A photograph showing a group of people in a meeting. In the foreground, a silver laptop is open, displaying a website with a dark background and a light-colored box. A person's hand is visible on the right, pointing at the screen. In the background, other people's hands are visible, some gesturing as if in discussion. The scene is brightly lit, suggesting an indoor office or meeting room environment.

The methodological approach
used to analyze the evolution in food
categories monitored by
the Food Quality Observatory

AUTHORS

Sonia Pomerleau Dt.P., M.Sc. – Institute of Nutrition and Functional Foods, Université Laval

Alicia Corriveau Dt.P., M.Sc.(c) – Institute of Nutrition and Functional Foods, Université Laval

Julie Perron Dt.P., M.Sc. – Institute of Nutrition and Functional Foods, Université Laval

Pierre Gagnon B.Sc. – Institute of Nutrition and Functional Foods, Université Laval

Véronique Provencher Dt.P., Ph.D. – Institute of Nutrition and Functional Foods, Université Laval

COLLABORATORS

Laurélie Trudel M.Sc. – Institute of Nutrition and Functional Foods, Université Laval

MEMBERS OF THE REVIEW COMMITTEE

Céline Plante Dt.P., M.Sc. – Institut national de santé publique du Québec

Marie-Ève Labonté Dt.P., Ph.D. – Institute of Nutrition and Functional Foods, Université Laval

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1 Introduction

This report details the methodological approach used in the context of monitoring sectoral studies conducted by the Food Quality Observatory (hereinafter referred to as the “Observatory”). The sectoral studies carried out between 2016 and 2022 provided an initial overview of the selected food categories (i.e., food categories considered high priority within the context of public health)¹. The monitoring studies were designed to identify changes in the overview of the different categories over time. These form part of the Observatory's mission, which is to monitor the evolution of the food supply in order to help improve its quality and accessibility.

More specifically, monitoring sectoral analyses helps to compare a food category's nutritional composition information between two reference years. At the same time, comparisons are made concerning the information displayed on the packaging, while associating it with data relating to consumer purchasing behaviour and the products' statuses (new, identical, modified or withdrawn). The current situation in Québec and Canada is scarcely known in this regard. In fact, few studies have examined changes in the nutritional composition of the food supply and in the purchase volume of various categories of processed foods. In such a context, the Observatory's work proves not only relevant but also very important in objectively monitoring the evolution, over time, of food categories deemed a priority². Such monitoring will support actions to improve the nutritional quality of foods offered in Québec. It will provide a better understanding of their impact on consumer purchasing behaviour over the long term.

This methodological report details the various steps required to monitor a particular food category, as well as the analyses that have been carried out.

Research² steps and objectives

Generally speaking, the research objectives for monitoring sectoral analyses are as follows:

- 1) To identify the differences in the types of products available in Québec or Canada, the information displayed on their packaging, and their sales volumes over the time between the initial overview and the follow-up study.
- 2) To compare the nutritional composition, selling price and nutrient contribution of the different types of products offered and sold in Québec or Canada between the initial overview and the follow-up study, as well as according to their status (new, identical, modified or withdrawn from the market).
- 3) To check: a) how the information displayed on the packaging is associated with the content of certain nutrients of interest and the selling price; and b) to what extent these associations differ between the initial overview and the follow-up study.

To meet these research objectives, the following steps were carried out for each food category studied:

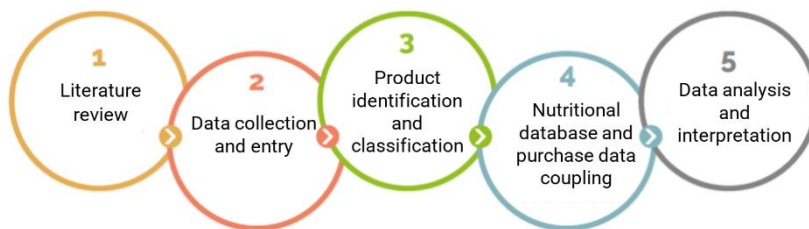


Figure 1. Steps for monitoring each sectoral study

As illustrated in Figure 1, the steps in the follow-up studies are essentially the same as those found in the initial overview of each sectoral analysis. These steps and any differences from the initial overview are detailed in the following sections.

Literature review

The methodology to perform the literature review is systematically the same for each follow-up study. The next sections outline the various steps related to this subject.

3.1 Methodology used

As part of monitoring the Observatory's sectoral studies, the main objective of the literature review is to verify whether similar studies on the evolution of a food category have been carried out here or elsewhere. If applicable, it is of interest to understand from what angle(s) these studies analyzed the category in question. The literature review also provides information about new studies carried out on this food category since the initial overview (e.g., consumption, nutritional composition, impact on health, consumer purchasing behaviour). In addition, the information collected during the literature review helps determine whether the groupings (classifications – see next section) should be adjusted compared to the initial overview. For example, cereals intended for children and families were classified separately during the initial overview. However, considering that most scientific articles group them together and that regulatory standards are evolving, the distinction between them is becoming increasingly less marked. Thus, during the follow-up study, these two classifications were grouped into one covering cereals marketed to children or families. This type of adjustment can be explained in particular by a change in the types of products available on the market between the two collection years.

Just as for the initial sectoral analyses, a “rapid review” methodology was retained, as the main objective of the literature review is more global and not exhaustive.

