

***Study Protocol***

***Fieldwork to collect data required to undertake nutrient assessment for the “******Food Away From Home” database and photos for use in field work of the project experiment***

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# BACKGROUND

The Pacific Community (SPC) has been working on the development of a survey experiment to assess current methodologies used to estimate dietary energy sourced from Food Away From Home (FAFH) among the Pacific Island countries and territories. ‘Food Away From Home’ (FAFH) is defined as food and beverage that is acquired and consumed away from the dwelling, such as in restaurants, at work, schools and at feasting events. The objective of the experiment is twofold: 1) Test the assumption that the cost of a calorie consumed at home is the same as the cost of a calorie consumed away from home, and 2) Propose alternative and innovative ways to collect FAFH consumption.

The survey experiment has been designed for countries conducting a Household Consumption and Expenditure Survey (HCES) according to the World Bank (WB)/Food and Agriculture Organization of the United Nations (FAO) guidelines, which will first include a module to gather information on the socio-economic, geographic and demographic characteristics of each household member (Module 1), a 7-day recall module to collect information on in-house food consumption (Module 2); and a 7-day recall module to collect number of meals consumed away from home, by meal event (Module 3). In addition, a 7-day diary module will be developed to also gather information of meals consumed away from home, using an atlas with photos of the most consumed foods from Samoa, where the experiment will take place (Module 4).

Therefore, the experiment involves the build-up of a database including photos, recipes, weights, nutrient content and cost of the main meals available for FAFH consumption in Samoa. The database will be built combining innovative techniques – such as web scrapping and crowd sourcing – and traditional methods, such as in-the-field survey on a sample of food vendors not covered by the web scraping.

Ultimately, the objective of the all assignment is to conduct a dietary assessment of national meals consumed away from home by combining both traditional dietary methods and innovative technology.

# OBJECTIVE OF THE STUDY PROTOCOL

To enable the creation of a database of the main meals consumed away from home from Samoa, associated with their nutritional content and photos for food identification and portion size quantification.

# METHODOLOGY

## Period

The development of the database of the main meals consumed away from home from Samoa will be developed from September 2022 to December 2023. The first set of information (hereafter called “Database Data Collection[[1]](#footnote-1)”), including photos of meals with their portion sizes and priority recipe data for nutritional assessment, will be collected between 27th of September and 13th of October of 2022. During this period, a nutritionist from Samoa will be trained in order to proceed with the finalization of the photos for the atlas.

## Local

The database data collection will be hosted by the Samoa Bureau of Statistics. A place to prepare recipes and take the photos will be identified prior the data collection.

## Defining the information needed for the database data collection

Given that the database data collection will result in two different types of information (photos with portion size and recipe data), it is possible to prioritize the number of foods and related methodology using a different approach in each case. This is especially important because of the logistic involved in preparing all the information needed, which may be challenging in 15 days of work. Therefore, the procedure is divided among these two types of information: Development of photos with their portion size and Recipe data disaggregation.

## Development of photos with their portion size

It has been agreed that the main objective of the manual is to aid the quantification of the portion size consumed from each food/meal, and not necessarily the identification of meals. To this end, a variation of portion sizes will be desired for those foods that can vary in size/portions.

Number of foods/meals and photos selected

To enable a manageable atlas within the fieldwork of module 4, a maximum of 150 foods will be identified. These will reflect the most consumed FAFH from Samoa islands, which will be prioritized from the work performed with webscraping, crownsourcing and focus groups, and following the Guidelines from the International Agency for Research on Cancer and Intake Organization(1, 2). Because these sources of information generated different types of data, a list with possible 150 foods/meals will be further compiled by grouping similar dishes. This list will be complemented/endorsed by local nutritionists from Samoa (or a steering committee to be identified), through a face validity of the list. Note: Similar recipes with slightly different ingredients will be photographed only once and their nutrient composition can be adjusted afterwards to consider possible differences in ingredients, if needed. Module 4 instrument should therefore be able to capture such information. For example, a red meat stew could be photographed to quantify the consumption of different stews. If chicken stew was instead consumed, the red meat stew photo could be used to identify the food and estimate amount consumed. During data analysis, nutrient composition can then be derived for different types of stews assuming a similar proportion of the protein ingredient.

