

SHORT COMMUNICATION

The gluten-free basic food basket: a problem of availability, cost and nutritional composition

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The basic food basket (BFB), formed by the more economical products available, is used by less-affluent countries to establish the minimum daily food consumption to satisfy nutritional requirements in less-privileged individuals. There is no information about groups that depend on the BFB and in addition follow gluten-free diet (GF/BFB). We measured availability, cost, main ingredients and nutritional composition of GF/BFB. Data were collected in the area that was first in the social priority list in the capital city, matching BFB components with gluten-free equivalents (GF/BFB). GF/BFB characterized by being 42% less available, three times more costly (>500% higher for bread), with up to 69% lower protein content and with no fortifications, leaving at nutritional risk celiac individuals that depend on GF/BFB. Results raise concerns on the capacity of the GF/BFB to encourage adherence, maintain adequate nutritional status and quality of life in celiac patients.

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INTRODUCTION

Celiac disease is an autoimmune enteropathy triggered by gluten in susceptible individuals. Treatment consists of strict and permanent gluten-free diet.¹ In many less-affluent countries, the concept of basic food basket (BFB), formed by the more economical products available in the market, is used to establish the minimum daily food to be consumed to satisfy nutritional requirements in less-privileged individuals. Little is known about the problems posed for celiac patients that depend on the gluten-free BFB (GF/BFB). We measured availability, cost, ingredients and nutritional composition of foods/products (GFF) forming part of the GF/BFB.

MATERIALS AND METHODS

BFB included 53 products divided into 10 groups: bread and cereals; meat; fish; dairy products and eggs; oils; fruits; vegetables, legumes and tubers; sugar, coffee, tea, sweets and condiments (miscellaneous); drinks and 'eating-out-of-home'.² Of the 53 foodstuffs, those that contain gluten or may be contaminated with it were chosen for analysis resulting in 34 foodstuffs (included in seven groups), for which lower cost gluten-free equivalents were matched (Table 1).

Assessed areas were top in the social priority list of the Ministry of Social Development (MSD) in Santiago, Chile. Stores were selected based on previous studies:³ quality supermarkets, mid-range supermarket, wholesalers, health shops and corner shops. Only mid-range and wholesale supermarkets were found in the assessed area, representing usual shopping places. Each product included in the BFB defined by the MSD, was matched with a gluten-free equivalent according to two requirements: (1) being certain that the product was gluten-free and (2) being the lowest-priced available. Then macro and micronutrients content and intakes were estimated following Food and

Agriculture Organization (FAO)/WHO recommendations.⁴ The first three ingredients listed in nutritional facts were used for analysis, grouping additives by function. Descriptive statistics was used to calculate prices, intakes and nutritional composition

RESULTS

Availability

In mid-range and wholesale supermarkets 33/34 and 29/34 items included in BFB were available respectively, but only 9/33 stated their gluten content (Figure 1). Search for products representing gluten-free equivalents to the 33 identified foodstuffs resulted in 19 and 8 in the mid-range and wholesale supermarket, respectively. Of 27 potential items, only 19 were analyzed because they fulfilled the second requirement of being similarly low-priced. Table 1 shows availability and cost of BFB and GF/BFB, per kilogram and food group.

Cost

The 19 gluten-free foods (GFF) were in average three times more expensive, the largest difference being for noodles. Following the latest available reference data by the MSD (November 2014), cost of the whole BFB was US\$ 70.4 and this was confirmed by our study. The 19 GFF that could be compared belonged to groups bread and cereals, meat, dairy and miscellaneous, their cost being US\$ 44.3 and US\$ 132.8/person/month in BFB and GF/BFB, respectively.²

Nutritional composition

The main differences were found in protein content. Bread and cereals in BFB were based on wheat, whereas in GF/BFB were on rice, corn, cassava and potato starch, being these poorer in protein. Thus, GF/BFB bread had up to 69% less proteins, a

Table 1. Availability and cost per kilogram of product in the 34 items included in the regular (BFB) and their 19 gluten-free (GF BFB) equivalents

	<i>Food basket items</i>	<i>REG BFB Cost/Kg</i>	<i>GF BFB cost/Kg</i>	<i>% in excess^a</i>
<i>Bread and cereals</i>				
1	Bread	1.6	10.05	628
2	Biscuits	4.43	18.22	412
3	Rice	0.87	1.31	151
4	Flour	0.8	6.99	874
5	Noodles	0.94	14.34	1530
6	Whole meal noodles	3.14	14.16	451
<i>Meat</i>				
7	Beef	8.82	7.35	83
8	Ground beef	8.67	—	—
9	Beef casserole	2.93	—	—
10	Whole chicken	2.72	—	—
11	Chicken pieces	3.63	3.63	100
12	Sausages	2.94	10.44	355
13	Mortadella	2.94	10.15	345
14	Bouillon cubes	9.41	—	—
<i>Fish</i>				
15	Hake	9.8	—	—
16	Canned mackerel	2.61	—	—
<i>Dairy products</i>				
17	Milk	1.06	1.01	95
18	Milk powder	6.12	6.92	113
19	Gouda cheese	6.87	8.83	129
20	Yogurt	1.46	1.55	107
<i>Oils</i>				
21	Bulk oil	—	—	—
22	Bottled oil	1.45	—	—
23	Margarine	1.8	—	—
<i>Sugar, coffee, tea, sweets and condiments</i>				
24	Sugar	0.82	—	—
25	Coffee	16.45	—	—
26	Tea leaves in bulk	5.37	—	—
27	Tea bags	16.33	20.62	126
28	Juice powder	5.65	—	—
29	Candies	6.1	5.71	94
30	Popsicles	2.13	3.26	153
31	Salt	0.28	—	—
32	Pepper	17.18	—	—
<i>Beverages</i>				
33	Large soda	0.73	0.73	100
34	Wine	1.16	1.16	100