3.2 Rapid review

A rapid review is defined as being “*a form of knowledge synthesis in which aspects of the systematic review process are simplified or omitted in order to generate information in a short time*”³. The research strategy used in the context of sectoral analyses was developed in collaboration with a librarian

from Université Laval. Three databases were reached via the OVID platform: Food Science and Technology Abstracts, MEDLINE and PsycINFO. Google Scholar was also used to find other scientific articles and grey literature documents. It was previously established that the texts would be available in English or French. The publication dates of articles or other documents of interest regarding monitoring had to be within the last 20 years. As for the publication dates of documents concerning new studies conducted on the food category in question, they were to be published since the initial literature review.

3.3 Search strategy

The keywords selected in the search strategy aimed to cover different aspects of each objective and were separated into five blocks. A first block is linked to the food category under study and, therefore, varies from one category to another. The four other research blocks are invariable and are as follows: the nutritional composition of the offer, the information displayed on the front of the packaging, consumer purchasing behaviour, and monitoring. Each of these four blocks is then linked to the first block—the one related to the food category. Note that the search was carried out in two stages, since the combination of Block 1 and Block 5 was completed with a different filter concerning the publication dates (over 20 years rather than approximately 5 years for Blocks 2, 3 and 4).

The following table displays the keywords used for each of the four invariable blocks as well as an example of Block 1 (breakfast cereals).

Table 1. Examples of blocks and keywords used for the literature review as part of monitoring the Observatory’s sectoral analyses - Breakfast cereals example

Blocks	Subjects	Keywords
1. Food category under study	Breakfast cereals	“breakfast cereal*”; “ready-to-eat cereal*”; “RTE cereal*”; “céréales à déjeuner”; “céréales prêtes-à-manger”
2. Nutritional composition	Nutritional value	nutrient*”; “nutriti* value”; “valeur nutriti*”
		“nutriti* composition”; “composition nutriti*”
		“nutriti* quality”; “qualité nutriti*”
	Diet food and nutrition	consumption; intake*; consommation; apport* “nutriti* intake”; “apport nutriti*”
	Food quality	“food quality”; “qualité nutritionnelle”
3. Information displayed on the front of the package	Food labeling	label*
		“nutritional information”; “nutrition fact*”
		front-of-pack*; FOP
		allégation*; claim*
		“nutrition fact table*”; “tableau de valeur nutriti*”; “tableau de la valeur nutriti*”;
		ingredient*; “liste d’ingrédients”; “liste des ingrédients”
		pack*; emballage*
		“nut* profil*”; “profil* nutriti*”
	organic*; biologique*	
	Marketing	natural; authentic; naturel; market*; “food marketing”; “child* marketing”; child*
4. Consumer purchasing behaviours	Food offer	“food offer”; “food supply”; “food diversity”; “offre alimentaire”; “diversité alimentaire”
	Food supply	purchas*; buy*; sale*; achat*; vente*
		behavi*; comportement*
		consumer*; consommateur*
Accessibility	“food accessibility”; “food availability”; accessibilité	
5. Monitoring	Monitoring	monitor*; “cross-sectional”; evol*; chang*; progress; compar*

**The use of the asterisk enables the search engine to look for different variations of a word formed from different suffixes. Thus, by using the term “nutriti,*” it is possible to find words such as nutritive and nutrition.*

For example, following the established search strategy, a search query entered into OVID, combining Block 1 and Block 2, could be as follows:

(“breakfast cereal” or “ready-to-eat cereal*” or “RTE cereal*”) AND (nutrient* or “nutriti* value” or “nutriti* composition” or “nutriti* quality” or consumption or intake* or nutriti* or intake or “food quality”)*

Within the scientific and grey literature, an initial sorting of search results was carried out using the titles and abstracts of articles, or the titles only (if too many articles were found with the summaries), to target the truly relevant documents as best possible. Once the documents were identified, they were selected according to their relevance to the research objectives. The relevant articles and documents were then classified according to the appropriate research objective, to be read and synthesized as an introduction for each report (context and issue with a food category). The same member of the research team completed all of these steps.

4 Data collection and classification

4.1 Product collection

To meet the research objectives, the collection methodology is the same as for the initial overview of a sectoral analysis¹. In fact, the first database on the nutritional composition of the food category under study was obtained through collection in supermarkets, big box stores and specialized grocery stores. To accomplish this, all the different products discovered for this food category were purchased. At this time, the universal product code (UPC) and each product's regular price were noted at each point of sale visited. New food stores were visited until saturation was reached (no new products were found by checking UPCs and product names). Thus, the number of stores visited varied from one food category to another. Subsequently, each product was numbered, and then all sides of the product were photographed to capture all the information displayed on the packaging.

In some cases, systematic in-store collection proved impossible (e.g., during the COVID-19 pandemic lockdown) or was unrealistic due to the complexity and costs (pan-Canadian collection). Thus, a web collection methodology was implemented, using information available on the websites of online grocery stores and bio-food industries. To do this, the starting point was a list of products in the food category under study obtained from NielsenIQ. This list reflected all the products sold during a year for a food category, according to optical scanning in food stores. The latter data was then cleaned to identify duplicates (e.g., the same product but sold in a different size package) and to retain approximately 80% to 85% of the largest sellers (in kilograms) for the year of study. This was intended to repeat the methodology used in the initial overview of a given food category. From this list, the website of the company manufacturing this product was first visited. If this site did not include all the required information (front image of the product, nutritional value table and/or list of ingredients), online grocery sites were then visited. For each piece of information to be retained, screenshots were taken in order to keep the necessary images in banks for the remainder of the study. The grocery stores were visited to obtain and complete the data if necessary. In the end, only the products for which all the required information was available were retained for analysis.

