In nutritionally adequate diets, the frequency of consumption of foods from the 4 SENS* classes follows a hierarchical progression, from Class-1 (high frequency) to Class-4 (low frequency)

*Système d'Etiquetage Nutritionnel Simplifié [Simplified nutritional labelling system]

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INTRODUCTION

Dietary advices, which aimed at promoting healthy eating, must consider not only the nutritional profile of foods but also the amount consumed (portion size) and the frequency of consumption.

The SENS nutrient profiling system distributes foods into 4 classes, from the most (Class-1) to the least (Class-4) favourable profile.

OBJECTIVES

To test the relevance of **associating to each SENS class a wording related to the frequency** of consumption.

MATERIALS AND METHODS

Classification of foods and definition of portion-sizes

- The 1192 foods of the French food database were assigned into the 4 classes defined by the nutrient profiling SENS system (**Figure 1**).
- A standard portion-size was defined for each food, based on published references (**Table 1**).
- The distribution of the portion-sizes of foods was assessed within each class of SENS.
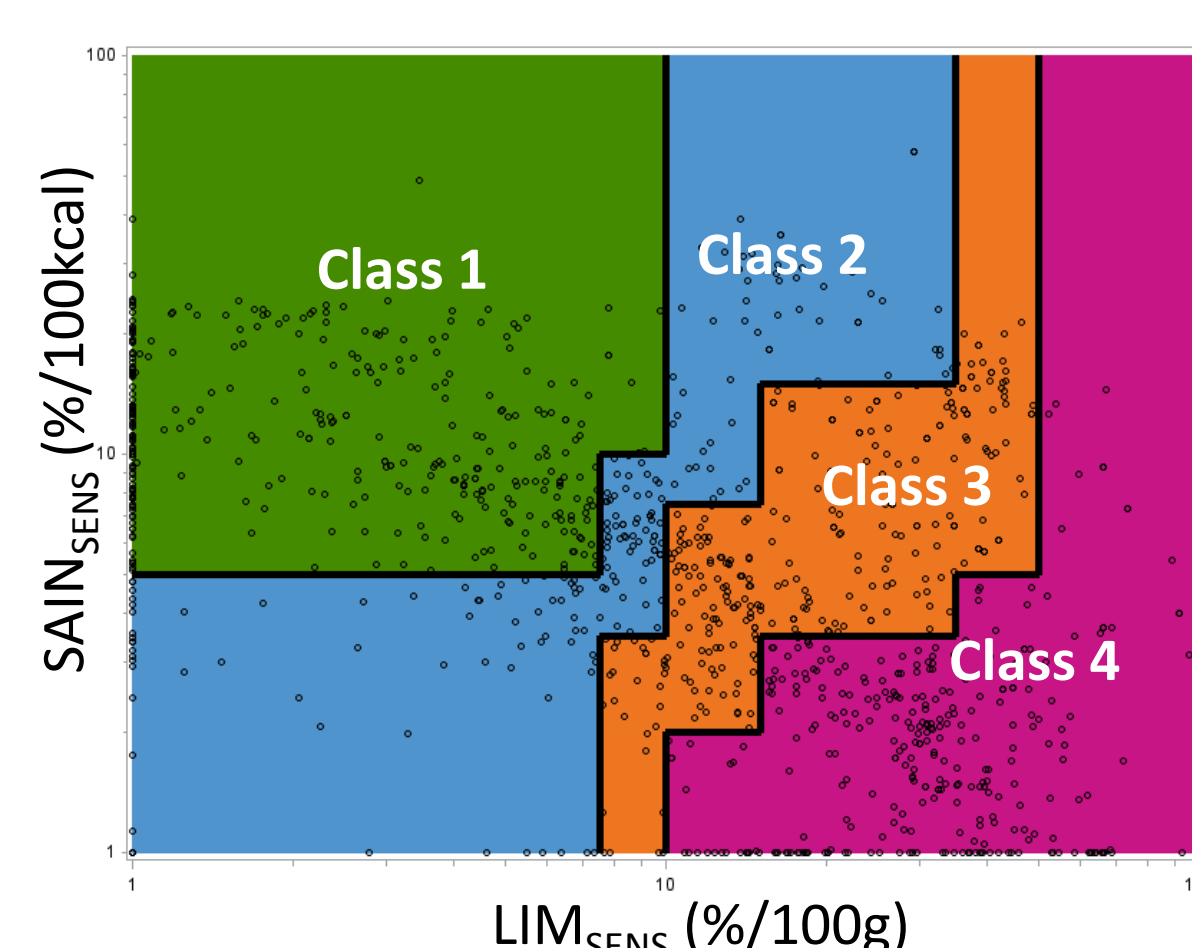

