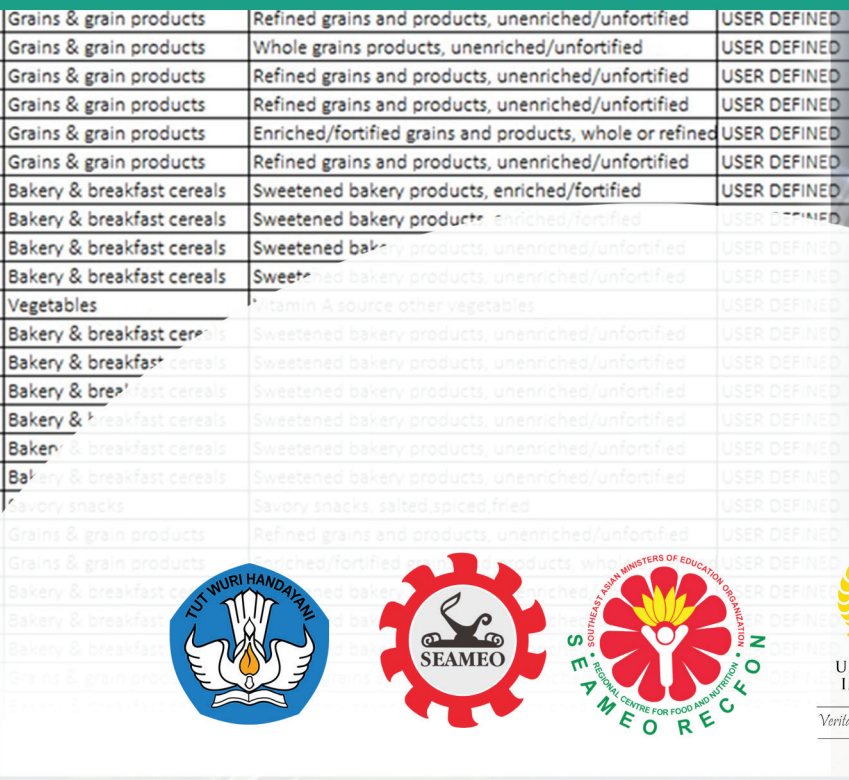

LINEAR PROGRAMMING APPROACH USING OPTIFOOD

TO DESIGN FOOD AND NUTRIENT INTERVENTION

Dr. Ir. Umi Fahmida, M.Sc
Indriya Laras Pramesthi, M.Nutr
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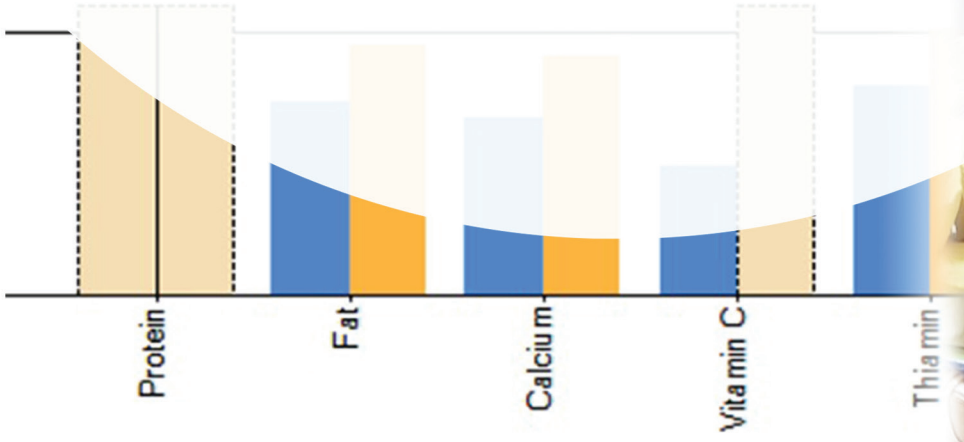

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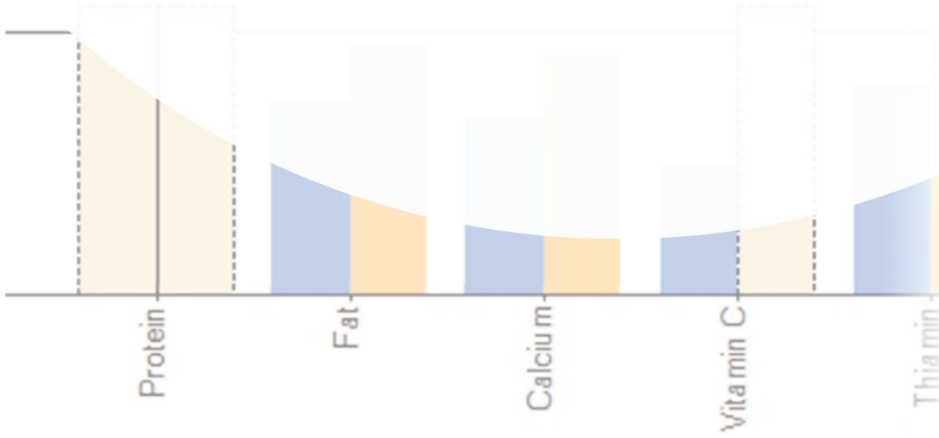

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Linear Programming Approach using Optifood to Design Food and Nutrient Intervention

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Contents

LIST OF ABBREVIATION

CFR	: Complementary feeding recommendation
EAR	: Estimated Average Requirement
EFR	: Estimated food record
FBDG	: Food-based dietary guidelines
FBR	: Food-based recommendation
FCT	: Food composition table
FFQ	: Food frequency questionnaire
FR	: Food record
LP	: Linear Programming
RNI	: Recommended Nutrient Intake
SQ-FFQ	: Semi-quantitative food frequency questionnaire
TIPs	: Trial of improved practices
WFR	: Weighed food record

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DIRECTOR'S REMARK

The Southeast Asian (SEA) region still faces great challenges in combating malnutrition especially amongst children and women of reproductive age (WRA). In some countries, child stunting, anemia and other micronutrient deficiencies are prevalent. These problems have been attributed to inadequate nutrient intake from the diet. The SEAMEO RECFON responds to this by initiating a "Model of partnership to translate guidelines into practices for optimal diet of SEA community". This initiative aims to build capacity within the region to formulate local specific optimized food-based recommendations (FBRs) or complementary feeding recommendations (CFRs), promote the developed FBRs/CFRs to the community, and evaluate its effectiveness. The partnership model involves the Ministry of Health and Ministry of Education in Indonesia, Myanmar, Lao, Cambodia, and the Philippines.

This book reflects our Centre's commitment to build capacity in the region on linear programming approach using Optifood to strengthen the food and nutrition programs in our region by designing food and nutrient intervention, which are effective and compatible with local food availability, food pattern and affordability. This book is our modest way to support the global efforts toward sustainable and healthy diet, particularly among the people of Southeast Asia.

Jakarta, April 2020

Muchtaruddin Mansyur, MD, Ph.D
Director of SEAMEO RECFON

FOREWORD

I am pleased to provide a foreword for this book, which is authored by Dr. Umi Fahmida and her team, on the use of linear programming (LP) to develop locally specific food-based recommendations. The development of locally specific food-based recommendations is a key strategy, for promoting healthy and sustainable diets, to improve population health.

I became interested in using linear programming analyses to develop locally specific food-based recommendations, while working on sabbatical with Dr. André Briend and Dr. Nicole Darmon in Paris, France in 2001. Together we developed an approach, using linear programming analysis, to robustly formulate and test locally specific food-based recommendations. The first prototype of our approach was created in Microsoft Excel, using the super solver function. Dr Umi Fahmida and I then worked together, in 2004 and 2005, to operationalise the approach by developing complementary feeding recommendations for young children living in different areas of Indonesia. The next important step, in 2011, was creating the Optifood software through a collaborative effort led by the World Health Organization's Departments of Maternal, Newborn, Child and Adolescent Health and Nutrition for Health and Development. This user-friendly software greatly simplified the modelling process, allowing other users to perform the complex LP analyses.

This approach, for robustly formulating population-specific food-based recommendations, however, will not benefit populations unless the capacity is developed to use the Optifood software. I am, therefore, grateful and pleased with the support from SEAMEO RECFON, as the regional center for food and nutrition in Southeast Asia, and Dr. Umi Fahmida and her team who have not only contributed to the development of the Optifood software but more importantly are building capacity in the region to use it. Their innovative initiative, for building LP expertise within the region, is critical for supporting global efforts to promote effective food-based interventions that align with local contexts. Local contextualization of food-based recommendations is often overlooked yet evidence is growing that it is essential to promote affordable and healthy diets that consider local food availability and cultural food patterns. This book will make a significant contribution towards capacity strengthening in LP analysis, using the Optifood software, to support these important efforts to promote population-specific affordable, healthy and sustainable food-based approaches to improve population health.

Jakarta, April 2020

Dr. Elaine Ferguson
Nutritionist

PREFACE

It is our pleasure to present this book that will serve as reference for understanding the principle and method of using linear programming (LP) approach using Optifood to develop local specific food-based recommendations (FBRs) and complementary feeding recommendations (CFRs). This book is the result of our experiences working with LP approach in the past two decades and providing LP trainings within the Southeast Asia (SEA) region in the past decade, including the most recent training for our academic partners in Indonesia to develop CFRs/FBRs for the 37 stunting districts in Indonesia.

We believe that despite the nutritional problems, there are locally available nutrient-dense foods which have potential to improve nutrient adequacy from the diet. Affordable, available, and locally contextual FBRs/CFRs that take into account cultural diversity and food availability will result in long-term improvements than general recommendations. Our studies using FBRs/CFRs developed using LP indicated more significant improvement in dietary diversity and intakes of problem nutrients. FBRs developed using LP have also been tested not only in improving nutritional status but also in preventing disease which gave promising results.

We hope that through this book and the LP-Optifood training, we can build a critical mass of expertise in Southeast Asia to formulate local specific FBRs/CFRs to strengthen food and nutrition interventions. We are thankful to the support extended by experts, partner-institutions, and students in our effort to optimize our diet for optimal health and nutrition of our population in the region. The 'Logic' and 'Passion' are both essential when working with LP approach and we have seen this when working with our partners.

Jakarta, April 2020

Dr. Ir. Umi Fahmida, M.Sc.
Indriya Laras Pramesthi, M.Nutr.
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INTRODUCTION

CHAPTER 1

CHAPTER 1.

INTRODUCTION

Linear/goal programming (LP) is a mathematical optimization technique in which a linear function is maximized or minimized within a given set of constraints. In Optifood, LP is used to select an optimal food basket (7-day diet) from among all possible food baskets (7-day diets) while simultaneously taking into account constraints that define the diet's energy content, cultural food consumption patterns, and affordability (optional). In the four modules of Optifood, many linear programming models are run. The models in Module I test the LP model parameters, allowing changes to be made to these parameters until realistic 7-day diets are selected. The two models run in Modules II are goal programming models. Both models aim to select 7-day diets that come as close as possible to achieving the FAO/WHO recommended nutrient intakes (RNIs) for protein and 11 micronutrients (nutrient goals); and in one model to come as close as possible to achieving the population's average food group patterns (food group goals). The LP models run in Module III and IV either minimize or maximize the 7-day diet's nutrient content or costs.

LP for Identifying both "the Problems" and "the Solutions"

Optifood can be used to identify "problem nutrients" and "food-based solutions". The analyses from Module II will show the **PROBLEM NUTRIENTS**, which are defined as nutrients that do meet 100% RNI in **both** of the Module II diets. The type of problem nutrient(s) is defined by the maximized (best-case scenario) diets selected in Module III. Problem nutrient can be partial (i.e. meeting 100% RNI in the best-case scenario) or absolute (i.e. less than 100% RNI in the best-case scenario). Therefore, at the end of this process each nutrient can be categorized as absolute problem nutrient, partial problem nutrient, dietary inadequacy, or dietary adequacy **(Table 1.1).**

Table 1.1. Type of nutrient as identified from the Optifood Module II and Module III

Type of nutrient	Maximised (best-case) MODULE III	Best-diet MODULE II
Problem nutrient, absolute	<100%	<100%
Problem nutrient, partial	≥100%	<100%

LP, in Optifood, will also provide information on the potential food-based **SOLUTION.** The 1st clue for the solution comes from the frequency for each food group in the two Module II best diets; in particular, the food groups that have a higher frequency/week in the No-FP compared with the FP best diet. These food groups are important to promote to improve intakes of the problem nutrients. Besides these nutrient-dense food groups, you can also identify specific food subgroups or food items which are **NUTRIENT-DENSE.** In our LP analysis we define nutrient-dense food(s) or sub-group(s) as those which contributed 5% or more of the intake of specific nutrients in the Best-diet No-FP. Bear in in mind that these nutrient-dense foods or sub-groups are contributing to 5% or greater of the intake (not RNI) therefore when the intake is very low (as in the case of absolute problem nutrient) inclusion of these food-sub-groups/foods into the FBRs may not be sufficient to fully meet the nutrient requirements.

