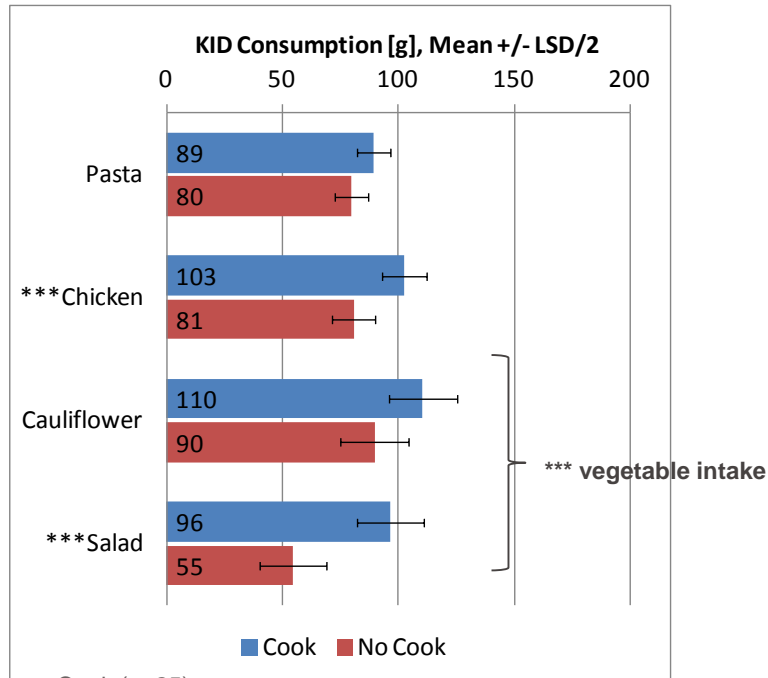


# Eating Behavior

- Picky eating in children
- Parenting style, feeding style and eating behaviors in infants and children
- Influence of cooking on childrens food intake



# CookKid



Cook (n=25)

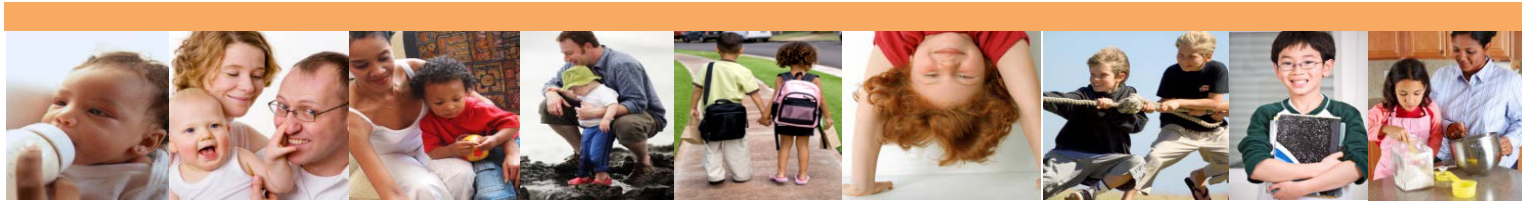
No Cook (n=22)

\*\*\* =  $p < 0.05$ ; \* =  $p < 0.10$



Children who cooked had a higher salad intake (+76%) and a higher chicken intake (+27%) than the children who did not cook