4.2 Data entry

Once all the products were identified, the data was entered into an Excel file using double-coding to ensure data accuracy and to prevent entry errors. The data entered came from the information displayed on product packaging (e.g., nutrition facts table, list of ingredients). The

main nutritional composition variables listed for sectoral analyses are: energy (kcal), fat (g), saturated fat (g), carbohydrates (g), total sugars (g), fibre (g), protein (g) and sodium (mg). The selling price was also documented by calculating the average of the prices observed in the various food stores visited.

4.3 Food purchases

Sectoral studies relating to monitoring – just like the initial overviews – require the use of a second database containing food purchases. More specifically, this is sales data from NielsenIQ in Québec (or Canada, if applicable) for a given food category. Most of the information originates from the optical scanning of products purchased at cash registers, representing purchases made in major grocery chains and drugstores (e.g., Sobeys, Metro, Loblaws, Walmart). This database covers a period of 52 weeks. The variables analyzed for each product are total annual sales in Canadian dollars, annual sales in kilograms, and annual unit sales for the province.

In addition to the nutritional composition, the list of ingredients and the information on the packaging were identified.

>> Sales data originates primarily from optical scanning of products purchased at cash registers and covers a period of 52 weeks.

4.4 Classification

For each of the food categories studied, the products were classified using a double-coder according to their respective attributes (e.g., type of processing, ingredients, target customer). These classifications allow similar products to be grouped together and product groups to be compared with each other, rather than one product at a time. In this way, the nutritional composition can be analyzed from different angles, consistent with the research objectives and the literature review on the subject. In addition, during the product classification process, discrepancies were noted, and when necessary, a third party was consulted in order to reach a consensus. More details regarding the classifications are available in the report on the methodological approaches used during the initial overviews of the sectoral studies¹.



Data matching

5.1 Data preparation

Before completing the data matching, duplicates of the same product (e.g., identical product but different sizes) were first removed. Thus, sales of different sizes of the same product can be combined. Subsequently, aberrant nutritional data was identified. Outliers were identified in two ways. First, if the nutritional values were more than four standard deviations from the mean, the statistician validated whether the data in question is actually possible (e.g., it is impossible for the value of saturated fat to be greater than the value of total fats). Then, the data was validated to check if the gram contents corresponded to the indicated percentage (e.g., if there are 15 g of sugars in a product and the indicated percentage is 30%, it is because there is an error in the data since 15 g of sugars is equivalent to 15% of the daily value for this nutrient). The manufacturer of the product with aberrant data was then contacted in order to determine the exact value and to correct the information in the database, if necessary.

5.2 Sales data matching

The UPC was first used to facilitate cross-referencing between the nutritional database obtained during collection and the sales database. This made it possible to automatically combine nutritional and sales information for a large part of the products studied (around 75% of products).

When automatic matching was not possible, it became necessary to combine the data manually. This was done through manual verification based on the product brand and name. This enabled us to cross-reference an additional 5% of nutritional composition data with sales data. The combination of automatic and manual matching thus leads to a total combined data (nutritional composition and sales) for approximately 80% of the products listed.

5.3 Matching between the initial overview and the follow-up

In order to determine the products' statuses (new, identical, modified or withdrawn – terms defined below), the UPCs for the products identified in the monitoring studies were automatically

matched to the UPCs for the products in the initial overview. Since some products have changed UPC since the initial overview, part of the matching is done via product names by brand or company. With this matching, manual validation is subsequently carried out using a double-coder. This manual validation was completed by comparing the product photos from the initial overview with those from the new collection. The objective was then to verify that it was either 1) a new product, 2) an identical product, 3) a modified product, or 4) a product withdrawn from the market:

- 1) A **new product** is a product not related to any product from the initial collection and having a UPC present only during the follow-up study.
- 2) An **identical product** may have a different UPC, as long as the following information is the same: product name, ingredient list, Nutrition Facts Table, product claims and packaging.
- 3) A **modified product** is a product available on the market during the two years of study (the UPC may or may not be identical), but has undergone changes in packaging (e.g., images, logos, product claims) and/or nutritional composition information (list of ingredients and/or nutritional value table). The type of modification has been identified and is presented in the report for the food category under study.
- 4) A **withdrawn product** is a product that was available only during the initial study.

With regard to modified products, certain changes are permitted without necessarily having to change the UPC. In this regard, the reason(s) explaining why a product ended up with the “modified” status were also taken into account. Thus, a modified product could present one or more of these reasons:

- ✓ Addition(s), removal(s) or change(s) in the Nutrition Facts Table (NFT).
- ✓ Addition(s), removal(s) or change(s) in the list of ingredients.
- ✓ Addition(s), removal(s) or change(s) concerning health or nutritional claims or logos (e.g., source of fibre or low in saturated fat).
- ✓ Addition(s), removal(s) or change(s) concerning any other information on the packaging (e.g., made from Canadian wheat or without preservatives).
- ✓ Addition(s), removal(s) or change(s) to the general appearance of the packaging (e.g., image, photo).

Please note that a change in lettering or positioning of an image was not considered a modification as long as the general appearance (e.g., colour scheme and image) remained the same.

