Photographic Methods for Measuring Packaged Food and Beverage Products in Supermarkets

Rebecca Kanter, Marcela Reyes, and Camila Corvalán

Institute of Nutrition and Food Technology, University of Chile, Macul, Santiago, Chile

Abstract

Background: The global obesity pandemic and rates of nutrition-related noncommunicable diseases (NCDs) have increased worldwide, especially in the Latin American and Caribbean region. In an attempt to control this obesity epidemic, the Chilean government has established a comprehensive set of regulatory actions, including beverage taxation, warning labels on foods, and marketing restrictions to children. To improve the effectiveness of actions to prevent obesity, a better understanding of the food environment is needed.

Objective: We developed and standardized photographic methods to assess and monitor packaged food and beverage products in supermarkets.

Methods: A standardized protocol and food categorization system was used to guide photo collection and data management of photos taken between February and April 2015 in 11 supermarkets, consisting of 5 different supermarket chains, from high- (n = 6) and lower-middle (n = 5)-income neighborhoods in Santiago, Chile. Photos (n = ~50,000) from nearly 10,000 unique food products from high- and lower-middle-income neighborhoods were used for this study.

Results: We developed standardized methods to use photographs to assess and monitor the food environment. A food categorization scheme is essential to guiding the data collection process. Substantial time and human resources are required to assess packaged food and beverage products in supermarkets. Because the number of photos per food product is variable, the organization of the photographs according to the food categorization system, before data entry, is imperative for easy access during data entry and analysis. We identified the information necessary for a photographic registry, which, with the food categorization system, is critical to create unique identifiers that are linked to each food product and its photos.

Conclusions: To adequately monitor food environments, standardized methods for food photo collection and management are essential. The information collected on food package photos to monitor food environments is important for guiding and evaluating actions in the context of the ongoing obesity and NCD epidemics. *Curr Dev Nutr* 2017;1:e001016.

Keywords: food environment, photographic methods, INFORMAS, Chile, international nutrition, food policy, packaged foods, supermarkets

Manuscript received April 13, 2017. Initial review completed June 16, 2017. Revision accepted September 12, 2017. First published September 13, 2017.

Supported by the National Commission for Scientific and Technological Research (CONICYT)-National Fund for Scientific and Technological Development (FONDECYT) (RK; grant 3150183) and the International Development Research Centre (CC and MR; 107731-002).

Author disclosures: RK, MR, and CC, no conflicts of interest.

The National Commission for Scientific and Technological Research (CONICYT)-National Fund for Scientific and Technological Development (FONDECYT) as well as the International Development Research Centre had no role in the design of the study or collection, analysis, and interpretation of data or in writing the manuscript.

Supplemental Table 1 is available from the "Online Supporting Material" link in the online posting of the article and from the same link in the online table of contents at http://cdn.nutrition.org.

Address correspondence to CC (e-mail: ccorvalan@inta.uchile.cl).

Abbreviations used: INFORMAS, International Network for Food and Obesity/Noncommunicable Diseases Research, Monitoring and Action Support; NCD, noncommunicable disease; SES, socioeconomic status.

Introduction

The global obesity pandemic and rates of nutrition-related noncommunicable diseases (NCDs) continue to increase worldwide (1–5). It is clear that more actions are required to halt these increases. Accordingly, several organizations have called for urgent action to halt this pandemic, especially with regard to children; for example, the WHO has made childhood overweight one of their global nutrition targets for 2025 (6–8). There is now relative agreement that dietary decisions not only depend on individual characteristics but that they are also importantly shaped by the environment. The food environment has been described in several ways (9–11). However, independently of the definition used, there is agreement that to define and improve the effectiveness of actions to prevent obesity, there is a need to better understand the food environment, which is equally important, if not more so, in shaping dietary decisions. The need to monitor the different aspects of the food environment has been recently highlighted by the International Network for

Food and Obesity/Noncommunicable Diseases Research, Monitoring and Action Support (INFORMAS) (12, 13).