# Food intake & eating behavior



Birth

2-3 years

12-13 years old

**FITS: Feeding Infants & Toddlers Study**

**Kids Nutrition & Health Study**

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Research

# What is FITS/KIDS?



## Large scale diet and behavior survey designed to:

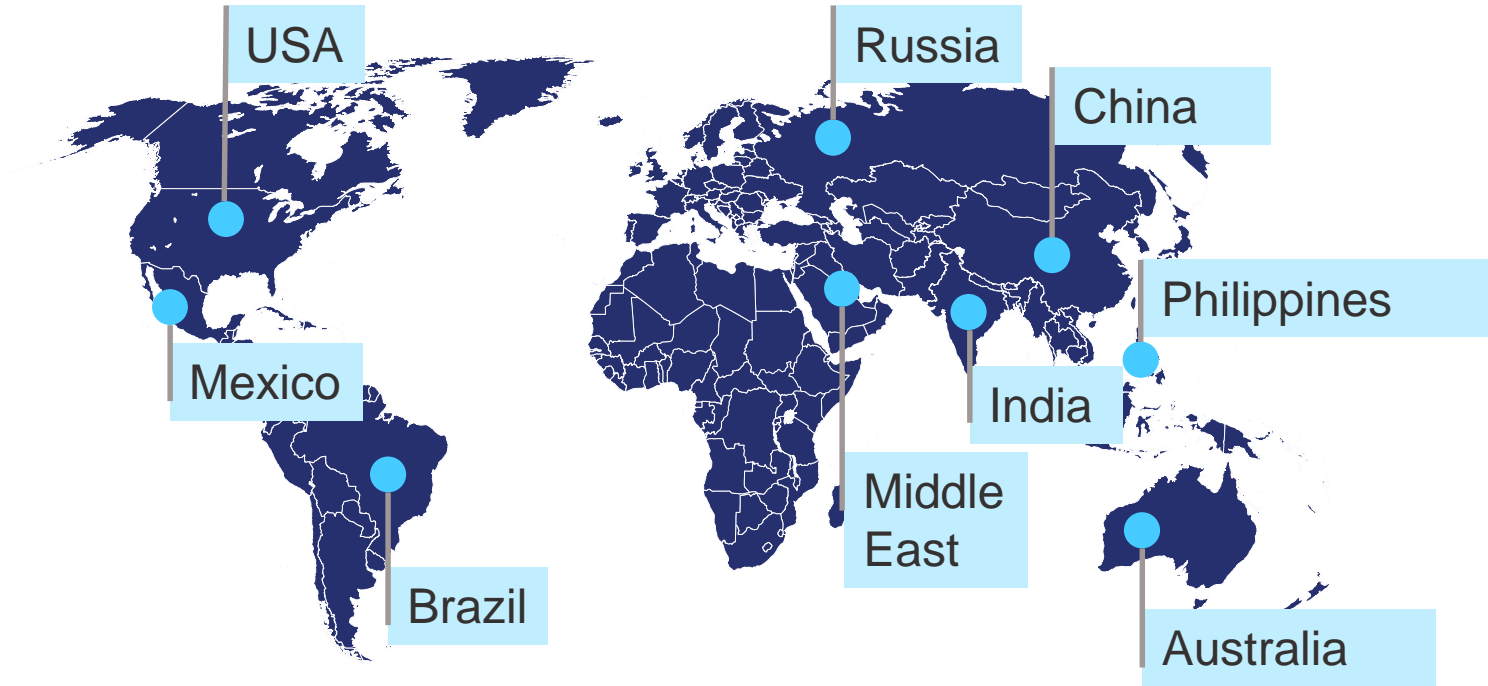
- Understand nutrient intakes and identify key nutrient gaps in the diets of infants, toddlers and children
- Identify food intake patterns and issues
- Gain insight on key dietary and related behaviors

## Scientific approach provides credibility to publish in peer reviewed journals

- Builds credibility for Nestlé
- Opens important doors for relationships e.g. Health Care Professionals
- Sample size and design make results generalizable

## Provides information for product Innovation and Renovation

# FITS/KIDS studies running in 9 countries



# FITS & KIDS will help answer...



- Where does salt, sugar and fat come from in children's diets?
- Are kids getting enough nutrients? Too much?
- What types of foods are children eating?
- What portions are children consuming?
- What are the meal patterns in infants and children?  
How many times per day do they eat?  
Are they skipping important meals?
- How much energy is coming from meals, snacks and beverages?
- How are parents involved in what and how children eat?
- What are the important lifestyle habits that influence eating behaviour?

# Scientific Approach

## Three-ways approach:

### 1. Understand existing science

- Literature reviews
- Data briefs
- Summary data tables on-line

### 2. Conduct additional analysis of existing National Survey data

### 3. Collect new data when needed to fill gaps

**NCHS Data Brief** • No. 166 • July 2014

**Fruit and Vegetable Consumption of U.S. Youth, 2009–2010**

Authors: Lynn M. Pifer, Ph.D., M.P.H.; Karen M. Evans, Ph.D., M.P.H.; Dawn M. Behre, Ph.D., M.P.H.; and Corinne L. Ogden, Ph.D., M.P.H.

**Key Findings:**

- The survey indicates that American (U.S.) adolescents consume less fruit and vegetables than recommended.
- There is a need to increase the consumption of fruits and vegetables among U.S. youth.
- There is a need to increase the consumption of fruits and vegetables among U.S. youth.

**Examining the Longitudinal Relationship Between Change in Sleep and Obesity Risk in Adolescents**

Authors: Leslie A. Lytle, PhD<sup>1</sup>, David M. Murray, PhD<sup>2</sup>, Melissa N. Link, MS<sup>3</sup>, Kerry E. Papp, MPH, PhD<sup>4</sup>, Sarah E. Anderson, PhD<sup>5</sup>, and Kim...

