

The SENS* adapted from the French SAIN,LIM nutrient profiling system classifies foods into 4 ordered classes

*Système d'Etiquetage Nutritionnel Simplifié [Simplified nutritional labelling system]
 Matthieu Maillot¹, Véronique Braesco² Nicole Darmon³

¹MS-Nutrition, Marseille, France; ²VAB-Nutrition, Clermont-Ferrand, France; ³UMR NORT INRA/INSERM/AMU, Marseille, France

INTRODUCTION

The European Regulation No 1169/2011 (FIC) allows simplified labels to help consumers make healthier food choices. Such labels are based on algorithms, such as the SAIN,LIM, initially developed by the French Food Safety Agency in 2008, which classifies foods into 4 classes, according to their nutritional quality.

OBJECTIVES

To describe the adaptation of the SAIN,LIM system into the SENS, an algorithm operational for simplified nutritional labelling in the EU. This requires to:

- reduce the number of nutrients needed to calculate the profile (especially those which labelling is non-mandatory);
- order the 4 classes,
- integrate the European Daily Reference Intakes (DRIs);
- consider the nutritional specificities of some food categories.

MATERIALS AND METHODS

Changes to the original SAIN, LIM algorithm followed a **step-by-step process**.

At each step, one or two changes were introduced and changes induced in the classification were interpreted.

A steering committee, including members of French food retailers and industries, participated in the development of the SENS, which was implemented by a scientific working group who decided and tested the adaptations, with respect to the principles of integrity and transparency. This **collective approach** is in line with WHO report "What works"* and with FIC regulation which both promote multi-stakeholders and participative interventions or "consultation with a wide range of stakeholder groups".

*World Health Organization. WHO | Interventions on diet and physical activity: what works: summary report [Internet]. Geneva: World Health Organization; 2009. Available from: http://www.who.int/dietphysicalactivity/publications/physical_activity_9789241598248/en

RESULTS

From the SAIN,LIM system ...

- The SAIN,LIM system = the French nutrient profiling system.
- SAIN score** = mean of the % **adequacy** with the French recommended intakes for 5 desirable nutrients (proteins, fibers, vitamin C, calcium, iron) **for 100kcal**.
- LIM score** = mean % of the **maximal recommended values** for 3 nutrients to be limited (sodium, added sugars, and Saturated Fatty Acids-SFA), **for 100g**.
- 19 successive versions to adapt the SAIN,LIM.

Main changes:

- French recommendations replaced by the European DRIs for SFA (20g), sodium (2400mg), calcium (800mg) and proteins (50g);
- In the LIM, added sugars were replaced by free sugars, using the WHO definition and recommendation (50g).
- In the SAIN, proteins and fibres were kept, iron was removed, vitamin C was replaced (except for liquids) by the percentage of Fruits and Vegetables, calcium was kept only for dairy products.
- Food-category dependent weighting factors were introduced for fibres (cereal-based products), calcium (cheese, other dairy products) and proteins (eggs, fish).
- A specific SAIN score was developed for added fats and for beverages.
- In addition to the initial SAIN and LIM thresholds, secondary ones were pragmatically defined to improve order of classes.

... to the SENS algorithm (SAIN_{SENS} / LIM_{SENS})

$$LIM_{SENS} = \left(\frac{\text{Sodium (mg/100g)}}{2400 \text{ (EU-DRI)}} + \frac{\text{SFA (g/100g)}}{20 \text{ (EU-DRI)}} + \frac{\text{Free Sugar (g/100g)}}{50 \text{ (WHO)}} \right) \times 100$$

(% for 100g)

Applies for all foods
 For beverages LIM_{SENS} multiplied by 2.5

$$SAIN_{SENS}^{\text{Fats}} = \left(\frac{\text{ALA (g/100kcal)}}{1.8} + \frac{\text{MUFA (g/100kcal)}}{44.4} \right) \times 100$$

(% for 100kcal)

Applies for added fats
 (oil, margarine, butter, cream, mayonnaise, vinegar dressing...)

$$SAIN_{SENS}^{\text{Beverages}} = \left(\frac{\text{F\&V (g/g)} \times 2}{10} + \frac{\text{Vit C (mg/100kcal)} \times 0.4^*}{80 \text{ (EU-DRI)}} \right) \times 100$$

(% for 100kcal)

* X 0.4 equals dividing by 2.5

Applies for all liquids except milk

$$SAIN_{SENS}^{\text{Other}} = \left(\frac{\text{F\&V (g/g)}}{10} + \frac{\text{Proteins (g/100kcal)}}{50 \text{ (EU-DRI)}} + \frac{\text{Fibres (g/100kcal)}}{20} + \frac{\text{Nut}_{Cat} \times \text{Weight}}{\text{Ref}_{NutCat}} \right) \times 100$$

(% for 100kcal)

Applies for all the other foods
 (See Table 1 for more information on NutCat)

Table 1. Specific nutrients by food categories (NutCat), reference values (Ref_{NutCat}) and weighting coefficient (Weight)

Food category	NutCat	Ref _{NutCat}	Weight
Cereals (> 50%)	Fibres	20 g	2
Cheese (>70%)	Calcium	800 mg (EU-DRI)	2
Other dairy products (>50%)*	Calcium	800 mg (EU-DRI)	1
Eggs (>50%)	Proteins	50g (EU-DRI)	1
Fish (>50%)	Proteins	50g (EU-DRI)	1
Other (except fats and beverages)	Zero	NA	NA

*Except 100% cheese (>50% milk ingredient)

Thresholds' definition to order the four SENS classes

Primary thresholds:

- SAIN_{SENS} : 5 (corresponding to 100% adequacy)
- LIM_{SENS} : 7.5 (corresponding to 0% excess)

Secondary thresholds:

- SAIN_{SENS} : 2 ; 3.5 ; 7.5 ; 10 ; 15 ;
- LIM_{SENS} : 10 ; 15 ; 35 ; 50 ;

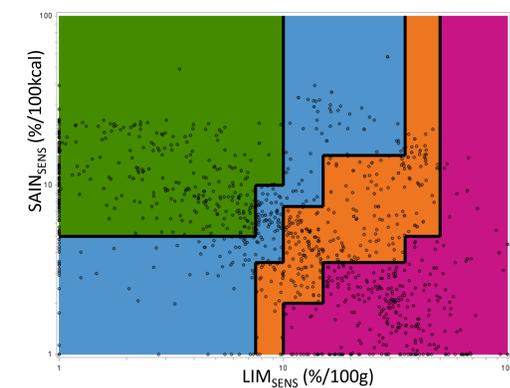
Exception: Water is the only beverage in Class-1:

For Water, LIM_{SENS}= 0 and SAIN_{SENS} is infinite
 Other Class-1 beverages are downgraded in Class-2 (e.g. diet-sweet beverages)

Exception: Downgrading high energy-dense foods (fats not concerned) :

- from 1 to 2 if > 400kcal/100g
- from 2 to 3 if > 400kcal/100g
- from 3 to 4 if > 500kcal/100g AND Na>200mg/100g

Food mapping according to SAIN_{SENS} , LIM_{SENS}



Mapping of foods from the CIQUAL

The SENS was used to classify 1192 foods from the French Food Composition table (CIQUAL) and 1737 real food products, marketed in 2015 in France.

Overall, the classification was in line with the French dietary guidelines and recommendations and discriminated adequately within and across food groups to provide a potentially useful help for consumer's food choices.

CONCLUSIONS

The SENS system preserves the strengths of the initial SAIN,LIM system while making it more operational, taking into account specificity of food categories, complying with European DRIs, and finally extending its use for simplified nutritional labelling.