Key aspects of the consumer-related food environment correspond to labeling of food products that includes both the marketing strategies as well as food-composition information printed on the food label. Several agencies have promoted actions targeting these different aspects of food labels, such as decreased marketing of unhealthy foods to children, the use of "traffic lights" as warning labels of processed foods (7, 14, 15), and suggesting the reformulation of the nutritional content, such as decreasing *trans* fats or sodium in processed foods (16). The existing methods that have been used to collect information on the basis of food labels are primarily based on survey methods (9) or by directly purchasing food products (17). To the best of our knowledge, although not yet reported in the scientific literature, another way to collect the information contained on food labels is by taking photos of packaged food products at supermarkets. In determining our study design, photographic methods seemed to be both less expensive and more feasible than conducting paper surveys or food product purchases, which have constraints to the printed page or storage space. Therefore, photographic methods appear to be a promising means to assess the consumer food environment. However, this needs to be done in a standardized way, following simple and replicable protocols that allow for collecting valid and comparable information. This is particularly relevant in the Latin American and Caribbean region, because the Latin American and Caribbean region, compared with other World Bank regions according to their division of the world into 6 distinct geographic regions, has the greatest prevalence of overweight and obesity in the world among women (18) as well as a high consumption of energy-dense, nutrient-poor foods, which has been indicated as one of the most important factors of overweight and obesity (19). Chile, in particular, has a high prevalence of obesity among all age groups (11.05% in children <6 y old, 24.09% in women) (20). In an attempt to control this obesity epidemic, the Chilean government has established a comprehensive set of regulatory actions in Law 20.606, known as the Chilean Law of Food Labeling and Advertising, which includes beverage taxation, warning labels on foods, and marketing restrictions to children (21). In this context, monitoring marketing strategies on packages, food labeling, and food composition becomes a key aspect of assessing the success of the Chilean Law of Food Labeling and Advertising. Therefore, we developed a protocol for collecting food photos at supermarkets within Santiago, the country's capital with ~50% of the total Chilean population. The aim of the present article was to describe the methods developed for the photo collection and management of packaged food and beverage products and present the subsequent resource needs, time, and challenges encountered. We believe this information will be useful for other countries of the region and worldwide to those interested in monitoring these aspects of the consumer food environment.

Methods

Neighborhood selection

The capital city of Santiago, Chile, was chosen as the primary study area, because it encompasses the largest proportion of the Chilean population. Santiago was also the most cost-effective area to conduct the study because it is where our research institution [Institute of Nutrition and Food Technology (INTA)] is located. To be able to assess potential associations in the availability of food and drink products by socioeconomic status (SES), neighborhoods were selected on the basis of their socioeconomic status level as defined by the Chilean National Office of Statistics. However, according to the most recent data, no supermarket chains were located in neighborhoods that fell into the poorest socioeconomic category (22). Therefore, only high- (n = 6) and lower-middle (n = 5)-income neighborhoods were selected for our study.

Supermarket selection

Supermarkets were selected as the source to collect data on food and drink items for this study because they offer the greatest variety of ultra-processed food items in Chile and are one of the primary sources of food provision (19). Before identifying any supermarkets for inclusion in this study, an agreement between the Chilean National Association for Supermarkets (ASACH) and INTA, at the University of Chile, was reached. On the basis of the agreement, 5 of the 6 different supermarket chains were included in the study; 1 chain declined to participate in the study. One supermarket from each chain was selected in either a high- or lower-middle-income neighborhood, with the exception of 1 chain that does not have any locations in a lower-middle income neighborhood within Santiago, Chile. After the agreement with the Chilean National Association for Supermarkets was signed, each supermarket was selected for inclusion into the study on the basis of having the greatest variety of products per chain within each of the 2 neighborhood income categories.