Figure 1. The four SENS classes

Modelling nutritionally adequate diets (*See Poster SENS system N°3*)

- For each individual diet consumed by adults in the nationally representative INCA2 dietary survey (n=1719 observed diets), an optimized diet (*i.e.* iso-energetic, nutritionally adequate and as close as possible to the subject's observed food choices), was designed with modelling.
- All the optimized diets respected official recommendations on nutrients (protein, fats, carbohydrates, fibers, essential fatty acids, vitamins, minerals, sodium, free sugars, saturated fats, cholesterol).

Table 1. Portion-sizes used in the analysis

Categories	Sub-categories	REF	g
Fruits		ENNS*	80
Vegetables	Raw and cooked vegetables	ENNS	80
	Soups	EFSA**	250
Dry Fruits	Dry Fruits	Canadian Guide	40
	Fruits oleagineux	USDA	15
Refined staches	Bread	ENNS	50
	Pasta, rice, semolina	ENNS	200
Unrefined starches	Wholegrain cereals	ENNS	175
	Legumes	ENNS	200
	Potatoes	ENNS	150
Breakfast cereals		ENNS	30
Meat	Offals, red meat and white meat	ENNS	100
	Deli meats	GEMRCN***	50
Eggs		ENNS (2 eggs)	100
Fish	Lean fish and fatty fish	ENNS	100
	Shellfish	Canadian Guide	75
	Fish-based processed products		30
Mixed-dishes	Mixed-dishes	GEMRCN	250
	Soups without vegetables	ENNS	80
Sandwich	Sandwiches, pizzas, salty tarts	GEMRCN	90
	Salty oleaginous fruits and similar products	GEMRCN	30
Milk		ENNS	150
Fresh dairy products	Yoghurts	ENNS	125
	Fresh cheese	ENNS	100
	Quark cheese	ENNS	120
Cheese		ENNS	30
Dairy desserts		GEMRCN	100
Pastries and cakes	Cakes, flans, tarts, ice-cream	GEMRCN	80
	Viennese pastries	Croissant	45
Biscuits	Dry biscuits	ENNS	30
Sugar and confectionary	Candies, chocolate, honey, jam, spreads	GEMRCN	30
	White sugar	Sugar cube	6
Waters		UK and Belgium REF	200
Beverages (hot, soda, fruit juices, nectars, …)		GEMRCN	200
Vegetal oil and animal fats		GEMRCN	8

* Étude nationale nutrition santé [French National Health and Nutrition study]
**http://referenceintakes.eu/files/downloads/1_portion_sizes_for_soups.pdf
*** Groupement d'Etude des Marchés en Restauration Collective et de Nutrition [French Grouping of studies on collective catering markets and on nutrition]

Frequency assessment

- The frequency of consumption of each food was assessed by the number of portions/day, for each observed diet and each optimised diet.
- Then the total number of portions/day of foods belonging to the same SENS class was calculated and was compared between the observed and optimised diets, for each class.

