Online Supplemental Material

Validity of a Food Frequency Questionnaire to Measure Nutrient and Food Intake in Tanzania

Page Content

- Composition of food groups from food frequency questionnaire (FFQ) food items in the Dar es Salaam Urban Cohort Hypertension Study (DUCS-HTN), 2014
- Portion size images used by interviewers to conduct 24-hour diet recalls and FFQs
- 8 Dar es Salaam Urban Cohort Hypertension Study (DUCS-HTN) food frequency questionnaire

Supplemental Table 1. Composition of food groups from food frequency questionnaire (FFQ) food items in the Dar es Salaam Urban Cohort Hypertension Study (DUCS-HTN), 2014

Foods or food	Food items from the Food Frequency Questionnaire (FFQ)
groups	
Cereals	Oat porridge or oatmeal, wheat porridge, millet meal porridge, corn porridge, rice porridge, millet porridge or stiff porridge (ugali), porridge with grain from factory, grain from factory, maize on cob, maize meal cooked as in stiff porridge (ugali), corn/sugar derived from corn juice, maize cooked with beans (kande), maize cooked with beans (kande) and rice, pilau rice, plain boiled rice, pasta, bread, scones, chapatti, pancakes, donut, rice cakes
Root vegetables	Cassava porridge, potato boiled or baked, cassava boiled, cassava stiff porridge (ugali), cassava in a mixed dish, sweet potato alone, sweet potato in a mixed dish, yam boiled alone, yam fried, yam in a mixed dish, pounded yam or other root vegetable
Legumes & nuts	Beans/legumes alone, beans in mixed dish, bean soup, bean cakes, bambara nuts, groundnuts alone, groundnuts with food, cashew nuts
Unprocessed red meat	Beef not minced, beef minced, goat, pork, lamb, offal, liver, meat samosa
Chicken	Chicken
Eggs	Eggs
Fish	Dried fish, anchovies (dagaa), canned tuna in salt water, canned tuna in oil, canned fish in salt water, canned fish in tomato broth, fish curry, fresh fish
Dairy	Powdered whole fat cows milk, powdered fat free cows milk, cow's milk full fat, cow's milk low fat, cow's milk fat-free, non-dairy creamer, plain yogurt, artificially sweetened yogurt, ice cream, cheese soft but not in liquid, cheese in liquid, other types of cheese, ghee, butter
Fruit	Ripe banana, mango, tamarind, plum, papaya, tangerine, lemon or lime, jackfruit, baobab, watermelon, guava, peaches, pineapple, passion fruit, orange, apple, grapes, apricot, pears, sweet melon, blood fruit (matunda damu), berries, fruit canned in syrup, raisins and other dried fruit, avocado
Vegetables	Cucumber, spinach, lettuce, cabbage, amaranth leaves, pumpkin leaves, cow pea leaves, cassava leaves, chinese cabbage, other cabbage, other green leafy vegetables, pumpkin, okra alone, okra in mixed dish, green peas alone, green peas in mixed dish, tomato fresh not in salad, tomato fresh in salad, tomato cooked, carrot fresh not in salad, green pepper fresh not in salad, green pepper fresh as in salad, vegetable samosa, zucchini, green beans, beet, broccoli, cauliflower, eggplant alone, eggplant in mixed dish, mushrooms, onions
Sugar-sweetened	Soda, squash or syrup
beverages	
Alcohol	Fermented mealie pap drink, beer commercially prepared, beer locally brewer or homemade, wine commercially prepared, wine homemade or locally brewed, distilled alcoholic beverages commercially prepared, distilled alcoholic beverages
Tea	Tea with milk, tea without milk

Portion size images used by interviewers to conduct 24-hour diet recalls and FFQs

UGALI/WALI (set 1)

Sahani



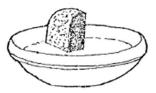
imejaa



robo tatu $(\frac{3}{4})$



 $nusu(\frac{1}{2})$



robo(1/4)