**Abstract:** Evidence is building regarding the association between inadequate amounts of sleep during childhood and the risk of obesity later in life. The objective of this study was to examine the longitudinal relationship between sleep and obesity risk in adolescents. The study included 1,212 adolescents who were followed up over a 2-year period. Results indicate that adolescents who slept less than 8 hours per night had a higher risk of obesity at follow-up compared to those who slept 8 or more hours per night. These findings suggest that sleep duration may be an important factor in the development of obesity risk in adolescents.

**WHAT WE EAT IN AMERICA**

Authors: Jeanne M. Shattell, PhD, MPH, and Richard W. Jefferies, PhD, MPH

**Table 1.4: 2011-2012**

Food Group	2011-2012	2009-2010	2007-2008	2005-2006	2003-2004	2001-2002
Total Fat	34%	34%	34%	34%	34%	34%
Saturated Fat	11%	11%	11%	11%	11%	11%
Trans Fat	1%	1%	1%	1%	1%	1%
Cholesterol	1%	1%	1%	1%	1%	1%
Sodium	10%	10%	10%	10%	10%	10%
Total Sugar	10%	10%	10%	10%	10%	10%
Total Fiber	10%	10%	10%	10%	10%	10%
Total Protein	10%	10%	10%	10%	10%	10%
Total Calcium	10%	10%	10%	10%	10%	10%
Total Iron	10%	10%	10%	10%	10%	10%
Total Zinc	10%	10%	10%	10%	10%	10%
Total Magnesium	10%	10%	10%	10%	10%	10%
Total Potassium	10%	10%	10%	10%	10%	10%
Total Phosphorus	10%	10%	10%	10%	10%	10%
Total Selenium	10%	10%	10%	10%	10%	10%
Total Manganese	10%	10%	10%	10%	10%	10%
Total Copper	10%	10%	10%	10%	10%	10%
Total Nickel	10%	10%	10%	10%	10%	10%
Total Vanadium	10%	10%	10%	10%	10%	10%
Total Chromium	10%	10%	10%	10%	10%	10%
Total Molybdenum	10%	10%	10%	10%	10%	10%
Total Boron	10%	10%	10%	10%	10%	10%
Total Silicon	10%	10%	10%	10%	10%	10%
Total Aluminum	10%	10%	10%	10%	10%	10%
Total Lead	10%	10%	10%	10%	10%	10%
Total Cadmium	10%	10%	10%	10%	10%	10%
Total Mercury	10%	10%	10%	10%	10%	10%
Total Arsenic	10%	10%	10%	10%	10%	10%
Total Selenium	10%	10%	10%	10%	10%	10%
Total Manganese	10%	10%	10%	10%	10%	10%
Total Copper	10%	10%	10%	10%	10%	10%
Total Nickel	10%	10%	10%	10%	10%	10%
Total Vanadium	10%	10%	10%	10%	10%	10%
Total Chromium	10%	10%	10%	10%	10%	10%
Total Molybdenum	10%	10%	10%	10%	10%	10%
Total Boron	10%	10%	10%	10%	10%	10%
Total Silicon	10%	10%	10%	10%	10%	10%
Total Aluminum	10%	10%	10%	10%	10%	10%
Total Lead	10%	10%	10%	10%	10%	10%
Total Cadmium	10%	10%	10%	10%	10%	10%
Total Mercury	10%	10%	10%	10%	10%	10%
Total Arsenic	10%	10%	10%	10%	10%	10%



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# FITS & KIDS in BRAZIL

## The Infant and Kids Study São Paulo (IKS-SP)

- To understand São Paulo infants and kids diet and associated factors (lifestyle and behaviors)
- To use the pilot test as a trigger to start the conversation with local scientific community – towards a national study



