Building an economic case for food interventions in the Pacific

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Abstract

Diet-related health problems are a major issue throughout the Pacific region. Micronutrient deficiencies are widespread and rates of non-communicable diseases are increasing. There is a need for food-related policy interventions to improve the quality of the food supply and to enhance access to a healthy diet. To support the promotion and eventual implementation of these interventions, it is vital that the costs and impacts of the interventions are known. This paper outlines a project being undertaken in the region to develop cost-effectiveness models for food interventions in order to help build the case for action. (PHD 2011; Vol 16(2): p24-29).

Introduction

The Pacific islands are currently suffering a double burden of communicable and non-communicable diseases (NCDs)[1] along with over- and under-nutrition. While some countries such as Papua New Guinea and the Solomon Islands still have relatively low obesity rates with underweight and undernutrition persisting as significant health concerns,[2] other countries, including Nauru and Tonga, are well-known for their high obesity rates. They suffer less from undernutrition, although micronutrient malnutrition problems do persist. [2]

While each of the Pacific Island countries and territories has its own unique food supply and health problems, there are many similarities, including a reliance on imported foods and declining food self-sufficiency.[3] Huge shifts in dietary habits are occurring, with imported products such as rice, bread and noodles replacing traditional staples, meat products replacing fish and sugary products replacing traditional snacks such as fruits. These dietary changes are leading to lower intakes of key vitamins and minerals, and contributing to the high rates of micronutrient deficiencies seen around the region.[4,5] The availability of both food energy and fat/oil have also increased considerably in recent decades[3] and the increasing trade in food parallels increasing energy density[6] (the amount of energy contained in a given volume of food) and consumption.[7]

A range of actions – from fortification to taxation – are needed to improve these diet-related problems, including education, policy and social marketing. Nutrition knowledge and education is considered an important aspect in facilitating dietary change, but is rarely sufficient by itself.[8] Social marketing is becoming more commonly used internationally; it seeks to use marketing practices to encourage health-promoting change in individuals.[9]

Policies can radically change food availability and access and thus change diets.[10] For example, policies affect what foods can be imported and sold as well as the price, availability, marketing and promotion of food. Additionally, environmental and policy interventions generally affect all members of the targeted population and therefore have wide impacts.[11]

There is an urgent need for more policy-based interventions to improve diets related to NCDs and micronutrient deficiencies. While

there is existing high-level commitment in most Pacific countries for actions to reduce these health problems,[12,14] technical and financial problems have hindered progress. Additionally, many policies which can affect food supply lie outside the domain of Ministries of Health[15] in the remit of trade, agriculture, industry and other sectors, and therefore support for policy change is needed from across sectors. There is a need for information on the cost-effectiveness of key food-related interventions to assist with advocacy for support from different sectors and the provision of sufficient funding and to highlight the urgent need for action. There is currently however a lack of locally relevant information on the economic credentials of the various food system options for change.

Building models for the Pacific Islands

In 2009, as part of efforts towards a Regional Food Summit in 2010, work commenced on the development of models designed to determine the costs and benefits of food interventions. The work was commissioned by the Centre for Health Innovation and Partnerships (CHIPS) in Sydney and was undertaken by the Pacific Research Centre for the Prevention of Obesity and Non-communicable Diseases (C-POND), (a joint research collaboration between Fiji School of Medicine and Deakin University, Australia) in conjunction with the University of Sydney. Funding was allocated by AusAID from funds provided for the Food Summit. The intent was to develop models for eight food policy interventions for the region, spanning micronutrients and NCDs. These models were developed to be run with data from individual countries to indicate the potential cost-effectiveness of national interventions.

The project began with the identification of 4 micronutrient-related policies and 4 NCD-related policies. Following discussions with other parties involved in the Food Summit, the following policy interventions were identified as the most valuable to policy makers across the region:

1. **Fortification of flour (iron, folate)**
2. **Fortification of rice (iron, folate)**
3. **Iodisation of salt**
4. **Fortification of oil with vitamin A**
5. **Quality standards on fat content of meats**
6. **Tax increase on high-fat meats**
7. **Tax increase on sugary foods and drinks**
8. **Restrictions on sodium content in foods**

It should be emphasised that the selection of these interventions was in part based on issues to be discussed at the Food Summit, and does not reflect the full range of actions which could be implemented. In particular it was focused on policy interventions, and therefore does not include educational initiatives or the promotion of local foods.

Model development

The project began with consideration of existing models related to these issues. A number of relevant sources were identified from journal articles, grey literature and other sources. The intent was to develop models that were similar in design across the eight topics, and that were as straightforward as possible, user-friendly and which allowed for data limitations in the region. The lead author had previously undertaken related modelling for select NCD-related policy interventions[16] for Fiji and Tonga, and utilised lessons-learnt to assist with the development of these eight models. Existing fortification models from the PROFILES program[17,18] and other sources[19] were reviewed to assist with the model development for fortification.

The next stage was to develop logic models to identify the steps in determining the impact of each policy on health, productivity and healthcare costs (see table 1).