Food and beverage selection

Food and beverages to be included in the photo collection were selected according to the categories that would be most affected by the Chilean Law of Labeling and Advertising on the basis of expert opinion from the George Institute's Food Policy group, which has extensive previous experience in the assessment of consumer food environments globally. Ultra-processed food and drink products were defined by following the NOVA food classification system to include all food or drink products that are industrially manufactured, containing little or no whole food, and being primarily those products that are ready-to-eat (19). Taken together, 11 different food categories were identified in which ultra-processed food labels would be collected: beverages, bread and bakery products, breakfast cereals, sweets, ready-to-eat foods, meats, fish and seafood, dairy products, canned and preserved fruits and vegetables, sauces and spreads, and snack foods. For each large food category, several subcategories were created depending on the large food group (from 1 category for meats to 9 categories for beverages). Each of these food subcategories was then also subdivided into another category that allowed us to distinguish food products and beverages most likely subject to the Chilean Law of Food Labeling and Advertising because of the addition of critical nutrients (sodium, sugar, and saturated fats). For example, in the "beverages" category, we had the subcategory of "sodas," which was then further divided into "sodas without sugar" and "sodas with sugar." Fieldworkers were given a

spreadsheet with various subcategories listed under each of these larger food categories and were instructed to take photographs of any processed foods within each subcategory (**Supplemental Table 1**). The fieldworkers were also instructed to carefully read the ingredients when they were not sure whether a food or beverage product was ultra-processed. To maximize the limited time available for data collection as well as to avoid unnecessary duplicates, we decided to always take photos of the largest package size for products in which >1 package size was available. However, in the instances in which the food product used different marketing strategies depending on the package size, we took photos of all of the sizes to capture the different marketing strategies.

Fieldworker training

Four fieldworkers conducted the data collection for this study; 3 of the fieldworkers were nutritionists and 1 fieldworker had a Master's degree in food security. All of the fieldworkers received 2 d of classroom training on the overall INFORMAS network and framework and the Chilean Law of Food Labeling and Advertising and specific didactic training on the food composition, food labeling, and food promotion modules of the INFORMAS monitoring framework. In addition, all of the fieldworkers received 1 d of photography training by a professional photographer and a half-day of training of fieldwork in a supermarket (**Table 1**).

Data collection and quality control

Materials. Photographs of food labels were taken with the use of 2 digital cameras (Canon EOS Rebel T3) because they produce photos at a higher resolution than mobile devices. One battery was included with each camera purchased. However, 1 extra battery was purchased for use with each camera. All of the equipment used in this study is shown in **Table 2**.

Data collection was scheduled to take place during the summer holiday in Chile, specifically the month of February, because supermarkets have fewer customers in those months. Fieldwork was prearranged to take place in each of the 11 supermarkets for, on average, 2 complete weekdays (0800–1700). When possible, fieldwork was avoided on Mondays and Fridays, because they constitute the 2 busiest weekdays at the supermarket (for new-item placement and greatest attendance of customers, respectively). All of the fieldwork for this study was conducted between 2 February and 1 April 2015.

All of the fieldworkers were instructed to wear a lab coat, identification badge, and closed-toe shoes in the supermarket during data collection. Fieldworkers were instructed to give a standard response if approached by customers (i.e., "What we are doing is for a study about nutritional labeling").

Fieldworkers were paired into 2 teams of 2, and each team was assigned different food categories for the duration of the study (team A: beverages, sweets, ready-to-eat foods, fish and seafood, canned and preserved fruits and vegetables, sauces and spreads, and snacks; team B: bread and bakery products, breakfast cereals, meats, and dairy). Each team was instructed to take photos with the digital camera of all sides of the food label and was given a checklist to verify that photos visibly included the following aspects of the food label: bar code, package shape, volume or weight of the package, nutrition information table, and ingredients. Fieldworkers were instructed to take photos of as many processed food products as possible within a given subcategory. It was sometimes the case that fieldworkers did not have enough time to collect photos of all of the products within a given subcategory in a supermarket over the course of the 2 data collection days. In those cases, the coordinator assigned a total time for each subcategory and each team was instructed to take as many photos of different products as possible in accordance with the schedule provided and prioritize taking photos of store-brand products. The photos of store-brand products were prioritized because store-brand products are unique to each chain and a store from each chain was only visited 1 or 2 times for a limited number of days. Therefore, if photos of a store-brand product were not taken, there might

TABLE 1 Tasks and estimated time associated with each task needed to carry out the fieldwork training necessary for data collection for the impact evaluation of the Chilean Law of Food Labeling and Advertising[1]