The Use of LP

To compare problem nutrients of sub-population. Module II and Module III (best-case scenario) can be used to make comparisons across population on the potentials of their locally available foods to meet nutrient requirements. In our analysis of the 10 stunting prioritized districts in Indonesia, we identified problem nutrients using LP that were in line with the nutritional problems of under-five year old children (stunting and anemia) and pregnant mothers (anemia). The top three problem nutrients were folate, zinc, and iron in under-five year old children and iron, folate, and calcium in pregnant mothers. More problem nutrients were found amongst the youngest children (6-11 months old) than older children. In addition, there were differences in number of problem nutrients between different sites. For example, the number of problem nutrients ranged from zero (for 12-23 months old in Maluku Tengah; 24-25 months old in Brebes, Cianjur, Pemalang, Maluku Tengah; 36-59 months old in Cianjur, Pemalang) to six nutrients (for 6-11 months old in Lampung Tengah, Rokan Hulu). The number of problem nutrients in comparison with the prevalence of stunting and anemia a well as data on local food availability can provide insights into whether the problems are mainly due to food availability or poor IYCF and dietary practices **(Figure 1.1)**. LP is also sensitive in identifying difference in problem nutrients between age groups, socioeconomic levels, and subjects with different nutritional status, such as anemic vs non-anemic adolescent girls (Fahmida *et al*, 2014; Oy *et al*, 2019).

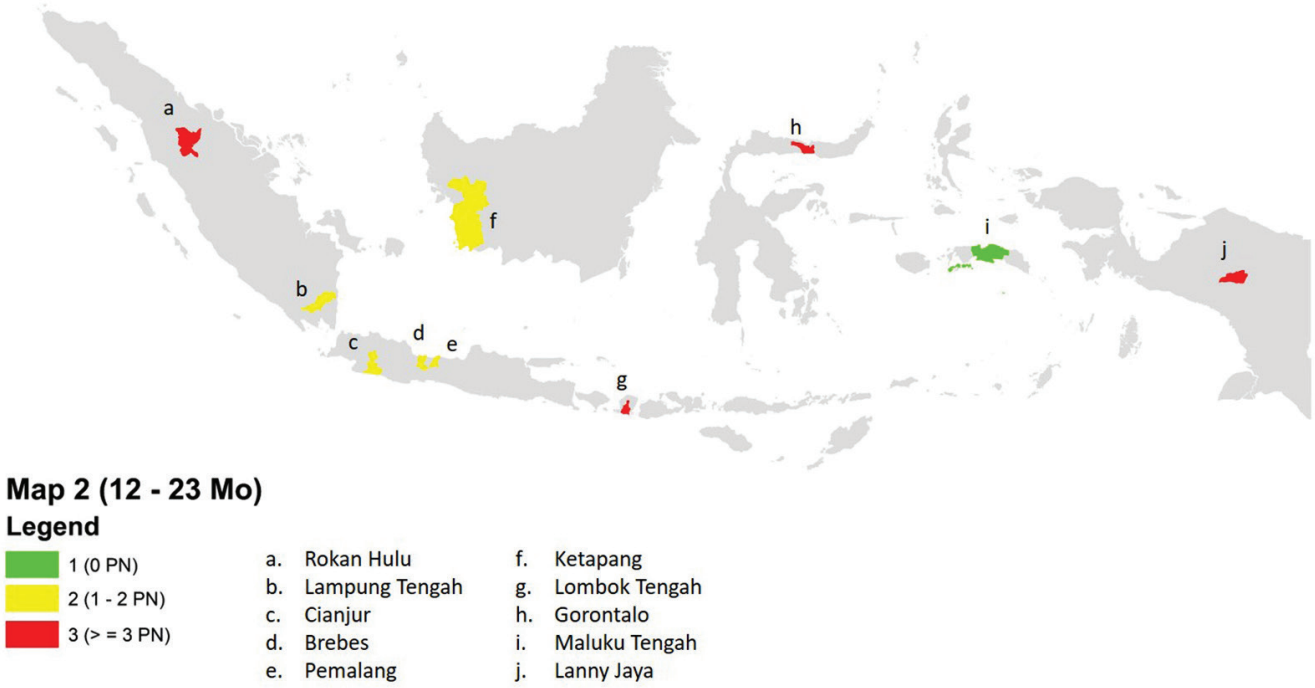


Figure 1.1. Mapping of problem nutrients amongst 12-23 months old children based on national food consumption survey in 10 stunting prioritized districts in Indonesia
(submitted for publication)

To design local-specific food-based recommendations. The primary use of LP, in Optifood, is to develop food-based recommendations (FBRs) which are suitable for improving the dietary adequacy of a population given the food availability in the area, the food consumption patterns, food prices and food affordability.

To identify the nutrient gap for formulation of fortified products, food multi-mix or other complementary approaches. Besides using LP to develop FBRs/CFRs when the food patterns did not allow all nutrients to meet 65% RNI, the so called "**NUTRIENT GAP**" —which is difference between RNI and %RNI achieved in 2best diet— can be used to inform other complementary approach. This complementary approach can be formulation of biscuits fortified with minerals and fatty acids or in identifying the foods to grow in the school garden. LP can also be used to identify nutrient gap for formulation of fortified products, food multi-mix or to provide recommendations on foods which should be grown more (eg. in home or school garden).

The LP analysis in Optifood can be summarized in **Figure 1.2**

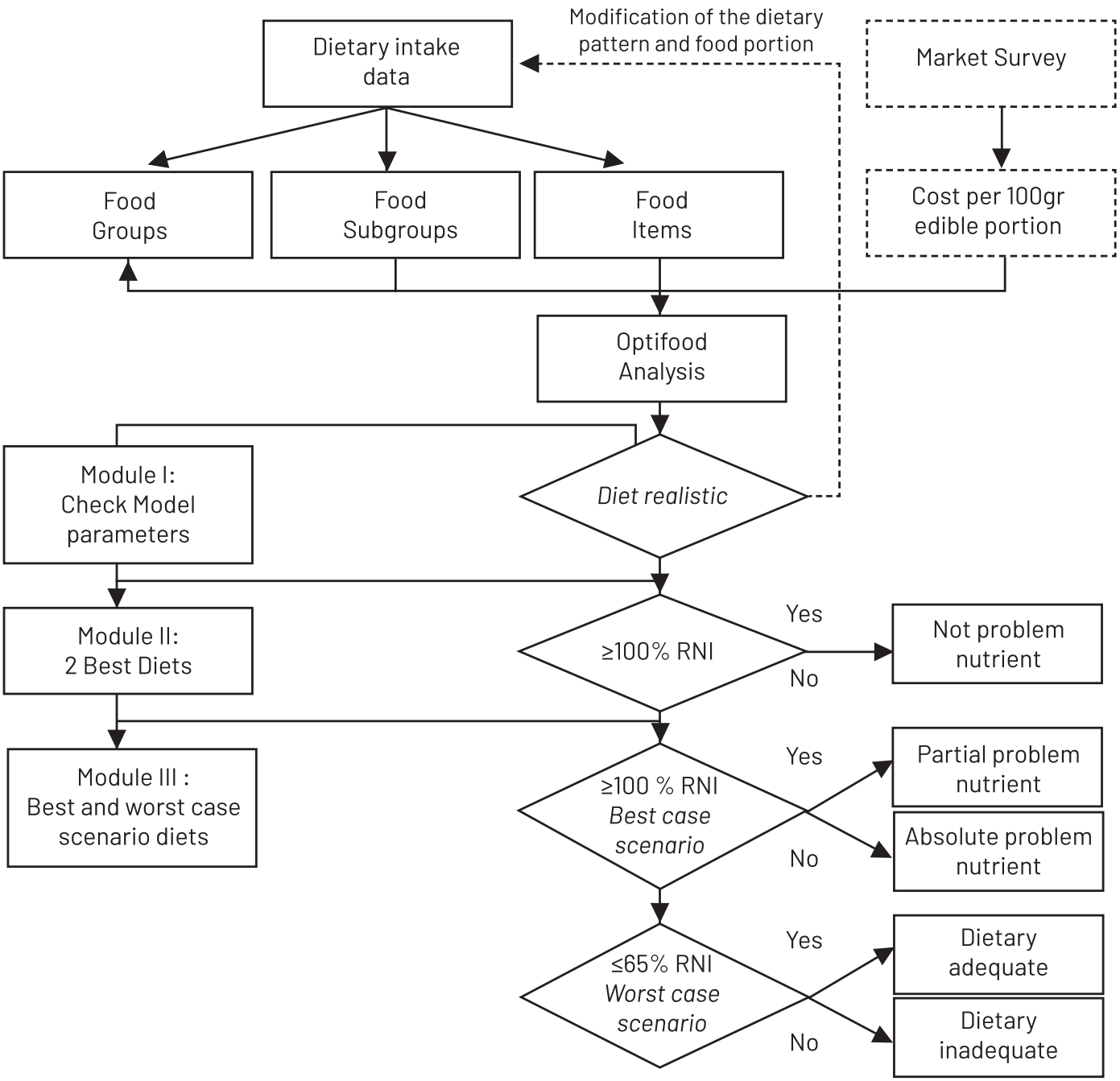


Figure 1.2. Flow of LP analysis to identify problem nutrients, nutrient-dense foods/subgroups/ groups and alternative food-based recommendations (FBRs)

FAQ: How local specific should we go?

Local specific FBR is a translation of national level food-based dietary guideline (FBDG) which is adjusted to local food availability, food pattern and food affordability. Therefore the level you should aim for the FBR very much depends on the clustering of food pattern in your country. For instance several provinces may share similar food pattern and in this case it is relevant to combine them into regional FBRs such as coastal, delta, hilly area, etc. On the other hand, food pattern may also differ even within one province given culture, religious practice etc. In this case it will be ore relevant to have local specific FBRs for each district.

The rule of the thumb for an FBR is not to be too generic (it won't be different than a generic FBDG outlining what food groups should be consumed each day) but also not too specific (it will be too difficult to remember and not flexible to be implemented). In general:

1. Start with outlining the general guideline ie number of meals, snacks and ensuring food groups are covered in each meal/day.

2. Aim for specifying nutrient-dense food sub-group rather than than specific food item (e.g. green leafy vegetable than 'spinach').

3. Specify specific food item only if specifying the nutrient-dense food sub-group does not result in dietary adequacy.

4. Make sure you have only maximally 7 messages for ease of recall (and hence ease of implementation!).

DIETARY DATA PREPARATION

CHAPTER 2

CHAPTER 2.

DIETARY DATA PREPARATION

In order to run LP analysis using Optifood, you will need information on the food consumed by the target group and for each food the median portion and food pattern of the target group at three levels (food item, food group and food sub-group). If you want to know the cost of FBRs/CFRs from the LP analysis or want to run cost analysis (Module IV), you also need the cost of the food from a market survey. The food pattern included the minimum and maximum frequency of consumption for each food, food group and food sub-group. Although you may have your own country food grouping, to run LP analysis using Optifood you need to categorize each food into the food group and food sub-group categories used in Optifood (**ANNEX 1**).

Food Consumption Survey

The data is ideally derived from 7-day dietary data so that you can have 1-week food pattern for each individual; however if this is not available, you can also run LP analysis with only 1-day dietary data provided that the number is sufficient (as rule of thumb around 100 for each RNI group). Example of 7-day dietary data may include combination of 1-day weighed or estimated food record, **WFR or EFR** (Day-2) including 24-hour dietary recall, **24HR** (Day-1) followed by 5-day food tally without portion sizes (Day-3 to Day-7). The standardized forms of WFR/EFR and 24HR can be seen in **ANNEX 2.** If you only have 1-day dietary data, either from WFR, EFR or 24HR, the frequency/week will be estimated from percentage consumers for each food item, food group and food sub-group (**Table 2.1.**).

Table 2.1. Deriving food pattern from percentage of subjects who consumed the food if only 1-day data available

% subjects who consumed the food	Equivalent to MAXIMUM weekly frequency of intake (days/week)
0-5	1
6-12	2
13-22	3
23-34	4
35-47	5
48-65	6
66-100	7

Market Survey

The best time to conduct market survey is after you finish dietary data collection and have identified the list of the foods consumed by the target group. Besides asking for the price, you need to weigh the gross weight (i.e. weight when bought) and the net weight (i.e. weight of only edible part in raw/cooked form). The cost you will include into the Optifood are the cost for each food per 100 gram edible portion of either raw (e.g. fruit) or cooked form (e.g. cooked rice). When there are several markets in the study area, is advisable that you collect these food prices from there different markets which may include different types of markets such as traditional market, local grocery and local minimarkets depending on where the food is mostly bought.

FAQ: Do I need to regroup similar foods from my dietary data prior to LP Optifood analysis?

When you look at the dietary data from your target group, you may find for instance different types of banana or different brands of biscuits consumed. Whether you need to keep these bananas and different brands of biscuits as they are or to combine them into more generic group of 'banana' or 'biscuits' very much depends on the nutrient composition of these different types of bananas or biscuits.

