An Analysis of Healthy Food Access Amongst Women in Peri-urban Honiara

Penny Farrell PhD; Anne Marie Thow PhD; Mia Rimon MPPM; Andy Roosen PhD; Pavle Vizintin MIPH; and Joel Negin PhD

Abstract

Highly processed and energy-dense foods are contributing to the high and rising rates of non-communicable diseases and nutrient deficiencies in Solomon Islands. Non-communicable diseases currently cause 69% of deaths in Solomon Islands, and the rate is rising, fuelled in part by limited health system capacity to treat these conditions. Solomon Islands also has the highest reported undernourishment rate in the Pacific. Recent decades have seen several factors change the food and economic environment in Solomon Islands. Importantly, rural-to-urban migration has caused a disconnect between urban residents and access to land and home gardens. This study aimed to examine the complexities of nutritious food access in urban Solomon Islands. Data were collected from 32 women in Honiara, the islands' capital, using a novel survey instrument. There were 3 important findings: (1) the dominant influencers of the diet patterns described by participants in this study were food affordability and access to land on which to grow it, (2) all participants experienced food insecurity, and (3) reported diet patterns reflected unhealthy diets which were particularly high in processed and sugary foods. These findings suggest a need for improvements in the food environment in Honiara.

Keywords

diet, Pacific, Solomon Islands, nutrition transition, non-communicable disease, Pacific Island Countries and Territories

Abbreviations and Acronyms

NCD = Non-communicable disease
PICTs = Pacific Island Countries and Territories

Introduction

Non-communicable diseases (NCDs), including cardiovascular disease and diabetes, are the leading cause of death and disability in the Pacific region, imposing significant economic strain, pressure on overstretched health systems, and high levels of societal loss from premature deaths.[1,2] Highly processed, energy-dense foods containing low amounts of micronutrients contribute to the high and rising rates of NCDs and nutrient deficiencies in Pacific Island Countries and Territories (PICTs), including Solomon Islands.[1,3] Solomon Islands is an archipelago country in the Southwest Pacific with around 1000 islands, with an estimated population of 600 000.[4] NCDs currently cause 69% of deaths in Solomon Islands, and the rate is rising. The problem is exacerbated by a limited health system capacity to treat these diseases.[5-7] Solomon Islands also has the highest reported total population undernourishment rate in the Pacific at almost 14%, rising 2% in the last decade.[8] The country currently faces a triple burden of malnutrition: nearly 40% of adult women and children have anaemia, 33% of children have stunted physical growth, and more than half of adults are overweight or obese.[9-12]

Recent decades have seen a number of factors change the food and economic environment in Solomon Islands. Five years of civil unrest from 1998 to 2003, the global financial crisis, rapid population growth, natural disasters, and urbanization contribute to ongoing cultural and economic change.[3] Solomon Islands ranks 152 of 189 countries in the Human Development Index.[13] Approximately 80% of people in Solomon Islands live in rural areas and access food via subsistence agriculture[14,15]; however, an annual urban population growth of 4.7% has caused a disconnect between urban residents and access to land and home gardens.[15-17] Cash poverty is common in Solomon Islands, and food prices are high relative to monetary earnings.[15]

There is a significant lack of data on food and nutrition security in PICTs,[18] including Solomon Islands. This lack of data is hampering efforts to build effective policies and regulatory frameworks to improve food systems.[3] The present study was designed to provide policy-relevant insight to start to address this research gap. The study focuses on women because there is global evidence that autonomy of women is positively linked with their household's nutritional status.[19] Women are more vulnerable to food insecurity than men, and the prevalence of obesity worldwide is 50% higher in women than in men.[20,21] Between 1975 and 2014, increases in body mass index for women in PICTs were amongst the largest globally.[22] Prevalence of overweight and obesity is higher in women in Solomon Islands than in men.[7] Importantly, women in Solomon Islands experience strong inequalities in access to resources and control of household decision making within households.[15]

This study aimed to understand the nuanced complexities of nutritious food access in urban Solomon Islands by examining the following factors: (1) food security and patterns of consumption of key food groups and specific foods, and (2) the most important drivers of diet amongst participants to help inform targeted program and policy design.