In the event of a change in the list of ingredients, the product was then analyzed more carefully to check whether the change detected was a real change. In fact, in several cases, it was simply a modification to comply with Health Canada’s new labelling regulations⁴ (for example, grouping of sugar-based ingredients, but the recipe was established as identical to 2016 given the presence of absolute quantities of identical nutrients in the NFT). Within the modified products, regardless of the reason, it was thus possible to distinguish which products actually had modified compositions from those that had merely complied with a new regulation.

6 Statistical analyses

6.1 Product and sales diversity (Objective 1)

To determine how each food category has evolved, the first table presents the diversity and sales for the two years under study. Diversity represents the food supply and is expressed in the number of different products for a given classification (e.g., granola-type cereals). For their part, sales represent the percentage of purchases of a classification over the entire food category. Thus, by having the values for each year, it becomes possible to follow the evolution of the number of products (diversity) and their distribution, expressed in percentage points (pp). The percentage points describe the evolution of the relative importance experienced by each product group compared to the category as a whole. Thus, if a group represented 5% of total sales during the initial overview and 7% during follow-up, its change in pp is +2. As an example, Table 2 here presents these results for breakfast cereals.

Table 2. Example of the change in diversity of products and their sales, according to their type

Classifications		Diversity 2016 (n(%))	Diversity 2021 (n(%))	Change in diversity (n(pp))	Sales 2016 (%)	Sales 2021 (%)	Change in sales (pp)
Type of cereal	Granola	130 (39)	177 (45)	+ 47 (+ 6)	22	24	+ 3
	Sugared	65 (20)	71 (18)	+ 6 (- 2)	41	41	0
	Muesli	37 (11)	44 (11)	+ 7 (0)	8	7	- 1
	Natural	54 (16)	41 (10)	- 13 (- 6)	16	12	- 3
	Chocolate	17 (5)	30 (8)	+ 13 (+ 3)	3	5	+ 2
	Bite-sized	17 (5)	17 (4)	0 (- 1)	7	5	- 1
	Fibre	11 (3)	12 (3)	+ 1 (0)	4	5	+ 1
Total		331	392	+ 61	28 052 887 kg	28 749 281 kg	

6.2 Distribution of products according to their status (Objective 2)

As part of a comparison between two years, it is relevant to check each status' distribution. This makes it possible to gain a better picture of the percentage of new products as well as identical, modified and withdrawn products since the reference year. Figure 2 below presents the example of breakfast cereals identified in 2021 compared to the reference year (2016).

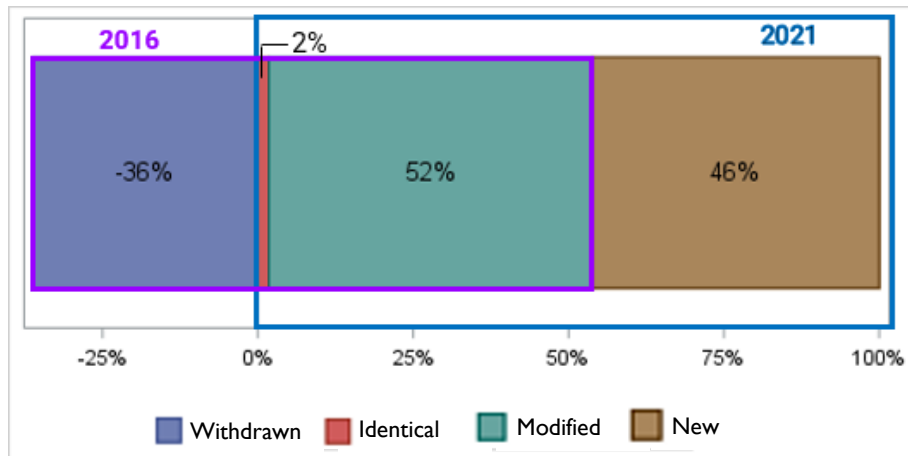


Figure 2. Example of product statuses distribution

This same type of figure can be created by separating all the products according to certain classifications. An example is shown below (Figure 3). This figure illustrates the status of breakfast cereals according to each type of product.