The rule of the thumb is to combine if the nutrient composition are similar (e.g. many brands of non fortified biscuits may have similar nutrient composition) but keep them as separate if the nutrient composition are different (e.g. if dark yellow banana has high vitamin A content you may want to split banana as 'vitamin A rich banana' and just 'banana' in general; similarly if some biscuits are fortified you may have 'calcium fortified biscuits', 'multi vitamin minerals fortified biscuits' and 'unfortified biscuits'). Please note that eventually they may belong to different food sub-group in Optifood, given their different nutrient composition.

FAQ: Do I need to have dietary and market survey data from different seasons?

If the food availability varies by season, the best is to have dietary data and food cost data from these different seasons, and run LP analysis separately to find out if problem nutrients and availability of nutrient-dense foods differ by seasons. You may also want to compare the cost of the optimized FBRs/CFRs from the different seasons to know if diet cost will be more expensive during one season over another.

LP INPUT

CHAPTER 3

CHAPTER 3.

LP INPUT

Food Composition

Optifood comes with a database of foods to be used as part of your analysis work. It can be found by selecting *Reference Data >> Food Composition* in the application menu. The list of foods within Optifood is provided by WHO/FAO (listed as authority "Optifood"). You can view but cannot change the data in the system. A "View" button appears next to these foods to allow you to review the nutrition information about that single food.

There is a filter option for quickly searching and locating records of the interested foods. The filter will search on any part of the text data provided, so by entering "apple" for instance in the "Food Name" all foods with "apple" anywhere in their names will appear e.g. "Pineapple", "Apples raw", "Apples Cooked", etc. The filter also can be applied to select foods under certain Food Group, Food Subgroup, or Authority. Click the "Filter" button to apply your filter choices and "Clear" button to reset the filter and see all the food list records.

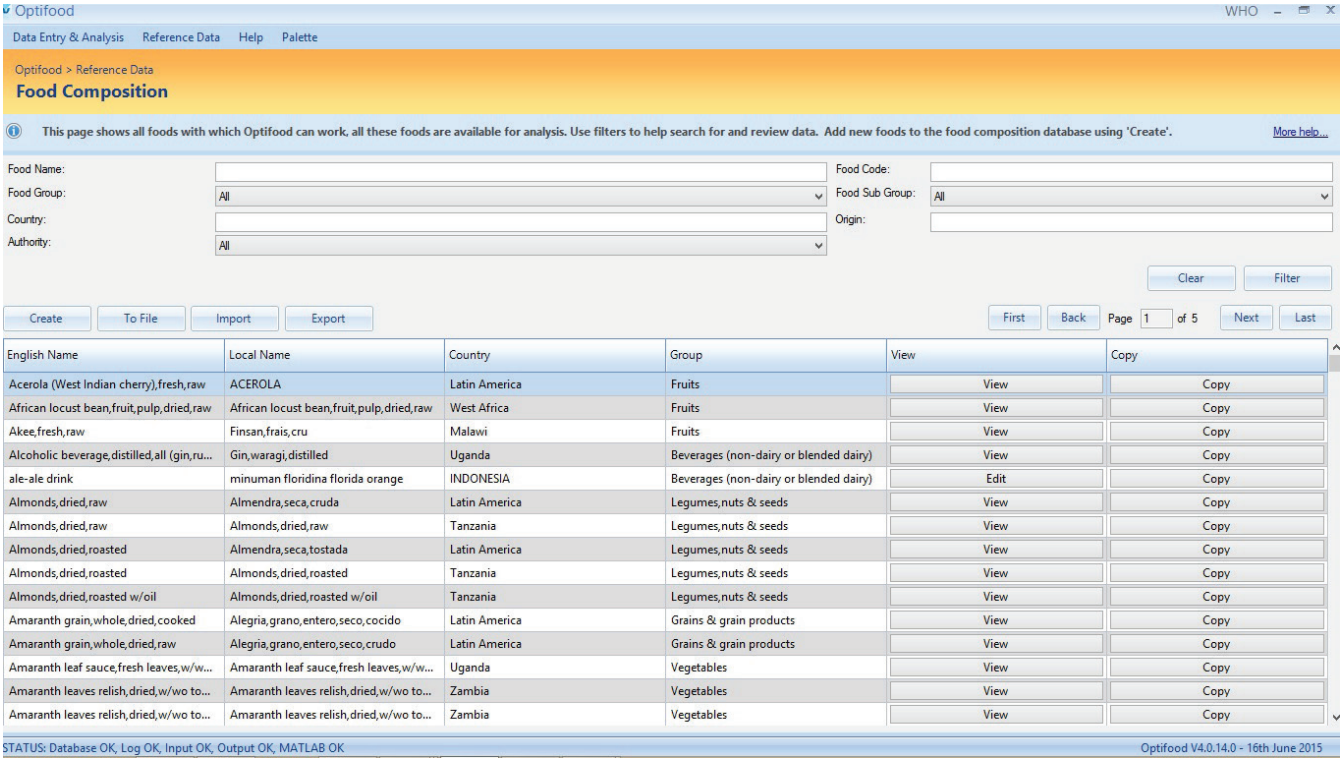


Figure 3.1. Food List in Optifood

You can create or input your own new foods by two ways:

1. Inputting new food one-by-one inside Optifood software by clicking the "Create" button or copying any existing food to modify it to become a new food item (using the "Copy" button then click "Edit" to modify the data).

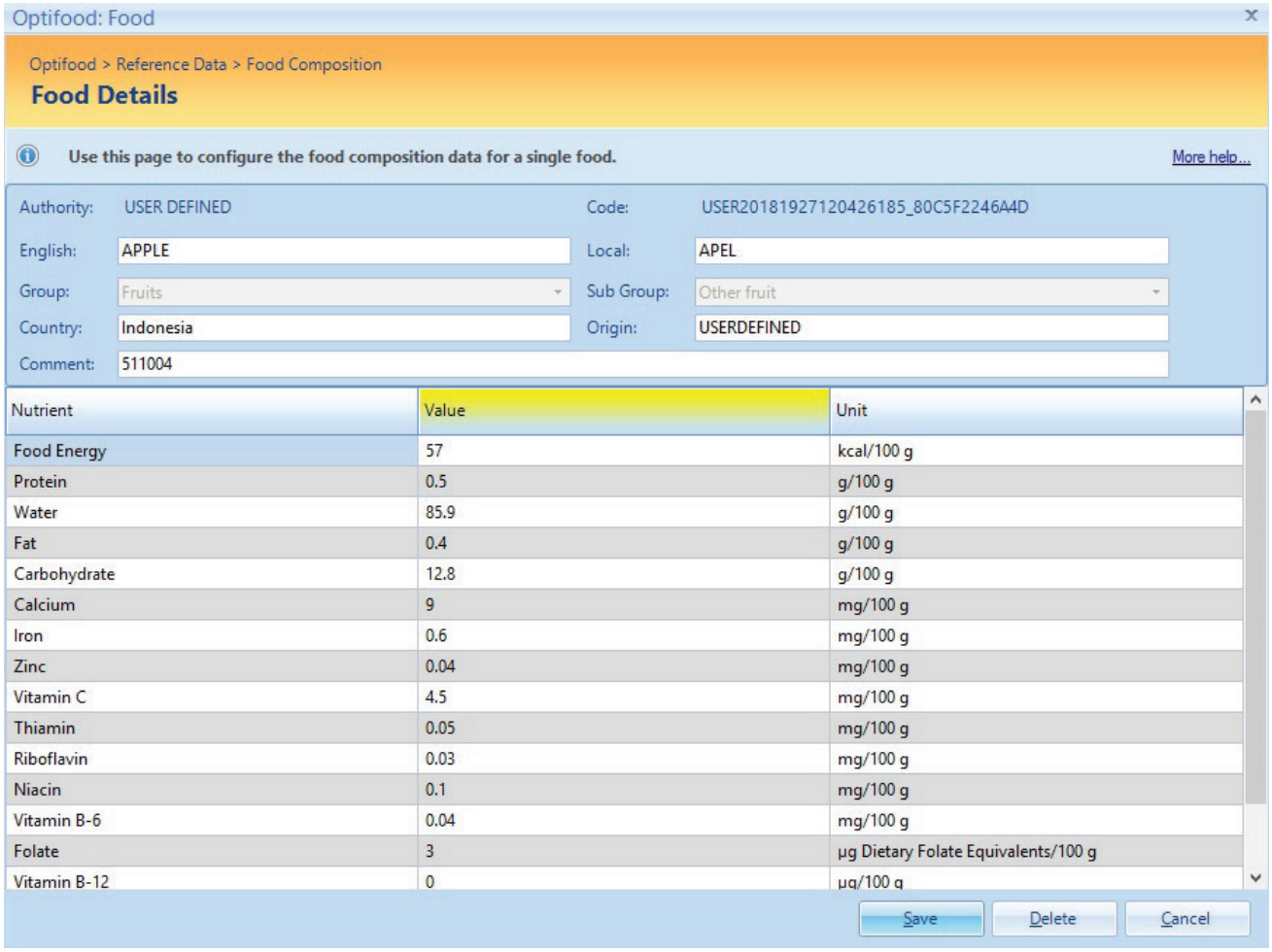


Figure 3.2. Single Food Page

2. Importing a file (in CSV format) which consists of several new food items by using "Import" button in *Reference Data >> Food Composition* page and choose your FCT file which is in CSV format. "Import" allows you to import an external file containing food data and this will create the foods if they do not exist in your system or overwrite them if they do.