Methods

Study Design

This study was informed by validated tools to collect data on food security and food consumption patterns.[23,24] Data were collected using a structured questionnaire (see Appendix) starting with questions about demographic characteristics and general health indicator information. Food security was measured with an adapted Radimer/Cornell tool based on that used by Shoae et al.[23] This tool included a series of questions about household, individual, and child food insecurity, and participants were asked to answer "always," "sometimes," or "never" to each question. Diet patterns were assessed using a shortened version of a food frequency questionnaire used in a published study of 785 adults in Samoa.[24] The aim of this data collection was not to quantify exact dietary intake levels but to ascertain broad patterns of food consumption in our study participants to explore the reasons for such diet patterns. Participants were then asked a series of open-ended questions about their diet patterns, which explored drivers and barriers to consumption of a nutritious diet.

Data Collection

The study took place in Honiara, the capital of Solomon Islands. In-depth interviews were conducted with 32 women with children in their care attending local primary schools. Participants were recruited using convenience sampling, which was directed by school staff. Invited participants were given detailed information about the study in the form of a participant information sheet and verbal explanation. Informed consent forms were signed before each interview commenced. There were no withdrawals from the study. Participants were reimbursed with funds to purchase lunch and bus transport.

Participants were interviewed individually in a private room. Interviews were run and transcribed in English by trained members of the research team. Research assistants were also present and translated the questions and responses into and from Solomon Islands Pijin when required.

Data Analysis

Interview answers were entered into Microsoft Excel. Food frequency data were classified into energy foods (carbohydrate-based foods), protective foods (fruit and vegetables), and body building foods (foods high in protein) using the Pacific Guidelines for Healthy Living.[25] These guidelines further classify energy foods into the following categories: "energy foods to choose" (for example, root crops, whole grains), "energy foods to limit" (foods high in refined carbohydrate including white bread and white rice), and "energy foods to avoid" (foods high in fat, highly processed, high in sugar including sugar-sweetened beverages).[25] Food security questionnaire responses were used to classify each participant as household, individual, or child food insecure.

The answers to the questions about food access and diet patterns were analyzed using thematic analysis to determine the most important reasons for dietary patterns.[26]

The study was approved by Solomon Islands National Health Research and Ethics Committee.

Results

Study Demographics

The study participants (n=32) were all women living in suburbs and villages close to Honiara. Table 1 summarizes the key demographics of the study population. Of note, 71% of participants (n=22) were under the age of 40, and 81% of participants (n=26) cared for their families full time without a direct source of personal income. The average number of years lived in Honiara was 19, and the average household size was 5 adults and 3 children.

Food Consumption Patterns

Table 2 presents a summary of key food items in participants' reported diet patterns. The most commonly consumed food group was energy foods. Among energy foods, white rice was consumed the most, with 86% of participants (n=24) consuming this daily. The second most commonly consumed food group was body building food. Fish was the most commonly consumed body building food; this food was consumed daily by 63% of participants (n=20). Less than a quarter (23%) of participants (n=7) reported consuming fruit daily, and 57% of participants reported consuming vegetables daily (n=17).

Cooking Style

Most participants cooked food in fresh coconut cream 3 or more times per week (data not shown). The main foods cooked in coconut were cabbage, fish, and starchy vegetables. Most participants cooked foods in oil at least weekly. The most common cooking oil mentioned was palm oil, and participants also used peanut and vegetable oil. The main foods cooked in oil were fish, cabbage, and chicken. Most participants also prepared foods in soups at least weekly. The main foods prepared as soups were starchy vegetables and chicken.

Reasons for Diet Patterns

Table 3 demonstrates that the most commonly mentioned reason for selecting particular types of food for consumption was affordability (84%, n=27). Other reasons given were availability of processed food (44%, n=14), availability of land (47%, n=15), taste (28%, n=9), pursuit of health (19%, n=6), and culture

(9%, n=3). When participants explained these reasons, some specific foods were mentioned as illustrative examples. For example, tinned fish was mentioned in relation to affordability. White bread, white rice, and tea with sugar were mentioned in relation to affordability and convenience. Participants noted noodles were easy to prepare. In addition, Table 3 shows that 63% of participants (n=20) reported that the cooking facilities available to them influenced the foods they were able to cook. Participants were not directly asked which cooking facilities they used, so it was impossible to quantify the most common cooking facilities used. Still, participants mentioned using firewood, gas stoves, and earth ovens.