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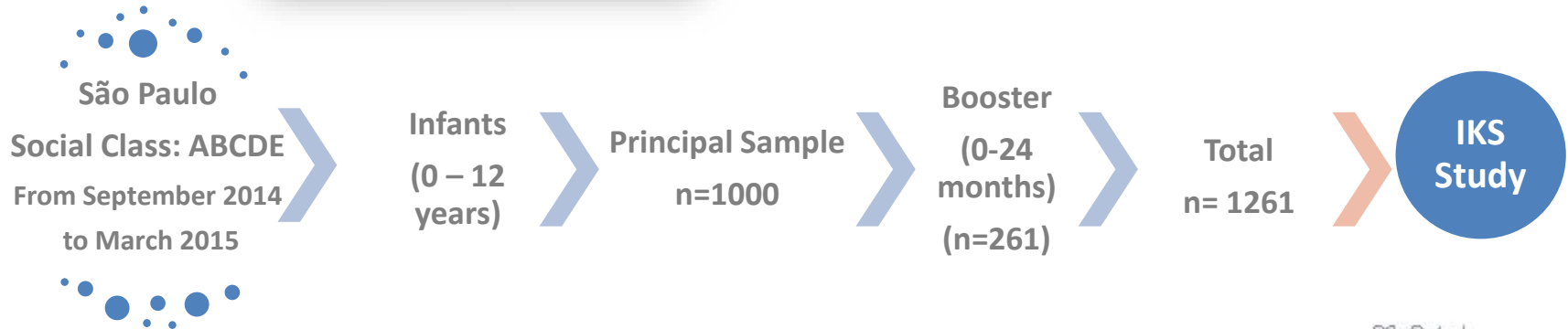
Research