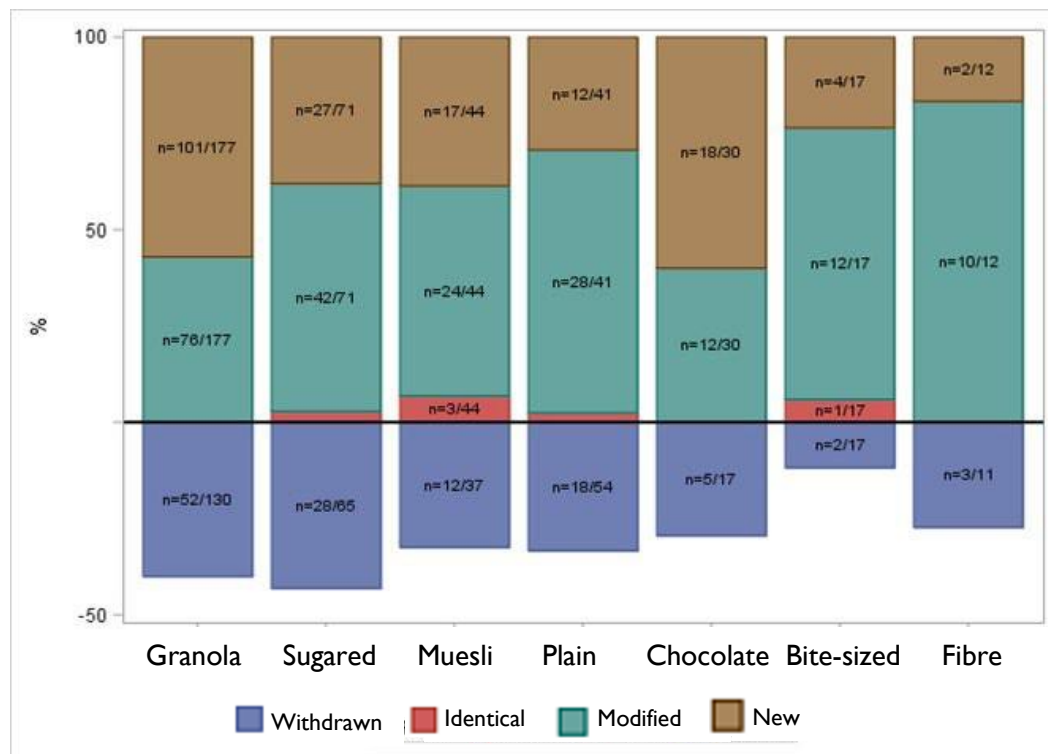


Figure 3. Example of product statuses distribution according to type of cereal

In this regard, the percentages of products in each status are calculated as follows: the same denominator is used to calculate the percentage of identical, modified and new products. This denominator is the number of products found on the market by type for the year under study. As for the calculation concerning the products withdrawn, the denominator used is the number of products of the same type found on the market during the reference year. For example, according to Figure 3 above, there were a total of 177 granola-type cereals in 2021 (the year under study). Since 101 of these cereals were new, the percentage of new granola-type cereals is then 57%. Whereas in 2016, there were more than 130 granola-type cereals on the market. Therefore, with a total of 52 granola-type cereals withdrawn from the market, this represents a percentage of 40% of products withdrawn.

6.3 Content analyses (Objective 2)

Before beginning the analyses concerning the nutritional composition of each food category, the nutritional data identified (as indicated on the packaging) were converted into a basis common to the food category under study. For example, for breakfast cereals, everything is reduced to a portion of 55g, which was the reference portion during the initial overview. This makes it possible to compare products for the same reference portion even if the portion indicated on the packaging is not necessarily the same. The following table presents an example of a nutritional composition table for the monitoring year (2021) in comparison

with the reference year (2016). The variations are indicated in absolute values as well as in relative differences (percentage). Relative differences are calculated by taking the value at the follow-up collection and subtracting the value at the initial collection, all divided by the value at the initial collection. Coloured boxes indicate that the data is significantly different from the base year. The orange colour is used for values significantly higher than the base year, while the blue colour (not shown here) is used when the data is considerably lower than the base year. Note that similar tables, but more detailed, are also produced. These present the nutritional composition of the products of each classification for the year under study, also indicating the variation compared to the reference year. Significant differences are identified using the Kruskal-Wallis test for supply data and rank regressions for purchase data. The thresholds of all tests are adjusted according to the Bonferroni correction.

Table 3. Example of a table displaying the nutritional composition of the new data collected in comparison to the reference year

	Fats (g)		Saturated fats (g)		Fibres (g)		Sugars (g)		Sodium (mg)		Sales price (\$)	
	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases
All cereals 2021	5.1±4.7	2.8±2.6	1.2±1.7	0.8±1.5	4.6±2.8	4.5±3.7	11.3±5.3	13.2±5.3	145±113	208±116	0.83±0.40	0.70±0.17
Variation (unit) vs 2016	1.2±0.4	0.1±0.3	0.4±0.2	0.0±0.2	-0.1±0.3	0.0±0.4	-0.1±0.6	0.4±0.6	-3.5±12.1	-7.4±13.7	0.08±0.04	0.10±0.02
Variation (%) vs 2016	30.1±11.0	5.0±11.2	44.2±18.2	-0.7±22.5	-2.2±6.8	1.1±9.6	-1.0±5.1	2.8±4.8	-2.3±8.2	-3.4±6.4	10.6±5.3	16.5±3.0

Average ± standard deviation.

Offer=Nutritional composition of cereals available on the market (n=392)

Purchases=Nutritional composition of cereals sold (the average was weighted according to the number of portions sold) (n=310).

The boxes in orange mean that the value is significantly higher than 2016. The threshold used is 0.0694% (p<0.000694) and corresponds to the Bonferroni correction (5%/72).

These results can also be illustrated using a figure illustrating the variation in nutrients of interest for both supply and purchases. Figure 4 below shows the example of breakfast cereals between 2016 and 2021.

