Food Prices Module

University of Auckland
2016
Version Sample 1
Introduction

There are some aspects of the food price methodology that require further testing and validation (outlined in Appendix 1). This draft protocol for the food prices module will be tested in 3 countries: New Zealand, Fiji and Australia. A final protocol for the Food Prices Module will be written after testing the methodology.

The United Nations acknowledges the enormous burden posed by poor diet, physical inactivity and associated chronic health conditions, and has prioritised the need for an increase in the monitoring of non-communicable diseases (NCDs) and their risk factors (1).

There are many influences on food prices including political, economic, socio-cultural and environmental factors at a local, national and international level (2). Cost is one of the most important considerations for people when purchasing household food (3,4). The relative price of food is important, especially for those on lower incomes, therefore food prices are an important determinant of health and household food security (2). There is a call for economic and fiscal policies to promote the consumption of healthier food with taxes and subsidies on these having the potential to influence consumption (5).

The INFORMAS approach is a step-wise approach to monitoring the healthiness of food environments so a country can choose a level of monitoring appropriate for available resources (i.e., minimal, expanded or optimal approach). The approaches complement, so if possible, a country would undertake all approaches (6). For the food prices module, the minimal approach monitors the cost of a series of healthy and less healthy foods, food groups and meals over time allowing measurement of the impact of food pricing policies implemented in countries. The expanded approach measures the cost of a healthy diet versus the current diet for a reference household for a specified energy requirement. The optimal approach measures the affordability of the healthy diet compared to the current diet through accounting for household income. More details can be found at the end of the Introduction. The relative price of healthy and unhealthy foods can differ depending on the price metric chosen (per 100g, per serve, per energy unit) whereas the price metric for the expanded approach is the total diet. Therefore the minimal approach is better suited for measuring the trends in the price differential over time between healthy and unhealthy foods, than a direct price comparison of healthy and unhealthy foods.

Monitoring tools for food prices need to be cost-effective, simple, valid, reliable and repeatable. To potentially be effective, the measures chosen and the food items selected need to have an associated relevant policy option. Tools need to be relevant at the household level and make use of available data on food consumption (dietary surveys, household budget surveys) and food prices (e.g. food price indices) without the expense of additional intensive household or other surveys. Useful price indicators need to be relevant to nutrition, obesity and non-communicable diseases (NCDs), and sensitive to economic and other changes (7). The price differentials need
to be measured in a comparable way within countries over time and between countries. Choosing an appropriate approach to measure the price differential is a balance between the ease of data collection and the validity, reliability and repeatability of the measures.

For each of the participating countries, the regulatory and policy environments relevant to food prices should be considered, including the structure of food pricing, taxes, exemptions and subsidies (7).

The aims of this (draft) protocol are to detail the methods to systematically and consistently collect and analyse information on the price of foods, meals and affordability of diets in different countries globally. The draft protocol covers the underpinning aims and rationale for the monitoring, definitions, sampling design and methods, data collection, data collection templates, data analysis and reporting. This draft protocol will be tested and validated in New Zealand, Fiji and Australia and outcomes will be used to finalize the protocol.

**Minimal approach**

The minimal approach:

- Includes commonly consumed foods, food groups and meals.
- Has four components, each with a different monitoring objective.
- Enables comparison over time (most important) of the change in price between healthy and unhealthy foods, food groups and meals.
- Allows comparisons between countries for the change in price differential over time.
- Allows the price differential between pairs of healthy and less healthy foods and types of meals to be measured.
- Is simple and cost-effective to implement.
- Is sufficiently comprehensive, valid and reliable to allow for robust monitoring.

Four components are recommended for the minimal approach. Each component will contribute to the research question: does healthy food cost more?

1. Pairs: Comparing the cost of pairs of healthy and less healthy foods is a common comparison used in assessing foods. The cost of pairs of similar items with a difference in nutrient content are compared (for example, wholemeal bread, white bread).
2. Food Groups: The average price changes over time for a list of healthy (core) foods from the five core food groups (fruit, vegetables, grains, dairy, meat and alternatives, fats and oils) are compared to a list of unhealthy (energy-dense, nutrient-poor) foods high in saturated fat, sodium, added sugars.
3. Degree of processing: The changes in the average price over time are compared for lists of minimally processed foods, processed foods and ultra-processed foods,
4. Meals: The costs of a set of popular takeaway meals, equivalent healthier home-cooked meals and equivalent home-assembled meals (using partially prepared processed ingredients), are compared.

**Expanded Approach**

The expanded approach collects data to assess the differential between the cost of ‘healthy’ and current, diets for a standard reference household (2 adults, 2 children). The nutrient-based and food-based dietary guidelines of a country and commonly consumed foods, as derived from dietary surveys or other sources (eg Household Expenditure Surveys), will be used to inform the food items chosen for the healthy menu plans. The current menu plans will be constructed from commonly consumed foods and the consumption of current food group and nutrient intakes identified from national survey data. The menu plans will be developed into shopping lists and priced.