# Sample

Population of São Paulo metropolitan region

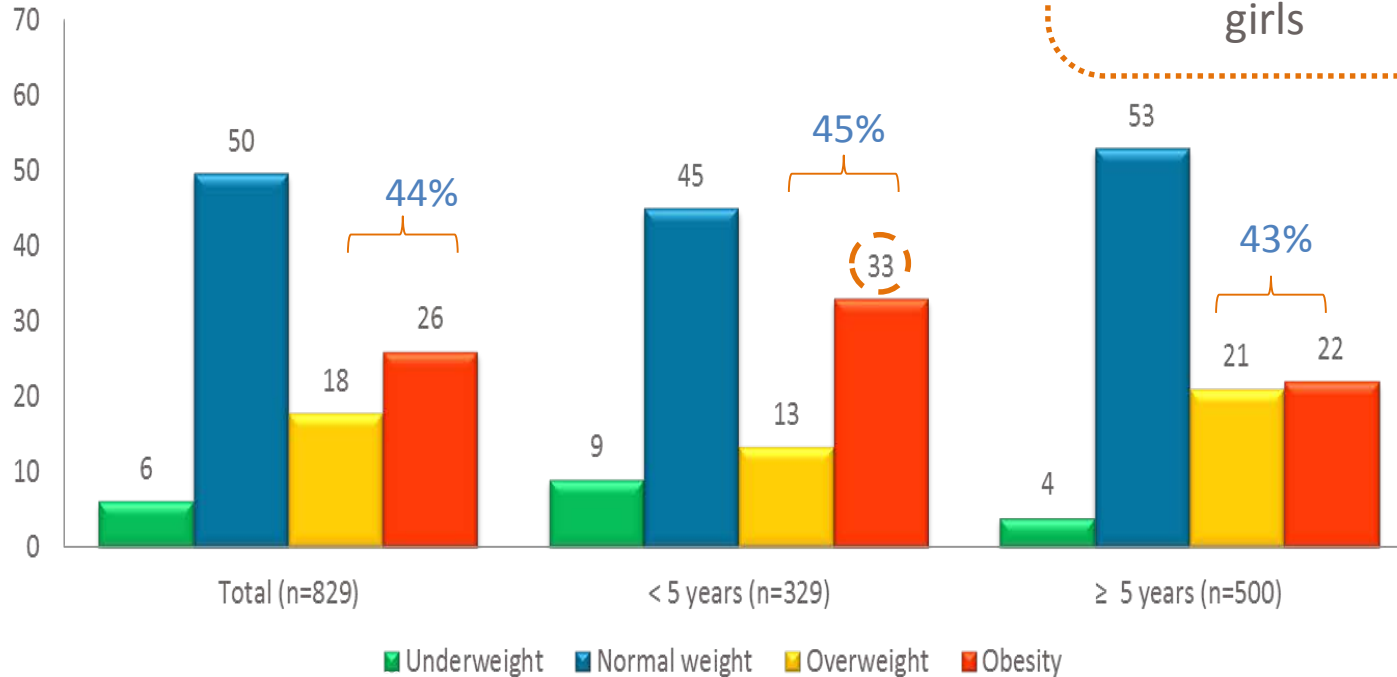


Age, Genders and SEC groups



# Nutritional Status

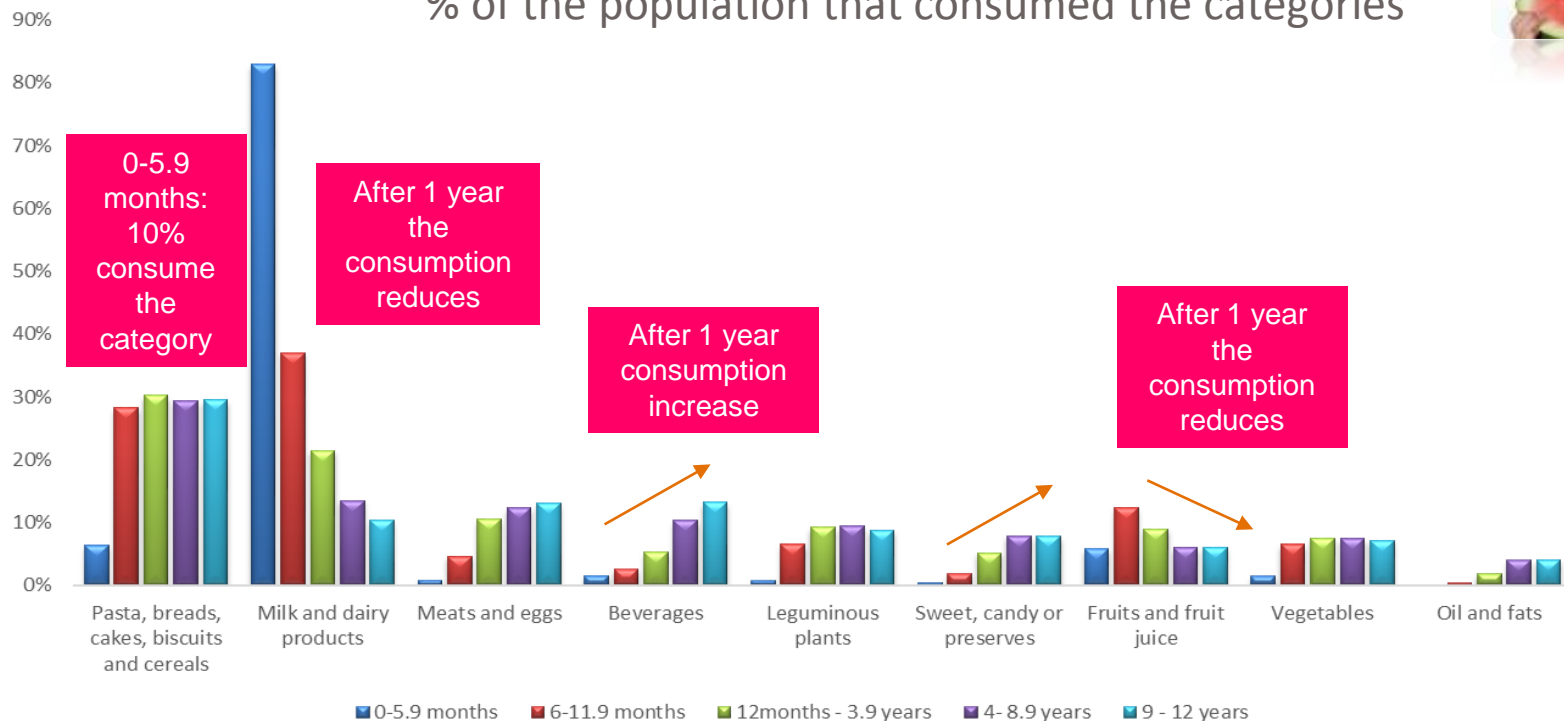