Table 1: Logic models for policy interventions

Intervention	Nutrient	Logic model	Outcomes modelled #
Fortification of flour	Iron	Pregnant women: Iron fortification →↓ iron deficiency →↓ maternal deaths and →↓ perinatal mortality	D, P, H
		All adults: Iron fortification →↓ iron deficiency →↑ productivity	M, P, H
		Children: Iron fortification →↓ iron deficiency →↓ cognitive impairment→↑ productivity	M, P
	Folate	Pregnant women: Folate fortification →↓ folate deficiency →↓ NTDs →↓ disability and deaths	D, M, P, H
		Adults: Folate fortification →↓ IHD and stroke →↓ mortality	D, M, P, H
Fortification of rice	Iron	As above	
	Folate	As above	
Salt iodisation	Iodine	Pregnant women: Iodisation →↓ iodine deficiency levels →↓ mentally impaired/ cretin children →↓ productivity losses	M, P, H
Oil fortification with Vitamin A#	Vitamin A	Pregnant women: Vitamin A fortification →↓ Vitamin A deficiency →↓ maternal deaths and →↓ perinatal mortality	D, P, H
		Children: Vitamin A fortification →↓ Vitamin A deficiency →↓ morbidity and mortality	D, M, H, P
Control of sale of high-fat meats	Fat, saturated fat	Adults: →↓ fat and saturated fat intake →↓ BMI*→↓ NCD mortality and morbidity AND →↓ cardiovascular disease →↓ mortality and morbidity	D, M, P, H
Higher tax on high-fat meats	As above	As above	
Higher tax on sugary items	Sugar	Tax →↓ reduced purchasing →↓ consumption by adults and children Adults →↓BMI→↓ NCD mortality and morbidity	D, M, P, H
Sodium content standards for specific products, resulting in specified reduction sodium intake	Sodium	Standards →↓ reduced intake sodium Adults →↓ cardiovascular disease →↓ mortality and morbidity	D, M, P, H

** D = deaths averted, M= morbidity averted, H = Health care costs saved, P = productivity gains*
NTD: neural tube defects
IHD: Ischaemic heart disease
BMI: Body Mass index

For example, the logic model for fortification of salt with iodine stated that such action would lead to increased iodine intake, leading to reduced iodine deficiency, resulting in reduced mental impairment and cretinism, and improved economic productivity and lowered healthcare costs. Once these logic models were developed, relevant evidence could be sourced from the literature to underpin each of the relationships in the pathway(for example, the impact of salt iodisation on iodine deficiency or iodine intake).

Models were then developed using Microsoft Excel © combined with the @Risk ©, an add-on software package developed by the Palisade Corporation. This software facilitates the calculation of uncertainty estimates around each of the outcomes, thereby enabling an assessment of the level of confidence which we can place in the results. Evidence and country-specific data was used to populate the logic models. The inputs required included demographic data, mortality and morbidity data, gross domestic product, employment rates, rates of micronutrient deficiencies, and cost of health-care and of interventions. Where country level data is not available, assumptions based on similar interventions are made. This is particularly needed for the costing of interventions, as most countries will not have undertaken similar interventions previously.

Model testing

Testing of the models necessitates their running using country-specific data. Working with staff from the National Food and Nutrition Centre in Fiji, a master data spreadsheet was populated. A number of data gaps were identified, where information either did not exist or could not be located in a timely manner. In such instances, evidence was sourced from elsewhere nationally and internationally, and used to guide assumption development.

These preliminary results for Fiji were presented, along with an outline of the process at the Vanuatu Food Summit in April 2010, in order to highlight the value of the approach. These results are not provided here, as work is still proceeding to rectify some of the data gaps. As an example however, use of the models in their preliminary forms, suggested that while salt iodisation might cost up to FJD1.4 million over ten years (including non-government costs), the lifetime productivity savings would be around FJD 3.9 million, with an additional FJD1.7 million saving in healthcare costs.

Model outcomes

For each food policy intervention, the model will be able to identify the costs of the intervention over both a one year and ten year period, expected number of deaths averted, cases of disease averted, expected productivity savings as well as expected healthcare savings. The modelling results will provide decision-makers with evidence on the costs and benefits of various food interventions in their countries to help advocate for policy changes that will improve health outcomes for the people of the Pacific. In the long-term it is important that the impact of any policy change is monitored for impacts. This would allow the validity and accuracy of the models to be assessed, for example, through indicators such as maternal folate levels and neural tube defect incidence rates.

Following the Vanuatu Food Summit presentation, a high level of interest was expressed by a number of Pacific countries in pursuing the modelling for use in their own country. They highlighted the importance of this type of information for policy-making purposes.

Next phase

The next phase of this project is currently under development. It will involve working

with country representatives to complete and run the models using country level data. The intent of this phase is to develop capacity within participating countries to use and interpret the results of the modelling for their own policy purposes.

Such efforts to build evidence-based policy-making capacity in the region are needed to enhance the policy process and to drive positive change for the people of the Pacific.

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1st Year students of 1933

(Source: Fiji School of Medicine Library)

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Tonga began training medical students in 1928. The first four students were selected by a simple procedure. Just before Christmas, at the end of the school term, the Prime Minister's office informed the top two graduates from each of Tonga's two high schools that they were being sent to Suva, Fiji, to become doctors. School term began in January. After only a week's notice, four young men, Sione 'Kuli' Helu, Tamata'ane Tonga, Tevita Silafou Palu and Sione Posesi Fanua were on a boat, steaming to Fiji. Three years later, in 1931, the first Tongans trained in Western biomedical techniques returned home to begin working as doctors.