As shown in Table 3, all participants who responded to the question of whether their diets were different from those eaten by their grandparents when they were the same age stated they were (n=31, 100% of responses). Participant responses described a shift away from diets high in fresh fruit and vegetables and wild-caught meat eaten in previous generations and towards diets high in energy-dense processed and convenience foods.

When participants were asked who in their household decides how much money was spent on food (Table 4), 55% of participants reported a joint decision (n=17, 15 of which was made jointly with the husband). Further, 23% (n=7) reported not being involved in the decision. Among those who reported not being involved in the decision, the participant's husband was the person most frequently mentioned to be responsible for this decision (n=7). Overall, 19% of participants (n=6) reported being solely responsible for the decision.

Food Security

All participants (n=32, 100%) reported experiencing food insecurity in their household (Table 5). The majority (n=29, 91%) also reported individual food insecurity, and 24 (75%) reported child food insecurity.

Table 1. Study Participant Demographics (N=32)

	n (%)	n (%)	n (%)	n (%)
Age (years)	**20 to 29**	**30 to 39**	**40 to 49**	**No Response**
	5 (16)	17 (55)	9 (29)	1
Average Household Size	**Adults**	**Children**		0
	5	3		
Occupation	**Care for family**	**Teacher**	**Retail**	**Other**
	26 (81)	2 (6)	2 (6)	2 (6)
Education	**Primary school**	**High school**	**University**	**No Response**
	14 (50)	11 (39)	3 (11)	4
Province of Origin	**Guadalcanal**	**Malaita**	**Other**	**No Response**
	6 (19)	23 (72)	3 (9)	0
Average Number Years Lived in Honiara	19			5

Table 2. Reported Frequency of Consumption of Commonly Consumed Foods (N=32)

Food Item	Daily n (%)	3 Times Per Week n (%)	Once Per week n (%)	Less Frequently Than Once Per Week n (%)	No Response
Energy Foods					
White rice	24 (86)	2 (7)	2 (7)	0 (0)	4
White bread	19 (61)	5 (16)	7 (23)	0 (0)	1
Cassava	14 (45)	6 (19)	11 (35)	0 (0)	1
Energy foods to limit (eg, doughnuts, pancakes)	17 (53)	7 (22)	7 (22)	1 (3)	0
Sugar sweetened hot beverages	19 (63)	1 (3)	6 (20)	4 (13)	2
Body Building Foods					
Fish	20 (63)	6 (19)	5 (16)	1 (3)	0
Chicken	3 (10)	5 (16)	9 (29)	14 (45)	1
Protective Foods					
Fruit	7 (23)	10 (32)	11 (35)	3 (10)	1
Vegetables	17 (57)	8 (27)	4 (13)	1 (3)	2

Table 3. Key Drivers of Diet Patterns (N=32)		
Driver/s of Diet Patterns	**Participants Who Describe Driver as Significant n (%)**	**Example Quotation**
Affordability	27 (84)	We grow our own local sweet potatoes which doesn't cost any money (23 year old participant)
Availability of land on which to grow food	15 (47)	If I had good soil to grow my own fruits, root crops, and vegetables, I would eat healthy (44 year old participant)
Availability of processed food	14 (44)	[my grandparents] depended on food from garden. Today, we live on money and depend on processed food from the shop (34 year old participant)
Type of cooking facilities available, ease of preparation	20 (63)	Yes [the cooking facilities available to me influence the type of food I prepare], because we only use fire so I tend to boil, fry, and stew our food (33 year old participant)
Perceived healthiness	6 (19)	Because it is a healthy meal and it is available at home (35 year old participant)
Taste	9 (28)	[I consume soda because] it tastes good and is cold (43 year old participant)
Culture	3 (9)	Affordability, culture, and availability [have the strongest influence on my diet patterns] (33 year old participant)
Comparison of Diet with Grandparents' Diet	**n (%)**	**No response**
Participant diet different from those of grandparents	31 (100)	1

Table 4. Household Decision Making Status (N=32)		
	n (%)	**No response**
Participant Only	6 (19)	1
Joint Decision	17 (55)	1
Of those with joint decision (N=17), decision made with husband	15 (88)	0
Someone Else	7 (23)	1
Of those with decision made by someone else (N=7), decision made by husband	7 (100)	0