RESULTS

1/ Portion size distributions in the French food database by SENS classes

A high variability of portion-sizes was observed within each SENS class. Class-1 and Class-2 foods had higher portion-sizes (median 100g) than Class-3 and Class-4 foods (median = 45g and 50g, respectively), which is consistent with their lower energy density (**Figure 2**).
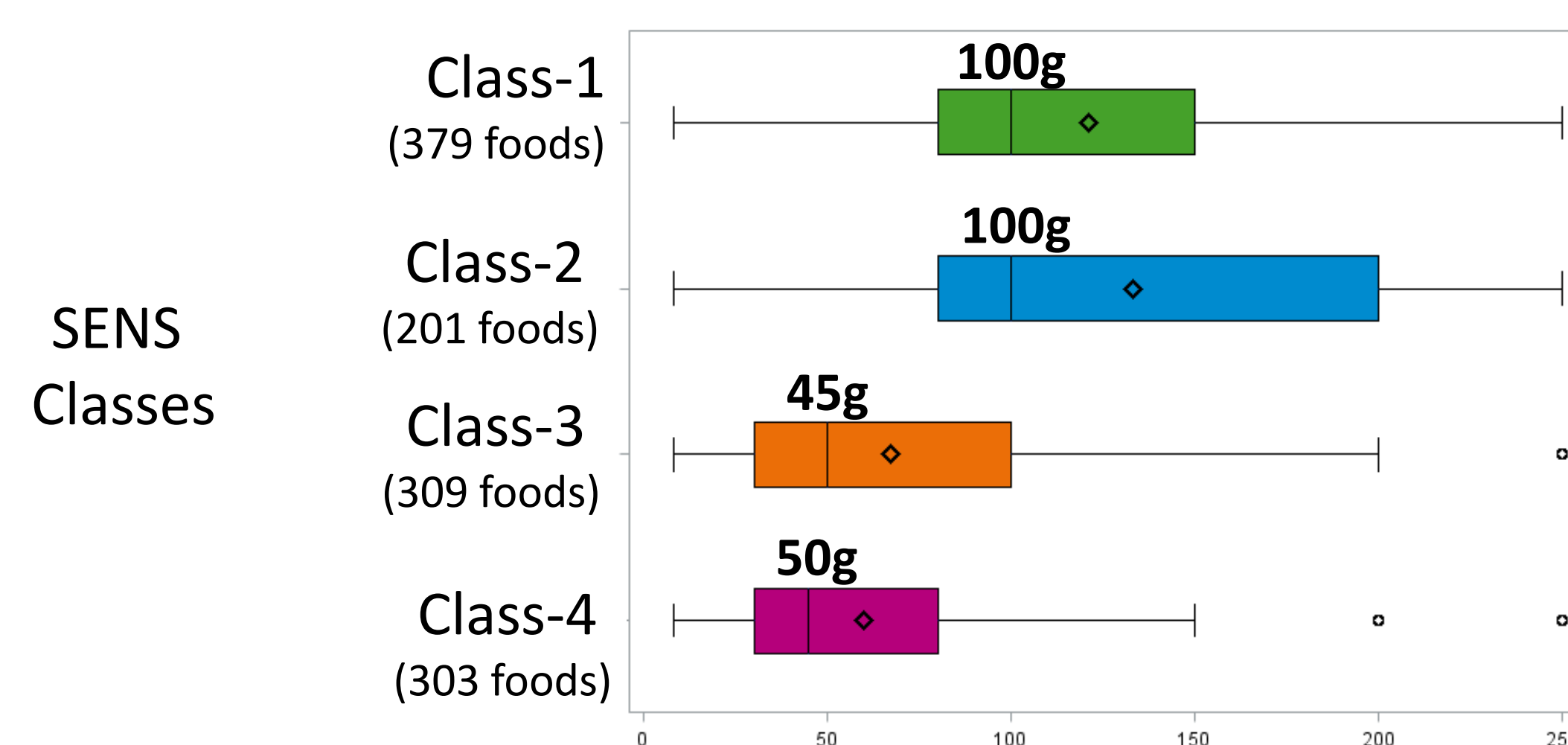

Figure 2. Distribution of portion-sizes (g/d) of foods by SENS classes

2/ Average frequencies by SENS classes, in observed and optimized diets

In the observed diets, an average of 6 portions/day of foods from each class was consumed (6.2; 6.0; 5.6 and 6.1 portions/day in classes 1, 2, 3 and 4, respectively; P<0.05) (**Figure 3**).