**Optimal Approach**

The optimal approach builds on the expanded approach assessing the affordability of the ‘current’ and ‘healthy diets’ at the household level. Food affordability will be measured by comparing the cost of the diet for a week to the median disposable household income for the reference household.

**Definitions**

**Foods**

- Foods: Includes foods and beverages for sale when referred to in the protocol.
- Fruits: Fruit juices are not included.
- Vegetables: A range of different types and colours including starchy vegetables.
- Grains: breads, rice, pasta, other grains, breakfast cereals, bakery goods.
  Refined grains are highly processed grain (cereal) foods where the outer layer of the grain is lost during processing. Whole-grains use every part of the grain including the outer layers, bran and germ regardless of whether the grain is in one piece or milled into smaller pieces (8).
- Meat and alternatives: lean red meat (beef, pork, lamb etc), poultry, fish, shellfish, legumes, and nuts.
- Processed meats: smoked, cured, salted or chemically preserved(9).
- Milk, yoghurt, cheese: full-fat and reduced-fat.
- Core food groups: Foods that form the basis of a healthy diet according to food-based dietary guidelines.
- Unhealthy foods: Energy-dense, nutrient-poor food and drinks not recommended to provide the nutrients the body needs, tend to be high in saturated fats, sugars, salt and/or alcohol and energy dense. See Appendix Two for a definition and categories.
Meals

- Fast food or takeaway: Without wait service, meals obtained quickly, purchased in self-serve or carry-out venues.
- Restaurant or café: May have wait service.
- Meal: has a serve from two (or three) food groups or more. Represents about 25-30% of daily energy (600-800kcal) (or 25% energy). At least 200g. There is a protein, starch and vegetable component. Does not include dessert, drinks or entrees.
- Ready-meal: purchased from the supermarket pre-prepared, consumed as packaged, little or no cooking time.
- Convenience meal: utilising pre-prepared items and ingredients that require minimal preparation, need to be assembled and heated or cooked at home (unless eaten cold).
- Home-cooked meals: prepared, assembled and cooked at home. Some pre-prepared items may be included that most people would not prepare themselves, such as buns and sauce. No items from a fast-food outlet.

Diets

- Dietary guidelines: sets of advisory statements that give dietary advice for the population in order to promote overall nutritional well-being and to address all diet-related conditions, expressed in technical nutrition terms or food groups (10).
- Dietary principles: guidance that is representative of global advice for dietary patterns compatible with good health.
- Commonly consumed foods: foods that are either frequently consumed, or consumed in large quantities by the majority of the population.
- Reference household: household with specified members, usually 2 adults and 2 children.
- Menu: a plan of foods required for all meals and snacks for a person or household for a specified time (2 weeks).
- Current diet: country’s usual population diet including the most common foods and beverages consumed by the reference household over 2 weeks including details on the current intake of food groups, average energy intake and consumption of macronutrients, fibre and sodium. Taking into account macronutrients is optional.
- Healthy diet: diet including the foods and beverages consumed by the reference household over 2 weeks that meet energy requirements, selected nutrient reference values and recommended consumption of key food groups.

Affordability

- Food affordability: The cost of a food basket as a percentage of household income.
- Gross Household Income: wages and salary, government transfers, self-employment, capital and property income, private pensions, private transfers,
social security transfers from public sources, taxes and social security contributions paid directly by households. Excludes employers’ contributions to social security.

- Disposable household income: Gross household income minus taxes and social security contributions paid directly by households.
- Equivalised household income: Household income adjusted by an equivalence factor for economies of scale of living in a household.

**Methodology: Rationale & Data Collection**

All countries participating in INFORMAS should endeavour to conduct the minimal approach. This involves constructing lists based on commonly consumed foods and meals and collecting the prices of these foods and meals. If the required information on food and nutrient intakes is available, the expanded and optimal approaches can be conducted.

The World Health Organization global strategy on diet and physical activity (11) recommends to: shift fat consumption away from saturated fats to unsaturated fats, eliminate trans-fatty acids, increase consumption of fruits and vegetables, legumes, whole grains and nuts; limit the intake of free sugars and salt.

INFORMAS identifies unhealthy foods as ‘high in energy density, saturated fat, trans fat and added sugar, added salt and/or alcohol’. The food prices module will focus on saturated fat, total sugar, sodium and wholegrains (fibre). Nutrient information on trans fat is not readily available for many foods.

**Country contextual analysis**

We advise each country to conduct a country contextual analysis including country-specific information as outlined in the text box below. Please note that a country contextual analysis may already have been undertaken for INFORMAS, so please check existing INFORMAS documents before commencing this analysis. While the focus is on foods and dietary patterns that contribute to the risk of NCDs, it is useful to document if a country has any public health nutrition issues such as micronutrient deficiencies or fortification programmes.

**Information to collect**

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xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

**Time of year for monitoring**

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**Commonly consumed foods**

Commonly consumed foods need to be identified to ensure that the collected food price data reflect usual food consumption within the country and are available to price in retail outlets. The information available to determine the commonly consumed foods and the number of commonly consumed foods will vary between countries. Commonly consumed foods may be identified from nutrition survey micro-data, a household expenditure survey, a food frequency questionnaire or market research data.