Table 5. Food Security Status of Participants (N=32)		
Food Security Status	**n (%)**	**No response**
Household food insecure[a]	32 (100)	0
Of participants who were household food insecure (N=32), participant has been concerned household food will run out (Appendix Section 8: Q1)	28 (88)	0
Individual adult food insecure[b]	29 (91)	0
Of participants who were individual food insecure (N=29), participant sometimes does not eat for whole days at a time (Appendix Section 8: Q10)	13 (45)	0
Child food insecure[c]	24 (75)	0
Of participants who were child food insecure (N=24), participant's children sometimes don't eat for a whole day (Appendix Section 8: Q15)	6 (25)	0

[a] Household food secure: Answered 'sometimes true' or 'always true' to one or more question related to household food insecurity (Questions [Q] 1–6 in Appendix Section 8).
[b] Individual adult food insecure: Answered 'sometimes true' or 'often true' in one or more adult-level items (Q7 –Q10 in Appendix Section 8).
[c] Child food insecure: Answered 'sometimes true' or 'often true' in one or more child-level items (Q11–Q15 in Appendix Section 8).

Discussion

Summary of Results and Likely Implications

Our study aimed to provide policy-relevant insights about access to a nutritious diet in contemporary Honiara in light of the current triple burden of malnutrition and the rapid changes to the urban population size and economy.[9,16] This was a methodologically novel study in Solomon Islands and the results provide useful information on the under-researched area of food insecurity and diet behaviour in Solomon Islands and other PICTs. The 3 most important findings were: (1) the dominant influencers of the diet patterns described by participants in this study were food affordability and access to land on which to grow fruit and vegetables; (2) all participants experienced food insecurity, meaning they all at least sometimes experienced difficulty accessing nutritious food, and some regularly skipped their own, or their children's, meals; (3) reported diet patterns reflected unhealthy diets which were particularly high in processed and sugary energy foods. There were no obvious patterns between socio-demographic characteristics, food security status, and diet patterns observed in this small descriptive study.

These 3 key findings are deeply interconnected and suggest the study participants are living in a food environment that is not supportive of good health. The dominant story told by the study participants was that they did not have the cash to purchase adequate nutritious food for themselves and their households, nor access to the land to grow it and that because of these challenges with nutritious food access (otherwise defined as food security), they are consuming inexpensive foods which are energy-dense, often highly processed, and low in nutrients. These foods have been implicated as key to the high rates of NCDs and micronutrient deficiencies in the Pacific.[1,3] There is evidence that in a food-insecure environment, consumption of energy-dense, highly processed foods is the main mechanism whereby food insecurity can lead to obesity.[27]

The diet patterns reported in this small study are consistent with grey literature reports that people in Honiara generally purchase food with cash, and as heavily processed, often imported foods are usually less expensive, these are increasingly becoming the main feature of people's diets.[3,7,17] The findings from this study reflect reports of a worsening food security situation throughout the Pacific region. Connell reported that food insecurity has increased in the region in recent decades—due to cost, convenience, and prestige, diets are high in imported and processed foods, especially rice.[28]

The most frequently reported energy foods consumed by the study participants are classified as "energy foods to limit" and "energy foods to avoid" in the Pacific Guidelines[25]: the most common of these were white bread, white rice, pancakes, and donuts. Of further concern is that the vast majority of participants reported consuming sugar-sweetened beverages (usually sugar in tea) at least weekly, and almost two-thirds consumed this daily. Sugar-sweetened beverages are classified as energy food to avoid in the Pacific Guidelines for Healthy Living. There are several potential poor health consequences of consuming these "energy foods to limit" and "energy foods to avoid." For example, consuming sugar-sweetened beverages increases the risk of diabetes.[29] It is notable that diabetes is now the leading cause of death and disability in Solomon Islands.[30]

The diet patterns reported by participants in this study suggest that fruit and vegetable consumption is likely to be well below the 5 servings per day recommended in the Pacific Guidelines for Healthy Living.[25] The most recent STEPwise approach to surveillance, known as STEPS, survey showed that 93% of the Solomon Islands population ate less than 5 servings of fruit and vegetables per day; the average daily consumption was 0.8 servings of fruit and 1.3 servings of vegetables.[31] There is evidence from Solomon Islands that households in urban areas and those with low incomes are vulnerable to insufficient fruit and non-starchy vegetable consumption.[32]