In the optimized diets, the frequencies of consumption differed largely between the 4 SENS classes, and followed a coherent and significant progression regarding the number of portions/day:

9.3 (including six portions/d of fruit and vegetables) >> 6.5 > 5.2 >> 3.7 for the class 1, 2, 3, 4, respectively (P<5%).
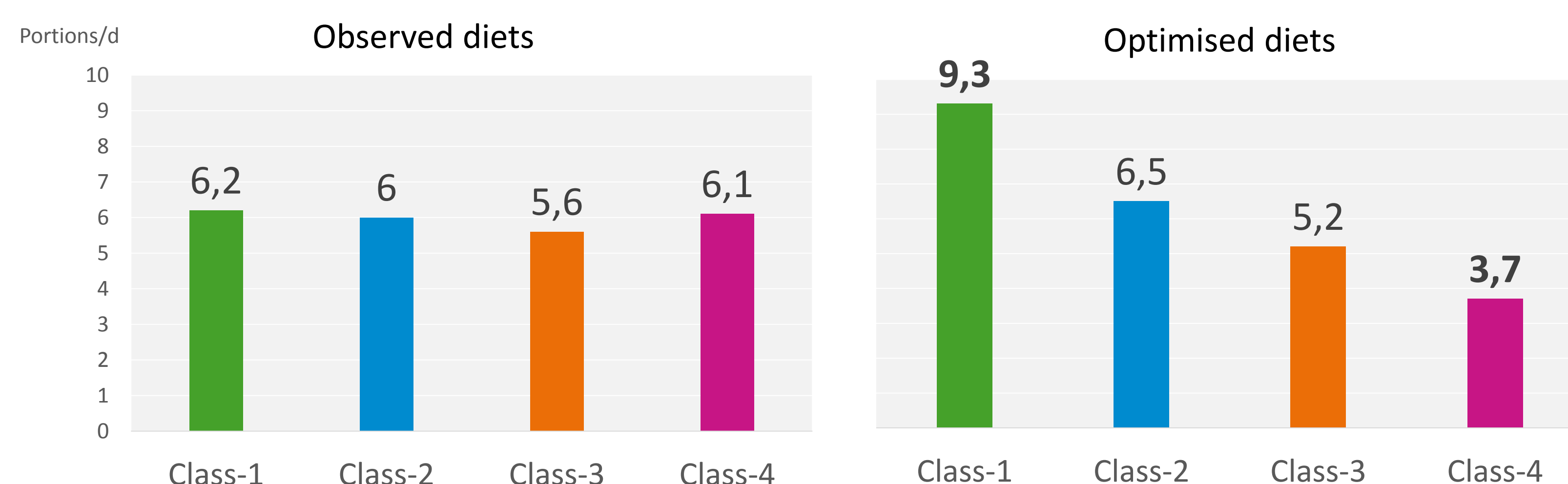

Figure 3. Food frequency (portions/day) in observed and optimised diets for each SENS class

3/ Percentage of subjects complying with optimization-induced frequency increase for Classes 1 and 2 and decrease for Classes 3 and 4