## % Nutritional Status by Age



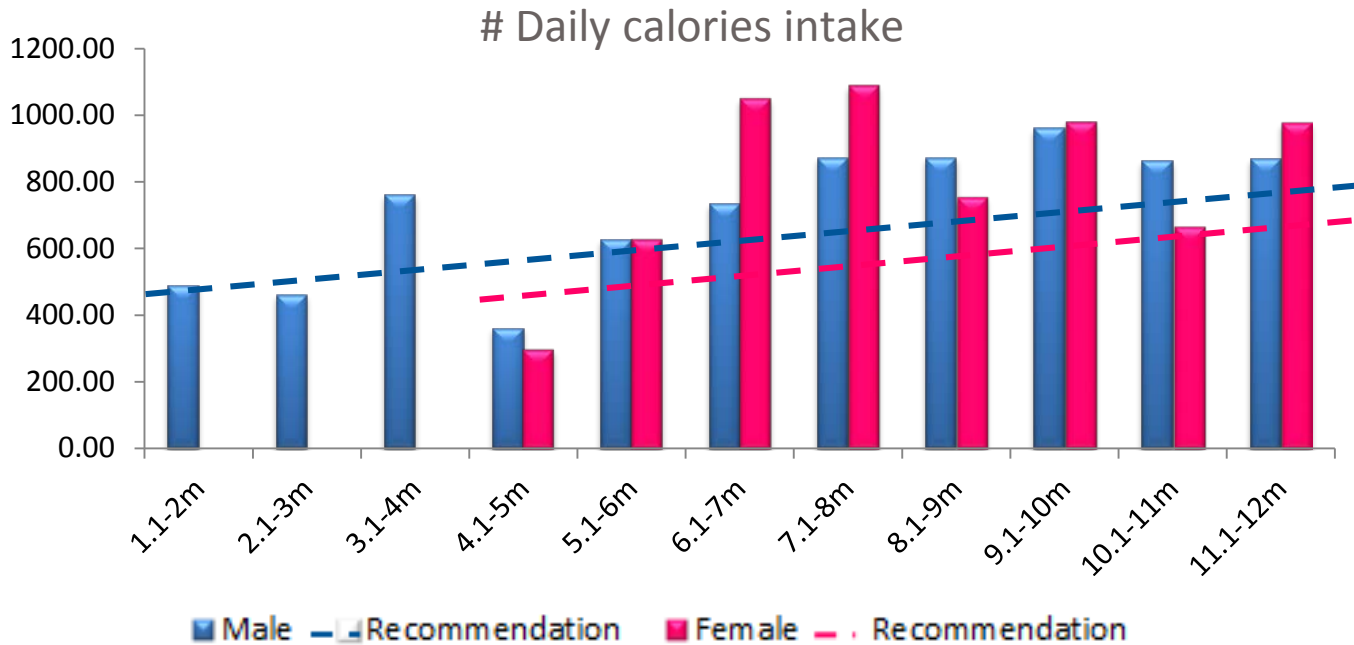
→ Higher prevalence of overweight and obesity: < 5y.o.  
→ D/E social class  
→ Boys are more obese than girls