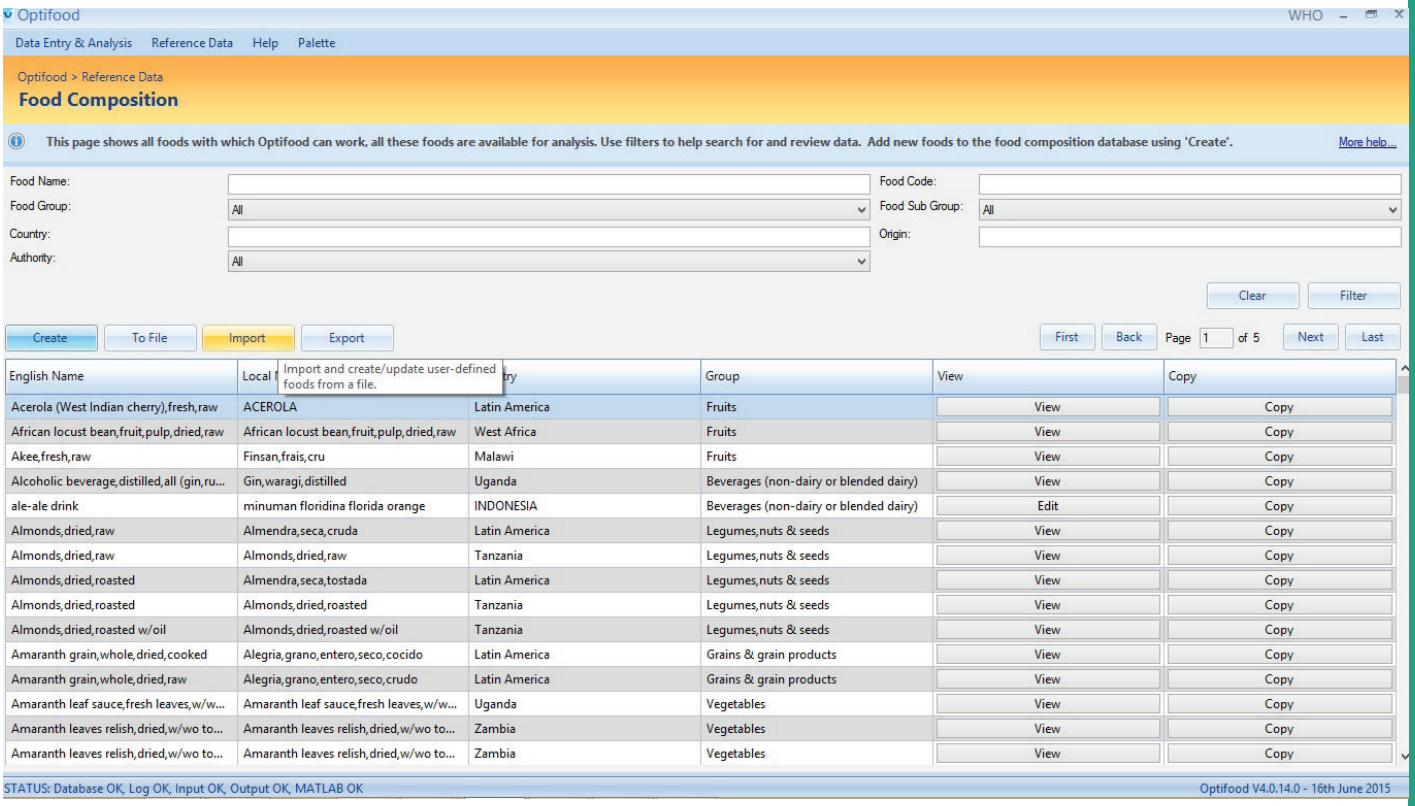


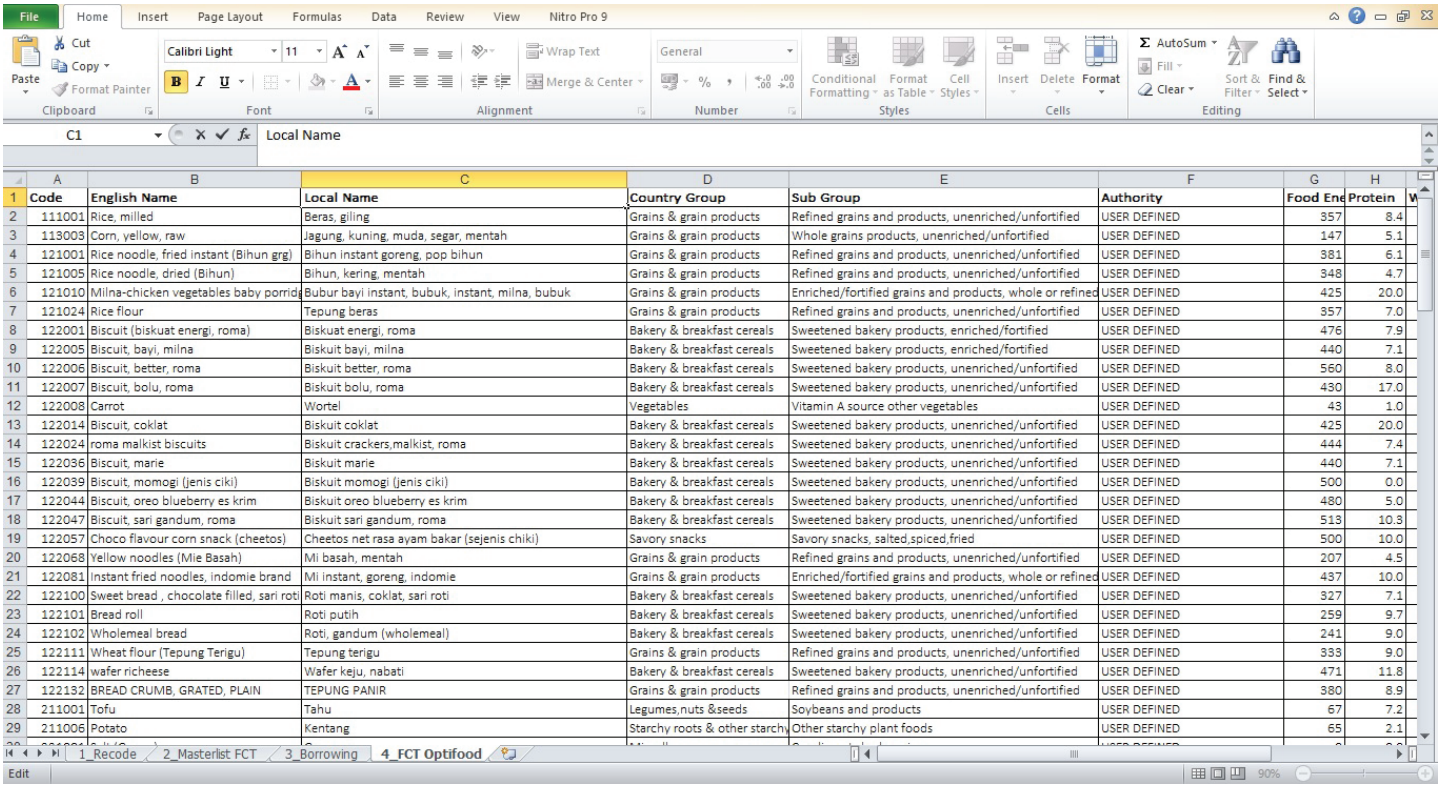
Figure 3.3. Importing a Food Composition File

Preparing FCT file to be imported into Optifood

1. You can work for FCT preparation in Microsoft Excel.

2. From the dietary data, get the list of all foods consumed by the population. Each of the food items must have the nutrient values. Currently, Optifood covers 17 nutrients (energy, protein, water, fat, carbohydrate, calcium, iron, zinc, vitamin C, thiamin, riboflavin, niacin, vitamin B6, folate, vitamin B12, vitamin A RE, and vitamin A RAE).

3. In the MS Excel file, follow the template for developing FCT file:



Code	English Name	Local Name	Country Group	Sub Group	Authority	Food Ene	Protein
111001	Rice, milled	Beras, giling	Grains & grain products	Refined grains and products, unenriched/unfortified	USER DEFINED	357	8.4
113003	Corn, yellow, raw	Jagung, kuning, muda, segar, mentah	Grains & grain products	Whole grains products, unenriched/unfortified	USER DEFINED	147	5.1
121001	Rice noodle, fried instant (Bihun grg)	Bihun instant goreng, pop bihun	Grains & grain products	Refined grains and products, unenriched/unfortified	USER DEFINED	381	6.1
121005	Rice noodle, dried (Bihun)	Bihun, kering, mentah	Grains & grain products	Refined grains and products, unenriched/unfortified	USER DEFINED	348	4.7
121010	Milna-chicken vegetables baby porrid	Bubur bayi instant, bubuk, instant, milna, bubuk	Grains & grain products	Enriched/fortified grains and products, whole or refined	USER DEFINED	425	20.0
121024	Rice flour	Tepung beras	Grains & grain products	Refined grains and products, unenriched/unfortified	USER DEFINED	357	7.0
122001	Biscuit (biskuat energi, roma)	Biskuat energi, roma	Bakery & breakfast cereals	Sweetened bakery products, enriched/fortified	USER DEFINED	476	7.9
122005	Biscuit, bayi, milna	Biskuit bayi, milna	Bakery & breakfast cereals	Sweetened bakery products, enriched/fortified	USER DEFINED	440	7.1
122006	Biscuit, better, roma	Biskuit better, roma	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	USER DEFINED	560	8.0
122007	Biscuit, bolu, roma	Biskuit bolu, roma	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	USER DEFINED	430	17.0
122008	Carrot	Wortel	Vegetables	Vitamin A source other vegetables	USER DEFINED	43	1.0
122014	Biscuit, coklat	Biskuit coklat	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	USER DEFINED	425	20.0
122024	roma malkist biscuits	Biskuit crackers,malkist, roma	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	USER DEFINED	444	7.4
122036	Biscuit, marie	Biskuit marie	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	USER DEFINED	440	7.1
122039	Biscuit, momogi (jenis ciki)	Biskuit momogi (jenis ciki)	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	USER DEFINED	500	0.0
122044	Biscuit, oreo blueberry es krim	Biskuit oreo blueberry es krim	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	USER DEFINED	480	5.0
122047	Biscuit, sari gandum, roma	Biskuit sari gandum, roma	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	USER DEFINED	513	10.3
122057	Choco flavour corn snack (cheetos)	Cheetos net rasa ayam bakar (sejenis chiki)	Savory snacks	Savory snacks, salted,spiced,fried	USER DEFINED	500	10.0
122068	Yellow noodles (Mie Basah)	Mi basah, mentah	Grains & grain products	Refined grains and products, unenriched/unfortified	USER DEFINED	207	4.5
122081	Instant fried noodles, indomie brand	Mi instant, goreng, indomie	Grains & grain products	Enriched/fortified grains and products, whole or refined	USER DEFINED	437	10.0
122100	Sweet bread , chocolate filled, sari roti	Roti manis, coklat, sari roti	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	USER DEFINED	327	7.1
122101	Bread roll	Roti putih	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	USER DEFINED	259	9.7
122102	Wholemeal bread	Roti, gandum (wholemeal)	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	USER DEFINED	241	9.0
122111	Wheat flour (Tepung Terigu)	Tepung terigu	Grains & grain products	Refined grains and products, unenriched/unfortified	USER DEFINED	333	9.0
122114	wafer richeese	Wafer keju, nabati	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	USER DEFINED	471	11.8
122132	BREAD CRUMB, GRATED, PLAIN	TEPUNG PANIR	Grains & grain products	Refined grains and products, unenriched/unfortified	USER DEFINED	380	8.9
211001	Tofu	Tahu	Legumes,nuts &seeds	Soybeans and products	USER DEFINED	67	7.2
211006	Potato	Kentang	Starchy roots & other starchy	Other starchy plant foods	USER DEFINED	65	2.1

Figure 3.4. FCT Template in MS Excel

The variable data name for FCT file should be placed in the first row of your Excel work sheet. This template shows the following data:

- **Code.** An internal code which uniquely identifies the food and is used for import/ export. For any new foods you create inside Optifood, it will be automatically generated while for any new food you create outside Optifood (in MS Excel), you have to assign the unique code (it can refer to the Food Code in the reference FCT).

- **English Name.** A name of the food in English.
- **Local Name.** A local name of the food.
- **Country Group.** The food group to which the food belongs. Please refer to the list of Optifood Food Group in the **Annex 2**.
- **Sub Group.** The food sub-group to which the food belongs. Please refer to the list of Optifood Food Sub-Group in the **Annex 2**.
- **Country.** The specified country from which the food originates.
- **Origin.** The source of reference FCT used (specify name of FCT database, the published year, and Food Code in the reference FCT – e.g. USDA-23-ID70100).
- **Authority.** The authority that issued the food data. Optifood comes with a set of foods from WHO/FAO source (listed as authority "Optifood") and you need to type "USER DEFINED" for any new ones you create or it will be marked automatically with authority "USER DEFINED" if you create inside Optifood.
- **Comment.** An optional comment can be entered for the food.
- **Nutrients.** The nutrients values which have to be entered for Optifood FCT (energy, protein, water, fat, carbohydrate, calcium, iron, zinc, vitamin C, thiamin, riboflavin, niacin, vitamin B6, folate, vitamin B12, vitamin A RE, and vitamin A RAE, respectively). The nutrient value is expressed per 100 grams of food.

4. After all of the FCT data is entered, save the file in CSV format to be imported in the Optifood.

Important Note:

Optifood data input is **character sensitive** which means all of variable name has to be exactly the same with Optifood variable format, including **the use of wording, spacing, or capital/small letter,** otherwise the file cannot be be successfully imported.

Important Note:

In preparing Optifood data input, **missing values is not allowed!** Each field has to contain value.

For FCT data, if some nutrient values are not available from the reference FCT, you can borrow the missing nutrient values from other reference FCTs.

How to choose and modify FCT?

Food composition values should represent average of particular food item on a year-round or nation-wide basis. It represents total amount of nutrients or minerals in food, **but not** the amount absorbed and utilized by body. Hence, potential **bioavailability** of nutrients from the diets must always be considered.

These are the limitations of food composition tables:

- Contain only average values which never reflect the exact composition of any single food.
- Do not represent the consumed foods when it is based on imputed values, borrowed values, poor analytical quality, and few samples.
- Often have missing data, such as missing foods, missing nutrient values.
- Often have missing documentation which may not allow us to assess the data quality.
- Data may not be comparable over time and across countries.

Available resources for food composition values:

- World Food Mini list: 53 nutrients (1800 foods) from 6 countries (Egypt, Kenya, Mexico, Senegal, India, Indonesia, available at: http://www.fao.org/infoods/
- International Network of Food Data Systems (INFOODS) Regional Organizations maintain regional database: e.g. ASEAN-FOODS, available at: http://www.fao-org/infoods/
- USDA database: http://www.nal.usda.gov/fnic/foodcomp/
- Indonesia database: http://www.panganku.org/
- Specialized database e.g. :
  - Carotenoids: West& Poorvliert (1993); O'Neilll *et al.* (2001)
  - Phytate: at http://bit/ly/faoinfoods or http://www.izincg.org/

Things need to be considered when imputing values for missing nutrient values:

1. Value for similar food:

   - Check that it is the same food
     - ✓ Taxonomic name; species
     - ✓ Description: fresh/dried food, raw/ cooked food, stage of maturity, Meat cut
     - ✓ Fat, water, protein content
     - ✓ Composition of brand name
     - ✓ Fortification/enrichment
   - Check that it is the same nutrient
     - ✓ Comparable definition
     - ✓ Comparable analytical method
     - ✓ Same expression (same unit)

2. Values for dried foods from fresh foods, or vice versa:

Convert nutrient content from **dry weight** to **fresh weight** basis	$\frac{\text{Nutrient content of dry food x (100 – moisture content of fresh food)}}{\text{(100 – moisture content of dry food)}}$

3. Values for cooked foods from raw foods, or vice versa:

Calculate nutrient content of **cooked food** from **raw food**	$\frac{\text{Nutrient content of raw food x Nutrient retention (\%) in cooked food}}{\text{Cooked yield of raw food (as \%)}}$

4. Values for local foods from published literature: **adjust moisture (water content):**

Adjust nutrient content for difference in **moisture content**	$\frac{\text{Nutrient content of food in borrowed FCT x (100 – moisture content of food in local FCT)}}{\text{(100 – moisture content of food in borrowed FCT)}}$

5. Generic values from specific values: Aggregate data of specific foods and then apply weighting to mean value (based on proportion of consumption).