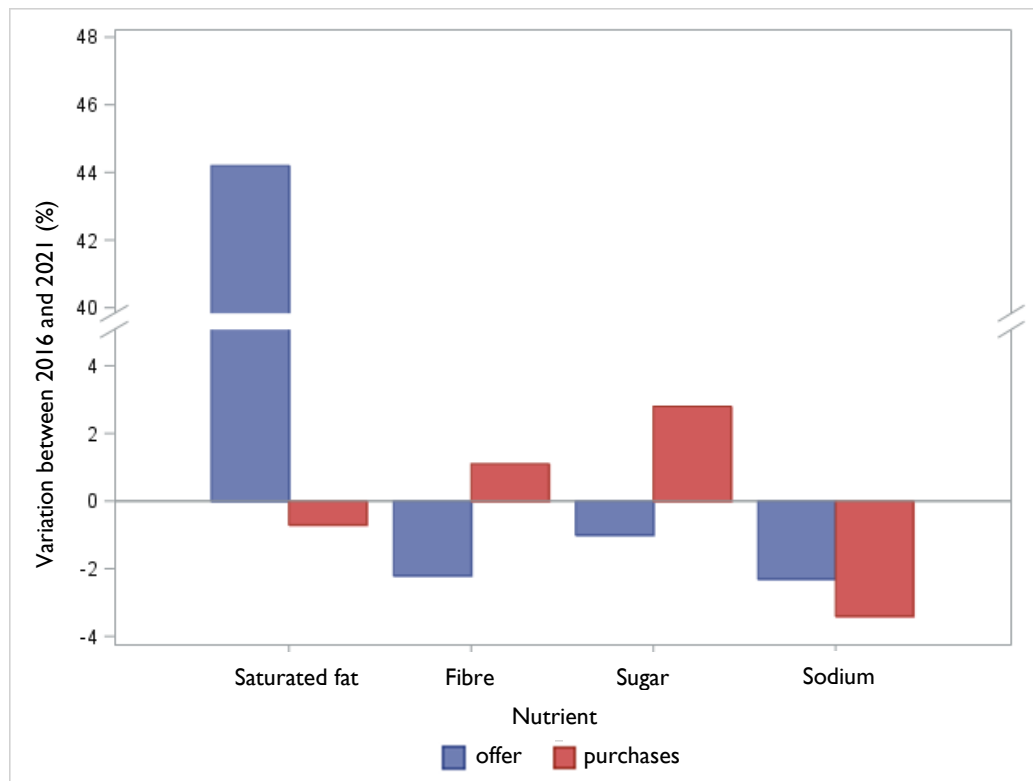


Figure 4. Percentage of variation in nutrients of interest for the supply and purchases of all cereals between 2016 and 2021

Beyond the absolute nutritional value presented per serving, it is again possible to picture this same nutritional composition in a relative manner by comparing it with the daily value (DV) proposed by Health Canada. The threshold of 5% of the DV is generally used to represent a product that contains little of a given nutrient for a reference serving, while the threshold of 15% indicates that it contains a lot. Through its Healthy Eating Strategy⁵, Health Canada has implemented new regulations that will assign a warning symbol on the front of packages reflecting high levels of nutrients of interest to public health (i.e., saturated fats, sugars and sodium)⁶. This symbol will then use the 15% DV threshold for the applicable nutrients. Consequently, the Observatory's monitoring studies provide figures illustrating the variation in the percentage of products respecting the threshold of 15% of the DV for each nutrient of interest between the current year and the reference year.

This makes it possible to check the evolution of the average of products according to the thresholds recommended by Health Canada for these nutrients of interest or other relevant nutrients. An example of such a figure is shown below.

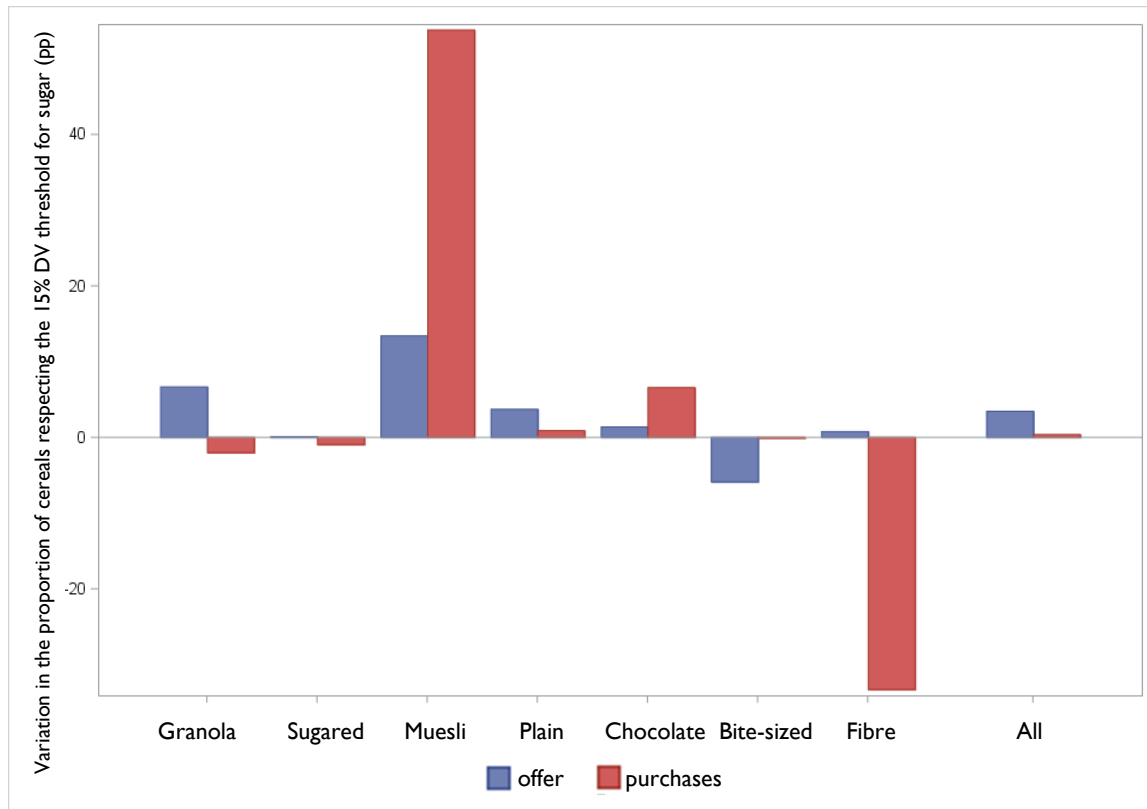


Figure 5. Change in the percentage of offered and purchased products respecting the 15% DV threshold for sugars per 55g portion of cereals