Kisahani



kimejaa



robo tatu(3/4)



nusu(1/2)



robo(1/4)

MAHAR GE [Set 2]

Bakuli



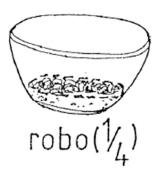
imejaa



robo tatu(³/4)



nusu(1/2)



Kisahani



kimejaa



robo tatu(3/4)



nusu(1/2)



robo(1/4)

MCHICHA [Set 3]

Kisahani



kimejaa



robo tatu $(\frac{3}{4})$



 $nusu(\frac{1}{2})$



robo(%)

Bakuli



imejaa



robo tatu(¾)



nusu (1/2)



robo(1/4)

NYAMA/KUKU [Set 4]

Kipande cha nyama:



kubwa



kubwa kiasi



kidogo

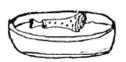
Paja la kuku:



kubwa



kubwa kiasi



dogo

MAZIWA [Set 5]

Bilauri (glass)



imejaa



robo tatu ($\frac{3}{4}$)



nusu(1/2)



robo(1/4)

Kikombe(cup)



kimejaa



robo tatu $(\frac{3}{4})$



 $nusu(\frac{1}{2})$



robo(1/4)

Dar es Salaam Urban Cohort Hypertension Study (DUCS-HTN) Food Frequency Questionnaire

How often have you eaten the following foods in the past 30 days?

Do not count periods of fasting, such as Ramadan. Please pick only one frequency for each food. A note about serving sizes: 1 serving spoon = ½ cup. If you eat 2 servings of a food once a week, then you will check "2-4 per week." If participants eat using handfuls from a shared container, change the serving size to number of handfuls. For the seasonal fruits and vegetable column, check the column if the participant eats the food only when it is in season.

Grain, Potatoes, and Related Foods

Code	Food	Serving	Never	1-3 per	1	2-4	5-6	1	2-3	4-5	6+
		Size		month	per	per	per	per	per	per	per
					week	week	week	day	day	day	day
FFQ001	Oat porridge or oatmeal (uji)	1 cup									
FFQ002	Wheat porridge (uji)	1 cup									
FFQ003	Millet meal porridge (uji)	1 cup									
FFQ004	Corn porridge (uji)	1 cup									
FFQ005	Cassava porridge (uji)	1 cup									
FFQ006	Rice porridge (uji)	1 cup									
FFQ007	Sorghum stiff porridge (ugali)	1 cup									
FFQ008	Millet porridge or stiff porridge (uji or ugali)	1 cup									
FFQ009	Pearl millet stiff porridge (ugali)	1 cup									
FFQ010	Mixed grain porridge (uji)	1 cup									
FFQ011	Grain from factory	1 cup									

Code	Food	Serving Size	Never	1-3 per month	1 per week	2-4 per week	5-6 per week	1 per day	2-3 per day	4-5 per day	6+ per day
FFQ012	Maize (roasted or boiled, on the cob)	1 whole cob									
FFQ013	Maize meal, cooked, as in stiff porridge (ugali)	1 plate									
FFQ014	Corn / sugar derived from corn juice	½ cup									
FFQ015	Maize cooked with beans (Kande)	1 plate									
FFQ016	Maize cooked with beans (Kande) and rice	1 plate									
FFQ017	Rice, mixed as in a pilau, fried	1 plate									
FFQ018	Plain rice, boiled	1 plate									
FFQ019	Potato, boiled or baked	1 potato, fist-sized									
FFQ020	Cassava, boiled (alone)	1 medium size piece									
FFQ021	Cassava stiff porridge (ugali)	1 piece, fist-sized									
FFQ022	Cassava (in a mixed dish)	1 plate									
FFQ023	Sweet potato (alone)	1 medium size									
FFQ024	Sweet potato (in a mixed dish)	1 plate									
FFQ025	Taro (alone)	1 piece, fist-sized									
FFQ026	Taro (in a mixed dish)	1 plate									

