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Packaged food supply in Fiji: nutrient levels, compliance with sodium targets and adherence to labelling regulations

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Abstract

Objective: To estimate the proportion of products meeting Fiji government labelling regulations, assess compliance with national Na reformulation targets and examine the Na and total sugar levels in packaged foods sold in selected major supermarkets.

Design: We selected five major supermarkets in 2018 and collected the product information and nutritional content from the labels of all packaged foods sold. We organised 4278 foods into fourteen major food categories and thirty-six sub-categories and recorded the proportion of products labelled in accordance with the Fiji labelling regulations. We looked at the levels of Na and total sugar in each food category and assessed how many products complied with the Fiji reformulation targets set for Na. We also listed the companies responsible for each product.

Setting: Suva, Fiji.

Results: Fourteen percentage of packaged foods in fourteen major categories met Fiji national labelling regulations. Na was labelled on 95·4 % products, and total sugar labelled on 92·4 %. The convenience foods category had the highest Na levels (1699 mg/100 g), while confectionery had the highest content of total sugar (52·6 g/100 g). Forty percentage of eligible products did not meet the proposed voluntary Na reformulation targets.

Conclusions: Our findings indicate significant room for improvement in nutrient labelling, as well as a need for further enforcement of reformulation targets and monitoring of changes in food composition. Through enacting these measures and establishing additional regulations such as mandatory front-of-pack labelling, government and food industry can drive consumers towards healthier food choices and improve the nutritional quality of packaged foods in Fiji.

Keywords
Packaged food
Sodium
Sugar
Food labelling
Fiji
Non-communicable disease

Pacific Island countries are facing a non-communicable disease (NCD) crisis, and unhealthy diets are the biggest contributors to the increasing rates of obesity, hypertension and diabetes[1–3]. NCD account for about 80 % of all deaths and 50 % of all premature mortality in the Pacific Islands[2,3]. In Fiji, where approximately 70 % of adult men and 75 % of adult women are overweight or obese[4], CVD account for one-third of all deaths and one-quarter of deaths is from diabetes[3]. A key reason for high rates of NCD in Fiji is the transition away from traditional diets, which consisted mainly of fresh fruit, vegetables and fish[5] towards more readily available[6,7] and nutrient-poor processed, packaged foods that are high in Na, free sugars and saturated fat[8,9].

The WHO recommends limiting foods high in Na, free sugars and saturated fat and ensuring that consumers can access and afford healthy food[10]. Pacific Island leaders have been proactive in adopting a range of food policies

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and regulations to tackle unhealthy diets by addressing the increasing consumption of processed foods[11–13]. This includes taxes on sugar, regulations for Na levels in processed foods and programmes to improve food environments in specific settings such as schools and hospitals[12,14]. In Fiji, the National Food and Nutrition Centre was established by the Government in 1982 to coordinate the multi-sectoral efforts needed to address the country's diet-related disease burden including informing policies on food regulation.

Information provided on nutrition labels for processed, packaged food allows consumers to assess the nutritional quality of their food and make healthier food purchases. In Fiji, all food products sold are regulated through the *Food Safety Act 2003*[15] and the *Food Safety Regulations 2009*[16]. Regulations around the labelling of processed, packaged food products require all pre-packaged food produced, processed, packed, distributed or imported to be labelled in English with the following required nutritional information per 100 g (or per 100 ml for liquids) for: energy, protein, fat and carbohydrate. In 2014, an amendment of the *Food and Safety (Amendment) Regulations 2014*[17] was passed which stipulates mandatory reporting of additional nutrients including trans fatty acids, Na, total sugar, fat, saturated and unsaturated fats to be labelled per 100 g (or 100 ml for liquids). Officers authorised by the Government of Fiji are responsible for periodic monitoring of compliance with the labelling regulations, with fines and/or imprisonment incurred for noncompliance[16]. However, to date, compliance with Fiji nutrient labelling regulations across the entire Fijian packaged food supply has not been assessed.

In 2010, the Minister for Health and Medical Services in Fiji convened a consultation with key stakeholders from the food industry, government and research groups who agreed on a coordinated strategy to reduce salt intake to 5 g/d by 2020. The *Fiji Salt Action Challenge Strategy* was endorsed by way of a Cabinet Submission in 2010, and the National Food and Nutrition Centre formed a secretariat to provide oversight and momentum. Na reduction has been highlighted as key to improving diet-related disease burden region-wide, and setting targets for Na levels in foods is a key component of effective salt (Na) reduction strategies[18–20]. Based on the contribution of different processed foods to Na in the diet in the Pacific, the proposed maximum acceptable regional targets for Na levels in eight selected food categories were developed and agreed by representatives at the Pacific Islands NCD Forum in September 2013[18]. These were adopted from the Pacific Island targets established the year prior and developed by the Food Taskforce Technical Advisory Group in 2014[21]. The Na reformulation targets were modified to apply specifically to Fiji and finalised through a series of stakeholder and food industry consultations between 2012 and 2014. However, these targets remain voluntary and have not been formally ratified by the Government of Fiji.

This research aimed to identify opportunities to improve the nutritional quality of the food supply in Fiji. Our objective was to conduct a cross-sectional survey of the packaged food supply in Fiji and quantify the nutritional composition of the main food categories using three criteria: adherence to national nutrition labelling regulations, levels of Na and total sugar in packaged food and compliance of packaged food products with proposed Na reformulation targets. The findings can be used to guide policy decisions related to reformulation activities, front-of-pack food labelling, import controls, sales taxes and subsidies for healthier products, which can help guide consumers towards healthier food choices.

