Milk drink fortification with potassium in prevention of cardiovascular diseases

Case Study

Creme Global

About the Project

Our client wanted to look at the effect of nutritional intervention products, with a specific focus on functional dairy products, in reducing the risk of cardiovascular diseases in China. The population of interest was adults of 45 years of age and older with a predisposition to hypertension.

Creme Global's work in data preparation and dietary intake modelling enabled the detailed simulation of the fortified product's consumption and the subsequent impact of this nutritional intake change on hypertension and Cardiovascular Disease Risk.

Services Provided

Advanced Model Creation
Safe Data Collection
Data Wrangling
Software Development

Data Used in the Project

Chinese Food Consumption Survey

The China Health and Nutrition Survey (CHNS) is an ongoing international collaborative project between the Carolina Population Centre at the University of North Carolina at Chapel Hill and the National Institute of Nutrition and Food Safety at the Chinese Centre for Disease Control and Prevention.

The 2009 survey took place over a 3-day period using a multistage, random cluster process to draw a sample of approximately 4400 households with a total of 11,886 individuals in nine Chinese provinces that vary substantially in geographical location, economic development, public resources, and health indicators. Participants were aged between 1 – 98 years of age. Of them, 6,134 subjects were 45 years old and older. The CHNS data contains dietary intake information reported by the individuals of all foods and beverages consumed away from and at home on three consecutive days using 24 hour recalls.

The survey records the amount of each food consumed per eating event. The composition data used for the foods consumed in the CHNS was obtained from the Institute of Nutrition and Food Safety, China CDC (2004) and Institute of Nutrition and Food Safety, China CDC (2002). The survey includes information for 21 food groups and 1599 foods. Anthropometric measurements, blood pressure and biomarker data were also available in this survey.

Methodology

Baseline Assessment

The CHNS survey data was incorporated into the Creme Nutrition® Model in order to run the baseline nutrient assessments for Potassium for individuals of 45 years of age and over. The baseline assessment model was validated against published data from the respective data source institution. These baseline assessments provided dietary intakes of Potassium from the existing diets of the populations.

Overcoming Data Gaps

There was a number of food codes in the CHNS data that did not have corresponding Potassium values. These food codes did not have a detailed food description available but were described by their subgroup name only. By filling in these data gaps we made the consumption data as robust as possible. This was done using discrete distributions for the missing values. These distributions were based on the nutrient values of other foods recorded in the same subgroups as the foods that were missing values. Using the frequency of consumption of the food codes with Potassium levels, a weighted distribution was created to fill the incomplete levels for foods within the same subgroup. A nutrient value was assigned to the gap, per iteration, based on the probability calculated from the frequency of consumption; where highly-consumed foods are more likely to be sampled than lesser-consumed foods.

Scenario Methodology

Subjects of 45 years of age and older were divided into subpopulations based on milk consumption habits and blood pressure status. These subpopulations were treated differently from one another in a given intervention scenario that was simulated. There were two different intervention scenarios. Milk consumption was assessed on the subjects' Potassium intake from a specific group of foods, called Milks. This list included all fresh, flavoured, fermented (including yoghurts) and powdered bovine milks mentioned in the survey.

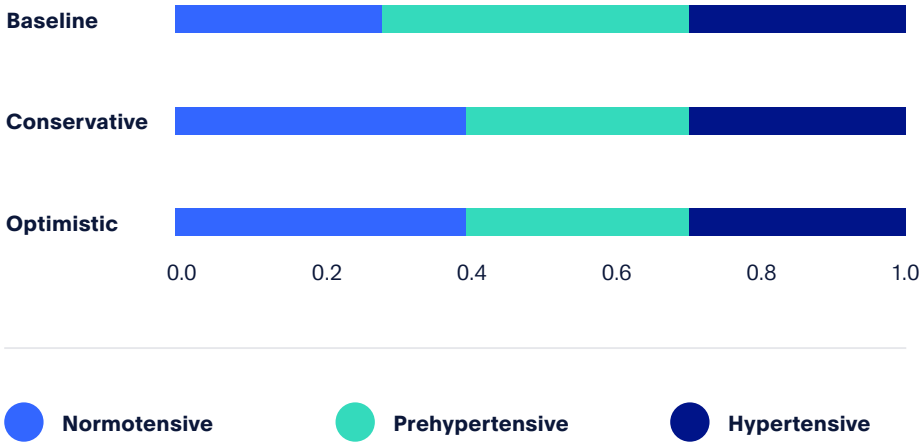
Health Impact

Increased Potassium intake is associated with Systolic Blood Pressure (SBP) reduction. The intervention simulated in this study increased the potassium intake, hence, the associated SBP reduction was simulated in the population. This created a new intervention distribution of SBP in the population.

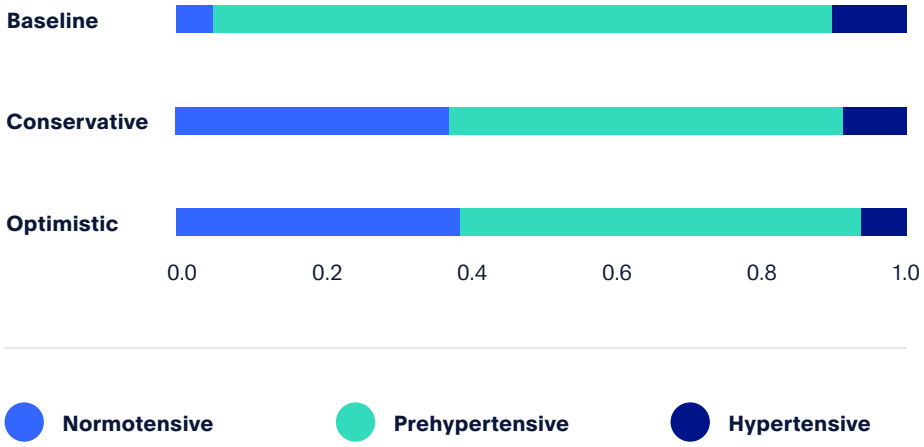
CVD risk (The risk of experiencing a CVD event) was calculated for both population distributions of SBP (baseline and intervention) and the risk decreased accordingly.

Results

New Products and Predicting Health Outcomes
Impact on SBP in Total Population



New Products and Predicting Health Outcomes
Impact on SBP in Product Consumers



Milk consumption trend

As an additional output, Milk consumption was analysed over time. Milk consumption in China among people that are 45 years of age and older was at 8.67 %. The Milk consumption was also assessed in the CHNS data from the 2004 survey. This analysis showed that there appeared to be a downward trend of Milks consumption in China; going from 10.24 % of the population in 2004 to 8.67 % of the population in 2009.

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