



An Approach to Monitor Food and Nutrition from “Factory to Fork”



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ABSTRACT

Background Accurate, adequate, and timely food and nutrition information is necessary in order to monitor changes in the US food supply and assess their impact on individual dietary intake.

Objective Our aim was to develop an approach that links time-specific purchase and consumption data to provide updated, market representative nutrient information.

Methods We utilized household purchase data (Nielsen Homescan, 2007-2008), self-reported dietary intake data (What We Eat in America [WWEIA], 2007-2008), and two sources of nutrition composition data. This Factory to Fork Crosswalk approach connected each of the items reported to have been obtained from stores from the 2007-2008 cycle of the WWEIA dietary intake survey to corresponding food and beverage products that were purchased by US households during the equivalent time period. Using nutrition composition information and purchase data, an alternate Crosswalk-based nutrient profile for each WWEIA intake code was created weighted by purchase volume of all corresponding items. Mean intakes of daily calories, total sugars, sodium, and saturated fat were estimated.

Results Differences were observed in the mean daily calories, sodium, and total sugars reported consumed from beverages, yogurts, and cheeses, depending on whether the Food and Nutrient Database for Dietary Studies 4.1 or the alternate nutrient profiles were used.

Conclusions The Crosswalk approach augments national nutrition surveys with commercial food and beverage purchases and nutrient databases to capture changes in the US food supply from factory to fork. The Crosswalk provides a comprehensive and representative measurement of the types, amounts, prices, locations and nutrient composition of consumer packaged goods foods and beverages consumed in the United States. This system has potential to be a major step forward in understanding the consumer packaged goods sector of the US food system and the impacts of the changing food environment on human health.

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THE MODERN, GLOBAL FOOD SUPPLY IS COMPLEX, ever-changing, and expanding. In 2010, we identified >85,000 uniquely formulated food and beverage products in the consumer packaged goods sector of the US food system alone.¹ The introduction of new products, removal of out of favor products, and reformulations of existing products results in continuous change and turnover of the food supply. In contrast, the resources available to countries across the globe to monitor this dynamic food system and to understand its impacts on human health are limited.

Accurate, adequate, and timely food and nutrition information is necessary for planning and evaluating the effects of nutrition programs and policies, for predicting future dietary intake trends, and for understanding the impacts of the changing food environment on health. Nutrition researchers have based our understanding of US diets, in large part, on foods reported in national nutrition surveys, such as What We Eat in America (WWEIA), the dietary intake component of the National Health and Nutrition Examination Survey (NHANES). However, the number of unique foods and beverages reported in any given 2-year collection period of WWEIA is much smaller than the number of products available in the marketplace (approximately 7,300 reported items in 2009-2010 as compared to >85,000 products available). Furthermore, updates of the national food composition data, which are used to determine nutrient intakes, occur infrequently due to limited resources. Consequently, many government and advisory reports have noted the need to

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enhance the accuracy and adequacy of food system surveillance in the United States.²⁻⁴

In this article, we describe an approach for monitoring US food and nutrient information from the factory to the fork. We focus on the consumer packaged goods food and beverage sector, as it accounts for >60% of caloric intake among US children and adolescents⁵ and is the most difficult component of the food supply to monitor due to the dynamic nature of product offerings. The Crosswalk we have developed augments national nutrition surveys with commercial food and beverage purchase and nutrient databases to capture changes in the US food supply from factory to fork. Our report describes the factory to fork Crosswalk developed to link each of the foods and beverages reported in a given cycle of the WWEIA-NHANES to corresponding consumer packaged goods food and beverage items that were purchased by US households during the equivalent time period.