Methods

This research encompassed a systematic survey of packaged foods for sale in five major supermarket chain stores in Suva, Fiji. Data were collected between November 2018 and January 2019.

Retail outlets surveyed

The stores were purposively selected to ensure that the majority of packaged products in Fiji were included. A total of seven supermarkets were approached and invited, two declined and the remaining five agreed to participate. Supermarkets with more than two branches were selected to ensure more than 70 % of the market was captured. Written permission to collect data was obtained from each store manager prior to commencement of data collection.

Packaged foods surveyed

Packaged food products for human consumption that were available for sale in each store during the period of data collection were surveyed. Where products were available in multiple stores, only one instance of the product was surveyed. During each product survey, data collection staff captured the barcode and photographed the front of the pack, nutrition label, manufacturer details, ingredients list and product weight for every packaged food item on every shelf in each store surveyed. This was done using a smartphone application developed by The George Institute for Global Health[22] and according to a protocol devised by an international collaborative project designed to document the nutritional composition of packaged foods globally[23]. The images collected were transmitted to a data management centre in India for processing. Data were uploaded daily into a database which was quality-checked, and data were recollected where required.

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Data extraction

The data management centre used an in-house technology system that enables the systematic, standardised and replicable collection and collation of data describing packaged foods and beverages. Images of food packaging are captured, stored and processed with key data extracted from food labels. The key variables used for the current analysis were the brand name, product name, manufacturer name, serving size and presence of nutritional information per 100 g (or per 100 ml for liquids) for energy, protein, carbohydrate, Na, total sugar, total fat, saturated fat and unsaturated fat. Where data were absent from food labels, it was recorded as missing. Different package sizes of the same product were recorded as duplicate items in the database, but each product was included only once in the primary analyses.

Categorisation of foods

Foods were categorised using the system developed by the Global Food Monitoring Group[23] into fifteen major food groups and fifty-eight selected sub-categories: (1) bread and bakery products; (2) cereal and grain products; (3) confectionery; (4) convenience foods; (5) dairy and dairy alternatives; (6) edible oils and oil emulsions; (7) eggs; (8) fish and fish products; (9) fruit and vegetables; (10) meat and meat products; (11) non-alcoholic beverages; (12) sauces and spreads; (13) snack foods; (14) sugars, honey and related products and (15) special foods. Excluded categories were alcoholic beverages, baking powders, chewing gum, cough lollies, eggs, herbs and spices, meal kits, plain teas and coffees, plain waters, sports/protein powders, sugar, sweeteners, vitamins and supplements, yeasts and gelatines since they do not contribute significantly to nutrient intake, nor are manufacturers required to display a Nutritional Information Panel for many of these products. The special foods category encompasses baby food and protein and diet bars. This left data for 4278 food products categorised under fourteen major categories and thirty-six sub-categories.

Manufactures

Manufacturer information for each product was recorded based on the manufacturer name listed on the pack and includes companies local to Fiji as well as multinational companies licenced to manufacture or sell products in Fiji. Overall, data for the top thirty-four manufacturers selling products in Fiji were reported with manufacturers chosen based on the number of products collected during the survey, representing 39 % of all products surveyed. Of these, seven were Fiji local manufacturers, identified using in-country expertise. The remaining manufacturers were classified as 'other', comprising manufacturers with smaller numbers of packaged foods and beverages under their portfolio.

Statistical analysis

Analyses were conducted across all products and for individual food categories. There were three main sets of analyses: (i) the proportions of packaged foods compliant with Fiji nutrient labelling regulations for all nutrients (i.e. displaying energy, protein, carbohydrates, Na, total sugar, saturated fat, trans-fat, monounsaturated fat and polyunsaturated fat), as well as separate proportions for products complying with labelling across each of the required nutrients; (ii) the average levels of Na and total sugar in packaged foods for which data were available, with both mean and median reported to allow ease of cross comparison against future years of data and against the packaged food supply in similar regions and (iii) the proportion of packaged foods meeting maximum Na content targets for the thirty-nine food sub-categories for which the targets have been developed. Foods were defined as 'known to meet' the target if the label reported a Na content that was at or below the specified target.

All analyses were done using the statistical software package Stata/IC version 15.1 and figures generated in Microsoft Excel.

Results

Nutrition labelling

Of the 4278 products analysed, 602 (14·1 %) products were fully compliant with Fiji nutrient labelling regulations (Table 1). Na was labelled on 4083 (95·4 %) products, and total sugar labelled on 3955 (92·4 %) (Table 2). Protein, energy, saturated fat and carbohydrates were also labelled on the majority of products and across most of the food categories; however, trans-fat, monounsaturated fat and polyunsaturated fat were only labelled on a minority of products.

The majority of manufacturers did well on labelling Na and total sugar across their products. Of the thirty-four top manufacturers selected for analyses, twenty-one complied with Na labelling across their products and nineteen complied with total sugar labelling (Table 3). The manufacturer with the lowest compliance to both Na and sugar labelling was Carpenters Fiji PTE Limited (79·5 % and 74·4 %, respectively). PepsiCo had the highest proportion of products meeting Fiji nutrient labelling regulations (33 (64·7 %)).