In Solomon Islands society, food and land are owned collectively – people are socially required to share food and housing with their extended kin, or *Wantok*.[7] This has implications for the way resources are distributed and preparing high-volume, low-cost meals often mean low-nutrient, high-volume foods like rice are sought.[7] The participants in this study were generally from large households. Although a pattern between household size and diet patterns was not observed in this small descriptive study, recent research from Solomon Islands found that those living in households with 7 or more people acquired less fruit and non-starchy vegetables than those in small households.[32]

The relationship between inter-household sharing of resources, poverty, and food security was not explored in this study but warrants attention in future research. It has been suggested that remittance funds sent to the rural population by their *Wantok* in Honiara are decreasing due to decreased food affordability in Honiara[17,] which demonstrates that urban welfare is connected with national development.[16]

Strengths and Limitations

This study was designed to understand dietary patterns, food preferences, and interactions with food environments, not exact food intake levels. The food frequency questionnaire results offer indicative descriptive figures only due to the small sample size and relied on self-reported diet information, which could have introduced bias. The question about vegetable consumption did not distinguish between starchy (an energy food) and non-starchy vegetables (protective foods). The survey was conducted in Honiara only, so may not be representative of all urban areas.

The survey was performed before the most recent Pacific Guidelines for Healthy Living were published, [25] so its recommendations about portions of energy, body building, and protective foods could not be built into the survey. However, these were used when analyzing the data, thus making the findings directly applicable to policy makers in the Pacific. The tool used to measure food security was designed based on the best available resources; however, there is no validated food security measurement tool for Solomon Islands.

The question about household decision-making in this study was simple, and as a result, the responses were likely more superficial than the lived reality for participants. Although most participants reported they had some say in household decision making around food purchasing, it should be noted that in Solomon Islands, "women are responsible for decisions about raising children, providing food, and running the household, but men have the power to beat them if they get it wrong."[15] More time and attention should be given to this vital but highly sensitive topic in the future.

Recommendations

The findings of this study call for urgent action in improving access to a nutritious and affordable diet in urban Solomon Islands. As the combination of rural-urban migration, lack of access to garden land, low incomes, and high formal unemployment in urban populations is a serious problem in many PICTs,[3,33] the methods and findings from this study have value across the region. The methodology used in this study may have use as a foundation in gathering further baseline and subsequent progress information, where food systems interventions and policy changes are implemented.

The combined findings of high food insecurity and diets high in processed foods match those of other studies from the Pacific. Connell declared that food insecurity in PICTs is "an increasingly urban problem," with the solution embedded in broad economic growth and poverty reduction, [28] and cross-sectoral action not limited to the agriculture or health sectors. The issue of urban food poverty in Solomon Islands will affect more and more people as urbanization continues to grow. The rise in urban population size—at a rate of 4.7% per year, faster than the national growth rate of 2.3%—means that poverty reduction and provision of basic services are in need of urgent attention by the national government.[16]

A 2018 review spanning 172 countries has shown that imports of processed food and sugar significantly increase average body mass index.[34] The promotion of healthier food imports through consideration of nutrition in trade policy design and input of the health sector in trade policy has strong potential to improve diets in the Pacific region.[35,36]

Increased alignment between local agriculture and nutrition and health outcomes is needed at high priority.[3] Policies that provide support for marketplaces to sell fresh local foods at affordable prices relative to other foods on the market; and to facilitate different cooking options for households can increase nutritious food consumption. The findings from this study add to the small amount of existing evidence from Melanesian countries that financial and physical access to nutritious food is an important barrier to its consumption.[7,32,37] There is the potential to trial programs that have worked in other countries to address these issues. For instance, research from a low-income area of the United States has shown that an intervention where mobile markets sell fruit and vegetables, combined with an education program, significantly increased consumption of fruit and vegetables.[38]

Conflict of Interest

None of the authors identify a conflict of interest.