Commonly consumed foods may not contain a sufficient selection of healthy foods for the lists and menus. These could be derived from foods most commonly consumed by those meeting dietary guidelines (if sufficient numbers), foods that are recommended for healthy eating based on a country’s dietary guidelines and/or based on evidence of the relationship between diet and health, staple foods or foods typical of a specified diet pattern.

**Identify commonly consumed foods and takeaway meals**

1. Identify sources of commonly consumed foods. Recent nutrition survey data is most useful as it provides consumption data. Use as many sources as required to identify common foods.

   a. National Nutrition Survey - the usefulness of survey data depends on how food items are named and grouped. Some nutrition surveys ask for the source of the food consumed so it may be possible to identify foods purchased at fast food and takeaway outlets.
   b. Household Expenditure Survey, Consumer Price Index, Food Price Index
   c. Market research data
   d. Other market baskets
   e. Consultation with experts

2. Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

**For full details request access to the full protocol**

**Information required for each food item:**
For each food item collect:

Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

**For full details request access to the full protocol**

**Limitations**
The data available on commonly consumed foods requires estimation and assumptions. Similar foods reported in a nutrition survey may be assigned different
codes, for example a rice and chicken dish could be coded to the individual food groups of the individual ingredients, by the main ingredient, which could be rice or chicken, or as a mixed dish. If Household Expenditure Data (HES) data are used then it is the expenditure on the food, rather than the amount purchased that is reported. Therefore a cheaper food item may be under-represented. The (crude) price of the food could be matched to expenditure to calculate quantity, but usually there is a wide range of products and prices making up the food group reported, for example cheap and expensive cuts of meat or different brands of a food product.

Table 1 Sources of information for commonly consumed foods

<table>
<thead>
<tr>
<th>Type</th>
<th>Potential usefulness</th>
<th>Type of data required to be useful</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Nutrition Survey</td>
<td>Most useful source if reasonably current (within ten years) as indicates actual consumption overall and by age/gender.</td>
<td>Foods need to be coded in a way to be able to identify and count the frequently consumed foods at food product level e.g. toasted muesli, not breakfast cereal.</td>
</tr>
<tr>
<td>Household Expenditure Survey</td>
<td>Very useful as provides expenditure data from all sources. Data unlikely to be available at level of disaggregation required. Unable to differentiate age/gender.</td>
<td>Foods need to be sufficiently disaggregated to be able to identify foods at a level at which decisions can be made for the food selection.</td>
</tr>
<tr>
<td>Food Price Index</td>
<td>Very useful as foods are selected based on foods identified as having a high expenditure or frequency from HES. Only provides information about a limited number of foods.</td>
<td>Foods need to be sufficiently disaggregated to be able to identify foods at a level at which decisions can be made for the food selection.</td>
</tr>
<tr>
<td>Market research Data</td>
<td>Very useful to provide details on popular brands. May not provide information on produce (fruit, vegetables, meat, fish). Very expensive. Euromonitor(12) data available for some countries</td>
<td>Useful if details on brand and type of product, e.g. Sanitarium toasted muesli, not Sanitarium breakfast cereal.</td>
</tr>
<tr>
<td>Current food price monitoring tools, e.g. food basket, total diet survey</td>
<td>Useful to cross-check with other sources. Usefulness will depend on the source of the foods for the tool. May only provide information on a limited number of foods. May differentiate age/gender</td>
<td>Foods will be described at the level required for the shopping list.</td>
</tr>
</tbody>
</table>
Collecting till receipts at supermarkets

<table>
<thead>
<tr>
<th>Collecting till receipts at supermarkets</th>
<th>Collecting till receipts at supermarkets</th>
<th>Collecting till receipts at supermarkets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Useful if no other sources of information. Potentially time-consuming. Only captures products purchased in supermarkets by a select group who may not represent the wider population.</td>
<td>Data is from point of purchase so foods will be described at the level required for the shopping list.</td>
<td></td>
</tr>
</tbody>
</table>

**Expert consultation**

Useful for cross-checking other methods or when no other data sources are available, particularly for a specified population. Can be relatively quick to conduct.

Can provide details on items but not backed by data.

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**Minimal approach**

The monitoring for the minimal approach aims to establish the relative change in price differential between ‘healthy’ and ‘unhealthy’ foods, food groups and meals within and across countries over time.

1) Healthy and unhealthy food groups: relative change in price over time.
2) Degree of processing: food groups classified by the degree of processing
3) Pairs: indicates whether manufacturers are pricing the healthy option differently.
4) Meals: price differentials between takeaway meals, convenience meals, and home-cooked meals.