Sodium and total sugar content

There was significant variability across all categories and subcategories for both Na and total sugar content (Table 4). Food categories with the highest mean Na content were 'convenience foods' (1699 mg/100 g) and 'sauces, dressings, spreads and dips' (1422 mg/100 g). Unsurprisingly, categories with the lowest mean Na content were 'sugars, honey and related products' (36 mg/100 g) and 'non-alcoholic beverages'

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Table 1 Proportion of 4278 packaged food products in 2018 meeting Fiji regulation for nutrition labelling, across categories

	Total products	Meeting Fiji nutrition labelling regulation	
Category	*n*	*n*	%
Bread and bakery products	517	45	8·7
Bread	54	0	0·0
Cakes, muffins and pastries	121	11	9·1
Savoury biscuits	104	17	16·3
Sweet biscuits	238	17	7·1
Cereal and grain products	462	86	18·6
Breakfast cereals	179	53	29·6
Cereal and nut-based bars	53	6	11·3
Noodles	59	6	10·2
Other cereal and grain products	82	11	13·4
Pasta	44	1	2·3
Rice	45	9	20·0
Confectionery	388	10	2·6
Chocolate and sweets	364	7	1·9
Jelly	24	3	12·5
Convenience foods	60	4	6·7
Ready meals	15	2	13·3
Soup	45	2	4·4
Dairy	348	78	22·4
Cheese	58	4	6·9
Cream	26	2	7·7
Desserts	11	1	9·1
Ice cream and edible ices	112	17	15·2
Milk	87	33	37·9
Yoghurt and yoghurt drinks	54	21	38·9
Edible oils and oil emulsions	105	58	55·2
Fish and fish products	116	41	35·3
Fruit and vegetables	678	77	11·4
Fruit	125	6	4·8
Jam and marmalades	81	13	16·0
Nuts and seeds	140	27	19·3
Vegetables	332	31	9·3
Meat and meat products	105	5	4·8
Non-alcoholic beverages	487	38	7·8
Beverage mixes	38	0	0·0
Coffee and tea	51	4	7·8
Cordials	26	4	15·4
Electrolyte and energy drinks	32	0	0·0
Fruit and vegetable juices	228	14	6·1
Soft drinks	94	12	12·8
Waters (flavoured)	18	4	22·2
Sauces, dressings, spreads and dips	628	42	6·7
Mayonnaise and salad dressings	57	6	10·5
Sauces	416	15	3·6
Spreads and dips	155	21	13·5
Snack foods	290	106	36·6
Special foods	26	0	0·0
Sugars, honey and related products	68	15	22·1
Dessert additions and toppings	42	9	21·4
Honey and syrup	26	6	23·1
Total	4278	605	14·1

(49 mg/100 g). There was significant variability across all categories and sub-categories.

Food categories with the highest mean total sugar content were 'confectionery' (52·6 g/100 g) and 'sugars, honey and related products' (44·2 g/100 g). Categories with the lowest mean total sugar content were 'edible oils and oil emulsions' (0·3 g/100 g) and 'meat and meat products' (0·7 g/100 g). The lowest range values for both nutrients demonstrated that there were multiple instances where a content of 0 for Na or total sugar was listed on the label.

Assessing against reformulation targets

Of the 1188 products with proposed Na reformulation targets, 707 (59·5 %) met the relevant target (Table 5). The highest compliance was observed for 'bacon' (100 %) and 'sweet, filled biscuits' (90·4 %), which had reformulation targets of 1210 mg/100 g and 450 mg/100 g, respectively. The categories of 'canned meat', 'meat-free products', 'shrimps/prawns peeled cooked/crumbed' and 'squid/calamari' did not have any products meeting Na reformulation targets.

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Table 2 Proportion of 4278 packaged food products in 2018 meeting Fiji regulation for nutrition labelling and proportion labelled with energy, protein, carbohydrate, sodium, total sugar, saturated fat, trans-fat, monounsaturated fat and polyunsaturated fat, across categories