6. Assumed zero is only use for nutrient which does not present in any detectable amount.

7. Pay attention to unit conversion:

- Carbohydrate by difference **versus** available carbohydrate. For FCT values, we use value for carbohydrate by difference, with formula:

CHO (g/100g) = 100 – (water+protein+fat+ash+alcohol+dietary fiber)

- Dietary folate equivalents (DFE) **versus** food folate

DFE = food folate + 1.7 x synthetic folic acid

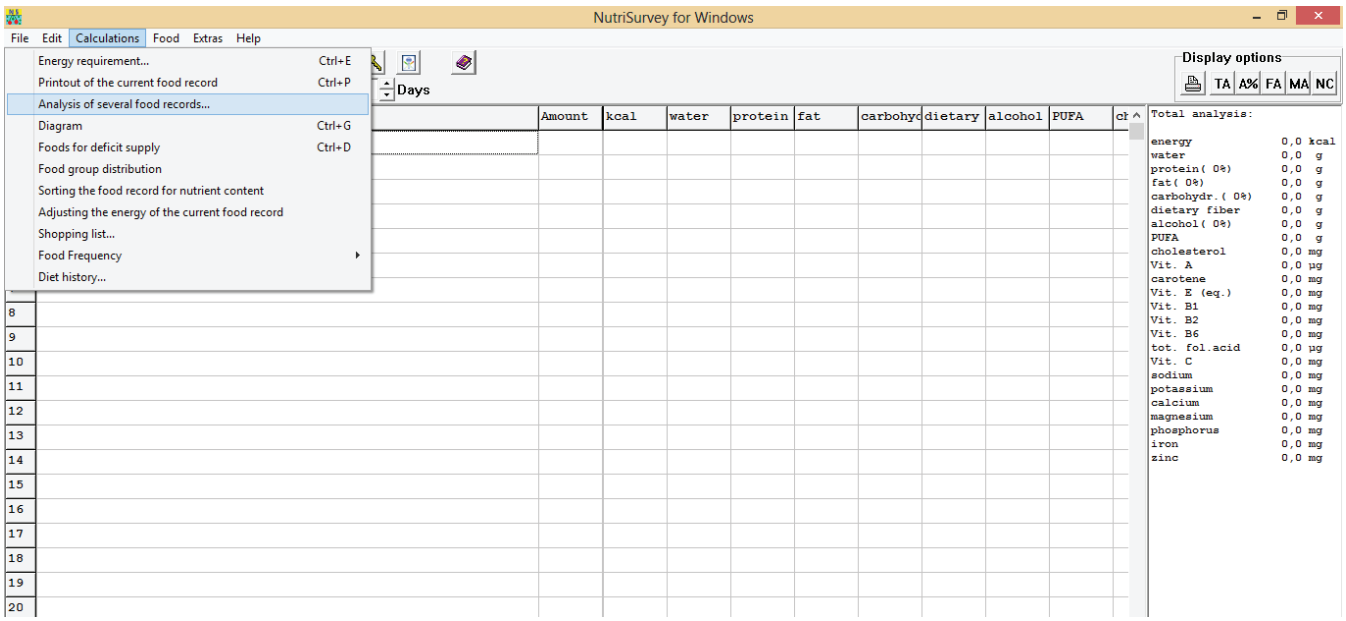
- Retinol activity equivalent

Source type of Vitamin A	Vit A – RE	Vit A – RAE
Retinol (µg) – from animal source food	1	1
Carotene (µg) – from non-animal source food		
Beta-carotene	1/6	1/12
Other beta-carotene	1/12	1/24

LP OPTIFOOD INPUT DATA

A. Preparing and extracting dietary data from Nutrisurvey to Excel file

Step: open Nutrisurvey software >> click Calculation >> Analysis of several food records >> select all of food records (epl. File) for analysis >> tick under Excel box: food records and breakdown of recipes >> click OK.



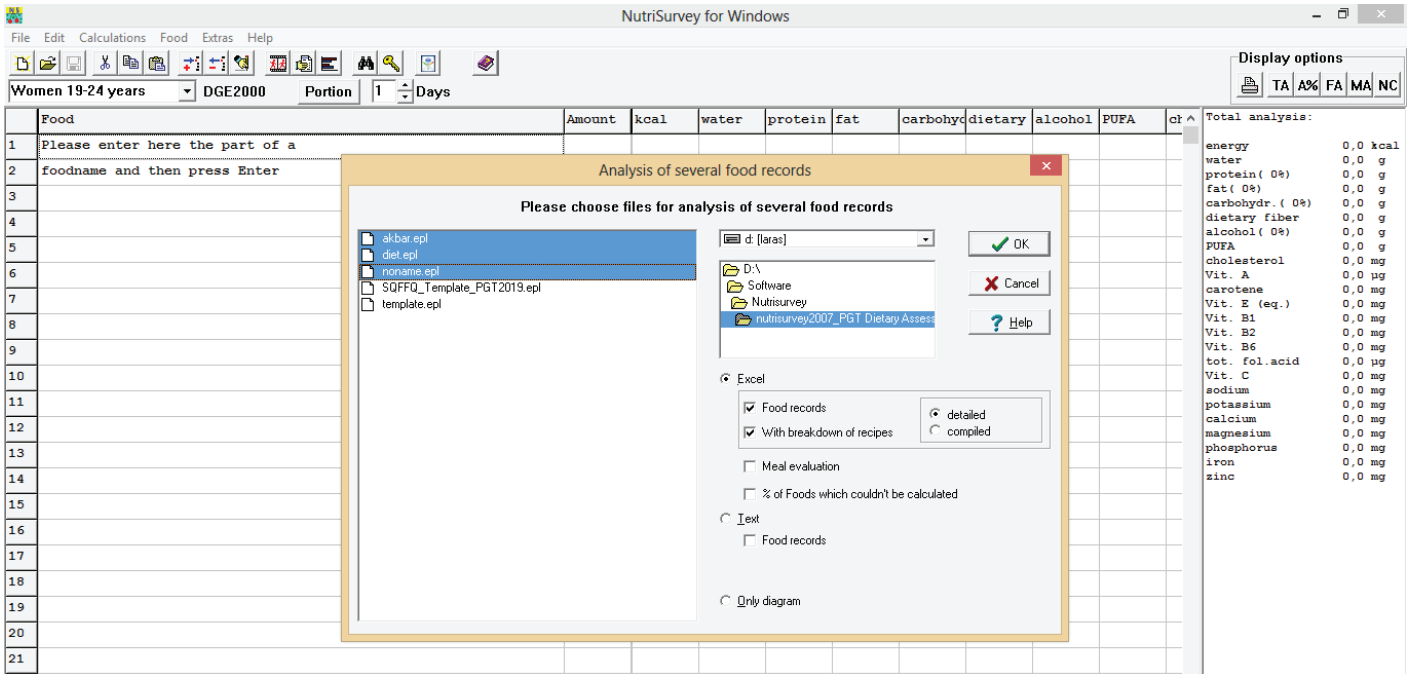


Figure 3.5. Exporting dietary data from Nutrisurvey to Excel

After we click OK, it should automatically opens the result in Excel file (as attached below). However, if the result still appears in Nutrisurvey window then select all the data (Ctrl+A) >> click the *copy icon* in Nutrisurvey >> open the Excel file >> click the *paste icon* in Excel.

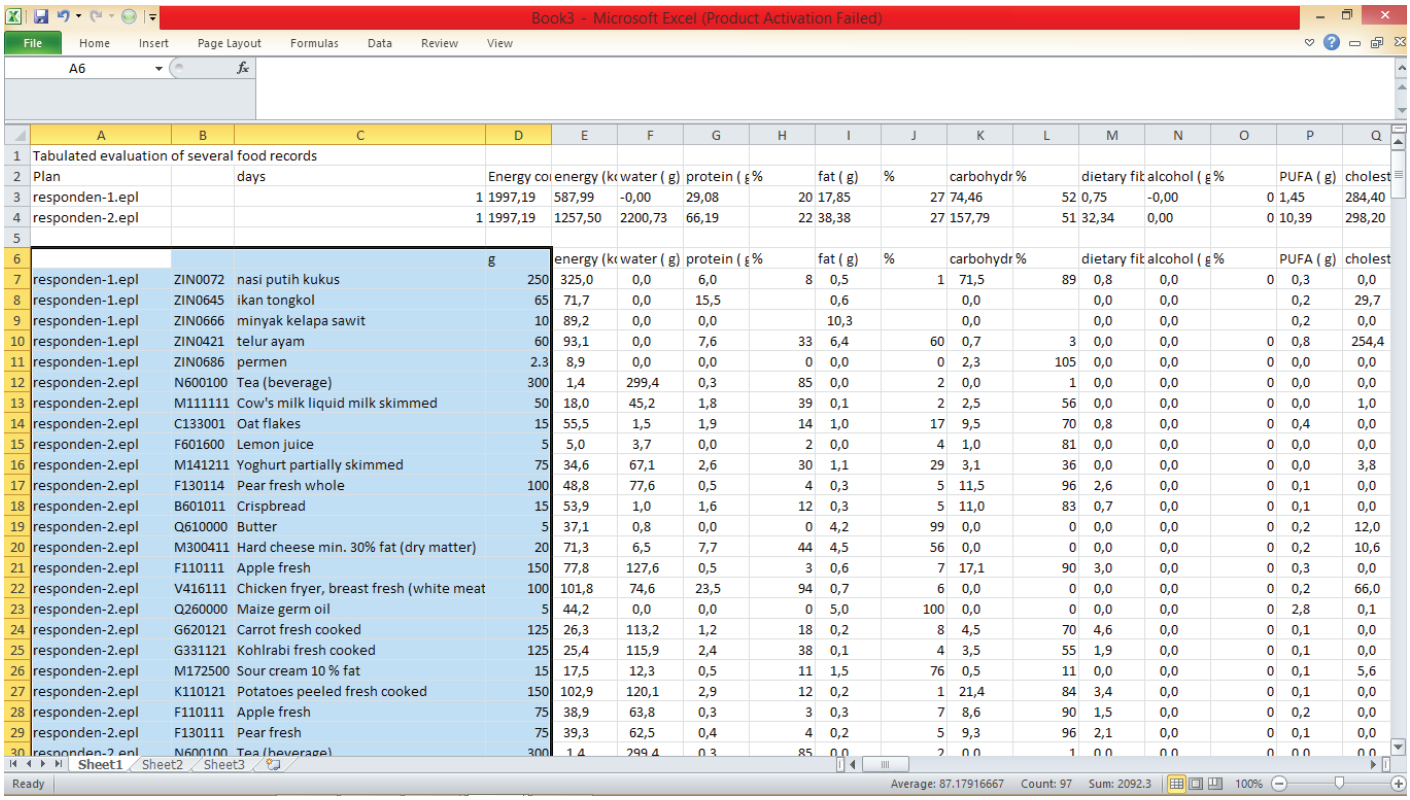


Figure 3.6. Result of dietary data export in Excel

The initial information used for LP input preparation is name/ID of respondent, days of dietary records, food code, food name, and food portion in grams. This information is formatted to Master Data as one of LP Optifood Input which should be prepared. Master data will be used as the basis in identifying food pattern of the target population. The steps on LP Optifood Input preparation are slightly different between input from 1-day dietary data and 7-day dietary data.

In preparing LP Optifood Input, it will be a back and forth process between developing Master Data and Food Composition Database. Below is the following step on preparing LP Optifood Input from two types of dietary data which are 1-day and 7-day dietary data.

Important Note:

Be caution that most of the work on FBRs development is in **LP Optifood Input preparation**. In most cases, 2P is needed for LP work which is **Passion and Patience!**

In general, the Master data sheet should include information on:

- **Code of area.** Unless you will analyze the FBRs from more than one area, this can be an optional variable.
- **Name of area.** Unless you will analyze the FBRs from more than one area, this can be an optional variable.
- **ID number of respondent**
- **Name of respondent**
- **Age of respondent.** For children aged less than 2 years old, the unit of age is MONTH; while for the other is YEAR.
- **Breastfeeding status (YES/NO) for under-2 children.** This information is required because there's different IYCF recommendation for breastfed and non-breastfed.
- **Pregnancy stage (Trimester 1/2/3) for pregnant women.** This information is required because the RNI for each trimester of pregnant women is different.
- **Days of dietary data**. If the data is obtained from 1-day dietary data, then this column will be filled by '1' only; if the data is obtained from 7-day data, then this column will be filled by 1 to 7 according to number of days dietary data was collected.
- **Initial food code.** It refers to food code of each food consumed by target population. We can get this information from Nutrisurvey result.