Task	Responsible	Estimated time
Training with designated fieldworker coordinator on all the subsequent training and work required for data collection	Principal or co-investigators; fieldwork coordinator	8 h
Presentation		
General introduction	Principal or co-investigators	1 h
Introduction to data collection in the field	Fieldwork coordinator	2.5 h
Introduction to photography of food packages	Fieldwork coordinator	0.5 h
Practical session: photographing food packages in controlled (institution) setting	Fieldwork coordinator with fieldworkers	2.5 h
Recommended practical session: advanced photography training with a professional or highly experienced photographer (optional depending on quality of camera)	Professional or highly experienced photographer; fieldworkers	5–6 h
Optional weekend practice: fieldworkers practice taking food package photos at home	Fieldworkers	3 d
Practical session: half-day training simulation in a supermarket	Fieldwork coordinator with fieldworkers	4 h

[1] Before training, it is important to obtain an agreement with desired supermarkets or other food establishments, which could take ≥2 mo.

TABLE 2 Equipment and human resources needed to carry out the different stages of food labeling and advertising data collection, data management, and data entry[1]

	Human resources			Equipment needed				
Phase	**Team leader**	**FWs**	**Extra personnel**	**Permissions or protocols**	**Digital cameras**	**Camera supplies**	**Extra supplies**	**Space**
Fieldwork training for data collection	Fieldwork coordinator	≥4	One photographer	Permission to do a half-day training simulation in a supermarket	≥1 camera/team of 2 FWs	—	—	Room with projector to give presentations
Data (photo) collection	Fieldwork coordinator	≥4	—	Written agreement between supermarket(s) and academic institution	≥1 camera/team of 2 FWs	Extra camera batteries (1/camera); 32-GB memory card (1/camera)	Lab coat (1/FW), rubber gloves (per day), credential with photo (1/FW), copy of agreement (1/FW); external hard drives (1 TB) (≥2, 1 for daily use and 1 as exclusive backup)	Supermarkets
Data management	Data manager (same or different as fieldwork coordinator)	≥4, same or different FWs	One assistant data manager	Protocol: data management (re-naming photo files)	—	—	16-GB USB memory stick (1/FW); external hard drives from previous phase; REDCap platform [backup: Excel (Microsoft Corporation)]; STATA (StataCorp)	Personal computers with access to REDCap platform; online (free) forum
Data entry	Data manager (same as or different from fieldwork coordinator)	≥4, same or different FWs	One assistant data manager	Protocol: data entry [Basic Excel (Microsoft Corporation)]; platform Nutrients/ Portion Information/ Ingredients)	—	—	16 GB USB memory stick (1/FW); external hard drives from previous phase; REDCap platform [backup: Excel (Microsoft Corporation)]; STATA	Personal computers with access to REDCap platform; online (free) forum

[1] FW, fieldworker; GB, gigabyte; REDCap, Research Electronic Data Capture; TB, terabyte; USB, Universal Serial Bus.

not exist another opportunity to capture photos of this product compared with a multinational brand product, which would likely be found at supermarkets linked to >1 chain. Photos of the same product were taken from the same supermarket chain for each of the 2 neighborhood income categories (i.e., for analyzing differences by SES) but not in supermarkets within the same SES level. To avoid taking photos of the same product (i.e., duplicating photos), each day the fieldworkers would place all of the products photographed in a shopping cart and then take a photo of the cart contents, which could be reviewed to confirm whether or not a product had been already photographed. The results presented later in this article regard the ~10,000 food items that were photographed during the study.