If the food/meal can be represented by only one portion (for example: [pani popo](https://i0.wp.com/tarasmulticulturaltable.com/wp-content/uploads/2013/03/Pani-Popo-Samoan-Sweet-Coconut-Buns-9-of-9.jpg?resize=1024%2C683&ssl=1) - Samoan Sweet Coconut Buns), this food will be placed in a section of the atlas together with different types of breads/buns to aid the identification of the food. There is no need to have different portion sizes of the Bun given that the food is represented by a specific portion (e.g. unit). This means that different foods/photos can be placed within the same page. On the other hand, if the food/meal can vary in portion size, the food will be represented by four to six portion sizes to not only aid the food identification but also the quantification of the food consumed. For example, [Sapasui](https://cdn.tasteatlas.com/images/dishes/608f8a0c07bc45309eb1d36c8c32cf0e.jpg?mw=1300) (Samoan Chop Suey) that can be placed in different portion sizes in a plate ([See example of photo series, representing different portion sizes](https://www.fao.org/3/cb4844en/cb4844en.pdf)).

These are potential food types to be portioned in a series of photos (1):

• Foods served in stiff mounds (e.g., ice cream)

• Slippery foods (e.g., pasta)

• Foods served in sauce or gravy (e.g., stew)

• Dry food served in a bowl (e.g., corn flakes)

• Wet food served in a bowl (e.g., soup)

• Discrete pieces of different sizes (e.g., fruits); i.e., shapeless foods and those foods that vary in individual portion size along a continuum size from very small to very large.

The prioritized list of foods/meals needs to be ready by September 24th in order to allow the preparation of the sections.

Number of portion sizes to depict in a photo series

The selection of the number of different sizes and which portion to depict is an important consideration for high-quality food photograph development. This is related to the number, interval, and range of portion depicted. A sufficiently large number of portion options needs to be depicted for each food item; this number will depend on the range of portion sizes typically consumed by the demographic group with whom the food photographs will be used for portion size estimation. The portion increments should not be so large as to lead to errors in the estimation of amounts consumed, but at the same time, the difference in the portion or unit sizes depicted should be visually discernible to the respondent (i.e., there should be a clear difference in portion or unit size between each successive portion or unit size depicted) (2). The number of recommended photos is six (1, 2), but in some cases only four portions are possible. In any case, an even number will be considered to avoid the selection of middle picture. In practical terms, the following will be done:

Step 1. Identify the minimum and maximum portion sizes to be depicted for the given food. Ask a local chef/knowledgeable person of what is expected to be the minimum and the maximum portion amounts. This usually refers to a soup spoon and full plate for the minimum and maximum amounts, respectively. These amounts will be weighed on a scale with precision of 1 g.

Step 2. Identify a set of intermediate portion sizes to depict for the given food item, which are in-between the minimum and maximum portion sizes identified. For that, the difference between the minimum and maximum portion size for the food item in grams will be calculated (identified in Step 1), then this amount will be divided by one less than the number of portion sizes to be depicted (usually 6). This represents the portion size increment (in grams) to depict between each image of the food item. Using this method to calculate the intermediate portion sizes to depict for a given food item ensures that the portion sizes depicted vary along a continuum and that the increment in portion size is always the same in grams. An Excel file template will be prepared with formulas to ease this verification.

Step 3. Visually confirm the usability of the selected portion sizes for the given food item, and adjust the portion sizes, if needed. Oftentimes, this can only be checked during the photo session If 6 portions are releasing similar portions on the plate, it may be considered to use 4.

### Preparation of foods/meals

It is expected that foods will come from three different situations: the meal is from a restaurant or canteen, the meal is from a street stand, the meal is consumed during a community event.