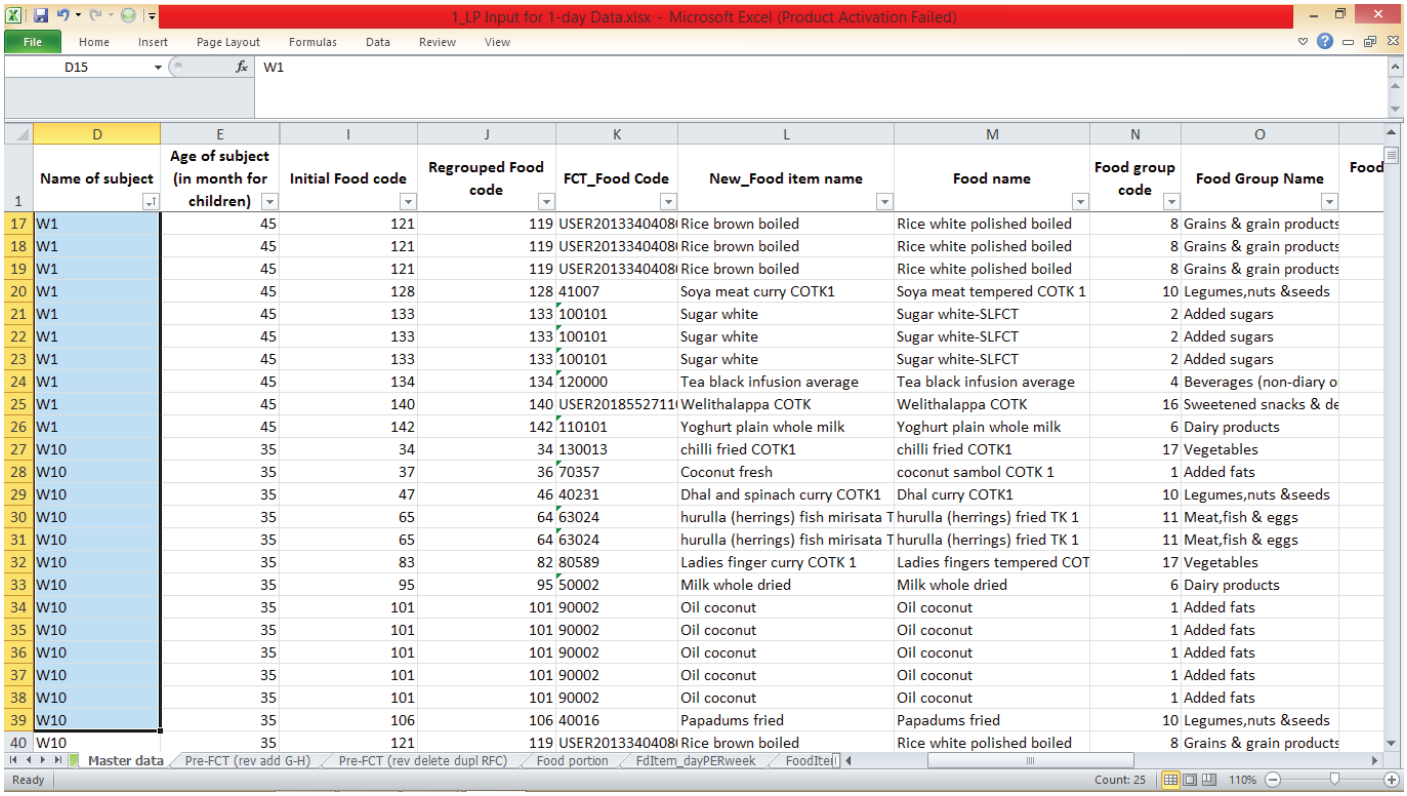
- **Initial food name.** It refers to food name of each food consumed by target population. We can get this information from Nutrisurvey result.
- **Regrouped food code.** In Optifood, we are not working with "too specific" food item so that some of food item may be regrouped to their similar food item. If this happens, the initial food code may have "new" food code due to regrouping process.
- **New food name.** The initial food name may have "new" food name due to regrouping process.
- **FCT food code.** Each of food items should be linked with the FCT food code. Unless your dietary data entry has already used food code from the FCT, this variable will be the same with initial food code.
- **Food group code.** The code of food group to which the food belongs (refer to **Annex 2**).
- **Food group name.** The name of food group to which the food belongs (refer to **Annex 2**).
- **Food sub-group code.** The code of food sub-group to which the food belongs (refer to **Annex 2**).
- **Food sub-group name.** The name of food group to which the food belongs (refer to **Annex 2**).
- **Amount.** Food portion amount in gram.
- **Conversion day/week.** The conversion value to convert our 1-day dietary data into 1-week food pattern (refer to **Table 2.1**).

Box 3.1. List of mandatory excel sheets in developing LP Optifood Input Data:

1. Optifood grouping of food group and food sub-group
2. Optifood FCT as reference
3. Master data
4. Pre-FCT
5. FCT Data
6. Food portion summary
7. Food item frequency (meal/day): to calculate percentage of consumer per each food item to convert into weekly food pattern (meals per day into day per week)
8. Food item summary (food portion and food frequency per week)
9. Food sub-group summary (frequency per week)
10. Food group summary (frequency per week)

B. Preparing LP Optifood Input from 1-day Dietary Data

1. **Put the initial information** (name/ID of respondent, days of dietary records, food code, food name, and food portion in grams) from Nutrisurvey result (in Excel) **into the given template of Master Data sheet** (name this sheet as **Master Data** in Excel). Our data in Master file will be in column-wise data structure for respondent. This column-wise data structure will best support further analysis.



1_LP Input for 1-day Data.xlsx - Microsoft Excel (Product Activation Failed)

File Home Insert Page Layout Formulas Data Review View

D15 W1

	D	E	I	J	K	L	M	N	O
1	Name of subject	Age of subject (in month for children)	Initial Food code	Regrouped Food code	FCT_Food Code	New_Food item name	Food name	Food group code	Food Group Name
17	W1	45	121	119	USER2013340408	Rice brown boiled	Rice white polished boiled	8	Grains & grain products
18	W1	45	121	119	USER2013340408	Rice brown boiled	Rice white polished boiled	8	Grains & grain products
19	W1	45	121	119	USER2013340408	Rice brown boiled	Rice white polished boiled	8	Grains & grain products
20	W1	45	128	128	41007	Soya meat curry COTK1	Soya meat tempered COTK 1	10	Legumes,nuts &seeds
21	W1	45	133	133	100101	Sugar white	Sugar white-SLFCT	2	Added sugars
22	W1	45	133	133	100101	Sugar white	Sugar white-SLFCT	2	Added sugars
23	W1	45	133	133	100101	Sugar white	Sugar white-SLFCT	2	Added sugars
24	W1	45	134	134	120000	Tea black infusion average	Tea black infusion average	4	Beverages (non-diary o
25	W1	45	140	140	USER2018552711	Welithalappa COTK	Welithalappa COTK	16	Sweetened snacks & de
26	W1	45	142	142	110101	Yoghurt plain whole milk	Yoghurt plain whole milk	6	Dairy products
27	W10	35	34	34	130013	chilli fried COTK1	chilli fried COTK1	17	Vegetables
28	W10	35	37	36	70357	Coconut fresh	coconut sambol COTK 1	1	Added fats
29	W10	35	47	46	40231	Dhal and spinach curry COTK1	Dhal curry COTK1	10	Legumes,nuts &seeds
30	W10	35	65	64	63024	hurulla (herrings) fish mirisata T	hurulla (herrings) fried TK 1	11	Meat,fish & eggs
31	W10	35	65	64	63024	hurulla (herrings) fish mirisata T	hurulla (herrings) fried TK 1	11	Meat,fish & eggs
32	W10	35	83	82	80589	Ladies finger curry COTK 1	Ladies fingers tempered COT	17	Vegetables
33	W10	35	95	95	50002	Milk whole dried	Milk whole dried	6	Dairy products
34	W10	35	101	101	90002	Oil coconut	Oil coconut	1	Added fats
35	W10	35	101	101	90002	Oil coconut	Oil coconut	1	Added fats
36	W10	35	101	101	90002	Oil coconut	Oil coconut	1	Added fats
37	W10	35	101	101	90002	Oil coconut	Oil coconut	1	Added fats
38	W10	35	101	101	90002	Oil coconut	Oil coconut	1	Added fats
39	W10	35	106	106	40016	Papadums fried	Papadums fried	10	Legumes,nuts &seeds
40	W10	35	121	119	USER2013340408	Rice brown boiled	Rice white polished boiled	8	Grains & grain products

Master data | Pre-FCT (rev add G-H) | Pre-FCT (rev delete dupl RFC) | Food portion | FdItem_dayPERweek | FoodIte(

Ready Count: 25 110%

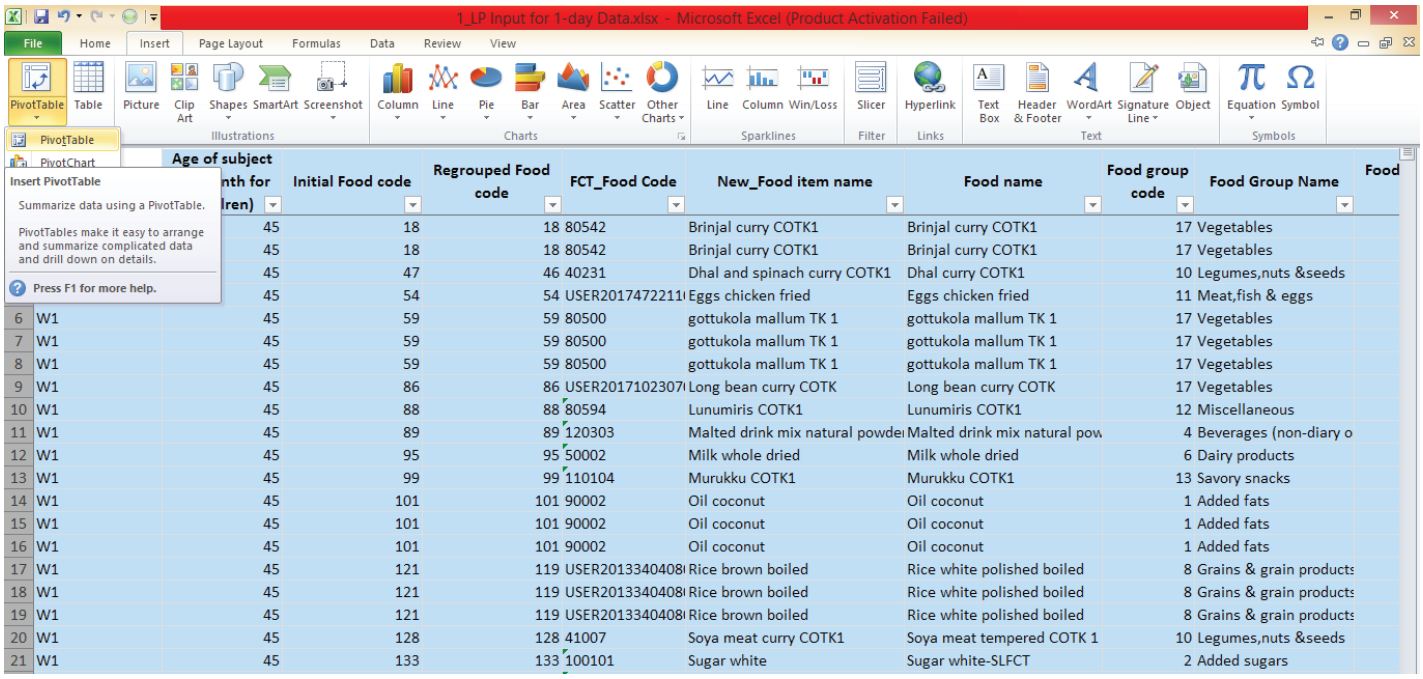
Figure 3.7. Column-wise data structure for Master Data

2. If your food item hasn't had the initial food code, then you can give the **initial food code** by giving the consecutive number for each food item (1, 2, 3, 4, etc.). To make it easier, you can perform SORT alphabetically (A to Z) in your food name and put the consecutive number on it.