Quality control. Quality control was performed at 2 levels. First, by the fieldworkers themselves in the moment of data collection in which they could view the product on the camera and retake the photo if it was not clear enough. After each day of data collection, the field coordinator collected and reviewed all of the photos for visibility and completeness. In general, reviewing the completeness of a product's photos meant making sure that the product's photos included pictures with all sides of the product, the bar code, all of the ingredients, the Nutrition Facts label, and the net contents of the product and were not partially obstructed after taking into account all of the photos associated with a product. Then, the field coordinator e-mailed a PowerPoint (Microsoft Corporation) presentation to all fieldworkers with the identified low-quality photos so that the fieldworkers could re-take the selected low-quality photos the next day in the same or in a different supermarket. Regular meetings were also held between fieldworkers and the field coordinator to discuss questions (e.g., what new products encountered were or were not included in a particular subcategory) or problems encountered taking photos (e.g., if a product was difficult to photograph). At the completion of each day of fieldwork, it was quickly determined that all photos had to be stored on an external hard drive due to their large file size. What was previously not anticipated was that it would be necessary to have a daily meeting with fieldworkers to discuss questions or problems encountered during fieldwork as well as to perform a daily review of all of the photos taken in order to uphold the quality in the database being collected.

Data management. After data collection was complete, the following basic information about each product pertaining to a photo or set of photos was entered into an Excel (Microsoft Corporation) spreadsheet: the date the photo or photos were taken, the name of the product, the subcategory to which the product pertains, the bar code number of the product, the factory that made the product, the elaboration date of the product (if applicable), the expiration date of the product (if applicable), the number of photos in the database that pertain to the given product, and any observations related to the product, such as "the expiration date is 18 mo from the elaboration date of the product." On the basis of these characteristics, this information was used to determine that products were unique from each other and not duplicates. After determining the unique individual products in the database, a unique ID for each product was created in STATA version 12.0 SE (StataCorp). The unique ID itself is based on our previously described 3-level food classification system that consists of 11 large food groups, which, in total, are composed of 53 general food subcategories that were further divided into a second subcategory level (186 in total; Supplemental Table 1). Each food category and subcategory were assigned 2 numerical digits. The combination of the 2 digits for each food categorization level (food group, subcategory 1, subcategory 2) comprised the first part of the unique ID, and then a script was used to count the number of unique products within each specific subcategory (e.g., subcategory 2). For example, the first juice concentrate product would have the unique ID 101011: "1" to represent the beverage category, "01" to represent the subcategory "fruit and vegetable juices," "01" to represent the second subcategory of "juice concentrates," and finally "1" to represent the first juice concentrate product in the database. This unique ID becomes part of a larger photo file name, whereby we decided that was important to also include the date, store code, and photo number in the series of photos associated with the product: for example, 101011_020215_1_1.jpg, 101011_020215_1_2.jpg 101011_020215_1_3.jpg, and 101011_020215_1_4.jpg, such that "101011" is the unique ID (consecutive within each food subcategory), "020215" the photo date, "1" the store code, and the final digit (before .jpg) shows if there is >1 photo of each product in a consecutive order per product.

Results

Overall, on each day of fieldwork, ≤1% of the photos (n = 10) were classified as missing or hard to read, which the fieldworkers were subsequently asked to retake. In addition to multiple full weekdays needed to conduct the photo collection, a main result of this study was learning that substantial time after each day of fieldwork was necessary for the preparation of the next day of fieldwork in order to maintain the representativeness of the sample as well as the database quality, specifically, by making agendas (15 min/d), having a daily meeting (1 h/d), daily photo back-up (0.5 h/d), and daily review of all of the photos collected (3 h/d) (**Table 3**). A main finding from this study was that a couple of data collection days in a supermarket do not provide enough time for 2 fieldworkers to collect photos of all of the different products in a large food category. Therefore, it was important to design daily fieldworker agendas to guide data collection of at least a few products per subcategory to maintain the representativeness of the study sample. Furthermore, the limited time in each supermarket showed that certain types of food products should be prioritized in the data collection process, such as store-brand products and imported products that might only be found in 1 particular supermarket. On average, each team took 1000 photos on each day of fieldwork. On the basis of the metadata of each photo file it was estimated that teams took, on average, ≤1 min to photograph a given product's food label in its entirety. A total of 10,000 products were collected among all SES levels (~50,000 photos).