Code	Food	Serving	Never	1-3 per	1	2-4	5-6	1	2-3	4-5	6+
		Size		month	per week	per week	per week	per day	per day	per day	per day
FFQ027	Yam (boiled, alone)	1 piece, fist-sized									
FFQ028	Yam (fried)	1 piece, fist-sized									
FFQ029	Yam (in a mixed dish)	1 plate									
FFQ030	Pounded Yam or other root vegetable	1 serving, fist-sized									
FFQ031	Plantain (boiled or steamed) (Ndizi)	1 banana finger									
FFQ032	Plantain (roasted) (Ndizi)	1 banana finger									
FFQ033	Plantain (fried, or chips) (Ndizi)	1 banana finger									
FFQ034	Plantain (in a mixed dish) (Ndizi)	1 plate									
FFQ035	Pasta, cooked (spaghetti, macaroni)	1 plate									
FFQ036	Bread, breadrolls, buns	1 slice/roll									
FFQ037	Scones, muffins	1 medium size									
FFQ038	Flat bread (Chapati)	1 round piece									
FFQ039	Pancakes (Chapati ya maji)	1 piece									
FFQ040	Donut, fried dough (maandazi, kalimati, half-cake)	1 piece									
FFQ041	Rice cakes (mkate kumimina)	2 pieces									

Code	Food	Serving	Never	1-3 per	1	2-4	5-6	1	2-3	4-5	6+
		Size		month	per	per	per	per	per	per	per
					week	week	week	day	day	day	day
FFQ042	Cookies (biscuits)	2 pieces									
FFQ043	Cake	1 medium slice									

Fruits

riuits			- 0								
Code	Food	Serving	Never	1-3 per	1	2-4	5-6	1 per	2-3	4-5	6+ per
		size		month	per	per	per	day	per	per	day
					week	week	week		day	day	
FFQ044	Ripe banana	1 banana finger									
	1										
FFQ045	Mango	1 medium fruit									
	5.53.28										
FFQ046	Tamarind	1 medium fruit									
11 00.0	Turriur	i iiidaiaiii iidit									
FFQ047	Plum	1 medium fruit									
11 2017		i incaram nan									
FFQ048	Papaya	1 slice									
11 0010	Тириуи	1 SHCC									
FFQ049	Tangerine	1 medium fruit									
11 0047	Tangerme	i incurani irait									
FFQ050	Lemon or lime	1 medium fruit									
11 Q030	Lemon of fine	1 medium muit									
FFQ051	Jackfruit	1 finger piece									
1110031	Jackiruit	i illiger piece									
FFQ052	Baobab	1 handful									
FFQ032	Баобаб	1 Hallulul									
EE0052	Watermaler	1 slice									
FFQ053	Watermelon	1 Since									
FF0054	C	1 1: C. :/									
FFQ054	Guava	1 medium fruit									
FEOOSS	D 1	1 1 0 1									
FFQ055	Peaches	1 medium fruit									
FF 0 0 7 6		1/ 1: 0 :									
FFQ056	Avocado	½ medium fruit									
FFQ057	Pineapple (fruit only, not juice)	1 thick slice									

Code	Food	Serving size	Never	1-3 per month	l per	2-4 per	5-6 per	1 per day	2-3 per	4-5 per	6+ per day
FFQ058	Passion fruit (fruit only, not juice)	1 medium fruit			week	week	week		day	day	
FFQ059	Orange (fruit only, not juice)	1 medium fruit									
FFQ060	Orange juice	One 250 ml glass									
FFQ061	Other fruit juice	One 250 ml glass									
FFQ062	Apple	1 medium fruit									
FFQ063	Grapes	1 medium bunch									
FFQ064	Apricot	3 medium									
FFQ065	Pears	1 medium fruit									
FFQ066	Sweet melon	1 slice									
FFQ067	Blood fruit (matunda damu)	1 medium fruit									
FFQ068	Berries (strawberries, raspberries)	½ cup									
FFQ069	Fruit canned in syrup	½ cup									
FFQ070	Raisins, and other dried fruit	1 handful									