		Nutrient labelled (%)								
Category	Total products *(n)*	Energy	Protein	Carbohydrate	Sodium	Total sugar	Saturated fat	Trans fat	Monounsaturated fat	Polyunsaturated fat
Bread and bakery products	517	97·9	97·9	97·9	95·4	95·9	95·2	54·7	11·2	11·2
Bread	54	100·0	100·0	100·0	94·4	100·0	92·6	53·7	0·0	0·0
Cakes, muffins and pastries	121	100·0	100·0	100·0	100·0	100·0	100·0	59·5	9·1	9·1
Savoury biscuits	104	99·0	99·0	99·0	99·0	99·0	98·1	41·3	21·2	21·2
Sweet biscuits	238	95·8	95·8	95·8	91·6	91·6	92·0	58·4	10·5	10·5
Cereal and grain products	462	98·3	98·1	98·1	96·1	93·9	91·6	44·4	21·2	21·2
Breakfast cereals	179	99·4	99·4	99·4	98·9	98·9	98·3	45·3	29·6	29·6
Cereal and nut-based bars	53	100·0	100·0	100·0	100·0	100·0	100·0	30·2	22·6	22·6
Noodles	59	93·2	93·2	93·2	93·2	88·1	86·4	50·8	15·3	15·3
Other cereal and grain products	82	96·3	95·1	95·1	89·0	85·4	76·8	42·7	15·9	15·9
Pasta	44	100·0	100·0	100·0	95·5	90·9	90·9	27·3	2·3	2·3
Rice	45	100·0	100·0	100·0	97·8	93·3	88·9	68·9	22·2	22·2
Confectionery	388	97·4	97·7	95·1	94·6	95·1	88·1	21·9	2·6	2·6
Chocolate and sweets	364	97·3	97·5	94·8	94·2	94·8	89·0	21·7	1·9	1·9
Jelly	24	100·0	100·0	100·0	100·0	100·0	75·0	25·0	12·5	12·5
Convenience foods	60	100·0	100·0	100·0	100·0	100·0	98·3	20·0	6·7	6·7
Ready meals	15	100·0	100·0	100·0	100·0	100·0	100·0	33·3	13·3	13·3
Soup	45	100·0	100·0	100·0	100·0	100·0	97·8	15·6	4·4	4·4
Dairy	348	99·4	99·4	98·9	98·6	98·0	95·4	41·1	23·3	23·3
Cheese	58	100·0	100·0	100·0	100·0	100·0	100·0	37·9	6·9	6·9
Cream	26	100·0	100·0	100·0	96·2	100·0	100·0	69·2	7·7	7·7
Desserts	11	100·0	100·0	100·0	100·0	100·0	100·0	36·4	9·1	9·1
Ice cream and edible ices	112	98·2	98·2	97·3	98·2	98·2	89·3	17·9	15·2	15·2
Milk	87	100·0	100·0	98·9	97·7	94·3	95·4	65·5	40·2	40·2
Yoghurt and yoghurt drinks	54	100·0	100·0	100·0	100·0	100·0	100·0	40·7	40·7	40·7
Edible oils and oil emulsions	105	100·0	98·1	99·0	94·3	83·8	86·7	61·9	75·2	70·5
Fish and fish products	116	95·7	98·3	95·7	98·3	89·7	96·6	62·1	39·7	39·7
Fruit and vegetables	678	98·2	98·7	97·1	97·2	95·0	92·9	31·3	13·1	13·1
Fruit	125	100·0	100·0	99·2	98·4	97·6	98·4	22·4	6·4	6·4
Jam and marmalades	81	96·3	100·0	87·7	95·1	92·6	77·8	23·5	16·0	16·0
Nuts and seeds	140	98·6	98·6	98·6	98·6	94·3	90·7	42·9	23·6	23·6
Vegetables	332	97·9	97·9	97·9	96·7	94·9	95·5	31·6	10·5	10·5
Meat and meat products	105	85·7	85·7	77·1	94·3	66·7	77·1	22·9	4·8	4·8
Non-alcoholic beverages	487	96·9	96·7	96·7	89·1	92·6	72·7	27·5	8·0	8·0
Beverage mixes	38	100·0	92·1	100·0	97·4	92·1	52·6	39·5	0·0	0·0
Coffee and tea	51	100·0	100·0	100·0	90·2	86·3	88·2	52·9	9·8	9·8
Cordials	26	100·0	100·0	100·0	53·8	84·6	53·8	38·5	15·4	15·4
Electrolyte and energy drinks	32	84·4	84·4	84·4	84·4	84·4	68·8	9·4	0·0	0·0
Fruit and vegetable juices	228	97·4	98·2	96·9	88·6	94·3	78·1	26·8	6·1	6·1
Soft drinks	94	97·9	97·9	97·9	97·9	97·9	74·5	14·9	12·8	12·8
Waters (flavoured)	18	88·9	88·9	88·9	88·9	88·9	27·8	22·2	22·2	22·2
Sauces, dressings, spreads and dips	628	99·4	99·0	97·9	97·1	91·4	84·1	30·7	6·7	6·7
Mayonnaise and salad dressings	57	100·0	96·5	100·0	100·0	93·0	82·5	28·1	10·5	10·5
Sauces	416	99·5	99·5	98·1	96·4	88·9	80·0	28·1	3·6	3·6

Table 2 *Continued*

Category	Total products (*n*)	Nutrient labelled (%)								
		Energy	Protein	Carbohydrate	Sodium	Total sugar	Saturated fat	Trans fat	Monounsaturated fat	Polyunsaturated fat
Spreads and dips	155	98·7	98·7	96·8	98·1	97·4	95·5	38·7	13·5	13·5
Snack foods	290	94·8	94·8	94·5	92·4	82·8	86·2	66·6	40·7	40·7
Special foods	26	96·2	96·2	96·2	96·2	76·9	15·4	11·5	0·0	0·0
Sugars, honey and related products	68	100·0	94·1	100·0	100·0	94·1	76·5	30·9	22·1	22·1
Dessert additions and toppings	42	100·0	97·6	100·0	100·0	97·6	81·0	31·0	21·4	21·4
Honey and syrup	26	100·0	88·5	100·0	100·0	88·5	69·2	30·8	23·1	23·1
Total	4278	97·7	97·6	96·8	95·4	92·4	87·7	38·5	16·0	15·9

Amongst manufacturers with at least three products eligible for proposed Na reformulation targets, Food Processors (Fiji) had the highest proportion of products meeting the targets (n (%) = 7 (100 %)) (Fig. 1). None of the six Desai Brothers products, which were all in the sauces and spreads category, met the proposed Na targets.

Discussion

This research found that most packaged foods in Fiji do not comply with national nutrition labelling regulations, although labelling of Na and total sugar was present on almost all foods surveyed. Packaged foods in Fiji were found to have a high degree of variability in their Na and total sugar content across all food categories examined, creating an opportunity to drive consumers towards healthier choices within any given food category. The proposed voluntary Na reformulation targets are already being met by the majority of products surveyed, suggesting that more stringent targets are needed to improve the nutritional quality of packaged foods in Fiji.