Data entry to complete the basic information registry of the photographic database required ~576 h (**Table 4**). With each

TABLE 3 Tasks and estimated time associated with each task needed to carry out the photo collection for the impact evaluation of the Chilean Law of Food Labeling and Advertising

Task	Responsible	Estimated time
Design of data collection agendas for fieldworkers according to priorities	Fieldwork coordinator	15 min for each day of fieldwork
Data (photo) collection in supermarkets or other food store settings	Fieldworkers	Every Tuesday, Wednesday, and Thursday for as long is agreed on with establishments
Daily meeting and discussion about data collection	Fieldwork coordinator and fieldworkers	1 h after each day of data collection
Daily backup (and removal of photos) from memory cards to external hard drive(s)	Fieldworkers	0.5 h after each day of data collection
Daily review of all photos collected	Fieldwork coordinator, possibly with experienced research assistants	~3 h after each day of data collection
Re-collection of data (photos) that were identified as having errors or as missing when it was not possible to re-collect these data during the following day	Fieldworkers	~1 h/mo of data collection (if possible)

product having a unique ID, each photo file was subsequently renamed with the unique ID of the product followed by the date that the photo was taken, the supermarket code, and the number of the photo in the product series; this process required ~840 h for the high-income neighborhoods (Table 4). After all of the photo files were renamed with unique identifiers, the basic information registry database was again checked for duplicate entries in case photos of the same product were inadvertently collected on another day of fieldwork. The basic information registry database was also reviewed to ensure that all products pertained to the correct subcategory. If not, the database was appropriately revised: for example, if a diet soda was listed as a sugar-sweetened soda by mistake. Overall, ~2% of products were found to be duplicates and erased from the database (n = 201) and ~2% of products (n = 201) were misclassified and re-assigned a new unique ID to reflect their correct subcategory.

Discussion

The present study aimed to describe the process of collecting photographs of foods to study both public and private actions related to food labeling and marketing and thus further the understanding of the food environment. To the best of our knowledge, this is the

TABLE 4 Tasks and estimated time associated with each task needed to carry out the data management for the impact evaluation of the Chilean Law of Food Labeling and Advertising[1]

Task	Responsible	Estimated time, h
Data entry (for data management) design: basic information registry platform in REDCap, supported by feedback from colleagues	Data manager and colleagues	4
Training		
Basic information registry platform to project research assistant	Data manager and project research assistant	1
Basic information registry platform to data entry personnel	Project research assistant; data entry personnel	In-person: 3; at home: 3
Fill in a basic information registry about each unique product (not a photo) collected during the data collection phase that includes year, subcategory,[2] photo date, store ID, multipack (yes or no), net content, brand, product name,[3] SKU, product manufacturer, number of photo associated with the product, missing photos (yes or no), and blurry photos (yes or no)	Data entry staff	576 (~6000 unique products)
Clean-up, data management of basic product information registry	Data manager and project research assistant	40 (~6000 unique products)
Use of basic product information registry to create unique IDs for each unique product in which photos were collected	Data manager	80 (~6000 unique products)
Re-naming[4] and organizing photo files	Data manager and project data entry persons	840 (~6000 unique products)

[1] ID, identification; REDCap, Research Electronic Data Capture; SKU, Stock Keeping Unit.
[2] Subcategory refers to predefined subcategories.
[3] Product name refers to a particular naming standard that assumes training of data entry personnel.
[4] Refers to the fact that all photo files can be renamed and organized at once (all before data entry) or concurrent with data entry.

first effort to use a systematic approach of photographic methods for the comprehensive study of food labeling and marketing of food packages. Compared with paper surveys or a more limited selection of purchased food packages, permanent digital photo files ensure that longitudinal follow-up as well as retrospective analyses are possible. An example of a retrospective analysis that could be performed on the basis of the photos collected might be an analysis of food and beverage package characteristics by food category, such as package shape, package weight or volume, and package ingredients and nutrition information, which would be equally useful for evaluating regulations similar to those of the Chilean Law of Food Labeling and Advertising during any stage or phase of regulation. Thus, the photographic data collection of food and beverage products is extremely pertinent and relevant for monitoring and, subsequently, for evaluating the implementation of packaged food and beverage regulations, such as the Chilean Law of Food Labeling and Advertising. Furthermore, we will use the photographs collected in this study to assess the impact of the Chilean Law of Food Labeling and Advertising in terms of marketing strategies, including front-of-package labeling and reformulation. In addition, it is less expensive and more feasible to obtain a larger study sample of foods by collecting data through photographic methods than through the purchase of individual food products for subsequent analysis.