More specifically, the cereal types are on the X axis. The Y axis gauges the variations of each cereal type, which now meet the 15% DV threshold (i.e., below the threshold) for the nutrient in question (sugar in the example above). The blue bars represent variations in supply, and the red bars represent variations in purchases. These variations are measured by comparing the monitoring year with the reference year. For example, Figure 5 shows a relative increase of almost 50% in the proportion of muesli-type cereals purchased, respecting the 15% DV threshold for sugars during the follow-up study in comparison to the reference year. In contrast, fibre cereal purchases have – for their part – experienced a large drop (-33%) in products respecting the 15% DV threshold for sugars.

In the context of monitoring the quality of the food supply, a comparison with the reference year can also be made by analyzing the products according to their status (new, identical, modified or withdrawn). The following table presents an example of such comparisons.

Table 4. Example of a table presenting the nutritional composition of a reference portion for products offered and purchased, according to their status

	Energy (kcal)		Lipids (g)		Saturated Fats (g)		Carbohydrates (g)		Fibre (g)		Sugars (g)		Proteins (g)		Sales Price (\$)	
	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases	Offer	Purchases
New (n=181/10%)*	229±29	218±18	6.6±5.5	4.0±3.1	1.7±2.0	1.0±1.5	38±8	43±5	4.2±1.7	3.9±2.4	1.7±5.1	15.0±4.7	5.7±2.2	4.4±2.1	0.90±0.44	0.67±0.22
Identical (n=7/2%)	229±19	220±4	6.3±4.2	2.9±1.0	1.1±0.6	1.0±0.7	36±9	44±4	4.5±2.0	3.1±1.0	0.3±6.8	15.2±5.2	6.6±3.4	4.3±1.9	0.98±0.67	0.55±0.17
Modified (n=204/78%)	216±23	211±18	3.8±3.4	2.6±2.5	0.8±1.3	0.8±1.5	42±5	45±4	4.9±3.5	4.6±3.9	0.9±5.5	12.9±5.3	5.3±2.1	4.9±1.7	0.76±0.34	0.71±0.16
Withdrawn (n=120/10%)	219±24	207±12	4.0±3.8	2.8±1.5	0.9±1.2	0.5±0.5	41±6	44±3	4.3±2.0	5.0±1.7	1.9±5.6	11.5±4.1	5.3±2.2	4.6±1.8	0.80±0.36	0.63±0.16

Average ± standard deviation

Offer=Nutritional composition of cereals available on the market (n=512).

Purchases=Nutritional composition of cereals sold (the average was weighted according to the number of servings sold) (n=419).

Orange boxes mean the value is significantly higher than other types of cereals, while blue boxes mean the value is significantly lower than other types of cereals. The threshold used is 0.139% (p<0.00139) and corresponds to the Bonferroni correction (5%/36).

*The n represents the variety of products offered, and the percentages indicate the percentage of sales volume. Sales volume, rather than the number of products, determines the power of tests for purchases.

Again, the coloured cells indicate that there is a significant difference from the other product grouping. The orange colour means this value is higher, while the blue colour means that this value is lower than the others.

The evolution of the nutritional composition of modified products can also be analyzed. The following figure illustrates the percentage of products that had a change in their content of a given nutrient and indicates, where applicable, the average change in nutrient content, in absolute value.

