

Supplementary Materials, Part 1: Portion size estimations

Estimation of vegetable portions

Fruits, vegetables and leaves of all kinds whether fresh, canned, frozen, cooked, or raw, and juices all count in the diet. However starchy food such as potatoes, yam, roots, jack fruits (not ripen), bread fruits, jack fruit seeds and ash plantain (without peel) were not included in the fruit and vegetable group although they were consumed as curries in the Sri Lankan context, they were counted as for cereal or equivalents. Well-ripened jack fruits (Waraka and Wala) count to the fruits group. However, ash plantain (with peel) is considered as a vegetable due to its high level of dietary fiber and plant nutrients but only counts as maximum one portion per day, rest of the amount was included to the starch group. Pumpkin which is a starchy vegetable was categorized under the vegetable group. In Sri Lanka, most green leaves are half-cooked or mixed with coconut scrapes or oil, still, they were included in the vegetable group. Coconut sambol (pol sambol) is a very common Sri Lankan cuisine and widely consumed in rural community. As main ingredient of coconut sambol is finely grated coconut, chilli, onion, curry leaves and lime juice, without disaggregating it was considered as a vegetable although it contains significant amount of fat. Moreover, Lunu-miris (chilli and onion paste), seeni-sambol (cooked onion with sugar) was also considered in the vegetable group, However, katta-sambol (mixed with dry fish and onion) was disaggregated to its' main ingredients. Other mixed curries were disaggregated for respective food groups according to recipes. For example, potato and peas curry was divided to food groups according to respective pre-cooked proportions of potato and peas.

‘Polos’ which is the young jack fruit is considered as a vegetable as it contains less starch. Kiri hodi (milk curry) is basically prepared mainly with coconut milk and some spices. In contrast to coconut sambol it consists of low plant products and therefore kirihodi is not included in the vegetable group. However, kirihodi is not categorized under any food group.

Vegetables are prepared as salad, individual curries and mixed curries by using several types of food preparation methods. While cooking the texture and the moisture content of vegetables are changed or reduced, thus volume is reduced. Therefore three heaped table spoons or ½ cup or 80 grams of cooked vegetable is defined as one vegetable serving [1-4]. If there is a vegetable curry with half amount gravy six table spoons are defined as one vegetable portion. In Sri Lanka vegetables are served from table spoons and coconut spoons and thus as a defaulter one medium size coconut spoon is considered as three table spoons or one serving. However, investigators cross-checked and clarified the size of coconut spoons with model coconut spoons and food images.

Though, ash plantain (with peel) and sweet potato are considered as vegetables they were calculated for maximum of one portion in a day. One serving of commonly consumed curries is weighed to define the weight of one portion of individual vegetable curry. When faced with difficulties to find the weight of one tablespoon of a vegetable curry, weight of one table spoon was considered as 15 grams.

Estimation of fruit portions

Fresh, juiced or dried fruits all count in the diet. Fruit juice was included in 'pieces of fruit' if it was at least a glass of fresh juice in a day. Even if more than one glass per day was reported, it would only count as one portion of fruit per day [2], A smoothie or fresh fruit juice containing all of the edible pulped fruit and/or vegetable may count as more than one portion but this depends on how it's made. Smoothies count as up to a maximum of two portions per day [3]. However, unlike western countries the frequency of fruit/vegetable intake as juice was very limited. Cordial and artificial flavored fruit drinks were not categorized and they were classified under sugary group.

The portion sizes of fruits were defined as follow.

One portion of fruit,

- Small sized fruits– Ten fruits considered as one portion, example: grapes, veralu, nelli, lovi, rose apple (jamboo)
- Small–medium size fruits – number may vary (2-6): ambarella, banana (small), naminan, rambutan, passion fruit, mangosteen, jack fruit ripen (waraka)
- Medium-sized - one medium fruit, such as one apple, banana, pear, orange, guava, woodapple, belli, mandarin
- Large-sized - one slice of papaya, one slice of melon (two-inch slice), one large slice of pineapple, two slices of mango (two-inch slices), pomegranate (1/2 medium), durian (2 pieces),

- Dried fruit: One tablespoon of raisins, currants, sultanas, one tablespoon of mixed fruit, two figs, three prunes, one handful of banana chips.
- Juice: One medium glass (150ml) of fruit juice.
- A-half cup of chopped fruits

Some of the portions were adjusted to Sri Lankan condition by considering the size of the fruit.

Though pineapple is defined as one longitudinal slice, in Sri Lanka pineapple is commonly cut into round shapes. Therefore pineapple portion is defined as one large slice or two round shapes slices. The portion size of banana is one medium sized banana in several dietary guidelines. Since several types of Sri Lankan bananas are smaller than in western countries, two bananas were defined as one portion. One portion of fruit is defined as 80 grams of edible portion of fruit or 100 grams of whole fruit and the average number of fruit items was counted. Curries which are prepared from fruits are defined under vegetables in spite of fruits; for example: mango curry, papaw salad.

Estimation of pulse portions

Pulses are another sub food group which is categorized under meat exchange as it provides protein [5]. Pulses are rich in nutrients like protein, dietary fiber, vitamins (folate) and minerals (zinc, iron, and magnesium) and are low in total and saturated fat and contain no cholesterol. While pulses contain fiber, they do not provide the same mixture of vitamins, minerals and other nutrients as fruit and vegetables [3]. Thus beans and pulse are not included in the vegetable group in our classification.