Only 14·1 % of all packaged foods available for sale in Fiji met national nutrient labelling regulations, whereby manufacturers are required to list certain nutrients on their packaged food product labels. In accordance with the national regulations, most packaged foods surveyed labelled Na, total sugar, energy, protein, carbohydrates and saturated fats. However, the majority of products did not comply with the requirement to report trans, monounsaturated and polyunsaturated fats. Lack of capacity for ongoing monitoring and accountability means that labelling incompleteness of nutrients is likely to persist, as the last amendment to nutrient labelling was made in 2014 providing ample time for the industry to comply. For consumers to make fully informed choices about the healthiness of products to purchase, packaged foods need to display all relevant nutrition information. The Fijian government needs to establish ongoing monitoring of nutrient labelling in order to enforce and assess compliance with these regulations.

In addition to implementing nutrient labelling completeness, the Fijian government has also been considering introducing Front-of-Pack (FoP) Labelling, which informs consumer choice by summarising the nutritional quality of a food with a summary indicator or warning label indicating high levels of nutrients to limit. A growing body of evidence suggests that FoP labelling may aid consumer understanding of nutritional quality, encourage selection and purchase of healthier foods and promote reformulation by industry[24,25]. Implementation of a FoP label is feasible in Fiji given the presence of imported food products from Australia and New Zealand. Some of these imported products already carry FoP labels known as the Health Star Rating[26,27]. In 2019, the WHO Fiji commissioned research to further elucidate stakeholder perceptions of FoP label

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Table 3 Proportion of 4278 packaged food products in 2018 meeting Fiji regulation for nutrition labelling and proportion labelled with sodium and total sugar, across manufacturers

	Total products	Meeting Fiji nutrition labelling regulation		Na labelled		Total sugar labelled	
Manufacturer	*n*	*n*	%	*n*	%	*n*	%
Ashabhai & Co.	68	41	60·3	67	98·5	66	97·1
CJ Patel Group	23	9	39·1	23	100·0	22	95·7
Campbell Arnott's	45	4	8·9	43	95·6	43	95·6
Carpenters Fiji PTE	39	8	20·5	31	79·5	29	74·4
Coca Cola Amatil	40	0	0·0	40	100·0	40	100·0
Desai Brothers	37	0	0·0	34	91·9	37	100·0
Eco Farms	30	1	3·3	30	100·0	30	100·0
FMF Foods	51	24	47·1	50	98·0	50	98·0
Food Processors (Fiji)	10	0	0·0	10	100·0	8	80·0
Foods Pacific Group	16	2	12·5	16	100·0	16	100·0
General Mills	54	1	1·9	54	100·0	54	100·0
George Weston Foods	64	2	3·1	64	100·0	63	98·4
Goodman Fielder	111	36	32·4	110	99·1	89	80·2
Heinz	89	10	11·2	88	98·9	89	100·0
IGA	52	3	5·8	52	100·0	52	100·0
Kellogg's	36	4	11·1	36	100·0	36	100·0
Lion Dairy & Drinks	33	0	0·0	33	100·0	33	100·0
Lolliland	34	0	0·0	32	94·1	34	100·0
Mars	82	0	0·0	78	95·1	78	95·1
Mondelez	92	14	15·2	92	100·0	91	98·9
Motibhai Group	38	0	0·0	38	100·0	37	97·4
Nestle	82	15	18·3	78	95·1	75	91·5
Oriental Merchant	40	2	5·0	39	97·5	39	97·5
Parmalat	41	1	2·4	41	100·0	41	100·0
PepsiCo	51	33	64·7	51	100·0	51	100·0
Punjas	100	37	37·0	97	97·0	99	99·0
SPC Ardmona	35	0	0·0	35	100·0	35	100·0
San Remo	33	0	0·0	33	100·0	33	100·0
Sanitarium	36	19	52·8	36	100·0	36	100·0
Simplot	74	28	37·8	74	100·0	74	100·0
SunRice	41	5	12·2	41	100·0	39	95·1
Unilever	40	11	27·5	40	100·0	40	100·0
Whittaker's	31	0	0·0	31	100·0	31	100·0
Woolworths	143	15	10·5	142	99·3	143	100·0
All other manufacturers	2487	280	11·3	2324	93·4	2222	89·3
Total	4278	605	14·1	4083	95·4	3955	92·4

implementation, focusing on investigating challenges and potential benefits of the different approaches. However, the fact that nutrient labelling is so low in Fiji means that governments and researchers would have to rely on supplementary, proxy nutrient information using alternate data sources in order to verify and monitor industry compliance and accuracy of FoP labelling. Research has shown that when a voluntary label such as the Health Star Rating is implemented, industry chooses to only label healthier products[28,29], defeating the purpose of a FoP label as a tool for consumers to assess the nutritional quality of their food purchases, and emphasising the need for mandatory implementation of such policy across all products. Key to the implementation of a FoP label would therefore be industry compliance to label all required nutrients in accordance with the Fijian regulations.