# Daily Food Intake

% of the population that consumed the categories



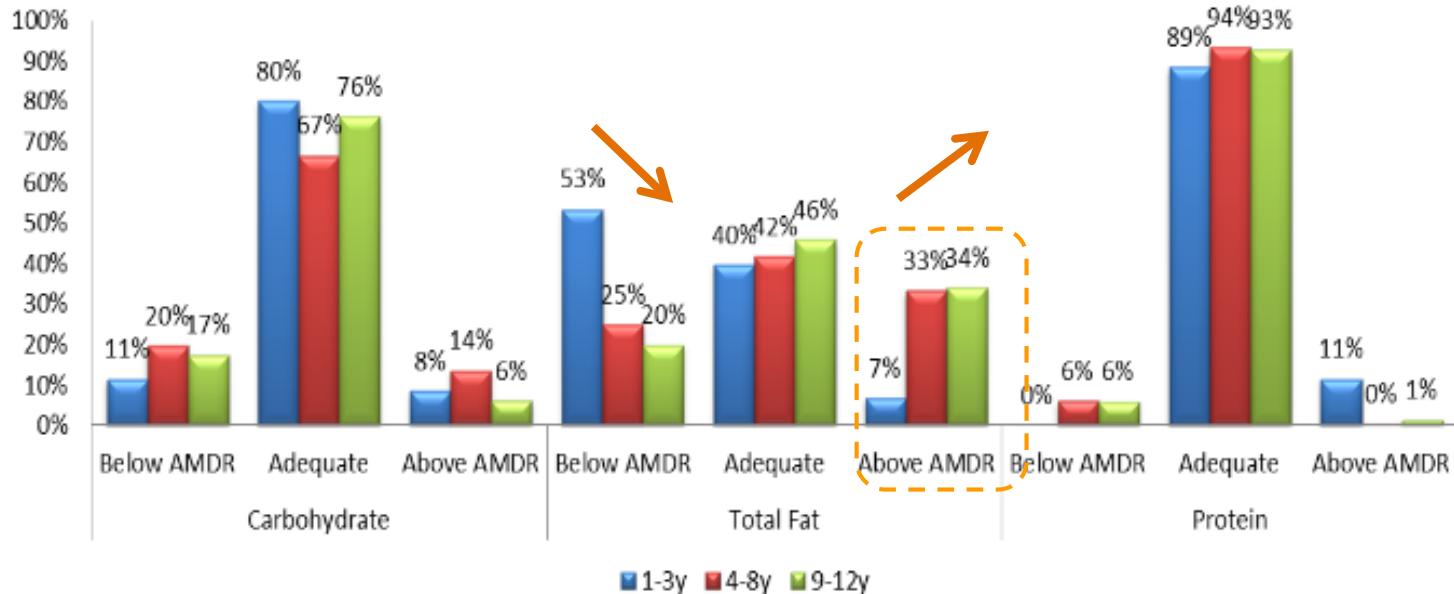
# Calories – first year



After 6 months, the calories daily consumed are higher than the recommendation

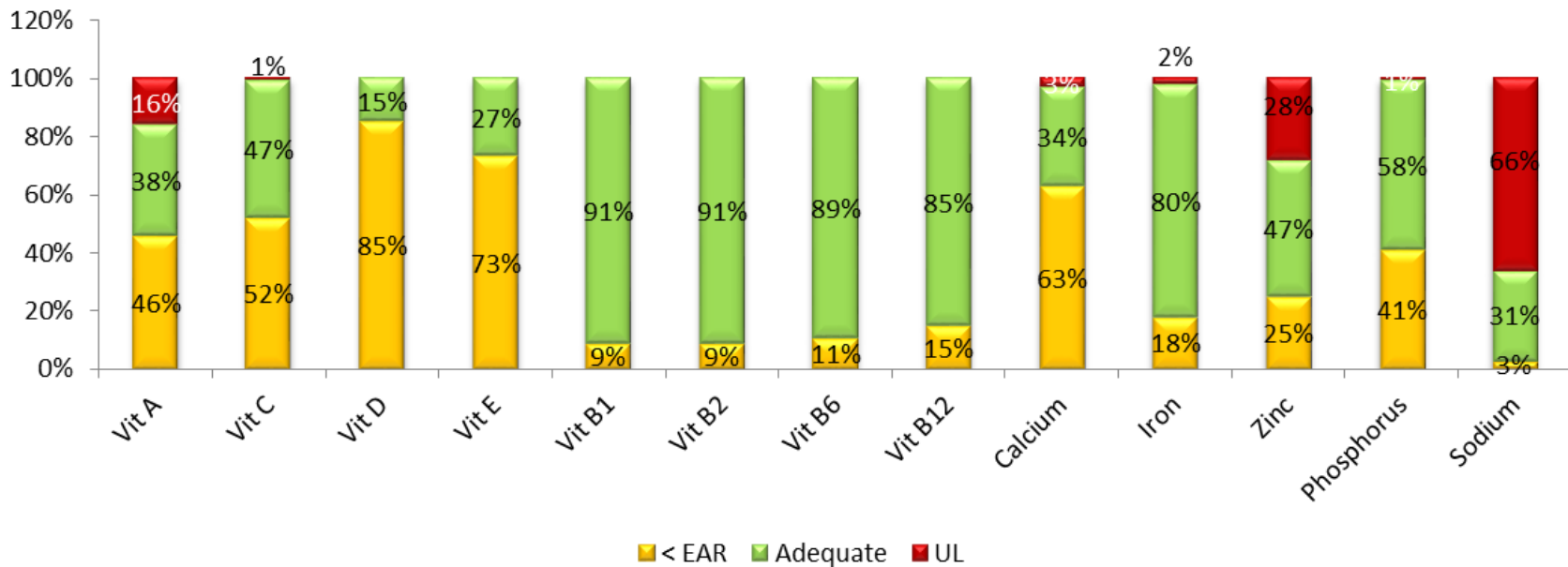
# Macronutrients

% of consumption per day by age

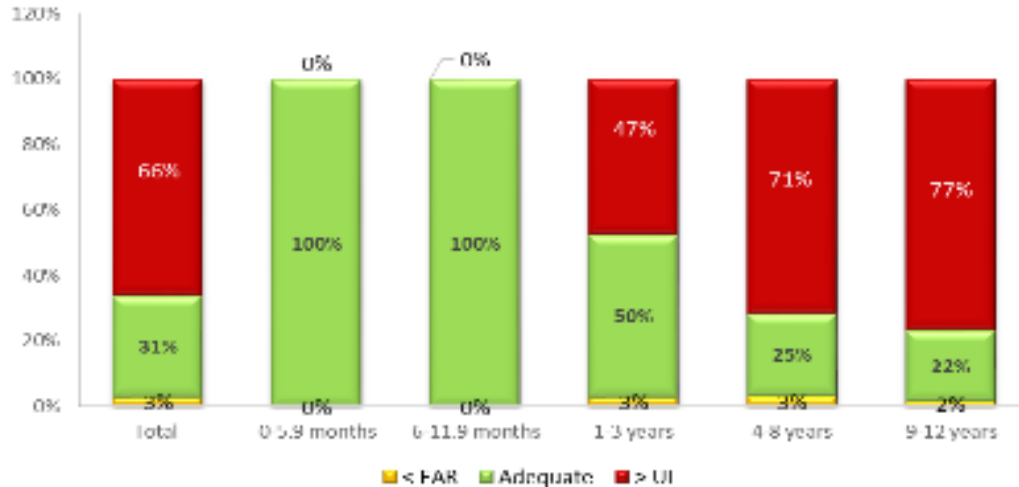


# Micronutrients

% of consumption per day: Infants aged 0 to 12 years



# Sodium intake



- 1 Rice – 11.3%
- 2 Bread – 8.6%
- 3 Margarine – 5.8%
- 4 Salty biscuits – 4.0%
- 5 Beans – 3.9%
- 6 Powder juice – 3.4%

# Physical Activity Level

## Low Level

# of activities accomplished in the last 7 days: 6,08

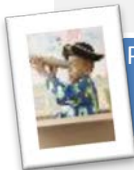


Watching TV

Drawing



Playing (indoors) with toys/board games/card games



Listening to music



3,6 hour  
per week  
(220,3 minutes)

## Moderate Level

# of activities accomplished in the last 7 days: 2,72



Physical education class at school

Riding a bicycle



Games (tag, hopscotch)



Play in the yard



1,9 hour  
per week  
(116,7 minutes)