*Meals from a restaurant or canteen & meals from a street stand:* can be bought and brought to the place where the photo shooting will take place. In specific, meals from a restaurant or canteen could also be prepared on a kitchen using a traditional recipe, provided the dish is a common traditional one. If the same meal is offered in various restaurants/stands with the same recipe but different weights (e.g., sashimi, fish and chips, eggs benedict), food will be bought from three different restaurants for weighing the food and averaging the weight, but only one picture will be taken.

*Meals consumed during a community event:* can be prepared on a kitchen using a traditional recipe, which would have to be identified and endorsed by a local steering committee.

Depending on the number of foods and photos to be developed, it will be necessary to prepare some food items in advance and plan multiple sessions on separate days. This planning will be possible when foods are identified. It should not be planned more than 10 preparations in a unique day, depending on the complexity of the preparations.

### Placing foods on a plate to be photographed

With the definition of portion ranges, the amounts of every portion should be placed on a plate and weighed using an electronic scale with precision of 1g. The final amounts should be recorded in a specific paper-based sheet and in an excel file at the end of the day. The weight of the plate should be discounted each time separately because the weight of plates may also vary (even for the same size and type of plate). If the weight does not equal exactly the intended, pre-established portion size, the actual weight of the portion size depicted in the food image is the weight that should be documented and used for all later steps of data processing. Important: Keep record of existence and weight of inedible parts because an edible part factor may be applied.

Furthermore, the plate used to place the foods should be white and the most common size used in the country. Size in cm or in should be recorded for future documentation. To enable the placement of different portions at the same time, it is advisable to have at least 18 plates (if possible, 30). Eventually, soup plates and dessert plates can also be used. In that case, at least 12 plates of each type should be ready for use. In case these two plates are used, they should be placed on top of the bigger plate, for standardization of the picture size.

Some food items will be ready for placement at any time and can be prepared/bought in advance, while others will have to be prepared just a few moments before the photo shoot to preserve the aspects of a good presentation. This is true for food items that change their appearance with time. For some food items, a solution with citric acid may be helpful to prevent discoloring. Vegetable blanching may be helpful in certain cases (e.g., spinach). Some of the food items will require heating before plate placement for a better presentation because they tend to dry out (e.g., porridges). For food items that need to be warmed, it is important to be careful to not have steam visible during the photo shoot (2). Furthermore, foods on the plate should look nice without losing the correct notion of volume-weight (1). For that, it is important to not press the volume of the foods on the platter, in a way that will look unnatural.

In addition, when placing the range portions, the smaller portions should always be placed on the left side of the plate and the increase of portion sizes should be on the surface and not on the height of the food. The height of the food should be the same from start (portion 1). If only one portion is photographed, the food should also be placed on the left side of the plate for standardization.

Placing more than one food/recipe on the same plate is not advisable, based on previous validation studies. Therefore, each food will be placed and photographed separately on a given plate. In case of Sunday events, each recipe will be prepared and placed on a range of 4 to 6 portions in different places. There will be no combination of foods on the same plate, given that the individuals can estimate each food separately using the atlas. Exception will be made only if the meal is the combination of two foods that goes together, as for example fish and chips, sandwich with fries.

### Photo shooting

The exact presentation angle will vary according to the size of the food but is likely to be around 45 degrees. The same presentation angle should be used for all portion sizes of a given food item included in a photographic series(2). The distance between the camera and the food item should be consistent for all photographs (i.e., somewhere between 150 cm and 180 cm).

Photographs needs to be taken with good lighting, at high resolution to allow large, high-quality prints. The background needs to be unobtrusive, neutral, and light (preferably light gray).

For food items for which it is important to visualize depth, the food item should be turned at an angle so that the depth of the food item is visible (e.g., showing the side of a slice of cake)(2).

During the photographs, a fork and knife will be used as reference on the side of the plate.

## Recipe disaggregation

Disaggregation of recipes into ingredients it is important to estimate their composition and contribution to nutrient intake with greater precision. Ideally, all recipes would be disaggregated from scratch, by preparing and weighing all ingredients before and after preparation. However, this is often not possible because of the resources available (time and monetary). Nevertheless, post recipe disaggregation is also possible by using estimated measurement rather than actual weights. Therefore, a two-way approach is proposed for the present experiment.