In this research, Na and total sugar content varied significantly both within and across food categories. High levels of Na were found in pre-packaged ready meals and sauces such as soya sauce, as well as in snack foods and meat products. Unsurprisingly, the highest levels of total sugar were found not only in confectionery but also in bread and bakery products such as cakes, muffins and pastries. These are all packaged, processed foods that are increasingly being consumed in Fiji as the traditional diet moves towards a more Western-style diet[9]. However, the high degree of variability found between the Na and total sugar content of similar product categories presents an opportunity for directing consumers towards the low Na and sugar options that are available in the Fijian food supply. Even as diet transitions towards processed, packaged foods, nutrient labelling completeness or FoP labels can drive consumers towards healthier food choices in any given food category. The wide variability of Na and total sugar is also encouraging as it suggests room for reformulation towards healthier products within any given category or product discontinuation. Building on the baseline data that our research has provided, ongoing monitoring of

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Table 4 Mean sodium and total sugar content of food products, surveyed in Fiji in 2018

	Na (mg/100 g)						Total sugar (g/100 g)					
Category	*n*	Mean	SD	Median	IQR	Range*	*n*	Mean	SD	Median	IQR	Range
Bread and bakery products	493	415	301	335	306	<1–2000	496	24·0	16·6	26·7	32·3	0·0–64·9
Bread	51	611	456	486	415	2–2000	54	5·1	8·3	2·5	4·6	0·0–42·8
Cakes, muffins and pastries	121	450	246	394	393	<1–1184	121	33·7	15·7	40·2	20·4	0·0–64·9
Savoury biscuits	103	631	310	556	370	1–1600	103	5·8	8·2	3·4	4·9	0·0–51·4
Sweet biscuits	218	248	140	239	182	17–837	218	31·9	9·3	32·9	12·2	0·0–50·0
Cereal and grain products	444	347	872	61	361	0–14 500	434	11·0	11·8	6·0	17·4	0·0–68·2
Breakfast cereals	177	225	214	170	341	0–1000	177	16·7	10·2	16·7	14·5	0·0–41·3
Cereal and nut-based bars	53	106	121	57	137	4–467	53	25·0	13·1	21·6	10·5	0·0–68·2
Noodles	55	1179	846	1340	1604	0–2880	52	3·9	4·1	3·1	4·8	0·0–24·6
Other cereal and grain products	73	528	1801	17	551	0–14 500	70	2·6	3·9	1·8	2·5	0·0–25·0
Pasta	42	87	180	29	27	0–957	40	2·5	1·7	2·5	2	0·0–7·1
Rice	44	33	133	2	4	0–691	42	0·4	0·5	0·1	1	0·0–1·8
Confectionery	367	112	229	62	89	0–3000	369	52·6	20·2	52·6	20·2	0·0–100·0
Chocolate and sweets	343	115	235	63	88	0–3000	345	52·1	19·7	52·1	19	0·0–100·0
Jelly	24	66	76	33	101	0–311	24	58·7	25·3	62·5	41	1·0–89·0
Convenience foods	60	1699	3765	300	1098	<1–26 000	60	4·3	4·9	2·9	4·6	0·2–25·0
Ready meals	15	621	658	600	932	<1–2432	15	3·0	2·1	2·5	3	0·5–7·8
Soup	45	2058	4283	298	1585	<1–26 000	45	4·8	5·5	3·0	6·4	0·2–25·0
Dairy	343	202	352	52	87	0–1903	341	14·7	16	10·4	19·6	0·0–83·5
Cheese	58	853	432	712	561	125–1903	58	2·8	6·6	1·0	1·2	0·0–45·0
Cream	25	154	133	191	164	0–470	26	35·5	30·1	53·0	57·2	1·0–83·5
Desserts	11	198	234	135	174	22–700	11	11·4	12·5	4·4	27·1	0·0–27·9
Ice cream and edible ices	110	41	40	37	40	0–261	110	21·7	10·6	21·8	11·2	2·1–67·0
Milk	85	70	72	47	23	8–390	82	10·2	14·3	5·0	6·6	0·0–56·3
Yoghurt and yoghurt drinks	54	58	18	52	10	22–118	54	10·5	8·4	10·5	16·7	0·0–31·3
Edible oils and oil emulsions	99	195	346	0	360	0–1200	88	0·3	0·5	0·0	0·6	0·0–3·0
Fish and fish products	114	602	951	400	168	10–7533	104	2·0	5·2	1·0	2	0·0–48·0
Fruit and vegetables	659	317	694	32	304	0–5333	644	16·4	23·1	4·5	14·8	0·0–75·0
Fruit	123	37	195	6	14	0–2100	122	30·5	24·5	17·0	43·3	0·0–75·0
Jam and marmalades	77	13	18	9	10	0–130	75	62·4	4·6	63·4	4·4	48·6–70·0
Nuts and seeds	138	190	223	65	316	0–1037	132	8·6	11·7	4·7	3·6	0·0–55·0
Vegetables	321	552	917	240	589	0–5333	315	3·3	4·9	2·0	3·3	0·0–49·7
Meat and meat products	99	679	508	632	546	30–1960	70	0·7	1·1	0·3	0·9	0·0–7·6
Non-alcoholic beverages	434	49	147	8	18	0–1300	451	14·8	20·1	10·3	4·8	0·0–98·7
Beverage mixes	37	255	353	30	388	0–1300	35	39·6	40·1	12·0	77·2	0·1–93·3
Coffee and tea	46	113	208	39	68	0–950	44	27·7	33·2	7·1	54·9	0·0–98·7
Cordials	14	23	35	6	40	1–130	22	35·0	31	38·8	53·4	0·0–79·8
Electrolyte and energy drinks	27	46	28	46	23	0–110	27	6·8	4·1	6·0	4·8	0·0–13·9
Fruit and vegetable juices	202	21	63	6	10	0–500	215	10·5	6·4	10·5	2·5	0·0–94·1
Soft drinks	92	8	5	7	6	0–23	92	8·8	4·3	10·5	3·5	0·0–14·0
Waters (flavoured)	16	13	28	1	18	0–113	16	4·7	3·5	5·2	5	0·0–12·8
Sauces, dressings, spreads and dips	610	1422	1982	670	1046	0–16 667	574	14·2	15·6	8·1	17·3	0·0–79·0
Mayonnaise and salad dressings	57	713	625	756	763	0–3400	53	12·1	10·5	13·0	13	0·0–50·0
Sauces	401	1710	2245	833	1616	0–16 667	370	13·5	14·1	7·1	18·1	0·0–79·0
Spreads and dips	152	929	1299	437	632	0–7100	151	16·6	19·8	9·2	18·1	0·0–77·3
Snack foods	268	690	381	670	351	1–4000	240	4·9	5·8	3·6	3·6	0·0–45·0
Special foods	25	103	146	21	168	1–533	20	6·3	7·7	5·3	6·1	0·0–35·0
Sugars, honey and related products	68	41	66	11	46	0–300	64	44·2	26·1	50·0	46·3	1·0–83·3
Dessert additions and toppings	42	43	69	10	64	0–300	41	46·4	25·4	50·0	24·6	1·0–83·3
Honey and syrup	26	39	62	13	25	0–207	23	40·2	27·4	28·0	50·2	7·5–80·9
Total	4083	493	1110	183	516	0–26 000	3955	18·0	21·5	8·7	24·9	0·0–100·0