## High Level

# of activities accomplished in the last 7 days: 1,6

Running (for fun)



Soccer

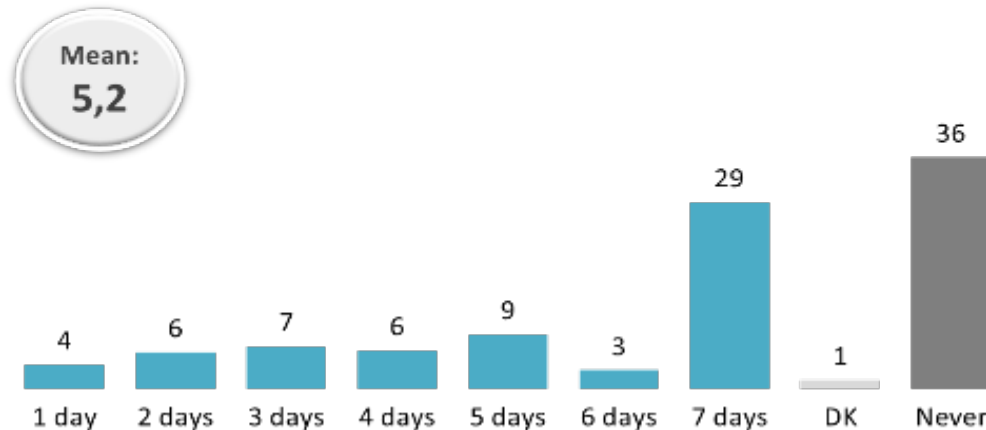


2,2 hour  
per week  
(133,8 minutes)

# Meal timing



How many days a week usually eat in front of the TV, studying, playing video games or reading?

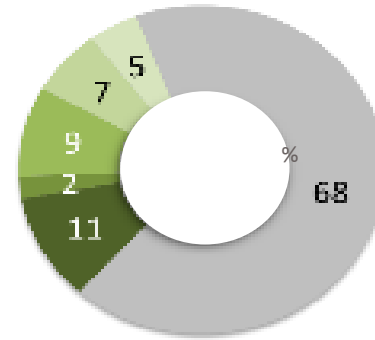


Around 63% of the children eat in front of TV, studying, playing video games or reading

# Food Preparation

Frequency as involved in the preparation of your food

## Children's Preparation



- Daily
- 4-6 times a week
- 1-3 times a week
- Once every 15 days
- Once a month or less often
- Doesn't know/ refused

# Conclusion

- Food intake data gives good understanding of
  - Population food intake and special 'risk' groups
  - Development of food patterns over childhood
  - Nutrient deficiencies
  - Main foods that contribute to healthy and unhealthy intake
  - Meal patterns
- Social sciences needed to further explore the why behind these behaviors
- Key is to find academic institutions to collaborate on a national study in Brazil to explore eating behavior in infants and children