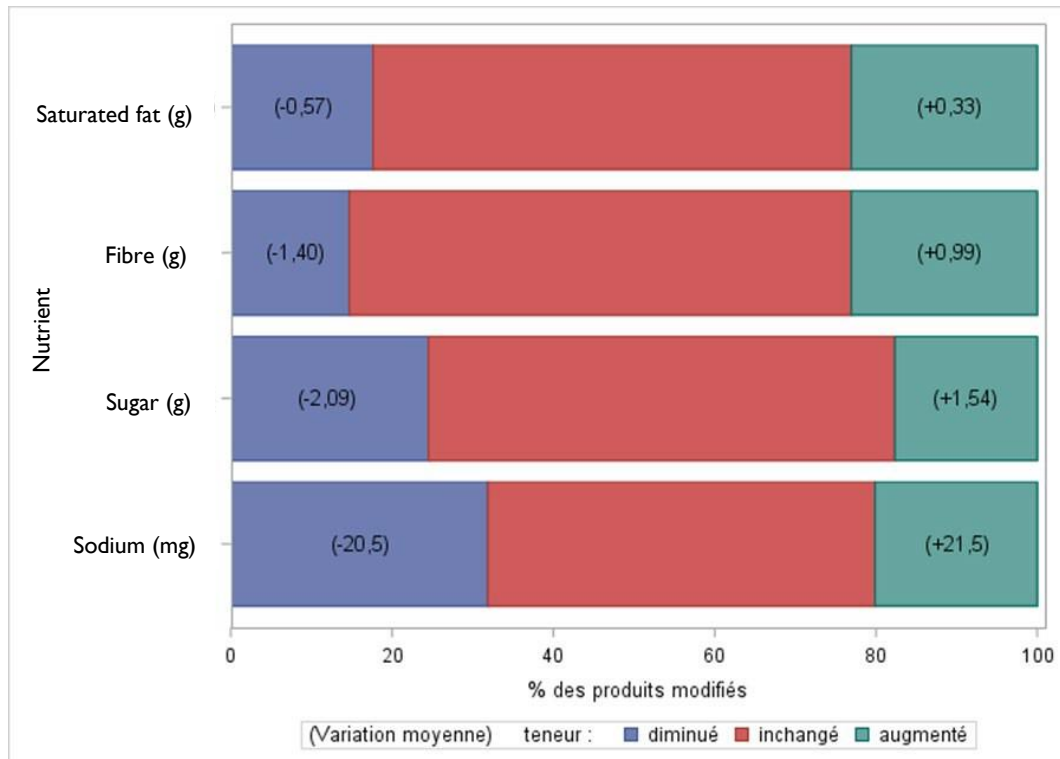


Figure 6. Variation in nutrients of interest in modified breakfast cereals, per 55 g serving

This type of figure makes it possible to visualize the percentage of modified products for which the content of a nutrient remained unchanged, increased or decreased. In addition, the extent of the variation in this nutrient can be seen at a glance. For example, Figure 6 shows that just over 30% of modified products had their sodium contents reduced, while approximately 20% of them had it increased. Moreover, the average decrease was 20.5 mg, while the average increase was 21.5 mg of sodium per 55 g serving.

6.4 Analyses according to information displayed on the front of the packaging (Objective 3)

As with the initial overview, it is relevant to check which information on the packaging is most associated with the content of certain nutrients of interest and the price per portion. In addition to these analyses, and since this is a follow-up study, it becomes of interest to check how the products have evolved – from a nutritional point of view – according to the information on the packaging.

Therefore, for all of these analyses, non-parametric tests are used due to the non-normality of the residuals when using a standard analysis of variance. These analyses are once again repeated by weighting for the volume of sales, which makes it possible to better represent what the Québec population buys. The Kruskal-Wallis test is used for supply data and rank regression is used for purchase data. The Bonferroni correction is used to account for multiple comparisons.

6.5 Distribution of sales and nutrient contribution (Objective 3)

To interpret the results by considering the best-selling products (in kg) for each food category, a table displaying the variation in the total contribution in sales and nutrients was created. This was created by interpreting the results of the 50 best-selling products (kg per year) for the year under study and the reference year. In this regard, Table 5 below shows the example of breakfast cereals and lists the types of cereals contributing the most to the nutrients of interest in relation to their sales volume, as well as the change observed between 2016 and 2021.

Table 5. Contribution and evolution (2016-2021) of the 50 best-selling cereals, according to their type

Type of cereal	Frequency (units)		% of sales (\$)		% of sales (kg)		% saturated fat contribution		% fibre contribution		% sugar contribution		% sodium contribution	
	2016	2021	2016	2021	2016	2021	2016	2021	2016	2021	2016	2021	2016	2021
Sugared	17	18	36.0	34.8	37.1	36.7	19.7	20.6	32.2	30.7	48.0	46.3	37.4	37.6
Granola	11	11	13.1	15.4	14.5	16.9	59.0	52.4	13.8	15.7	13.7	16.2	7.7	10.4
Plain	5	6	10.5	10.7	11.9	11.3	1.3	1.2	1.9	4.6	5.3	4.8	19.8	16.5
Muesli	5	4	5.8	5.4	5.3	5.2	1.3	1.0	5.8	6.6	5.9	5.4	6.0	6.3
Fibre	3	4	3.5	4.4	3.2	4.3	0.7	0.9	13.0	15.1	2.9	3.5	4.8	6.0
Bite-sized	6	4	4.3	3.2	5.2	4.0	2.4	1.6	6.9	4.8	3.0	2.4	4.8	3.6
Chocolate	3	3	3.2	3.4	2.9	3.0	1.7	2.6	2.7	2.5	3.9	4.1	3.7	3.6
Total	50	50	76.5	77.3	79.9	81.4	86.2	80.3	76.3	80.0	82.8	82.7	84.2	84.0

7 Conclusion and perspectives

Monitoring a food category enables you to obtain a second overview, but above all the manner in which this category has evolved in recent years. These analyses make it possible to simultaneously evaluate the quality of the supply and purchases of products available in Québec and in certain cases, in Canada. Just as with the initial overviews, areas can be targeted for improvement in the supply by looking in particular at the information on the packaging. Consequently, solutions can be identified to support innovation in the bio-food industries as well as in public health strategies.

The methodology used here was adapted from that used for the initial overviews, making it possible to follow, as closely as possible, the nutritional changes that occurred, both for the products offered and for the products purchased, and this, for the food categories deemed a priority. Once all of the 15 food categories under study have been analyzed for a second time, the Observatory will have an accurate picture of a vast range of processed products available and purchased by the population. With the intention of acting as a partner, the Observatory collaborates and will continue to collaborate with all stakeholders having an influence on the quality of the food supply, such as the bio-food industries, public health professionals, researchers and consumer representatives. Ultimately, the desire is to increase the proportion of better nutritional quality food products on the Québec market and to ensure these products are accessible to everyone.

8 References

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