First, given the time resources available, the 30 most consumed recipes in Samoa will be disaggregated from scratch, by weighing foods before and after preparation, using the adapted ingredient method approach, as recently adapted by FAO together with the Federal University of Paraná. By weighing ingredients before and after preparation, yield factors and edible portions will be recorded in a specific Excel Template. Another possibility is stick with the traditional Ingredient method, which will allow for recipe disaggregation for nutrient assessment but will not lead to % of amounts from each ingredient (3).

Second, a post-recipe disaggregation will be done based on the reported recipes collected in Module 4 of the experiment, following the same procedure as mentioned above but using reference information to estimate measurements into grams, and collect information from edible portions and yield factors applicable to ingredients and recipes.

Briefly, the following steps will be followed:

**Figure 1 -** Steps for Recipe Disaggregation in Food Consumption Surveys

1. Identify the standard recipes for each recipe of interest.
2. Classify the identified recipes according to their final liquid content (with or without fluid).
3. Disaggregate the list of ingredients with the description of method of preparation and household measurements or standard units for all ingredients.
4. Convert household measurements and standard units into grams for all ingredients.
5. Identify the food coding system (i.e. food code used in the food consumption survey)
6. Select edible coefficients and Yield Factors (YF) for all ingredients as well as YF for the recipe.
7. Calculate the grams and percentages of ingredients in each recipe.
   1. If the recipe was classified without fluid content: estimate the amounts using the factors mentioned in step 6.
   2. If the recipe contained fluids in considerable amounts at the end of the preparation: estimate the amounts using the factors mentioned in step 6 AND estimate the fluid content in the recipe as part of the calculation.
8. Estimate the nutrient content of each ingredient.
   1. Select and apply nutrient Retention Factors (RF) at the ingredient level, if needed.

The following references can be used to identify edible factors and yield factors:

* [Pacific Food Composition Database. [Accessed September 2022].](Food%20Composition%20Tables%20for%20Pacific%20Island%20Household%20Income%20and%20Expenditure%20Surveys)
* [The Australian Food Composition Database.](http://www.foodstandards.gov.au/) (4). [Accessed June 2022]. Named as “Analysed Portion”.
* [FAO/INFOODS Global Food Composition Database for Fish and Shellfish](https://www.fao.org/3/i6655e/i6655e.pdf) - uFISH 1.0 (5). [Accessed June 2022].
* [The New Zealand Food Composition Database](file:///C:\Users\crisp\Downloads\New%20Zealand%20Food%20Composition%20Database.%202019.%20New%20Zealand%20FOODfilesTM%202018%20Manual.%20The%20New%20Zealand%20Institute%20for%20Plant%20and%20Food%20Research%20Limited%20and%20Ministry%20of%20Health) (6) [Accessed June 2022].
* [Tables on weight yield of food and retention factors of food constituents for the calculation of nutrient composition of cooked foods (dishes)](https://www.fao.org/uploads/media/bognar_bfe-r-02-03.pdf) (7).
* Nutrient losses and gains in the preparation of foods. (8).
* [Food Yields summarised by different stages of preparation.](https://www.ars.usda.gov/ARSUserFiles/80400530/pdf/ah102.pdf) (9).

The recipes to be disaggregated prior the survey will be prioritized from the work performed with webscraping, crowdsourcing and focus groups. Because these sources of information generated different types of data, a list with possible 50 foods/meals will be further compiled by grouping similar dishes. This list will be complemented/endorsed by local nutritionists from Samoa (or a steering committee to be identified), through a face validity of the list.

**Important: A standard recipe to represent the recipe needs to be identified prior the data collection.**

## List of personnel, equipment and supplies

- A cook/chef to cook some of the recipes for the photo shooting and the recipe disaggregation database.

- A very good photographer. Experience with foods is desirable but most importantly capable to take great quality pictures.