**Objectives**

1) Contribute to answering the research question – ‘Does healthy food cost more?’
   a) within countries.
   b) between countries
2) Determine the relative difference in the change of the mean price of healthy (core) food groups and unhealthy food groups over time
3) Determine the relative difference in the change of the mean price of food groups according to the degree of processing over time
4) Determine the price differential between policy relevant pairs of healthy and less healthy foods that are direct substitutes with clear nutritional differences.
5) Determine the price differential between a common takeaway meal, its home-cooked equivalent and a home-prepared meal of processed ingredients.
6) Identify and compare the relative tax component of healthy and unhealthy foods and meals
7) Identify the effects of economic and fiscal policies on prices of different foods, food groups and meals (details depend on the specific policy introduced).
8) Inform the development of appropriate and effective fiscal options to encourage consumption of healthy foods and meals, and reduce consumption of less healthy foods and meals.
The four components of the minimal approach each contribute to the overall research question by providing different perspectives on the cost of food. For each measure, the relevant policy action should be considered.

There are four different potential comparisons to make (listed in detail below):

1. Healthy and unhealthy food groups
2. Comparing level of processing
3. Comparing food pairs
4. Comparing meals

**Healthy and Unhealthy Food Groups**

*What is the change in price differential over time between healthy and less healthy food groups?*

Healthy (core) foods are those recommended in food-based dietary guidelines. Unhealthy foods are energy-dense, nutrient-poor foods and drinks high in fats and/or refined sugars or sodium that increase the risk of non-communicable diseases (13). Unsaturated oils and spreads are part of a healthy diet so are a separate group within the core foods.

The average cost of healthy food groups and unhealthy food groups will be monitored over time. The cross-sectional comparison between the average costs of healthy versus unhealthy foods is relatively meaningless. The comparison really only has value when the changes in average costs are followed over time. The total cost of the foods in the healthy and the unhealthy lists is not used because this is heavily influenced by the number and size of items within each list. There is no anchor to determine the number of items placed in each list.

Food items may be priced differently relative to other food items in different countries due to differences in agriculture, cuisine, culture, food habits and income. When monitored over time, relative differences in price changes between food groups can be identified and used to advocate for fiscal policies for specific foods.

The healthy food groups and the unhealthy groups need to have a minimum number of foods so the average price per group is not skewed by one particularly cheap or expensive item. This will differ for food groups depending on the range of products available and is likely to vary between countries. An estimate of the minimum number is provided in Appendix Two. *As part of testing the methodology, the minimum number of foods required for monitoring will be investigated and discussed in the final protocol.*

Takeaway foods can contribute a high proportion of the cost of food lists because the items have large serve sizes and may be expensive, therefore the comparison of takeaway meals with equivalent home-cooked meals is another component of the minimal approach. Alcohol can contribute a lot to energy and expenditure in some countries. The unhealthy food group can be analysed with and without takeaway
items, and with or without alcohol, as the price of these may alter the average price considerably.

The relative price difference can be calculated overall (healthy, unhealthy) and for specific food groups.

Degree of Processing

*What is the change in price differential over time between minimally processed, processed and ultra-processed foods?*

A range of natural or minimally processed foods, predominantly of plant origin, is the basis of healthy diets (14). Ultra-processed foods are typically energy dense high in saturated fat, trans fats, free sugars, sodium and low in nutrient density. This classification system is used in the new Dietary Guidelines for the Brazilian population (14). See Appendix Two for a full definition and additional examples of foods from each food group.

The *processing component* compares the relative difference in the change in the average cost of food groups classified by the degree of processing, over time and between countries. This approach will be particularly useful for countries in nutrition transition to monitor changes in the cost and availability of processed foods compared to minimally processed foods. Foods are classified according to the classification system used in the Dietary Guidelines for the Brazilian population (14), rather than the contributing nutrients and food types. Food processing is defined as ‘all methods and techniques used by industry to turn whole fresh foods into food products’. Energy-dense snacks and fast-food and sugary drinks are key drivers of obesity and associated non-communicable diseases. An increase in per capita sales of ultra-processed products is associated with an increase in BMI in OECD (15) and Latin American countries (16).

<table>
<thead>
<tr>
<th>Degree of processing</th>
<th>Definition</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural or minimally processed foods</td>
<td>Natural foods have not been altered following their removal from nature.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minimally processed foods have undergone minimal processing and have no</td>
<td></td>
</tr>
<tr>
<td></td>
<td>added oils, fats, sugar, salt or other substances.</td>
<td>Vegetables, fruit, rice, whole-grains, flour, pasta, unsalted nuts, meat,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>poultry, legumes, eggs, plain yoghurt, fresh milk,</td>
</tr>
<tr>
<td>Processed culinary ingredients</td>
<td>Products extracted from natural foods or from nature. Used to create</td>
<td>Oil, fats, sugar, salt,</td>
</tr>
<tr>
<td></td>
<td>dishes and meals.</td>
<td></td>
</tr>
<tr>
<td>Processed products</td>
<td>Products manufactured by industry from natural or minimally processed</td>
<td>Vegetables preserved in salt or vinegar, fruits preserved in sugar,</td>
</tr>
<tr>
<td></td>
<td>foods</td>
<td>salted, smoked or</td>
</tr>
</tbody>
</table>
with the addition of salt, sugar, oil etc. | cured meat or fish, cheeses, breads (wheat flour, yeast, water, salt).
---|---
Ultra-processed products | Industrial formulations made from substances extracted from foods, food constituents or synthesised from food substrates. | Soft drinks, takeaways, sugary baked goods, ice-creams, sweetened breakfast cereals, cereal bars, sweetened yoghurts, ready-to-eat meals, confectionary.