On the basis of our experience, we identified a few aspects that we believe need to be solved before, during, and after the process of photo collection to ensure its quality. Before starting the data collection, it is important to define the sampling strategy of food products and of supermarkets: specifically, how and which food groups will be selected for data collection, the selection of package sizes for products that are sold in >1 size (and often many sizes are available), and ultimately, the number of individual unique food products that should be sampled. The number of products that can be photographed will, of course, depend on the economic and human resources available, but in thinking about the sampling strategy of food products, one may want to consider collecting the most highly consumed foods [ideally based on representative dietary data or sales data (market share)] in a given country or in a subgroup of interest (e.g., children or adolescents) or collecting photos in food categories subject to current or potential regulations related to packaged foods (e.g., high in *trans* FAs, sugars). It is also important to carefully think through the sampling strategy of the stores according to the food environment to include in the study sample. A first consideration should be made as to the degree of representativeness desired with regard to store type. One strategy may be to represent the different types of stores (mega markets, supermarkets, convenience stores, kiosks, etc.) in the study sample. Another strategy may be the one used in our study to compile a study sample that represents the various supermarket chains, whereas another option is to use a convenience sample of supermarkets to achieve the desired sampling strategy of food products. Depending on what strategy is used to determine the stores that make up the study sample, an inherent trade-off may exist between store-type variety and product variety. In the case of our study, a clear limitation is that, although we tried to maximize product variety by visiting only large supermarkets, we potentially missed products that are unique to other store types, such as convenience stores, kiosks, and candy shops.

Before going into the field, it is also important to carefully identify and train the individuals in charge of taking the photos. We believe that it is not required that those taking the photos be nutritionists, as was the case in our study, but some training in human nutrition or food science is useful for a better understanding of what categories should be included in photographs, which may result in greater work efficiency during data collection and management. A challenge during the photo collection was agreeing on the food categorization. This may be more difficult for some food subgroups (e.g., dairy products). Therefore, persons with some nutrition background may be able to more quickly determine what food classification they are working with and complete the basic information registry after data collection. Additional fieldworker training was necessary to understand what foods pertained to certain subcategories, especially with regard to dairy products, marinated frozen whole chicken, spreadable icing, preserved fruit with sugar added, the different instant soups (e.g., powdered compared with cup-of-noodles), the difference between butter and margarine, and the differences between cracker types (sweet, salty, whole grain, soda). There are many different ways in which foods may be classified. It is recommended to decide what food categorization scheme will be used before beginning data collection so that the fieldworkers can be properly trained in following this scheme to help minimize errors during data collection as well as data management.

A limitation of our study is that our photographic experience and subsequent data collection were restricted to only the food-labeling aspect of the consumer food environment. Other aspects of the consumer food environment, such as food availability, food affordability, food accessibility, and food marketing within a store, need to be collected if a more comprehensive assessment of healthy diets is intended either for monitoring or evaluation purposes. We also experienced some difficulties during the process of photo collection. The primary difficulty was that, although individual agreements were obtained before data collection to conduct fieldwork during prearranged dates and times for each supermarket, the fieldworkers still encountered some problems in entering supermarkets (e.g., local manager had not been informed or was away), which slightly delayed the data collection. During the process of photo collection, we also found that there were food packages that were especially difficult to photograph in a supermarket with poor lighting and which therefore resulted in photos of poor quality. Food packages that were particularly difficult to photograph included the following: extremely large packages (e.g., multipacks of 3-L sodas), packages with extremely small printed text, shiny packages, packages with irregular shapes (e.g., large bags, cylindrical packages of cookies), packages with excessive contrast, packages that contain multiple individual items (e.g., multiple drinkable yogurts), transparent packaging, packages that have a plastic top over a paper or metallic cover with information that may or may not be visible underneath (e.g., margarine tubs), and additional labeling stickers placed over the food label (e.g., imported products). The photographic quality of sausages and other processed meat products can often be limited due to possessing a