METHODS

Nielsen Homescan (Commercial Consumer Packaged Goods Purchases Data)

For this article, Nielsen Homescan data from 2007 through 2008 were used. Homescan contains detailed bar code–level information about household food purchases brought into the home and contains all bar code transactions from all outlet channels, including grocery, drug, mass-merchandise, club, supercenter, and convenience stores. The data are collected daily by providing scanning equipment to a sample of 35,000 to 60,000 households across 76 major metropolitan and nonmetropolitan markets in the panel survey each year.⁶ All purchases are linked to retail stores and markets and include price paid. Homescan also contains key sociodemographic and household composition data and basic geographical identifiers, as well as household weights for each year of data in order for analyses using Homescan to be nationally representative.⁷⁻⁹ Others scholars and government agencies have used and evaluated these data, and have found that, while the sample tends to be older and higher income, the household weights provided by Nielsen re-weights the sample to be nationally representative for consumer packaged goods purchases.^{7,8,10}

Nutrition Facts Panel Data (Commercial Consumer Packaged Goods Nutrition Data)

Nutrition Facts Panel (NFP) data are the nutrition data found on food labels of consumer packaged goods products. As required by the US Food and Drug Administration (FDA), label data contain information on serving-size measurement, total calories, calories from fat, total fat, saturated fat, *trans* fat, total sugars, total carbohydrate, protein, dietary fiber, sodium, cholesterol, vitamin A, vitamin C, calcium, and iron.¹¹ Commercial NFP data sources also contain the full ingredient list, brand name, and all other printed material on each product package. We obtained the NFP data from a number of commercial sources (eg, Mintel Global New Product Database and Datamonitor Product Launch Analytics) described in earlier publications.⁵ The NFP data include date of data collection, and there can be multiple NFP records for some bar codes over time. For the purposes of this article, linking foods purchased with foods consumed in 2007-2008, we used NFP records that were collected between 2006 and 2009 (using the closest date when more than one record was available)

for matching with the Nielsen Homescan 2007 and 2008 purchase data. There is currently no existing way to validate the accuracy of the >200,000 records of NFP data.

WWEIA (Public Dietary Intake Data)

WWEIA is the dietary intake interview component of the NHANES and is conducted as a partnership between the US Department of Health and Human Services and the US Department of Agriculture (USDA). It is the only nationally representative survey that includes detailed 24-hour dietary intake data of US individuals. Since the creation of this merged survey, WWEIA provides nationally representative data for 2-year periods. Because the focus of the Crosswalk is on consumer packaged goods products, the WWEIA analyses only include intake reported as obtained in stores and through vending. For this article, data from 2007-2008 were used.

Food and Nutrient Database for Dietary Studies (Public Food Composition Data)

The Food and Nutrient Database for Dietary Studies (FNDDS), the source of nutrient data for WWEIA-NHANES, is based on nutrient values in the USDA National Nutrient Database for Standard Reference.^{6,12} The comparison presented here uses FNDDS version 4.1, which is based on Standard Reference release 22 (corresponding to foods and beverages reported in WWEIA-NHANES 2007-2008).¹³

Factory to Fork Crosswalk Methods

The major steps used in creating the Crosswalk include (detailed explanations follow):

1. Create a list of USDA food codes that represent foods and beverages reported consumed in a given WWEIA-NHANES cycle, and determine where each food was obtained (eg, store, restaurant).
2. Map USDA food codes to corresponding commercial bar codes.
3. Convert nutrient information of bar codes from “as purchased” to “as consumed” form if needed.
4. Create a Crosswalk-based nutrient profile for each USDA food code.

Step 1: Create a List of Foods Reported Consumed in a Given WWEIA-NHANES Cycle and Determine Food Source. For WWEIA-NHANES 2007-2008 data, we used all available dietary recalls to create a list of all foods and beverages reported consumed and reported as having been obtained from stores and vending. A number of items reported in WWEIA-NHANES 2007-2008 could not be mapped to the purchased bar codes (eg, loose fruits and vegetables, cuts of meat sold by weight, home prepared items). In each of these cases, the FNDDS nutrient profile was used. We have completed the Crosswalk for beverages, yogurts, and cheeses and present those results in this article.

Step 2: Map USDA Food Codes to Corresponding Commercial Bar Codes. USDA food codes identified in Step 1 were mapped to commercial bar codes purchased by households participating in the Nielsen Homescan panel in 2007 and 2008. Links between products were based on information available in commercial databases (item description and commercial categorization of product) and

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