*'< 1' Na values refer to non-zero Na content for the lowest range to distinguish from actual zero values listed on pack.

nutritional content is key to monitoring policy interventions to improve the nutritional quality of packaged foods in Fiji.

To reduce NCD, Member States of WHO are being urged to reduce salt intake[30]. Many countries are doing this by setting targets to reduce Na (salt) levels in processed foods[31]. Compliance with proposed voluntary Na reformulation targets in Fiji varied, with large differences found between manufacturers and in some food categories. The fact that over half of the products surveyed met the proposed targets also suggests the need for revised, more stringent targets to achieve widespread Na reduction through reformulation[32]. The breadth of the proposed targets is encouraging as food categories with the highest Na content have a proposed reformulation target in line with recommendations[18], with the exception of convenience foods. Increasing stringency in the reformulation targets would therefore require lowering the Na targets in categories where the majority of products are already meeting the proposed Na levels. Ongoing monitoring of Na content is essential if targets are to be met so that manufacturers

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Table 5 Compliance of targeted food categories with voluntary Fijian sodium reformulation targets

Category	Sub category	Reformulation target (mg/100 g)	Total products	Meeting target	
			n	*n*	%
Biscuits	Plain, dry	610	40	28	70·0
	Savoury	800	63	41	65·1
	Sweet, filled	450	135	122	90·4
	Sweet, unfilled	450	100	81	81·0
Canned fish	Fish finger/fillet	350	7	3	42·9
	Mackerel	420	29	19	65·5
	Salmon – pink	430	11	9	81·8
	Sardines	360	11	7	63·6
	Shrimps/prawns peeled cooked/crumbed	350	2	0	0·0
	Squid/calamari	350	1	0	0·0
	Tuna	390	34	14	41·2
Meat & other products	Bacon	1210	1	1	100·0
	Canned meat	540	11	0	0·0
	Luncheon meat	1030	6	3	50·0
	Meat-free products*	480	1	0	0·0
	Salami	1400	6	1	16·7
	Sausages – pre-cooked	650	8	1	12·5
	Sausages – uncooked	650	23	8	34·8
	Sliced meat (ham, beef, chicken)	650	8	1	12·5
Noodles	Instant flavoured assorted – dry	370	40	8	20·0
Sauces & spreads	Asian sauces	4840	92	53	57·6
	Chilli sauce	1600	43	22	51·2
	Gravy Stock	540	33	24	72·7
	Marinade	1600	16	6	37·5
	Mayonnaise	650	16	7	43·8
	Meal-based – curry paste	490	9	3	33·3
	Meal-based sauces – other	800	70	43	61·4
	Meat accompaniment	600	15	13	86·7
	Mustard	1910	25	20	80·0
	Pasta sauce	450	40	30	75·0
	Salad dressing	940	28	18	64·3
	Tomato sauce	750	38	13	34·2
Snacks	Corn chips	560	17	9	52·9
	Extruded	750	78	35	44·9
	Other: dalo, cassava chips etc.	560	8	7	87·5
	Other: rice crackers, popcorn etc.	650	15	2	13·3
	Potato crisps	600	65	36	55·4
	Salt & vinegar	1000	8	5	62·5
	Snack packs – bhujas etc.	650	35	14	40·0
Total			1188	707	59·5

*Plant-based products sold as meat substitutes.

can transparently be assessed for compliance, and the efficacy of a reformulation policy for the Fijian packaged food supply can be assessed over time[30].