number of these characteristics. To ensure the quality of photos collected in this study we used professional-level digital cameras. It is possible to work with a less expensive digital camera. However, it is essential that the digital camera have a "macro" setting that can be set by the user (i.e., not through the automatic detection by the camera). Battery life is also important to check before data collection. We only used back-up batteries after 8 h of continuous work; however, some less expensive cameras may include batteries with a shorter life span, for example, a duration of 2 h during continuous work. Therefore, achieving quality data collection on a daily basis requires not just the photographic data collection itself in a store setting but also work before and after the data collection.

Another critical aspect relates to the management of the photos once they have been collected. Photos accumulate in file folders with random file names that may be repeated (e.g., IMG_1517.jpg) and >1 photo is often associated with 1 product. For example, to capture the image of a cereal box, often ≥6 photos are needed. When >1 camera is used in a study, the automatic photo file names given by a camera are repeated (e.g., a study with 2 cameras both could give the file same name of, eg, IMG_1517.jpg, even though each camera took a photo of a product different from the other). On the basis of our experience in Chile, the same barcode can be seen on a different type of product in as little time as 1 mo. Taken together, it is important to re-name each photo file so that photo files of the same name do not accidentally replace photo files with the same name. In Chile, we decided that it was important to apply a systematic data-labeling and -management system to the creation of unique IDs for the food products, so that the product with its photos could be more easily identified later on. This means that after data collection the following basic information [year, food subcategory, photo(s) date, store code, product name that includes brand name, product description, package type, package size, barcode, factory, and number of photos associated with a product] was entered into a registry used to create a unique ID, similar to how sociodemographic characteristics of a person might be used to create a unique personal identifier in a large national household survey. Each subcategory of foods in which food or beverage product photos were collected during the study was assigned a unique subcategory code (analogous to how a zip code is used to define a given small area), and then a script was used to count the number of food products in the basic registry that are included within each subcategory. It is from this composite that a unique ID was created for each unique individual product that was photographed.

We therefore recommend the use of a basic information registry to aid in the designation of unique IDs to each unique product and the subsequent re-naming of each photo file. We recognize that this is a time-consuming process, but believe that the time to create IDs and to re-name each photo file is less than the time that would be required if one had to look through thousands of photo files to find the product or products of interest during the data entry and data analysis phases of this work. With the basic information registry as well as with the use of unique IDs, it is possible to quickly identify each product and its associated photos. Furthermore, if file folders are created on the basis of the food subcategories used to create IDs for the photos, assuming the re-named photos are moved to these folders, it is very easy to find a particular photo set on the basis of just the unique product ID at a later stage.

In conclusion, to adequately monitor the consumer food environment in Chile and to assess the impact of the Chilean Law of Food Labeling and Advertising, we developed a simple, standardized method for food photo collection and management to aid in subsequent data entry and analysis. Our overall conclusion is that it is relevant to share this type of protocol to advance the standardization of field methods, which will, in turn, enable the collection of standardized data to carry out valid food environment comparisons within and between countries. As global research teams and other entities implement photographic methods to assess the consumer food environment, especially with regard to food and beverage products, we strongly recommend that data repositories be established to facilitate historical reference as well as data sharing to support within- and between-country consumer food environment comparisons. The information collected on food package photos is key for monitoring food environments and therefore for guiding and evaluating actions in the context of the ongoing obesity and NCD epidemics.

Acknowledgments

We thank the original "super chicas" (Gina Bautista, Denise Oliva, Rocío Planells, Francisca Villagran Silva) for their hard work and assistance with the fieldwork conducted for this study, including their immense feedback throughout the study. We also thank the Chilean Association for Supermarkets (ASACH) for allowing us to conduct this study in various supermarkets. The authors' responsibilities were as follows—RK: carried out the study, analyzed the data, and was responsible for writing the manuscript; MR and CC: made revisions to the article; and all authors: formulated the research questions and designed the study, and read and approved the final manuscript.

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