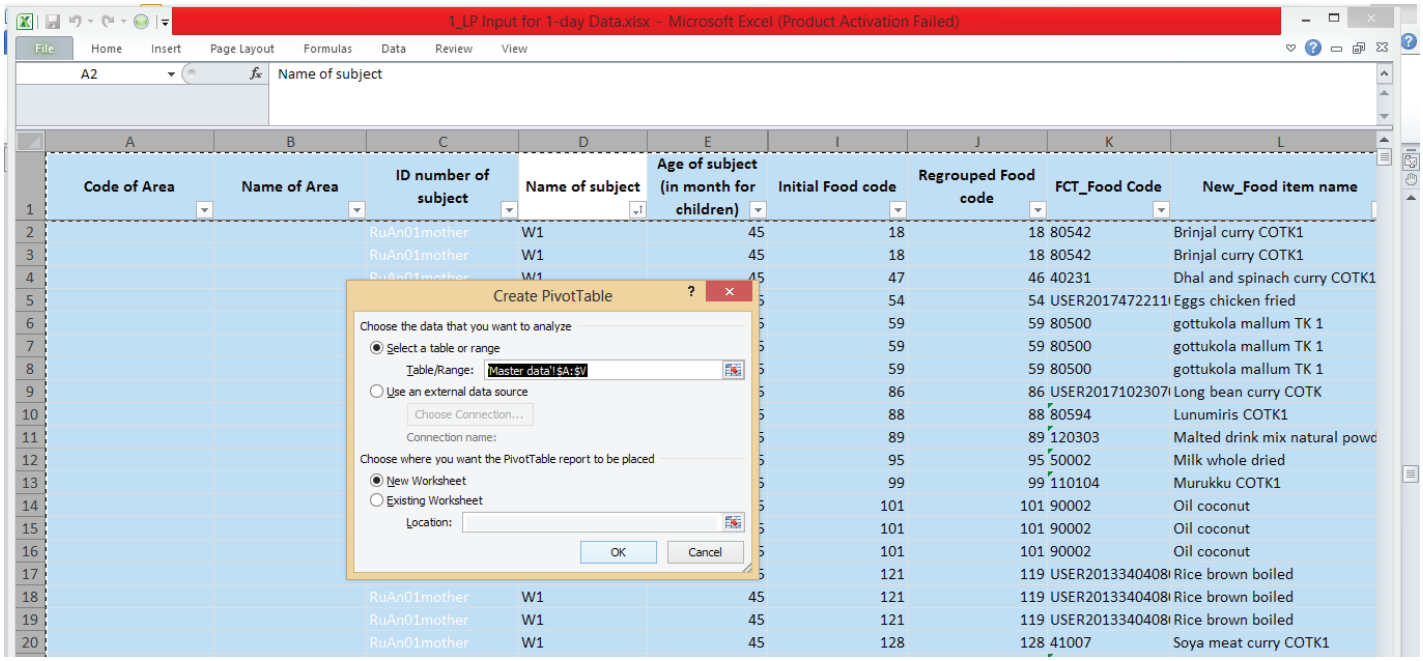
3. **Get the list of all food consumed** by target population by performing **PIVOT table.** This aims to (1) identify the similar food items so that regrouping of food item can be done and (2) prepare the FCT database based on the food consumed. Steps:

   - Select all the data (or just click the triangle in the top left corner)
   - Go to "Insert" and click "Pivot table"
   - Select a table or range
   - Tick "new sheet" for choice to place the Pivot Table report
   - Click Ok

- In Pivot Table Field List, drag "Initial food code" variable into Row Labels box. You can find in the worksheet the list of food code consumed by our target population. Remember: It is easier to do further command if we do Pivot by "code/number" format. We have to move the Pivot Table result (copy-paste to other sheet and rename the sheet as **Pre-FCT**) because in the Pivot Table sheet, we can't do any calculation formula.



	Age of subject	Initial Food code	Regrouped Food code	FCT_Food Code	New_Food item name	Food name	Food group code	Food Group Name	Food
1	45	18	18	80542	Brinjal curry COTK1	Brinjal curry COTK1	17	Vegetables	
2	45	18	18	80542	Brinjal curry COTK1	Brinjal curry COTK1	17	Vegetables	
3	45	47	46	40231	Dhal and spinach curry COTK1	Dhal curry COTK1	10	Legumes,nuts &seeds	
4	45	54	54	USER2017472211	Eggs chicken fried	Eggs chicken fried	11	Meat,fish & eggs	
6 W1	45	59	59	80500	gottukola mallum TK 1	gottukola mallum TK 1	17	Vegetables	
7 W1	45	59	59	80500	gottukola mallum TK 1	gottukola mallum TK 1	17	Vegetables	
8 W1	45	59	59	80500	gottukola mallum TK 1	gottukola mallum TK 1	17	Vegetables	
9 W1	45	86	86	USER2017102307	Long bean curry COTK	Long bean curry COTK	17	Vegetables	
10 W1	45	88	88	80594	Lunumiris COTK1	Lunumiris COTK1	12	Miscellaneous	
11 W1	45	89	89	120303	Malted drink mix natural powde	Malted drink mix natural pow	4	Beverages (non-diary o	
12 W1	45	95	95	50002	Milk whole dried	Milk whole dried	6	Dairy products	
13 W1	45	99	99	110104	Murukku COTK1	Murukku COTK1	13	Savory snacks	
14 W1	45	101	101	90002	Oil coconut	Oil coconut	1	Added fats	
15 W1	45	101	101	90002	Oil coconut	Oil coconut	1	Added fats	
16 W1	45	101	101	90002	Oil coconut	Oil coconut	1	Added fats	
17 W1	45	121	119	USER2013340408	Rice brown boiled	Rice white polished boiled	8	Grains & grain products	
18 W1	45	121	119	USER2013340408	Rice brown boiled	Rice white polished boiled	8	Grains & grain products	
19 W1	45	121	119	USER2013340408	Rice brown boiled	Rice white polished boiled	8	Grains & grain products	
20 W1	45	128	128	41007	Soya meat curry COTK1	Soya meat tempered COTK 1	10	Legumes,nuts &seeds	
21 W1	45	133	133	100101	Sugar white	Sugar white-SLFCT	2	Added sugars	



	Code of Area	Name of Area	ID number of subject	Name of subject	Age of subject (in month for children)	Initial Food code	Regrouped Food code	FCT_Food Code	New_Food item name
2			RuAn01mother	W1	45	18	18	80542	Brinjal curry COTK1
3			RuAn01mother	W1	45	18	18	80542	Brinjal curry COTK1
4			RuAn01mother	W1	45	47	46	40231	Dhal and spinach curry COTK1
5						54	54	USER2017472211	Eggs chicken fried
6						59	59	80500	gottukola mallum TK 1
7						59	59	80500	gottukola mallum TK 1
8						59	59	80500	gottukola mallum TK 1
9						86	86	USER2017102307	Long bean curry COTK
10						88	88	80594	Lunumiris COTK1
11						89	89	120303	Malted drink mix natural powd
12						95	95	50002	Milk whole dried
13						99	99	110104	Murukku COTK1
14						101	101	90002	Oil coconut
15						101	101	90002	Oil coconut
16						101	101	90002	Oil coconut
17						121	119	USER2013340408	Rice brown boiled
18			RuAn01mother	W1	45	121	119	USER2013340408	Rice brown boiled
19			RuAn01mother	W1	45	121	119	USER2013340408	Rice brown boiled
20			RuAn01mother	W1	45	128	128	41007	Soya meat curry COTK1

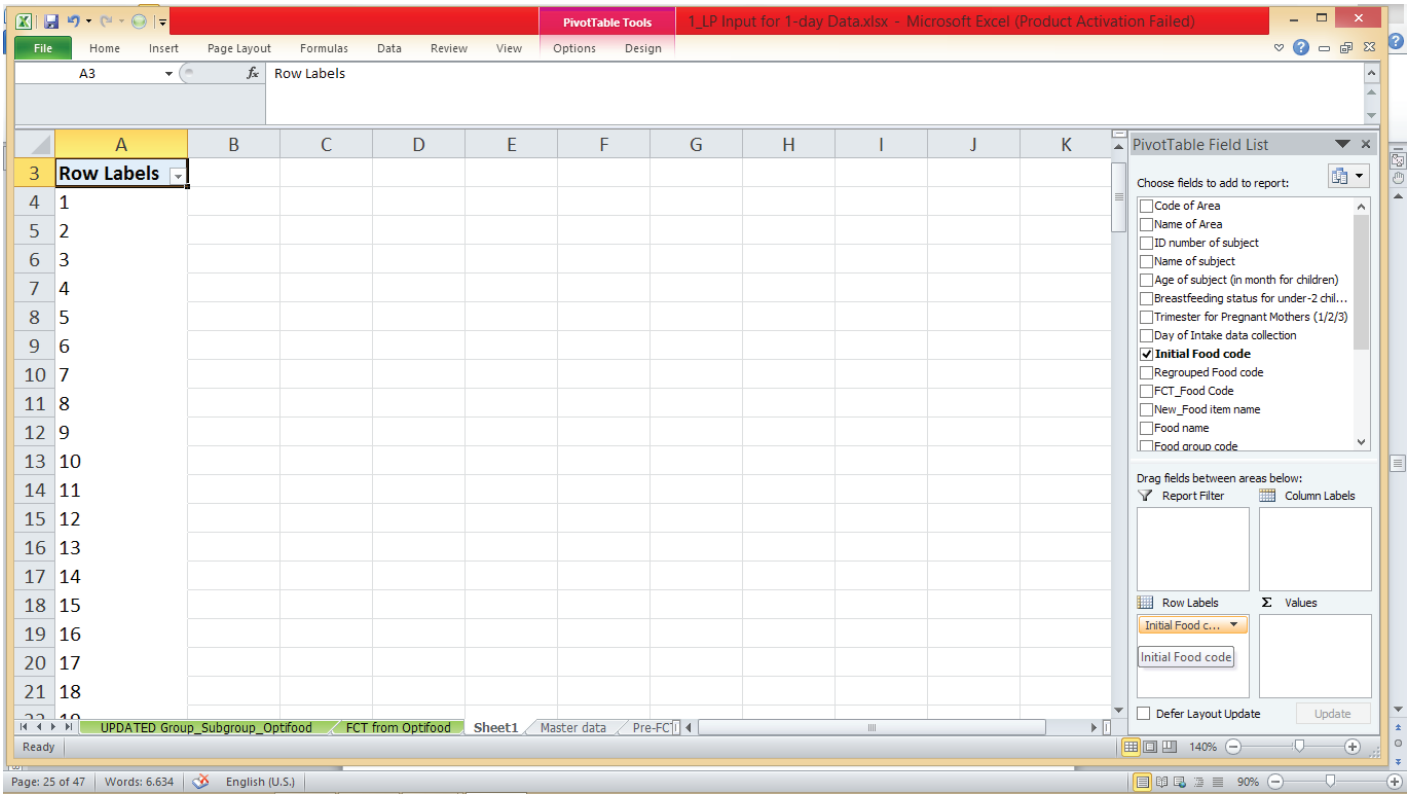


Figure 3.8. PIVOT step to get the list of food item consumed

4. In the Pre-FCT sheet when we put the list of initial food code, call on the **food item name** by performing VLOOKUP command:

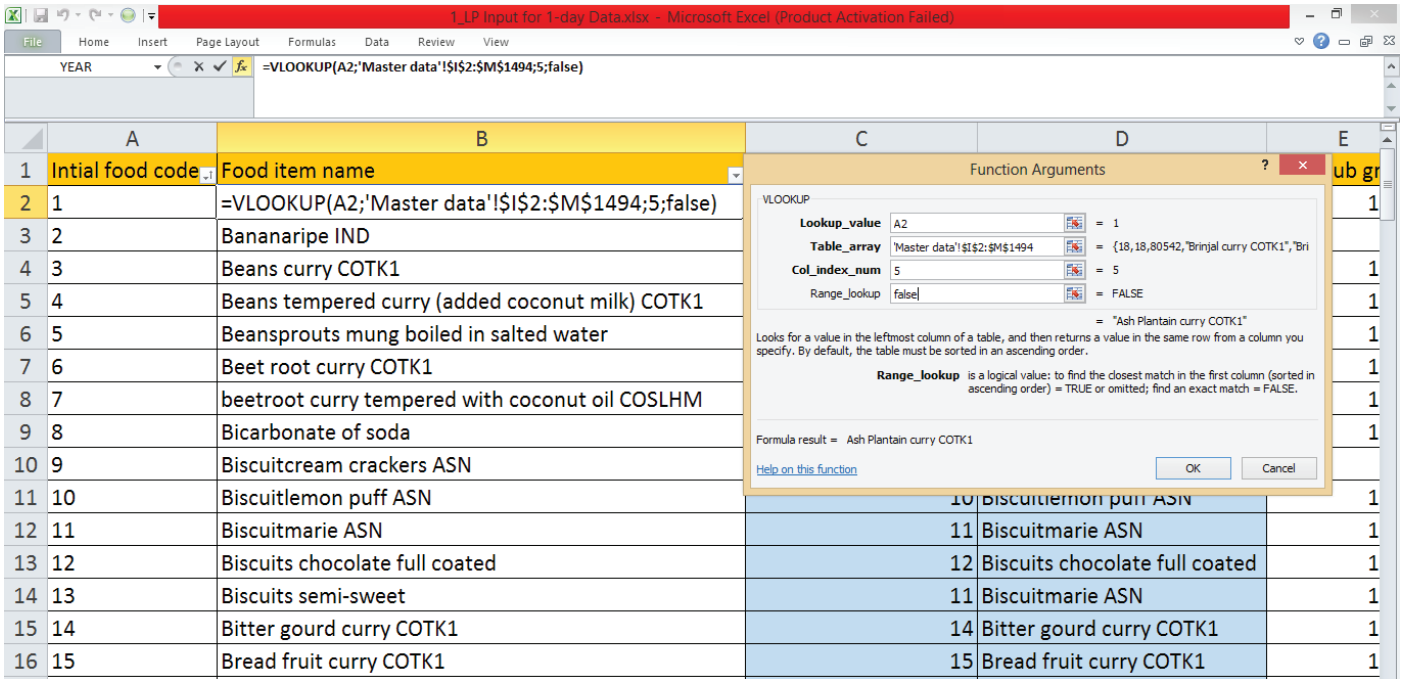
    - Lookup_value is the value to be found in the first column of the table and can be a value, a reference, or a text string. In this case, our lookup value is the initial food code (A2).