Legumes, Vegetables and Nuts: Please note that 1 ladle or large serving spoon is equal to ½ cup

Code	Food	Serving	Never	1-3 per	1	2-4	5-6	1 per	2-3	4-5	6+ per
		size		month	per	per	per	day	per	per	day
					week	week	week		day	day	
FFQ071	Beans/legumes alone (Examples:										
	mung & soybeans; pigeon, cow &										
	chick peas, split peas, lentils, dried	½ plate									
	beans)										
FFQ072	Beans in mixed dish	1 plate									
FFQ073	Bean soup	1 plate									
											<u> </u>
FFQ074	Bean cakes (Bhajia)	1									
EE0055		1/ 1 /									<u> </u>
FFQ075	Bambara nuts	½ plate									
FFQ076	Groundnuts (alone)	½ plate									
TTQUI	Groundinuts (arone)	72 plate									
FFQ077	Groundnuts (added to food)	1 plate									+
11 00//	Groundinais (added to 100d)	1 place									
FFQ078	Cashew nuts	½ cup									
		1									
FFQ079	Cucumber	½ plate									
		_									
FFQ080	Spinach, cooked	½ plate									
FFQ081	Lettuce	1 plate									
											<u> </u>
FFQ082	Cabbage	1 plate									
EEO002	A magnetic leaves as also d	1/									1
FFQ083	Amaranth leaves, cooked	½ cup									
						1	1				

Code	Food	Serving size	Never	1-3 per month	per week	2-4 per week	5-6 per week	1 per day	2-3 per day	4-5 per day	6+ per day
FFQ084	Pumpkin leaves, cooked	½ cup									
FFQ085	Cow pea leaves, cooked	½ cup									
FFQ086	Cassava leaves	½ cup									
FFQ087	Chinese cabbage, cooked	½ cup									
FFQ088	Other cabbage, cooked	½ cup									
FFQ089	Other green leafy vegetables, cooked	½ cup									
FFQ090	Pumpkin, or Butternut, cooked	½ plate									
FFQ091	Okra (alone)	½ cup									
FFQ092	Okra (in a mixed dish)	1 cup									
FFQ093	Green peas (alone)	½ plate									
FFQ094	Green peas (in a mixed dish)	1 plate									
FFQ095	Bitter tomato (alone)	½ cup									
FFQ096	Bitter tomato (in a mixed dish)	1 cup									
FFQ097	Tomato (fresh, not in salad)	1 fruit									
FFQ098	Tomato (fresh, as in salad)	2 slices									

Code	Food	Serving size	Never	1-3 per month	1 per week	2-4 per week	5-6 per week	1 per day	2-3 per day	4-5 per day	6+ per day
FFQ099	Tomato, cooked	½ cup			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	W GOL	WOOL				
FFQ100	Carrot (fresh, not in salad)	1 carrot									
FFQ101	Carrot (fresh, as in salad)	½ carrot									
FFQ102	Green pepper (fresh, not in salad)	½ cup									
FFQ103	Green pepper (fresh, as in salad)	½ small									1
FFQ104	Pie, pastry with vegetable filling (vegetable samosa)	1 piece									
FFQ105	Zucchini, cooked	½ cup									
FFQ106	Green beans, cooked	½ cup									
FFQ107	Beetroot, cooked	½ cup									
FFQ108	Broccoli, cooked	½ cup									+
FFQ109	Cauliflower, cooked	½ cup									1
FFQ110	Eggplant (alone), cooked	1 slice									+
FFQ111	Eggplant (in a mixed dish), cooked	½ cup									+
FFQ112	Mushrooms, cooked	½ cup									-
FFQ113	Onions (cooked with oil)	1/2 cup									