Adapted from Dietary Guidelines for the Brazilian Population (14)

**Pairs**

What is the price differential between direct food substitutes with clear nutritional differences?

The *pairs component* indicates whether manufacturers are pricing the healthy option differently. In most countries this component will exclude some key food groups as there are few less healthy fruits and vegetables, and few healthy takeaway items. The *pairs component* can identify the relative price differential between a *more healthy* and *less healthy* item, and monitor the price differential over time.

The number of pairs in each country will depend on the food supply, particularly whether healthier options are offered. Each pair should be compared individually. The total price of the healthy items of the pairs will not be compared with the total price of the less healthy items. Some items defined as ‘less healthy’ (e.g. white rice) may be more desirable in a healthy diet than some items defined as ‘more healthy’ (e.g. lite soy sauce). It is the relative difference between each pair that is to be considered. Suggested pairs, including those commonly used in published studies, are outlined in Appendix Two.

**The key criterion to choosing pairs is that it relates to a potential policy option.**

Each member of the pair should:

Xxxxxxxxxxxxxxxxxxxxxxxxx
Xxxxxxxxxxxxxxxxxxxxxxxxx

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**Meals**

What is the price differential between a common takeaway meal, its home-cooked equivalent and a home-prepared meal using processed ingredients?

Xxxxxxxxxxxxxxxxxxxxxxxxx
Table 3: Characteristics of each component of the minimal approach

<table>
<thead>
<tr>
<th>Food Groups</th>
<th>Degree of processing</th>
<th>Pairs</th>
<th>Meals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Includes all foods</td>
<td>Includes all foods</td>
<td>Lack some core food groups, e.g. fruit, vegetables, egg, legumes.</td>
<td>Meals will include at least 2 or 3 food groups.</td>
</tr>
<tr>
<td>Clear differentiation between healthy &amp; unhealthy.</td>
<td>Classified by degree of processing relating to addition of salt and sugar.</td>
<td>Differentiated between each pair. Some core foods defined as less healthy.</td>
<td>Home-cooked meals meet criteria for healthiness.</td>
</tr>
<tr>
<td>Price of takeaways and alcohol is often more expensive than other items per serve and per 100g so can skew cost of food group.</td>
<td>Alcohol a separate group. Price of takeaways is often more expensive than other items per serve and per 100g so can skew cost of food group.</td>
<td>May lack takeaways if no realistic option for the healthy pair. Alcohol not included.</td>
<td>Allows separate comparison of takeaways with meals. Alcohol not included.</td>
</tr>
<tr>
<td>No anchor so need to measure the average cost per food group.</td>
<td>No anchor so need to measure the average cost per food group</td>
<td>Anchored by a similar food in each pair.</td>
<td>Anchored by a similar weight (within 10%) for each equivalent meal.</td>
</tr>
<tr>
<td>Some items classified as processed may be recommended in food-based dietary guidelines.</td>
<td>Need to ensure pairs are realistic.</td>
<td>Does not include cost of transport or time to purchase takeaway meals.</td>
<td></td>
</tr>
</tbody>
</table>
Checklist of information/data required for minimal approach

Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

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Expanded Approach

Objective
Determine the price differential between a healthy and the current diet.
  i)  within countries over time
  ii)  between countries

To provide the relative cost difference of the healthy diet with the current diet, diets should be constructed with a healthy diet based on nutrient-based and food-based dietary guidelines and energy requirements and a current diet constructed from commonly consumed foods meeting the current energy and nutrient intake identified from nutrition survey data. The expanded approach uses the total cost of the diet as an anchor (and price metric) with a reference household as the denominator. All food groups, snacks and takeaway foods can potentially be included in the expanded approach if they are commonly consumed and are part of either a healthy or current diet.

The diets need to be representative of foods commonly eaten, consisting of those foods that will affect the majority of people if the prices change. The robustness of the expanded approach is limited by the quality of the data to inform the selection of foods and to describe the current eating patterns and nutrient intakes. Varying methodology leads to varying results (28) so a standardised methodology will allow valid comparisons over time and between locations.

Ideally, recent food consumption surveys would inform the composition of the diets (baskets), however as these surveys are expensive, there may not be recent data, or children may not have been included in the survey.

Studies comparing the cost of healthy versus current diets do exist, where most studies take the approach of costing a basket of healthy foods (29) . This method compares the cost of a healthy basket (based on dietary guidelines) with the cost of a current diet (current basket). However, these baskets are not routinely monitored. A few studies have compared the cost of ‘healthy’ with current ‘unhealthy’ diets.