- A contact person in the country to help running the study. For example, to identify where to buy ready-to-eat dishes.

- Two helpers for the photo shooting. They will assist on some small preparations, placing and weighing the foods on the plate; Cleaning the plates for the photos shooting.

- An equipped kitchen to prepare the foods/recipes.

- Foods and dishes to be bought.

- Purchase OR collect of White Plates for the photos shooting. Minimum 18 white common plates, 12 soup plates, 12 dessert plates.

- Identify a pair of forks, knives and spoons mostly used in the country.

- Two Digital Scales with precision of 1 gram.

- Citric acid.

- Common household measurements to be displayed in the atlas.

- Paper and kitchen towels.

## Other aspects to be considered:

* Photographer needs to agree the transfer the rights of use of the photos.
* Graphic designer may be needed in a later stage depending on how we intend to use the photo and/or the quality of the photo.
* Which household measurements to take photos (if decided)

## Timeline

* 12 to 21st September - Michael will prepare logistic (buy material, find kitchen, hire photographer, hire cook, hire nutritionist, establish protocol to buy meals and ingredients to cook).
* 26th 30th September - Solene will test the protocol with 10 foods.
* 1st and 2nd October – Sandra and Solene will test together the protocol
* 3rd to 7th of October – Photo shooting in Apia – Average of 6 foods per day. Goal: 30 foods in Apia.
* 8th to 11th of October– Photo shooting in Savai´I – Average of 6 foods per day. Goal: 24 foods in Savai´i.
* 12th and 13th of October - Photo shooting in Apia – Average of 7 foods per day. Goal: 15 foods in Apia.

A Step-by-Step guidance to hold the photo shooting session is presented in Annex 1.

# REFERENCES

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Annex 1 - Step-by-step guidance for the photo shooting

**Preparation of the session**

1. The following aspects needs to be in place at the beginning of the session:

|  |  |
| --- | --- |
|  | Kitchen with stove, microwave, oven, kitchen utensils… |
|  | Dinner plates |
|  | Soup plates |
|  | Dessert plates |
|  | Reference Knife |
|  | Reference Fork |
|  | Reference Spoon |
|  | Kitchen/Paper towel to clean the plates before the photo is taken |
|  | Background for the picture (light gray colour) |
|  | Photographer |
|  | Digital scales |
|  | Cook/Chef |
|  | Foods for the section |
|  | Paper-based form to record the amounts (Annex 2) |
|  | Notebook for recording amounts in the Excel template, where between portions will be defined |
|  | Identify the person that will help the identification of the smallest and largest portion of the picture series. Usually is the cook but could be someone else knowledgeable on the food habits of Samoa. This person will be consulted every time a new series of pictures will be prepared. |
|  | Helpers to assist the photo shooting and clean the plates, which may be used again. |

2. Once the foods are identified, discuss with the cook/chef the order of the preparations, having in mind that some foods may take longer to prepare, that some will get dry and should be prepared closer to the photo shooting and that others will have to cool down before the food is placed on the plate.

3. Have in mind that some preparations can be ready and placed on the plates before the photographer arrives, as long as the appearance will not change because the food is staying a long period on the plate.

4. Once the photographer arrives, he will have to be briefed about the background placement (what is going to be put as background), position of the plate, fork and knife (or spoon), and the angle & distance of the camera. The exact presentation angle will vary according to the size of the food but is likely to be around 45 degrees. The distance between the camera and the food item should be consistent for all photographs (i.e., somewhere between 150 cm and 180 cm).

**During the session**

1. Once the first food is ready for placing on the plates, choose the best plate to place the food, according to the characteristics of the food. It should be chosen the most common for the country. Usually, a dinner plate will be used. But for soups, a soup plate can be used or salad/dessert plate can be used for desserts or other foods eaten with small plates.

2. The empty plate should be weighed on the scale. Then, the scale should have the weighed tared.

3. After, the smallest food portion should be determined to be placed on the same tared plate. Usually, this means a soup spoon or a small piece but it can vary from to food. The most important is that someone from Samoa helps the validation of this smallest portion.

