To what extent can food nutritional quality improvement allow public health goals to be reached?

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Introduction
To face the burden of chronic diseases linked to food consumption, improving nutritional quality of processed foods becomes a crucial issue for health policy makers. This issue raises two questions: to what extent modifications of food composition are feasible and what can be their impacts on health, and what means can be used by policy makers to favor food quality improvement.

The purpose of the study is to contribute to these debates by assessing what can be the potential contribution of food quality modification from a public health point of view. More precisely, we assume that consumers continue to consume the same food products but that the nutritional characteristics of each one of these food products have been improved in a realistic way, i.e. acceptable from technological and sensorial points of view. Then, what could be the impacts on the individual nutritional intakes?

To address this question, detailed data on nutritional characteristics of food items and on individual consumption among representative samples of population are clearly required.

Methods
Food Quality database
In France, Ministries in charge of Food and Agriculture, Health, and Consumption decided to fund the creation of an Observatory of Food Quality (Oqali) in 2008. The goal was to set up an independent system of observation in order to assess the nutritional composition of food items marketed by all the brands present in the French market. In 2010, the Oqali database contains about 15,000 items, representing around 30% of the processed food marketed in France. We used these data to assess the nutrient composition of individual branded food items among three groups: breakfast cereals (355 items available divided into 29 food categories, covering 75% of the market in 2008), biscuits/pastries (1805 items, 51 food categories, 72% of the market shares in 2008) and bread-based products (620 items, 31 food categories, 57% of the market shares in 2009).

Consumption databases
For each food item, we matched the food quality database with two consumption databases: TNS Kantar Worldpanel (to assess the market shares of each food item delivered to the market) and INCA2 (an individual consumption survey).
On this basis, we considered mean consumers of the 3 groups studied for children and adult sub-populations.

Scenario analysis
First, we determined the nutrient composition variability among each product category of breakfast cereals, biscuits/pastries and bread-based products.
Second, we considered several scenarios of food composition modification within each product category, by assuming that the lowest nutritional quality food items were modified in order to reach better quality levels already observed in the food category. Then, for each scenario, we calculated the variation of total quantities of sugars, fat, fiber and sodium delivered to the market. Finally, we determined the variation induced at the individual consumption level by each scenario and assessed the modification of total quantities of sugars, fat, fiber and sodium delivered to the market. For each scenario, we calculated the variation by assuming that the lowest nutritional quality food items were modified in order to reach better nutritional quality levels already observed in the food category. Then, for each scenario, we calculated the variation of total quantities of sugars, fat, fiber and sodium delivered to the market.

To test the significance of nutrient individual consumption evolution, two-sample t statistic tests were performed (α=5%) which allow to compare the current consumption with the various scenarios.

Conclusions and perspectives
The results give useful insights and show to what extent food modifications can contribute to public health goals. Nevertheless, it would be necessary to take into account the interactions between nutrients. For instance, a decrease in fat may in some cases imply an increase in the sugar content (for technological or sensorial reasons)

The food modifications simulated in the study can be interpreted as the improvement of the Minimum Quality Standard (MQS) - i.e. the enhancement of the lowest nutritional quality items - within each food category. The potential magnitude of the effects suggests that such a strategy can constitute a relevant target for the public authorities, which radically differs from the one which would promote quality improvement through differentiated product claims.

Results

Table 1: Relative interquartile ranges (RIR) greater than 25% for sugars, fat, fiber and sodium content within the categories of breakfast cereals having at least 8 items.

Table 2: Impacts of scenarios on the total amounts of nutrients delivered to the market

Table 3: Impacts of scenarios on individual consumption for adults and children subpopulations

The impacts of scenarios on individual consumption for adults and children subpopulations are up to 4.2% for S1, to 8.4% for S2 and to 18.8% for S3, depending on the sector and the nutrient considered.

For adults, the greatest impact is observed for each scenario on sugars intakes provided by breakfast-based products (respectively -2.8%, -5.7% and -13.9%).

For children, the strongest impact depends on the scenario considered: for S1 it concerns fats intakes provided by breakfast cereals (-4.2%), for S2 it concerns sodium intakes provided by breakfast cereals (-8.4%) and for S3 it concerns fiber intakes provided by bread-based products (+18.8%).

Statistical tests show that nutrient individual consumption evolution is significant, for all scenarios and nutrients tested except for fat and fiber adults individual consumption within scenario S1 for breakfast cereals.

To what extent modifications of food composition are feasible and what can be their impacts on health, and what means can be used by policy makers to favor food quality improvement.