Linear programming (mathematical optimization models) can be used to define baskets of food that meet nutrition recommendations for minimum cost using
nutritional and food habits constraints to generate a pattern following Nutrient Reference Values and dietary guidelines while incorporating familiar foods (30).

Appendix Three provides an overview of the data required to implement the expanded approach.

Reference Household

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Energy Requirements

A common height will be used for each member of the reference household based on a national health survey. If a country does not have data on mean height the estimated average height across the world is 1.73m for men and 1.60m for women (31).

There are two possible methods for estimating the energy requirement.

Dietary Targets:

Healthy diet

Food-based dietary guidelines have some common themes but different dietary patterns can be compatible with recommended nutrient intakes based on the country’s culture, ethnicity and local foods (10). The main food groups in the Food Based Dietary Guidelines are often similar but due to differences in the type of foods within the main food groups the recommended amounts may differ.

A country should use its own food-based dietary guidelines when constructing the healthy basket, or guidelines from a similar country. If these are not available, or are not in sufficient detail, then the INFORMAS dietary principles can be followed.

Dietary principles for the INFORMAS food prices module are based on the WHO Regional Office for Europe CINDI dietary guidelines (37)and the World Health Organization Population Nutrient Intake Goals (38)

Dietary principles:
At least 400g fruit and non-starchy vegetables
- About half of energy from grains with two-thirds wholegrain.
- Use moderate amounts of meat, seafood, poultry and alternatives with the relative proportions depending on the country’s key foods. Choose foods with minimal processing and low saturated fat.
- Milk and dairy – include lower fat products. Include calcium-rich foods if milk products are not commonly consumed in the country.
- Fats and oils – include the common unsaturated fats or oils used in the country.
- Added sugars – limit foods with added sugar.
- Added salt – limit foods with added salt.
- Energy-dense, nutrient-poor foods – do not include.

If quantitative advice on amounts of food groups to be consumed is provided by an individual country’s food-based dietary guidelines, then determine the amount (grams, # serves) of each food group (or sub-group) required to meet the diet. For example, 455g per week red meat, 7 eggs per week, 60g nuts/seeds per day.

If proportions are recommended (half your plate is vegetables) rather than quantitative advice, the amount would need to be estimated with assumptions required on the weight of serve sizes corresponding to the recommended proportion.

In a country where few people follow food-based dietary guidelines, if there are very few healthy commonly consumed foods then use survey data to identify the foods commonly consumed by those who meet food-based dietary guidelines. Potential markers from dietary habits or food frequency questionnaires could be considered, for example, meet fruit and vegetable guidelines, use wholegrain bread, use trim milk.

To provide a clear contrast between the current and healthy baskets, the healthy basket will not have energy-dense, nutrient-poor snack foods and meals. Commonly consumed healthy convenience foods can be added. *A healthy basket with and without convenience foods will be constructed when testing the methodology in New Zealand and Australia.*

**Current diet**
The current diet reflects food currently consumed. The ideal method to obtain this information is by using recent *nutrition survey data* which allows identification of food group consumption, proportion of energy-dense, nutrient-poor foods consumed, nutrient intakes and commonly consumed foods

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Xxxxxxxxxxxxxxxxxxxxxxxxxx

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**Nutrients**

A country should use its own Nutrient Reference Values when available, or use the WHO Population Nutrient Intake Goals, and WHO/FAO Recommended Intakes for Vitamins and Minerals. The WHO Population Nutrient Intake Goals (38) provide a range or a minimum or maximum amount so there is some flexibility for different dietary patterns.

Identify the average current nutrient intake and Nutrient Reference Value for the relevant age/sex group of each member of the reference household for: energy, fat (g, % energy), carbohydrate (g, % energy), protein (g, % energy), saturated fat (g, % energy), fibre (g), sodium.

The micronutrients selected will depend on the public health concerns for the country, available nutrient intake and food composition data. Suggested micronutrients are: calcium, iron, zinc, potassium, vitamin A, folate, vitamin C, iodine.

**Healthy Basket**

The healthy menu will meet the identified Nutrient Reference Values where feasible. Use Suggested Dietary Target for macronutrients. It is recommended to use RDIs and AIs rather than Estimated Adequate Requirements for planning nutrient intakes (IOM 2006). Most healthy baskets in the literature are constructed to meet 95-100% of RDIs though it is noted that if a nutrient is particularly difficult to meet (eg Vitamin E, zinc, potassium) then the target is relaxed.

---

**Recommended Dietary Intake (RDI) or Recommended dietary allowance (RDA) or Recommended Nutrient Intake (RNI)** ‘is the daily intake, set at the Estimated Adequate Requirement plus 2 standard deviations (SD), which meets the nutrient requirements of almost all apparently healthy individuals in an age- and sex-specific population group’ (44).

**Adequate Intake:** ‘The average daily nutrient intake level based on observed or experimentally-determined approximations or estimates of nutrient intake by a group (or groups) of apparently healthy people that are assumed to be adequate ’ (44). The European Food Safety Authority (45) has established dietary reference values for the intake of carbohydrates, dietary fibre, fats and water and is developing DRVs for vitamins and minerals.