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Authors' Affiliations:
- Sydney School of Public Health, Edward Ford Building A27, The University of Sydney, NSW, 2006, Australia (PF, PV, JN)
- Menzies Centre for Health Policy, Charles Perkins Centre D17, The University of Sydney, NSW, 2006, Australia (AMT)
- Pacific Community (SPC). Port Vila, Vanuatu and Honiara, Solomon Islands (MR)
- Synergies Ltd, Ngossi Ridge, Honiara, Solomon Islands (AR)

Correspondence to:
Penny Farrell PhD; Sydney School of Public Health, Edward Ford Building A27, The University of Sydney, NSW, 2006, Australia;
E-Mail: penny.farrell@sydney.edu.au

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Appendix: Survey Instrument

Understanding the socio-demographic determinants of access to healthy food
SURVEY INSTRUMENT FOR INDIVIDUAL INTERVIEWS
CONFIDENTIAL

Interviewer name
Date
School at which interview conducted
Participant ID

1. Participant consent
1.01 Information sheet given and verbally explained
1.02 Consent form given and signed?

2. Introduction
Thank you for agreeing to participate in this survey. We are Penny Farrell and … and … from The University of Sydney in Australia.
We will ask a series of questions about your diet and the interview will go for around an hour.
Your participation is confidential and will not be linked to your child in any way. We will not share the answers with anyone including your child's school.
You can interrupt the interview at any point to ask questions, voice concerns or end the interview if you wish.
There are contact details for our research team on the participant information sheet which is yours to keep.

3. General information about participant
3.01 Age (in years, as at last birthday):
3.02 Sex:
3.03 Village & district live in: Village: District:
3.04 Could you tell me the final class you graduated from at school or in your education? Circle one of: Did not finish primary school, finished primary school, finished high school, has university degree)
3.05 Please briefly explain what you do (e.g. study, type of employment, unemployed, care for family at home)
3.06 Number of adults including yourself (18 and over) in household
3.07 Number of children (18 and under) in household
3.08 Did you grow up in Honiara, if not where did you live as a child?
3.09 How long have you been living in Honiara?
3.10 Do you mainly live in Honiara?

4. Food frequency questionnaire
We will now work through a list of food items and ask how often (never, <1/month, few times a month, 1/week, 2-4/week, 1/day, 2-3/day, >4/day) you consume one serve of each item. [Refer to printed card]

How often do you eat one serve of:

MEAT
Beef in soy sauce, Beef curry,Tinned Corned beef, Salt beef, BBQ chicken, Fried chicken, Chicken curry with coconut cream, Chicken in soy sauce, Baked chicken, Roasted pork (if Y, what cut – or do you eat the whole pig?), Pork baked in earth oven (if Y, what cut – or do you eat the whole pig?), Fried fish, Boiled fish in coconut cream, Tinned fish, Fish prepared in any other ways – how often, Other seafood (ask to list), BBQ lamb chop, Mutton in any other form (if yes, what cut and how is it prepared?), BBQ sausage, Other meat (if yes, what cut and how is it prepared?)

STAPLE/ENERGY
Taro, Potato, Sweet potato, White bread, Wholemeal bread, Cassava, White rice, Green/cooking banana; If yes, how is it prepared, Coco yam, Yam, Cereal; If any, what type, Breadfruit

FRUIT & VEG
How often do you eat 1 serve of fruit? [reiterate serve: half a pawpaw or whole guava, eating banana], How often do you eat 1 serve of vegetables? [reiterate serve: fistful]

DRINKS
Fruit juice (packaged), Fruit juice (fresh), Cordial drink e.g. Tang e.g. raro or sprim, Soda can, Tea or coffee WITH milk, Tea or coffee WITH sugar, Young drinking coconut, Milo, 3 in 1 coffee sachets

SNACKS/TREATS
Lollies, Ice cream, Nuts (e.g. peanuts), Fried snacks, Pizza, Beef burger, Meat pie, Packaged potato chips, Twisties, Hot potato chips, Instant dried noodle, Pancakes, Donuts, Cake, Cream biscuits, Cabin crackers, Sausage roll, Cream bun, Coconut bun

5. Summary of commonly eaten foods
5.01 With the most commonly eaten item in each of the 5 categories in the previous question, why do you eat them – what influences your food choices (if need prompting, rank the most important reasons (affordability, availability, advertising, taste, convenience, habit, healthiness, or culture) for eating these foods?
5.02 [Show flip card of food pyramid.] This is the guideline for the healthy amounts of each food type you should eat. What would help you to eat your meals in these proportions?
5.03 Do you think your overall diet is different to what your grandparents ate when they were your age? Why?