Meat, fish and eggs

	sn and eggs		- II	1							-
Code	Food	Serving	Never	1-3 per	1	2-4	5-6	1	2-3	4-5	6+
		Size		month	per	per	per	per	per	per	per
					week	week	week	day	day	day	day
FFQ114	Beef (not minced)	1 palm-sized serving									
FFQ115	Beef mince	½ cup									
FFQ116	Goat	1 palm-sized serving									
FFQ117	Pork	1 palm-sized serving									
FFQ118	Lamb/Mutton	1 palm-sized serving									
FFQ119	Offal/Tripe	1 palm-sized serving									
FFQ120	Liver	1 palm-sized serving									
FFQ121	Chicken	1 palm-sized serving									
FFQ122	Sausage	1 piece (length of a hand)									
FFQ123	Bacon	3-4 rashers									
FFQ124	Processed meat (bologna)	2 pieces									
FFQ125	Processed meat (Vienna sausages)	2 pieces									
	,										
FFQ126	Ham	2 pieces									
FFQ127	Canned beef	½ plate/bowl									
		<u> </u>									
•		•		•		•	•	•	•	•	

Code	Food	Serving	Never	1-3 per	1	2-4	5-6	1	2-3	4-5	6+
		Size		month	per	per	per	per	per	per	per
					week	week	week	day	day	day	day
FFQ128	Pie, pastry with meat filling (meat	1 piece									
	samosa)										
FFQ129	Dried fish	1 palm-sized serving									
FFQ130	Anchovies/sardines (dagaa)	4-5 sardines or ½ cup									
FFQ131	Canned tuna in salt water	½ bowl									
FFQ132	Canned tuna in oil	½ bowl									
FFQ133	Canned fish in salt water	½ cup or two fish									
FFQ134	Canned fish in tomato water	½ cup or two fish									
FFQ135	Fish curry/stew	½ cup									
FFQ136	Fish, fresh	1 palm-sized serving									
11 4150	(Other forms of fish - not canned)	- paint sized serving									
FFQ137	Eggs	1 egg									

Dairy Foods

Code	Food	Serving	Never	1-3 per	1	2-4	5-6	1	2-3	4-5	6+
		Size		month	per week	per week	per week	per day	per day	per day	per day
FFQ138	Powdered cow's milk, whole or full cream	One 250 ml glass									
FFQ139	Powdered cow's milk, fat free or non-fat	One 250 ml glass									
FFQ140	Cow's milk; full cream, whole, or direct from the cow	One 250 ml glass									
FFQ141	Cow's milk; low fat or 2%	One 250 ml glass									
FFQ142	Cow's milk; fat-free, or non-fat	One 250 ml glass									
FFQ143	Non-dairy creamer (Cremora)	2 heaped teaspoons									
FFQ144	Yogurt, plain	1 cup									
FFQ145	Yogurt, artificially sweetened	1 cup									
FFQ146	Yogurt, sweetened	1 cup									
FFQ147	Ice cream	1 cup									
FFQ148	Cheese, soft but not in liquid	½ cup									
FFQ149	Cheese, in liquid	28 g or about the size of a small matchbox									
FFQ150	Other types of cheese,	1 slice or 28 g or about the size of a small matchbox									

Beverages

Code	Food	Serving	Never	1-3 per	1	2-4	5-6	1	2-3	4-5	6+
		Size		month	per week	per week	per week	per day	per day	per day	per day
FFQ151	Tea with milk	1 cup									
FFQ152	Tea without milk	1 cup									
FFQ153	Coffee with milk	1 cup									
FFQ154	Coffee without milk	1 cup									
FFQ155	Soda (Coke, Fanta, etc)	One 350 ml bottle									
FFQ156	Diet soda	One 350 ml bottle									
FFQ157	Squash or syrup mixed with water (with sugar)	One 250 ml glass									
FFQ158	Squash or syrup mixed with water (with artificial sweetener)	One 250 ml glass									
FFQ159	Soya drink	1 cup									
FFQ160	Fermented mealie pap drink (mageu, amahewu, amarhewu)	1 cup									
FFQ161	Coconut milk	1 cup									
FFQ162	Beer, commercially prepared	One 250 ml glass									
FFQ163	Beer, homemade or locally brewed	One 250 ml glass									
FFQ164	Wine, commercially prepared	One-half 250 ml glass									