The WHO target for sodium is no more than 2000mg per day (46). Healthy diets should aim to meet this target though healthy food baskets developed in western countries do not always meet the respective country’s sodium recommendation.
Current Basket
The information on current nutrient intake may be out-dated. The weight or volume consumed from the core food groups may not be reported. Therefore other data, such as dietary habits questions, may be required to guide construction of the menu, for example, the percentage of people consuming wholegrain bread. As the questions are not quantitative, assumptions are required to estimate proportions or quantity. The intake of micronutrients from the survey could be used as a cross-check, however micronutrients may be provided by fortified food high in sugar, fat or salt, or by core foods.

If nutrition surveys have not been conducted for children then the information will need to be extrapolated from adult surveys, which will not account for differing eating patterns. Health surveys, small surveys or expert opinion may inform how the dietary patterns of children differ from adults.

Representative diets

Some countries may choose to develop more than one basket if eating patterns of ethnic groups are distinctly different and the necessary survey data is available by ethnicity. The baskets could be constructed using local experts and members of the ethnic group. For between-country comparisons, the average cost of the baskets weighted by population will be used as a comparator.

Other costs

To prepare foods, a household requires knowledge, skills in food production, time, kitchen equipment, storage, space, cooking fuel, and access to food stores (25). There are cost-time trade-offs involved in purchasing and preparing a nutritious diet. Time is not usually factored into the price of food preparation and the evidence to do so is limited. A limitation of the expanded approach is that the potential time to purchase and prepare a healthy diet compared to purchasing takeaway items or the current diet is not measured. The cost to prepare the USDA Thrifty Food Plan was met by 62% of low-income households but when the time costs were included only 13% could purchase the required foods (47). The edible portion of the food and beverage is used, but additional wastage in the home is not accounted for.
Select nutrient targets and energy requirements

**Reference Household**
The reference household is the same for each country.
Four-person household: girl 7 years, boy 14 years, women 45 years, man 45 years.
One-person household: man 45 years.

**Healthy basket**

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Dietary patterns

**Healthy basket**

1. The healthy diet will be guided by the food-based dietary guidelines of the country. The following principles can be used as an alternative or in conjunction with the country’s own guidelines.

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**Current diet: Identify current patterns**

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Develop a menu plan that meets dietary targets or current nutrient intakes for each age/sex group

**Healthy diet:**

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**Current diet:**

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Both menus
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XXXXX

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Guidance for menu construction
XXXXX
XXXXX

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Analyse nutrient profile of menus
XXXXX
XXXXX

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Validation of menu plan
XXXXX
XXXXX

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Convert to a shopping list.

Use the excel worksheet to calculate the following.

XXXXX
XXXXX

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### Optimal Approach

#### Objectives

1. Determine the affordability of a healthy and the current diet:
   - a) within countries over time.
   - b) between countries.

2. Identify and compare the relative tax component of healthy and current diets:
   - a) within countries over time.
   - b) between countries.

3. Identify the effects of economic and fiscal policies on the cost and affordability of healthy and current diets.

4. Use affordability to inform the development of appropriate and effective fiscal options (taxes and subsides) to encourage consumption of healthy diets, and reduce consumption of unhealthy diets.

#### Measurement of household income

Food affordability requires a benchmark to evaluate the adequacy of income to purchase a standard basket of food within the context of the household (55). Affordability of food is measured by calculating the cost of a food basket as a percentage of income. Affordability of food baskets can only be compared if the same measure of income is used. The benchmark used by INFORMAS is the **median disposable household income**.

Household income is the best measure to use for affordability (56) as it reflects the total income of the household. Wages may not be a representative measure of income, particularly amongst emerging and developing economies, as self-employment can be a major source of income (57). Many countries have household economic surveys, which usually includes income, though definitions of income may vary. Household income is the most common measure of economic wellbeing, for which comparable data for all OECD countries are available based on a common set of statistical conventions (56).

Household income survey data can be reported differently between countries. Income can be reported as gross or disposable (after tax), equivalised or not, per capita or per household size or per household. Household income may not be reported for different household sizes. It may be necessary to obtain further data or classification from the agency that collects and reports the data.

Median household income is preferable compared to mean household income, as median income is less influenced by high and low values.

Disposable income is preferable as it represents the income available to a household after deduction of income tax and transfers such as pension contributions, employment insurance contributions, union and professional fees, child/spousal
support payments and work-related child care expenses (58,59). Data on disposable income is not reported for some countries (57).

**OECD Income Definition**
OECD defines disposable household income as ‘the sum of wages and salaries, mixed income, net property income, net current transfers and social benefits other than social transfers in kind, less taxes on income and wealth and social security contributions paid by employees, the self-employed and the unemployed’ (60).