The optimisation (*i.e.* reaching nutritional adequacy):
- increased the frequency of Class-1 foods (98.3% of subjects) and Class-2 foods (66.8%);
- decreased that of Class-3 (57.2%) and Class-4 foods (94.8%) (**Figures 4a and 4b**).
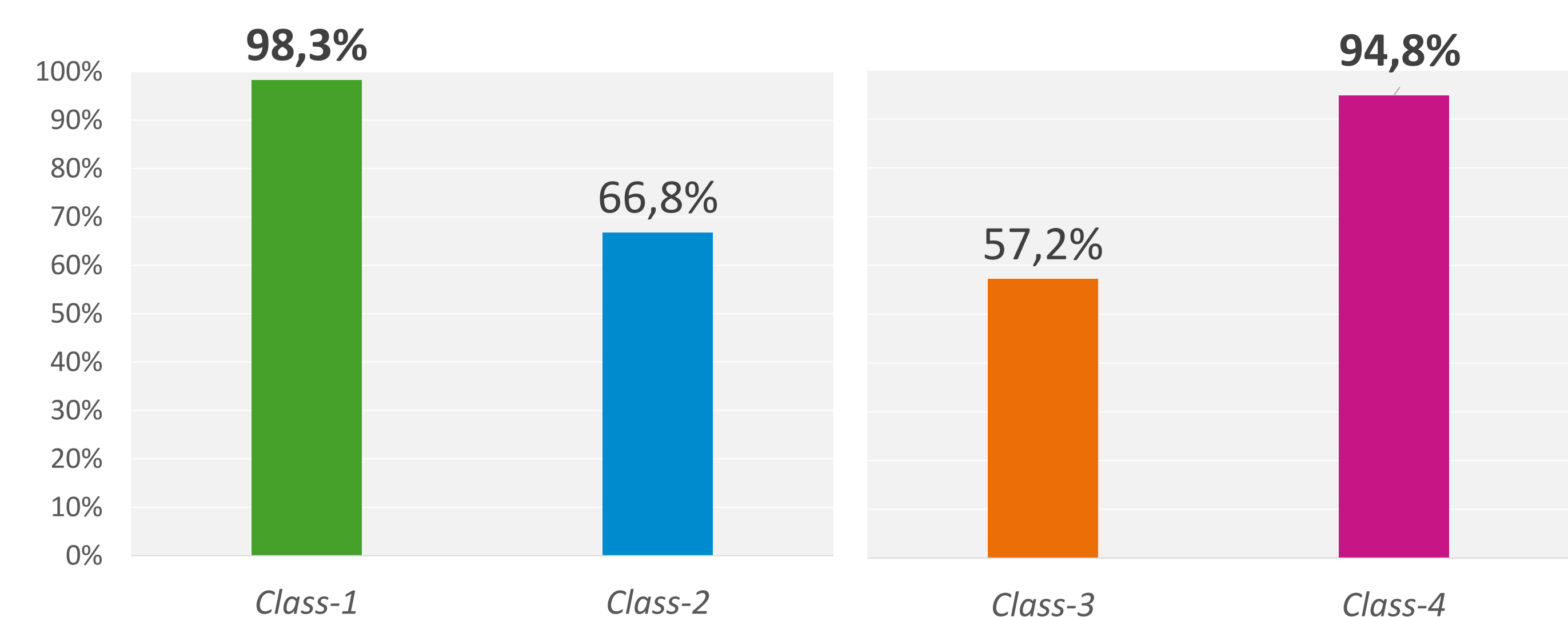

Figure 4a. Percentage of subjects for which the optimisation increased the frequency of Class-1 and Class-2 foods

Figure 4b. Percentage of subjects for which the optimisation decreased the frequency of Class-3 and Class-4 foods

CONCLUSION

- In diets optimized to fit nutritional recommendations, the daily frequency of consumption of foods from Class-1 (and Class-2) was much higher (higher) and the frequency of consumption of foods from Class-4 (and Class-3) was much lower (lower) than in the observed diets.

- It appears relevant to accompany the simplified nutritional labelling based on the SENS nutrient profiling system with simple and consumer-friendly messages advising that Class-1 (including all kind of fruit and vegetables) and Class-2 foods should be eaten more often and that foods belonging to Class-3 and Class-4 of the SENS should be eaten less often.

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