Code	Food	Serving	Never	1-3 per	1	2-4	5-6	1	2-3	4-5	6+
		Size		month	per	per	per	per	per	per	per
					week	week	week	day	day	day	day
FFQ165	Wine, homemade or locally brewed	One 250 ml glass									
FFQ166	Distilled alcoholic beverages, commercially prepared (examples: whisky, rum, vodka, gin)	1 drink or shot or tot									
FFQ167	Distilled alcoholic beverages, homemade or locally brewed	1 drink or shot or tot									

Other foods

Code	Food	Serving	Never	1-3 per	1 per	2-4	5-6	1	2-3	4-5	6+
		size		month	week	per week	per week	per day	per day	per day	per day
FFQ168	Sugar added to foods (include in tea & coffee)	1 teaspoon									
FFQ169	Honey or jam	1 teaspoon									
FFQ170	Peanut butter	1 heaped tsp									
FFQ171	Mayonnaise or salad dressing	1 heaped tsp									
FFQ172	Chocolate bar	1 bar									
FFQ173	Other sweets or candy	1 handful, or 4-5 pieces									
FFQ174	Small pieces of roasted corn (crisps)	1 cup									
FFQ175	Potato, crisps, Cassava crisps French fries (Irish potato)	1 cup									
FFQ176	Ghee (samli)	1 heaped tsp									
FFQ177	Hard (unmelted) butter	1 heaped tsp									
FFQ178	Soft (melted) butter	1 heaped tsp									
FFQ179	Animal fat	1 heaped tsp									

Vitamins
FQ180: Do you currently take multi-vitamin tablets?
□ No
☐ Yes, 2 or less per week
☐ Yes, 3-5 per week
☐ Yes, 6-9 per week
☐ Yes, 10 or more per week
FQ181: Not counting multi-vitamins, do you take any other vitamins or supplements on a regular basis? ☐ No ☐ Yes
FO181a: If yes, which?

Eating Behaviors

Code	Food	Never	1-3 per	1	2-4	5-6	1	2-3	4-5	6+
			month	per	per	per	per	per	per	per
				week	week	week	day	day	day	day
FFQ182	How many times per day do you eat?									
FFQ183	How often do you eat food prepared away from home, for									
	example in a restaurant, cafeteria, or from a street stall?									
FFQ184	How often do you eat food that has been fried, at home?									
FFQ185	How often do you eat food that has been fried, away from									
	home?									
FFQ186	How often do you add salt to foods on your plate?									
FFQ187	How often do you (or your partner) add salt to foods during									
	cooking?									
FFQ188	How often do you (or your partner) use Maggi cubes, Aromat,									
	Soy sauce, Vegemite when cooking at home?									
FFQ189	How often do you eat food rich in salt such as salted fish									
	(Nguru), salted meat (Mishikaki), salami, salted peanuts,									
	pizza, etc)?									

FFQ190: Do you think that a high salt intake can cause serious health problems? ☐ Yes ☐ No ☐ Refused ☐ Don't know	FFQ194: If yes, what do you do to control your salt intake?
FFQ191: If yes, can you mention one or two health problems that are related to high salt intake (if the participant doesn't know, write "don't know"):	Cooking Oil FFQ195: What is the main cooking oil used at home for frying? (Choose one) Butter Margarine Ghee
FFQ192: Is it important for you to limit salt in your diet? ☐ Not really ☐ Somewhat important ☐ Really important ☐ Refused ☐ Don't know	Olive oil Sunflower oil (SA: "fish oil" Groundnut oil Corn oil Soy oil Other vegetable oil (Korie) Other (specify) Do not use oil
FFQ193: Do you do anything to limit your salt intake, e.g. avoid salty products or avoid adding salt in your food? ☐ Yes, often ☐ Yes, sometimes ☐ Not really ☐ Refused ☐ Don't know	