**OECD equivalised income**
A major determinant of economic wellbeing is the level of income that a household receives. Income is usually received by individuals and shared within the household amongst adults or dependent children. There are economies of scale when living together in a household. Therefore using the household as the unit of analysis rather than the individual reflects distribution of income. Equivalised disposable income allows households of different size and composition to be compared, reflecting the need for a larger household to have a higher level of income to achieve the same standard of living as a smaller household, and the lower material needs of children. Equivalence scales are applied to indicate the economic resources available to each individual within a household (57). The adjustment used by the OECD in reporting median disposable household income is the square root of household size, so will be used in this methodology.

**Calculating Household Income**

**OECD countries**

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**Price Collection All Approaches**

**Retail and Fast Food Outlets**
Identify the type of outlet where products are usually purchased. In some countries, supermarkets are the main retail outlets for food purchases. In other countries, markets or specialist shops are common outlets to purchase fresh produce (eg vegetables, fruit, seafood, meat, bread). The price may vary between the type, size and location of stores.

Retail outlet selection is a balance between time and robustness. The selection procedure will depend on the retail environment in a country and may differ between geographic locations within a country. Principles have been developed to guide selection rather than a specific process. The selection needs to consider that
the retail outlets will be visited over time and that those with a high volume will capture more of the food purchased by the population. This INFORMAS draft protocol outlines monitoring of food prices for a country overall, however an individual country may be interested in the price of foods by geographic location, urban or rural or the income level or ethnicity of a neighbourhood. Enumerating retail outlets can be time-consuming, especially over a large geographic area when it may be difficult to check the outlet is still open. Methods used to select stores have been to enumerate all outlets and randomly select, convenience sampling, one outlet from each chain chosen, the largest supermarket in the region or popular outlets.

**Principles for retail outlet selection:**

For full details request access to full protocol

**Product Collection**

The price may differ between different brands of a food item, by package size and whether it is discounted. The cheapest brand represents the cheapest available price to consumers. The most popular brand is most representative of the price that consumers pay. Discounts are common and price is a factor in choosing products, though brand loyalty is also important for some products. The sampling protocol needs to specify a brand to select or range of brands and the package size. The product needs to be available in most stores nationwide, though if regional brands are common this may not be possible. In countries where bartering is common, the final price is the price collected.

The quality of fruit and vegetables must be reasonable. Some studies have used measures of food quality though these are prone to inter-observer variance (personal communication – A Lee).

Some foods have one common package size (loaf of bread) while others are available in a variety of sizes (tin of tuna, coke) so it may be difficult to determine which is the most representative. Shelf space and placement can be a useful guide. The package size chosen reflects the amount required in the shopping list, and a common or medium package size. A bulk package size should not usually be chosen, unless the item is required in this amount, or the package size is a common size purchased.

The price of one brand of a food item could be collected, or a range of brands to represent one food item and the average price calculated. A recommendation will be made following the testing of the methodology.
When averaging the price of a number of brands of a food item, it is important that the products are similar. For each packaged product that may differ, state a range that the nutrient of interest must fall between. The range can be absolute (g, mg) or relative (percentage). The variability in nutrient content between items will differ between food items so it may not be possible to set one range for all items. A database of NIP label information or a food composition database can aid in identifying the variability. It is important to collect the specified brand as the nutrient analysis to meet targets depends on this. If a different product is available (eg not fortified with iron, higher in sugar or salt) then this will change whether the diet meets the targets.

Validation is required if there is a need to check that the food price surveyor has actually undertaken the work, or to check that the same price is identified when following the protocol. Validate food price data by having another person collect prices from a subset of stores on the same day. It is useful to test the instructions are specific enough to ensure the same product and price is chosen each time. Inter-observer variation can be reduced by sufficient training, and by a protocol that specifies the product to price with a process to follow if the product is not available.

**Product and price selection**
Collect the cheapest price

For the pilot, collect the following prices:

Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

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Details
Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

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Process
1. Gain permission from the manager of the retail outlet.
2. Validate the price collection if required. Sampling design and methods

Potential sampling scenarios
As a minimum the prices of 3 major supermarkets in the largest city will be collected.
Analysis

Data analysis

XXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXX

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References


(14) Brazil. Ministry of Health of Brazil. Dietary Guidelines for the Brazilian population. 2014.


(44) NHMRC. Nutrient Reference Values for Australia and New Zealand. 2006.


(47) Davis GC, You W. Not enough money or not enough time to satisfy the Thrifty Food Plan? A cost difference approach for estimating a money–time threshold. Food Policy 2011 4;36(2):101-107.


(49) WHO. Guideline: Sugars intake for adults and children. 2015.


(52) Bognár A. Tables on weight yield of food and retention factors of food constituents for the calculation of nutrient composition of cooked foods (dishes). 2002.


Appendices

Appendix One: Validation of proposed methods

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Appendix Two: Minimal Approach Food Groups

Table 1: Guide to Categorizing Healthy and Unhealthy Foods

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Table 2: Healthy & Unhealthy Food groups

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Appendix Three: Data required for construction of baskets

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Appendix Four: Sample food group serve sizes

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