A key strength of this research is the highly standardised approach to the collection, processing and evaluation of the data and the extensive range of products captured in line with global protocols[33]. Additionally, this research has conducted the largest survey of packaged food products available for sale in Fiji to date, providing baseline data required to improve the nutritional quality of the Fijian food supply. The results, however, must be interpreted in view of some limitations. While the data are representative of what was on the shelves of the sampled stores during the survey period, they do not represent every food and beverage available in every store throughout the year. In addition, the data illustrate what is available for sale in stores but not what is purchased or consumed, meaning that this research cannot allude to the actual consumption of harmful nutrients and their direct effect on ill-health. That said, the manufacturers included are the major suppliers nationally, and it is likely that the products included in the study would comprise the majority of packaged food available in the country. In the absence of time- and resource-intensive food monitoring such as individual diet surveys or population purchase and consumption data, our survey provides a good indication of the range of packaged food products available in supermarkets. Last, we acknowledge that this study does not necessarily represent what people in Fiji eat daily; however, given evidence of the nutrition transition in Fiji, we hypothesise that assessing and improving the nutritional content of processed packaged foods in Fiji will have beneficial impacts on diets generally.

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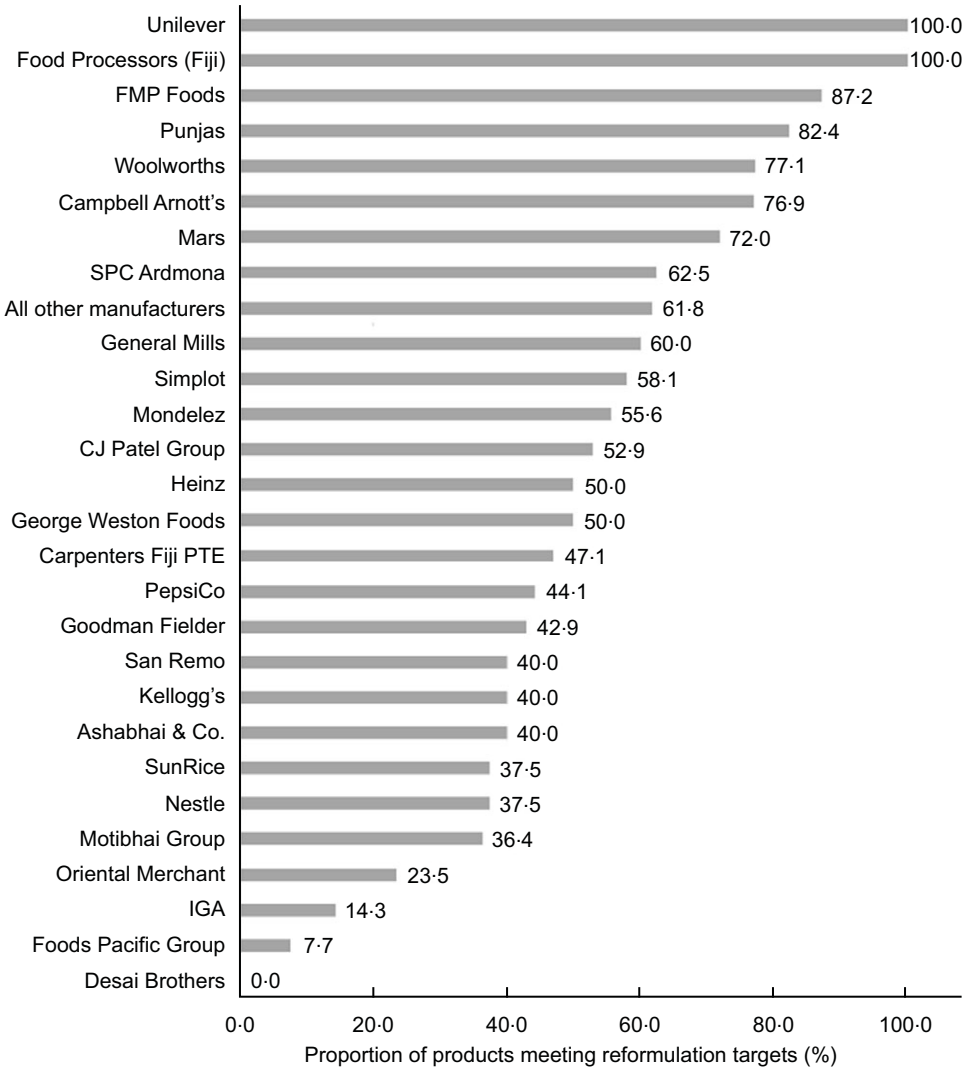

Fig. 1 (colour online) Compliance of International and National manufacturers producing eligible products with voluntary Fijian sodium reformulation targets

Conclusions

There is a great need for the Fijian government to urgently address the healthiness of the packaged food supply in Fiji as diets continue to shift towards more processed, ready-made foods and burgeoning rates of diet-related NCD pose an enormous threat to the economy and health care system in Fiji. There are key opportunities for driving consumers towards healthier food choices and improving the nutritional quality of packaged foods in Fiji by improving nutrient labelling, further enforcing reformulation targets and monitoring changes in food composition, as well as introducing mandatory FoP labels. With strong government support and open transparent monitoring to ensure industry compliance, these measures have the potential to curb the escalating burden of disease associated with poor diets in Fiji.

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the manuscript. A.P. supervised data collection. M.S. carried out data analysis with input from C.J. J.W. and G.W. helped interpret the results. M.S. and G.W. co-wrote the first draft of this research paper. All authors reviewed drafts and agreed the final draft. *Ethics of human subject participation:* N/A.

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