6. Ways of preparing food
6.01 Which main type of cooking oil do you use and why?
6.02 How often do you cook with coconut?
6.03 Which are the main foods you cook in coconut?
6.04 How often do you fry foods in oil?
6.05 Which are the main foods you cook in oil?
6.06 How often do you prepare (or eat) soup?
6.07 Which are the main foods you prepare in soups?
6.08 List the type of cooking equipment you have at home: (E.g. open fire, small gas burner, oven etc. Do the cooking facilities in your home influence the food you cook?.) How?

7. Food consumption and living situation
7.01 During a typical week day, what do you eat, and where do you get it from? Why do you choose this food? For example, in the morning after you wake up and before you leave home, what do you eat and why? [Continue to prompt until participant has explained source of all foods typically eaten in a day – will ask this open-ended question via interpreter]
7.02 What is their role in food purchasing in their household?
7.03 Who decides how money is spent on food in your household? (Participant, joint decision [with whom]) or someone else's decision [who])
7.04 What is your household income, including remittances? What proportion of your household income is from remittances?
7.05 What is your personal income?
7.06 Can you estimate how much money you spend on food each week for yourself?
7.07 Can you estimate how much money you spend on food each week for your family?
7.08 Can you describe what is a healthy meal?
7.09 Can you list ways to make a meal healthier and balanced?
7.10 Please point to the body shape you think looks attractive for men [Show flash card]
7.11 Please point to the body shape you think looks most attractive for women [Show flash card]
7.12 Please point to the body shape you think looks most healthy for men [Show flash card]
7.13 Repeat for most healthy for men and most healthy for women [Show flash card]

8. Food security
Participants will be asked to answer the following questions in relation to the past 12 months: (Remind of confidentiality)

Household questions	**Often true/Sometimes true/Not true**
1. I have been worried that our food will run out	
2. I have been thinking that I wish I had more money and I could buy more food	
3. When I want to make a meal, the materials needed for making it have run out and it's hard for me to get more	
4. I can't prepare meals that I think are healthy for my family, because the materials needed to make it have run out, and I don't have money to buy them again	
5. We eat the same food for several days in a row, because we don't have enough money to buy different kinds of food	
6. I only prepare a few kinds of cheap food and can't make different food because I don't have enough money	
Individual adult items – how often are these true for you?	
7. How often are these true for you: (a) I have one meal per day (b) I have 2 meals per day (c) I have 3 meals per day	
8. I can't eat nutritious food because I don't have money to buy it	
9. Due to lack of money and enough food, I only eat bread, rice or noodles	
10. Sometimes I don't eat all day	
Individual child items how often are these true for the children in your care?	
11. I can't feed my child/children nutritious food because I don't have enough money	
12. Sometimes my child/children only have bread or rice because I don't have money to buy more of other foods	
13. I know that my child/children sometimes is/are hungry but I don't have money to buy more food	
14. My child/children have their meal sizes cut because I don't have enough money to buy food	
15. Sometimes my child/children don't eat all day	

Household secure: Answered 'not true' to all questions
Household insecure: Answered 'sometimes true' or 'always true' to one or more question related to household food insecurity (Q1– Q6).
Individual adult insecure: Answered 'sometimes true' or 'often true' in one or more adult-level items (Q7–Q10).
Child food insecure: answered 'sometimes true' or 'often true' in one or more child-level items (Q11–Q15).
Adapted from Shoae et al. 2007: Is the adapted Radimer/Cornell questionnaire valid to measure food insecurity of urban households in Tehran, Iran?; Public Health Nutrition: 10(8), 855–861; and Derrickson et al. The core food security module scale measure is valid and reliable when used with Asians and Pacific Islanders; The Journal of Nutrition; Nov 2000; 130, 11.

9. Health information
9.01 How frequently do you do exercise where your heart rate is fast for 30 minutes or more? __ < 1 X a week, __ 1-3 X a week, __ >3 X a week
9.02 Are you pregnant? If pregnant, how many months (number of completed months if known)
9.03 Have you ever been diagnosed with diabetes? (Y/N)
9.04 Have you ever been diagnosed with heart disease or high blood pressure? (Y/N)
9.05 Alcohol consumption (Y/N)
9.06 If Y: How many times a week do you drink, how many drinks do you have on average when you drink? how many drinks per week on average (1-3; 4-7; 8+)
9.07 Do you smoke? (Y/N)