20130707 - Nutritional balance of cheese (inferential statistics) - 2012

[Data] [<Normal page] [**PEREZGONZALEZ Jose D (2012).** *Nutritional balance of cheese (inferential statistics).* Knowledge (ISSN 2324-1624), 2013, pages 116-120.] [DOI]

Fold

Table of Contents

Cheese's BNI (inferences)

Perezgonzalez assessed the nutritional balance of cheese[5] in 2012[1], as part of a research on the nutritional composition of food in New Zealand. This article provides inferential information about the population of products under research (foodBNI) as well as about a hypothetical diet based on those products (dietBNI).

foodBNI

The population of cheeses appears unbalanced (illustration 1). Indeed, it can be inferred, with a 95% degree of confidence, that the median nutritional balance is located somewhere between BNI 123 and BNI 132, and the mean a bit higher, somewhere between BNI 126 and BNI 134, thus indicative of a tendency (skewness) towards higher unbalance.

Illustration 1: Food's nutritional balance

Non-parametric	BNI	WHO	US/CAN	AUS/NZ	UK
Median CI_{95} lower	122.64	138.54	107.05	110.02	106.04
Median CI_{95} upper	132.44	147.90	119.07	119.54	118.04
SPR lower	5.39	10.08	4.28	10.01	4.30
SPR upper	15.20	19.45	16.31	19.52	16.29
Parametric	**BNI**	**WHO**	**US/CAN**	**AUS/NZ**	**UK**
Mean CI_{95} lower	126.02	142.44	107.03	113.91	106.20
Mean CI_{95} upper	134.23	150.27	117.09	121.87	116.22
SD CI_{95} lower	7.99	7.63	9.80	7.76	9.77
SD CI_{95} upper	13.57	12.95	16.64	13.16	16.59

(95% confidence interval's lower and upper bounds)

Similar nutritional profiles appear when using other international recommended dietary intakes (RDIs). Although correlations between indexes are moderate to high (illustration 2). These correlations would occur by chance less than two times in 100; thus it can be inferred that they truly reflect an underlying relationship between international indexes.

Illustration 2: Correlations between international RDIs					
r / rho	BNI	WHO	US/CAN	AUS/NZ	UK
BNI CI_{95} lower		.408	.653	.752	.668
BNI CI_{95} upper		.959	1.000	1.000	1.000
WHO CI_{95} lower	.654		.103	.418	.104
WHO CI_{95} upper	1.000		.780	.963	.781
US/CAN CI_{95} lower	.614	.253		.553	.943
US/CAN CI_{95} upper	1.000	.876		1.000	1.000
AUS/NZ CI_{95} lower	.805	.593	.573		.537
AUS/NZ CI_{95} upper	1.000	1.000	1.000		1.000
UK CI_{95} lower	.616	.246	.969	.543	
UK CI_{95} upper	1.000	.872	1.000	1.000	
(95% confidence interval's lower and upper bounds)					

dietBNI

As part of a hypothetical diet in which all products contributed the same weight of cheese, the resulting nutritional balance would still be unbalanced, with 95% confidence of it ranging somewhere between BNI 120 and BNI 130. However, differences in international RDIs become more apparent at this level, as this diet would "worsen" under WHO's RDIs but would "benefit" more under US', Australia's and UK's RDIs.

Illustration 3: Diet's nutritional balance							
CI_{95}	Protein	Carbs	Sugar	Fat	Sat.fat	Fiber	Sodium
lower	20.1	0.8	0.7	24.9	16.2	0.0	0.669
upper	24.9	1.2	1.0	30.8	20.2	0.0	0.827
CI_{95}	International RDIs		BNI	WHO	US/CAN	AUS/NZ	UK
lower	(diet)		120.35	140.35	104.00	105.99	104.00
upper	(diet)		129.68	149.68	111.86	114.29	111.86
*(Values per 100g; *carbs' upper and lower bounds are reversed[6])*							

In any case, the most visible differences between the lower and upper bounds of this confidence interval are the levels of fat, saturated fat and sodium that these products provide to the diet.

Illustration 4: dietBNI CI_{95} lower bound

75%						
70%			*			
65%			*			
60%			*			
55%			*			
50%			*			
45%			*			
40%			*			
35%			*			
30%			*			
25%	*		*			
20%	*		*			
15%	*		*			
10%	*		*			
5%	*		*			
mid	**p**	**c**	**f**		**fb**	
max		**s**	**sf**			**na**
5%			*			*
10%			*			*
15%			*			*
20%			*			*
25%			*			*
30%			*			*
35%			*			*
40%			*			
45%			*			
50%						

ideal % = grey cells; actual % = asterisk (*)

Illustration 5: dietBNI CI_{95} upper bound

75%			*			
70%			*			
65%			*			
60%			*			
55%			*			
50%			*			
45%			*			
40%			*			
35%			*			
30%			*			
25%	*		*			
20%	*		*			
15%	*		*			
10%	*		*			
5%	*		*			
mid	**p**	**c**	**f**		**fb**	
max		**s**	**sf**			**na**
5%			*			*
10%			*			*
15%			*			*
20%			*			*
25%			*			*
30%			*			*
35%			*			*
40%			*			*
45%			*			
50%			*			

ideal % = grey cells; actual % = asterisk (*)

Study's scope

The sample was a convenient one, although no particular bias in the selection of cheeses was evident. The sample included both local and international cheeses. Even so, prudence may be appropriate, and generalization may be limited to New Zealand (nationwide) until future studies replicate this research. These results may also be of interest to food researchers, dietitians, food policy makers and consumers.