4. The amount of the smallest portion should be weighed and recorded on the paper sheet.

5. Steps 3 and 4 should be repeated but now for the largest possible portion. This usually means completing the full plate. Validation of the largest portion is also needed.

6. The recorded small and large portions in grams should be typed on the Excel template to define the number of portions desired, which will vary from 4 to 6. If the differences between the portions are too small, please consider using only 4 portions. Preference should be given to 6 portions, though. An odd number is not desirable.

7. From the Excel template, you will have the amounts in grams desired for the portions in between the first and last portions. Using again tared plates, the exact amounts of the food should be placed on different plates.

8. All plates (borders) should be cleaned to not have spots, finger prints, water, that will be captured with the camera light.

9. Each portion should be photographed separately, checking the result every time a picture is taken. The position of the plate needs to be checked each time.

10. Be aware that some foods may have inedible parts that needs to weighed and recorded in the paper sheet after the photo is taken. These are usually bones.

11. We will also take the opportunity to weight the quantities of some other types of measurement used for the foods (serving spoons, standard units and portions). Therefore, the second part of the paper-based form should be completed, using measurements that makes sense for the food. Triplicates of the quantities should be recorded.

12. Some foods will be taken to represent the units eaten and not necessarily the portion sizes. For example, we may have a photo series with different biscuits placed on a plate. These will all be weighed and recorded, separately. See example on page 98 from this manual: <https://www.fao.org/3/cb4844en/cb4844en.pdf>

13. We will also have a session of household measurements. See example on pages 12 to 22 from the above manual. In these cases, the volume and dimensions of the utensils should be recorded.

**TIPS:**

* If a food is getting dark to fast, a solution with citric acid can be used. Use 1 teaspoon of pure ascorbic acid dissolved in x ml of cold water.
* Vegetable blanching may be helpful in certain cases (e.g., spinach).
* For food items that need to be warmed, be careful to not have steam visible during the photo shoot.
* Foods on the plate should look nice without losing the correct notion of volume-weight. For that, it is important to not press the volume of the foods on the platter, in a way that will look unnatural.
* Important: When placing the range portions, the smaller portions should always be placed on the left side of the plate and the increase of portion sizes should be on the surface and not on the height of the food. The height of the food should be the same from start (portion 1). If only one portion is photographed, the food should also be placed on the left side of the plate for standardization.
* For food items for which it is important to visualize depth, the food item should be turned at an angle so that the depth of the food item is visible (e.g., showing the side of a slice of cake.
* Each food will be placed and photographed separately on a given plate. Exception will be made only if the meal is the combination of two foods that goes together, as for example fish and chips, sandwich with fries.
* Food should look like in the same way someone would eat them. It is not about looking pretty but looking real. For instance, you do not need to order food pieces in the plate but rather place them as one would eat.

Annex 2 - Paper-based form to record the amounts

**Date: \_\_\_ / \_\_\_ / \_\_\_**

**Responsible for the record: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Food name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |
| --- | --- | --- |
|  | **Weight (grams)** | **Weight of inedible part[[2]](#footnote-2) shown in picture (if applicable)** |
| Portion 1 |  |  |
| Portion 2 |  |  |
| Portion 3 |  |  |
| Portion 4 |  |  |
| Portion 5 |  |  |
| Portion 6 |  |  |

To be completed during the session but used for the purpose of building a database of household and standard measurements:

|  |  |  |  |
| --- | --- | --- | --- |
| **Household measurement or Standard unit/portion[[3]](#footnote-3)** | **Weight 1** | **Weight 2** | **Weight 3** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Observation - keep note of any important remark of the shooting \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Also know as Food Establishmento Survey [↑](#footnote-ref-1)
2. Bones, skins, shells... [↑](#footnote-ref-2)
3. Examples are small unit, average unit, large unit, small portion, average portion, large portion, serving spoon, tea spoon, soup spoon…whatever will make sense for the food/meal. [↑](#footnote-ref-3)