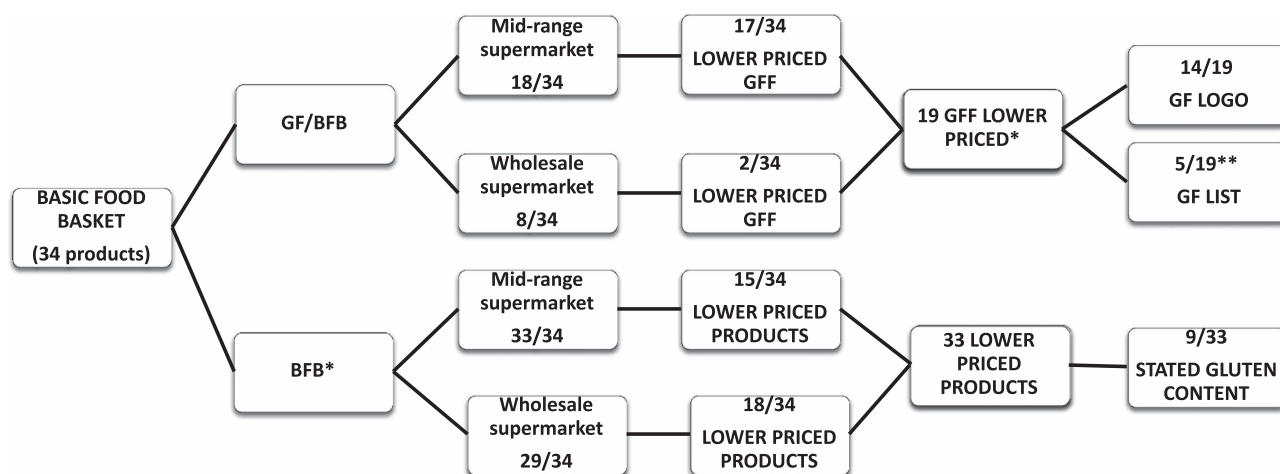
Abbreviations: BFB, basis food basket; GF, gluten-free product; REG, regular product; —, product not available. Cost expressed per kilogram, in dollars; 1 USD = 611CLP (6 May 2015). ^aColumn GF BFB/REG BFB × 100.

relevant difference considering the 96 kg/person/year bread consumption in the assessed population (5). In meats, gluten-free sausages and mortadella contained different texturizing, coloring and acidity regulators, resulting in a better protein quality than in BFB. Related to fiber, regular biscuits and noodles had 54.6% and 50% more fiber than GF/BFB, respectively. Fats content was similar in both 'baskets', providing ~14% of the total composition. The only difference was found in ice-creams, the regular version included more varied oils, such as palm shortening, vegetable oil and soy, resulting in a higher variability of types of fats. Information on micronutrients was nearly always absent in labels except the sodium. Information about fiber, calcium, iron, folic acid, thiamin, riboflavin, pantothenic acid, cobalamin and vitamin A appeared in a few products, but magnesium, niacin and pyridoxine were always absent in GFF.

Regular cheese and yogurt had 52.4% and 32.3% less sodium than in GF/BFB, respectively.

DISCUSSION

The concept of BFB is efficient to assess satisfaction of basic food needs in less-privileged groups. Results showed that GF/BFB was 42% less available, not different from reports from England and Argentina;^{3,5} our results though are relevant because they refer to the GF/BFB. Limited availability of GFF has a strong social impact, difficulting adherence, contributing to nutritional deterioration and increasing health expenditures, all in a group that may be already at nutritional risk. And indeed, this also means a significant deterioration of quality of life for celiac individuals. GF/BFB was also three times more expensive. In 2008, the Chilean GF/BFB was



*= GF/BFB was 42% less available than the BFB

**=these 5 GF products had no gluten-free logo but local organizations certified that they are gluten-free

Figure 1. Flowchart. *=GF/BFB was 42% less available than the BFB. **=these five GF products had no gluten-free logo but local organizations certified that they are gluten-free.

reported to be 89% more expensive than BFB;⁶ 6 years later we found this figure ~300% higher.

Production of GFF is industrially challenging, often resulting in higher costs. Although grains that may replace wheat are numerous, GFF limited them to rice, corn, cassava and potato starch, similar to data from Brazil.⁷ These ingredients decrease protein content and nutritional quality, relevant considering the high bread consumption in our society.⁸ None of the GFF analyzed included quinoa or amaranth to improve nutritional quality.⁹ Additives in most countries follow Codex Alimentarius recommendations,¹⁰ which regulate them to be safe, but not in terms of gluten; indeed, a large number of additives may contain gluten and they were not declared as such.

A relevant finding was that protein content in GFFs was 24.2% less, up to 69% lower in breads and cereals. Our results agree with data reported from FAO/WHO, which suggest that GFF would contain ~24% less protein than regular products. New strategies should be applied to improve protein quality in GFF. None of the dairy products forming part of GF/BFBs were fortified with iron or had fiber added and these nutrients are important owing to celiac patients usually report anemia and constipation. Instead, gluten-free and gluten containing premium products in the same market contained them (data not shown), but at prices well above those of both BFBs. These results raise concern on the capacity of GF/BFBs to promote adherence, maintain adequate nutritional status and quality of life in celiac patients.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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