Methods

Research approach

Exploratory study for inferring the nutritional balance of the population of cheeses[5] in New Zealand.

Design

Quantitative (fixed) in nature, including a mix of a descriptive design and a relational design.

Sample

A convenient sample of 29 cheeses, including diverse flavors and other relevant categories *(see Perezgonzalez, 2012b[2])*. The actual products were collected in a convenient manner from four major national supermarket chains.

Variables

Variables of interest for this research were the following:

- Weight contribution of seven nutrients (protein, carbohydrate, sugar, fat, saturated fat, fiber and sodium) to 100g of a food product.
- The Balanced Nutrition Index (BNI) of each food product, as calculated from above variables.
- Aggregated information for the sample of products (foodBNI).
- Aggregated information about the individual nutrients for the simulation of hypothetical diets (dietBNI).

Materials and procedure

Relevant data were collected in person by purchasing the food products or by capturing such information from producers' websites if this information was available and was deemed reliable. The data were then assessed using the Balanced Nutrition Index™ (BNI™) technology *(see Perezgonzalez, 2012c[3])*.

Data analysis

The sample's data were assessed as per normality *(see Perezgonzalez, 2012a[1])*. The BNI distribution was normal both in skewness and kurtosis when being quite conservative in such assessment, as per Tabachnick & Fidell *(2001[4])* (z=3.39, p<0.001, s=0.001).

The present stage of research on the BNI of foods offers little evidence for ascertaining the real distribution of nutritional balance in the population of food products, including that of cheese. In theory, the nutritional distribution of well-balanced products would resemble a reversed J-shaped distribution, thus, it can be expected that as products move up the scale towards greater unbalance, they may adopt a more normal distribution. Anecdotal evidence of the nutritional distribution of a sample of 1000 food products seems to support such trend towards either a normal distribution or a right-skewed distribution.

Given the uncertainty about the nutritional distribution of cheese in the population, the sample data was not transformed in any way. Instead, the article provides results to cover both eventualities: on the one hand, that the sample represents the true nature of the population, this being skewed towards higher levels of unbalance, therefore non-parametric results are more appropriate under such assumption; on the other hand, that the population is normally distributed, therefore parametric results are more appropriate under such assumption.

Linearity between variables was adequate.

The main analyses carried out were population inferential statistics using 95% confidence intervals.

SPSS-v21 was used for the computation of variables, including the BNI and international indexes, and for inferential statistical analyses.

References

1. **PEREZGONZALEZ Jose D (2012a).** *Nutritional balance of cheese (descriptive statistics).* Knowledge (ISSN 2324-1624), 2013, pages 110-112.
2. **PEREZGONZALEZ Jose D (2012b).** *Cheesy cheese*. The Balanced Nutrition Index (ISSN 1177-8849), 2013, issue 2.
3. **PEREZGONZALEZ Jose D (2012c).** *Balanced Nutrition Index™ (BNI™) (2e)*. Knowledge (ISSN 2324-1624), 2013, pages 38-40.
4. **TABACHNICK Barbara G & Linda S FIDELL (2001).** *Using multivariate statistics (4th ed).* Allyn & Bacon (Boston, USA), 2001.

+++ **Notes** +++

5. Different types of cheese but excluding processed cheese.
6. The lower and upper bounds for carbohydrates are reverse in order to keep the total energy count of the resulting profiles as similar as possible. Carbohydrates were selected for this reversal as they are the nutrient typically set by difference, after estimating proteins and fats.

Want to know more?

BNI analyses of individual cheeses

You can access either the BNI™ database or the 'BNI™ journal (2013, issue 2) - Cheesy cheese' for individual nutrition analyses of each cheese in the sample.

WikiofScience - Nutritional balance of cheese (further knowledge)

These WikiofScience pages provide introductory and descriptive analyses about the nutritional balance of cheese.

WikiofScience - Nutritional balance of foods

This WikiofScience page collates information about several foods on a single page and provides useful links to the appropriate files.

Author

Jose D PEREZGONZALEZ (2013). Massey University, Turitea Campus, Private Bag 11-222, Palmerston North 4442, New Zealand. (JDPerezgonzalez).

Other interesting sites				
Knowledge	WikiofScience	AviationKnowledge	A4art	The Balanced Nutrition Index

page revision: 8, last edited: 5 Jul 2013, 14:00 (9 seconds ago)