Cooked pulses ½ tea cup or three full table spoons or 1 coconut spoon is defined as one pulse portion. The weight of one serving of cooked pulse varieties are defined by considering that one serving should have 7 grams of protein. ‘Soya meat’ is superior in nutritional quality than other pulses. It contains more protein and is also a good source of iron and calcium. Soya products (e.g. texturized vegetable protein) contain high quality protein and, around 7gms of protein will be contained in two table spoons.

Estimation of dairy products

All fluid milk products and many foods made from milk are considered part of this food group [6]. Milk is a complete food which contains numerous beneficial nutrients such as calcium, phosphorous, magnesium, vitamin B₁₂, vitamin A, zinc and riboflavin. These nutrients are favorable for healthy bones and teeth, for muscle function, for immune function.

One glass of milk (250 ml) of fresh milk is defined as one portion [4]. As milk powder is used commonly in Sri Lanka as main dairy food source three table spoonfuls is defined as one serving equivalent to fresh milk. Two small cups of yoghurt (80grms each) and one tea cup or eight table spoons of curd is considered as one serving [4]. Two slice or two wedges of cheese or 1/8 from 250 g of cheddar cheese are defined as one portion [1, 7]. Malted milk powders and Milo are drunk as replacement for milk. However, those are defined under starch group as they contain considerable amount of carbohydrate [7].

Estimation of cereal or equivalent portions

Cereals are a rich source of vitamins, minerals, carbohydrates, fats, oils, and protein. In their natural form (as in whole grain). When a cereal is milled or processed the bran and wheat germ is removed. Through these processes many of the vitamins, minerals and phytochemicals are lost and remaining is mostly carbohydrate. Similarly, tubers and starchy vegetables which have high carbohydrate content.

One portion of cereal or equivalent is defined as the amount of starchy food in which 15 g of carbohydrate is contained. 1/3 tea cup of rice, milk rice and noodles, one slice of bread, 1/4 of 10cm diameter and 0.5 cm thickness coconut roti, 2 string hoppers and 1/2 hopper is considered as one serving of each food. 1/3 tea cup of boiled bread fruit, jak and sweet potato, 1/2 tea cup of ash plantain and yam is defined as one portion.

Serving of cooked starch vegetables is decided by comparing the amount of curry which contains 15 g of carbohydrate. Then portion size is calculated as how many household measures with the above weight of curry. This is used for both cooked and raw foods. As an example, one portion of manioc curry is 90 g and it holds in three table spoons. Ash plantain curry 90 g is defined as one serving and six table spoons of it is taken as one portion.

Biscuits, cake, short eats (roll, cutlet), vegetable roti and papadam are also included in starch portions [8]. One piece of 4 cm slice cake and one short eat is calculated for one portion cereal or equivalent. As size and weight of biscuits vary, servings of biscuits were taken from pre-defined portion size from nutrition information leaflets and direct contacting manufactures.

Estimation of meat portions

Meat group is a large food group which includes meat and meat alternatives as poultry, fish, seafood, eggs and pulses [5]. This group includes mainly animal food sources concentrated of protein which is not only of high biological value but its amino acid composition complements that of cereal and other vegetable proteins. It is also a good source of iron and zinc and several B vitamins.

One egg, 30 gram weight of meat, fish, and 30 g weight of prawns and meat balls is defined as one meat portion. The serving size was defined considering 7 grams of protein in that food portion. Since dry fish contain more protein, 15 g is defined as one portion. But when it is defined for dry fish curry one portion is considered as 30 g since it contains gravy. Commonly sprats are served using table spoons. As one table spoon holds 7-8 sprats weight of one table spoon is considered as 7.5-8 g. Thus 2 table spoons of sprats are defined as one portion. In Sri Lanka 1 kg of chicken is cut into 13-15 pieces and one piece of chicken is considered as two portions. Since non- vegetarian fried rice contains more than 2.6g protein than normal cooked rice, it is considered as 1/3 of meat portions include in fried rice.

Estimation of sugar portion sizes

All types of glycaemic carbohydrates will be digested, absorbed and ultimately converted to glucose or metabolized in the body. Although all sugar and starches are indistinguishable in metabolic effects, there are different health implications between them in terms of their dietary origin. Extracted sugar from food has virtually no nutrients except calorie, it is found that high intake of sugar is associated with negative health consequences; hence sugar was defined as a

separate food group. Five grams of sugar is defined as a portion. One portion of honey, treacle and jaggery was calculated estimating the weight or volume which contains 5grms of sugar. The amount of sugar in sweets, desserts and sugary beverages were estimated by recipes.

Reference list

1. Michael Nelson, M.A., James Meyer, *A Photographic Atlas of Food Portion Sizes*. 1997, UK: MAFF publications.
2. The British Dietetic Association (2006) *Fruit and Vegetables - Enjoy 5 a day!!* Food Fact.
3. nhs-uk. *5 A DAY: what counts?* Popular topics 2009 18/12/2009 [cited 2011 10/06]; Available from: <http://www.nhs.uk/Livewell/5ADAY/Pages/Whatcounts.aspx>.
4. Non-Communicable Disease Unit, *Food Base Dietary Guidelines for Sri Lanka*. 2003, Colombo: Ministry of Healthcare and Nutrition, Sri Lanka.
5. USDA. *Protein foods*. Food groups 2011 [cited 10/6/2011].
6. USDA, *Dairy Group*. Food groups. 2011: usda.org.
7. Suzana Shahr, N.A.M.Y., Nik Shamita Safii, Rafidah Ghazau, Roslina Ahmad., *Atlas of Food Exchanges & Portion Sizes*. 2009, MDC Publishers: Kuala Lumpur.
8. Jayatissa, R., *Optimum Nutrition for Beating Diabetes*. 1 ed. 2011, Colombo: Lalith Printers.