    - Table_array is a table of text, number, or logical values, in which data is retrieved (reference table for the lookup value). In this case, our table array is in Master Data sheet ('Master data'!$I$2:$M$1494). Remember: always put dollar sign ($) before and afterthe alphabet so that the table array is not moved to the next column or row.

    - Col_index_num is the column in table array from which the matching value should be returned. The first column of values in the table is column 1. In this case, our target values are in the 5th column from the matching values.

    - Range_lookup is a logical value to find the closest match in the first column (sorted in ascending order) = TRUE or omitted; find an exact match = FALSE. In this case, we would like to have the exact match so it will be FALSE for range lookup.

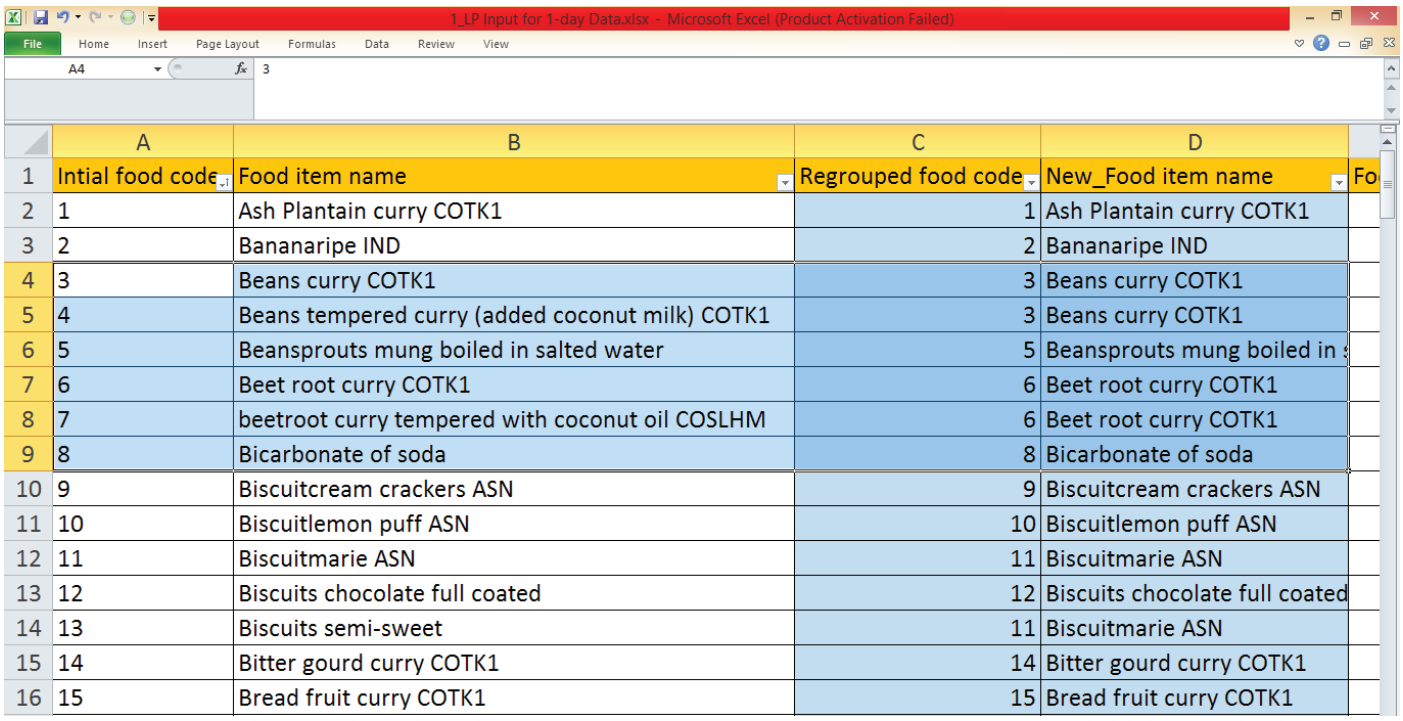
    - After the result is shown up, double click the bottom right corner of the cell to duplicate the formula/command for the rest of food item name.



	A	B	C	D	E
1	Intial food code	Food item name			ub gr
2	1	=VLOOKUP(A2;'Master data'!$I$2:$M$1494;5;false)			1
3	2	Bananaripe IND			
4	3	Beans curry COTK1			1
5	4	Beans tempered curry (added coconut milk) COTK1			1
6	5	Beansprouts mung boiled in salted water			1
7	6	Beet root curry COTK1			1
8	7	beetroot curry tempered with coconut oil COSLHM			1
9	8	Bicarbonate of soda			1
10	9	Biscuitcream crackers ASN			
11	10	Biscuitlemon puff ASN	10	Biscuitlemon puff ASN	1
12	11	Biscuitmarie ASN	11	Biscuitmarie ASN	1
13	12	Biscuits chocolate full coated	12	Biscuits chocolate full coated	1
14	13	Biscuits semi-sweet	11	Biscuitmarie ASN	1
15	14	Bitter gourd curry COTK1	14	Bitter gourd curry COTK1	1
16	15	Bread fruit curry COTK1	15	Bread fruit curry COTK1	1

Figure 3.9. VLOOKUP step to call on the food item name from food code

5. In Pre-FCT sheet, **review the similar food item and do regrouping.** Put the revised food code under "Regrouped food code" and revised food name under "New food item name" columns.

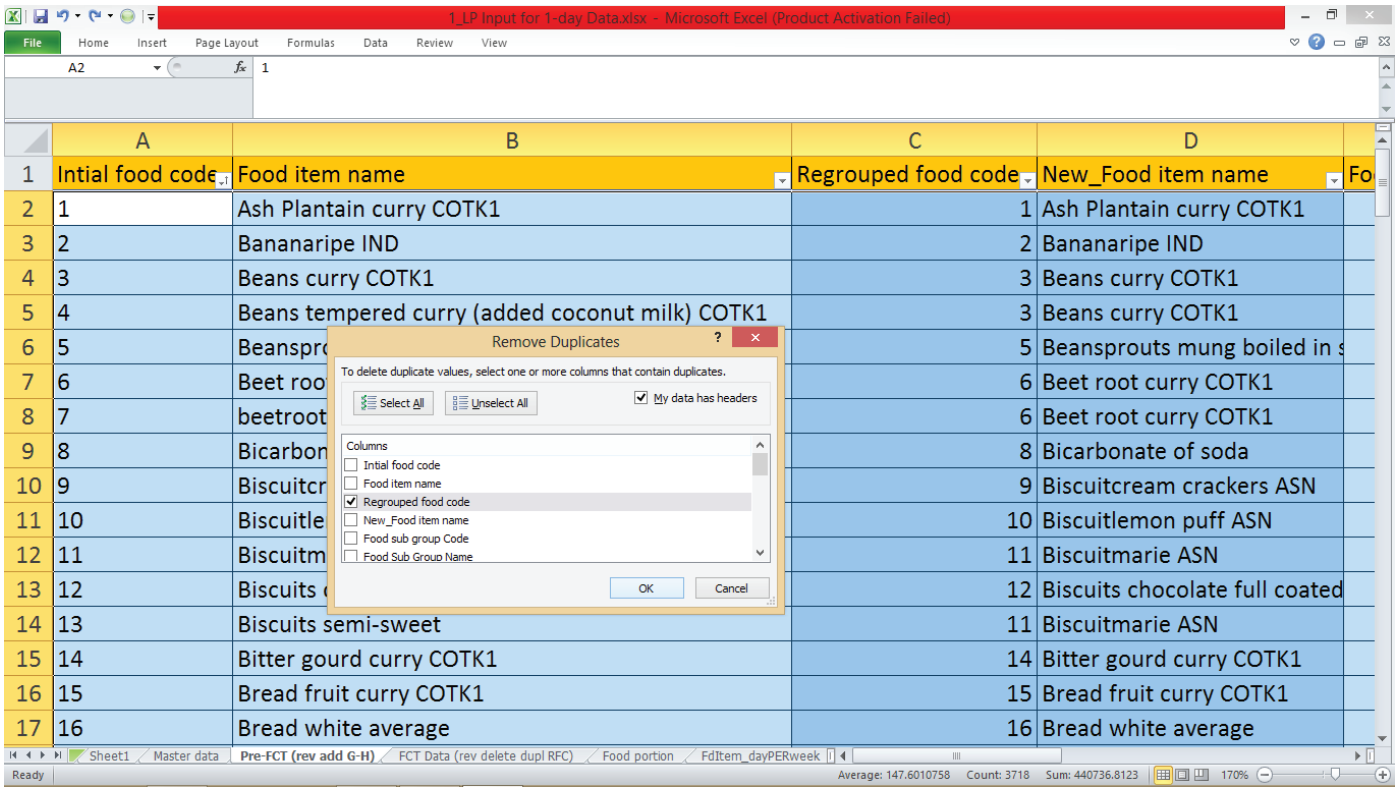


	A	B	C	D
1	Intial food code	Food item name	Regrouped food code	New_Food item name
2	1	Ash Plantain curry COTK1	1	Ash Plantain curry COTK1
3	2	Bananaripe IND	2	Bananaripe IND
4	3	Beans curry COTK1	3	Beans curry COTK1
5	4	Beans tempered curry (added coconut milk) COTK1	3	Beans curry COTK1
6	5	Beansprouts mung boiled in salted water	5	Beansprouts mung boiled in
7	6	Beet root curry COTK1	6	Beet root curry COTK1
8	7	beetroot curry tempered with coconut oil COSLHM	6	Beet root curry COTK1
9	8	Bicarbonate of soda	8	Bicarbonate of soda
10	9	Biscuitcream crackers ASN	9	Biscuitcream crackers ASN
11	10	Biscuitlemon puff ASN	10	Biscuitlemon puff ASN
12	11	Biscuitmarie ASN	11	Biscuitmarie ASN
13	12	Biscuits chocolate full coated	12	Biscuits chocolate full coated
14	13	Biscuits semi-sweet	11	Biscuitmarie ASN
15	14	Bitter gourd curry COTK1	14	Bitter gourd curry COTK1
16	15	Bread fruit curry COTK1	15	Bread fruit curry COTK1

Figure 3.10. Reviewing the similar food item and assigning the regrouped food code and new food item name

6. In Master Data sheet, perform VLOOKUP command to call on the **"Regrouped food code" and "New food item name"** from Pre-FCT sheet to Master Data sheet.

7. Duplicate the Pre-FCT sheet and rename it as **FCT Data sheet**. **Remove the duplicate food code** under "Regrouped food code" column. Steps: select all data – go to Data and click Remove Duplicate – select column that contains duplicates (in this case is "Regrouped food code").



	A	B	C	D
1	Intial food code	Food item name	Regrouped food code	New_Food item name
2	1	Ash Plantain curry COTK1	1	Ash Plantain curry COTK1
3	2	Bananaripe IND	2	Bananaripe IND
4	3	Beans curry COTK1	3	Beans curry COTK1
5	4	Beans tempered curry (added coconut milk) COTK1	3	Beans curry COTK1
6	5	Beanspr	5	Beansprouts mung boiled in s
7	6	Beet roo	6	Beet root curry COTK1
8	7	beetroot	6	Beet root curry COTK1
9	8	Bicarbon	8	Bicarbonate of soda
10	9	Biscuitcr	9	Biscuitcream crackers ASN
11	10	Biscuitle	10	Biscuitlemon puff ASN
12	11	Biscuitm	11	Biscuitmarie ASN
13	12	Biscuits	12	Biscuits chocolate full coated
14	13	Biscuits semi-sweet	11	Biscuitmarie ASN
15	14	Bitter gourd curry COTK1	14	Bitter gourd curry COTK1
16	15	Bread fruit curry COTK1	15	Bread fruit curry COTK1
17	16	Bread white average	16	Bread white average

Figure 3.11. Removing duplicate values of regrouped food code

8. In FCT Data sheet, **assign the code of food sub-group** to which each of the food items belongs. Please refer to the Optifood Grouping of Food Sub-group in the **Annex 2**. You may put the assigned code of food sub-group in the column "Food sub-group code", and then call on the **food sub-group name** by performing VLOOKUP command from "Optifood Food Grouping" sheet into "FCT Data" sheet.

- Lookup_value is the sub-group code.
- Table_array is in "Optifood Food Grouping" sheet. Remember: always put dollar sign ($) before and after the alphabet so that the table array is not moved to the next column or row.
- Col_index_num is the column in table array from which the matching value should be returned. Remember: The

first column of values in the table is column 1. In this case, our target value is food sub-group nama.

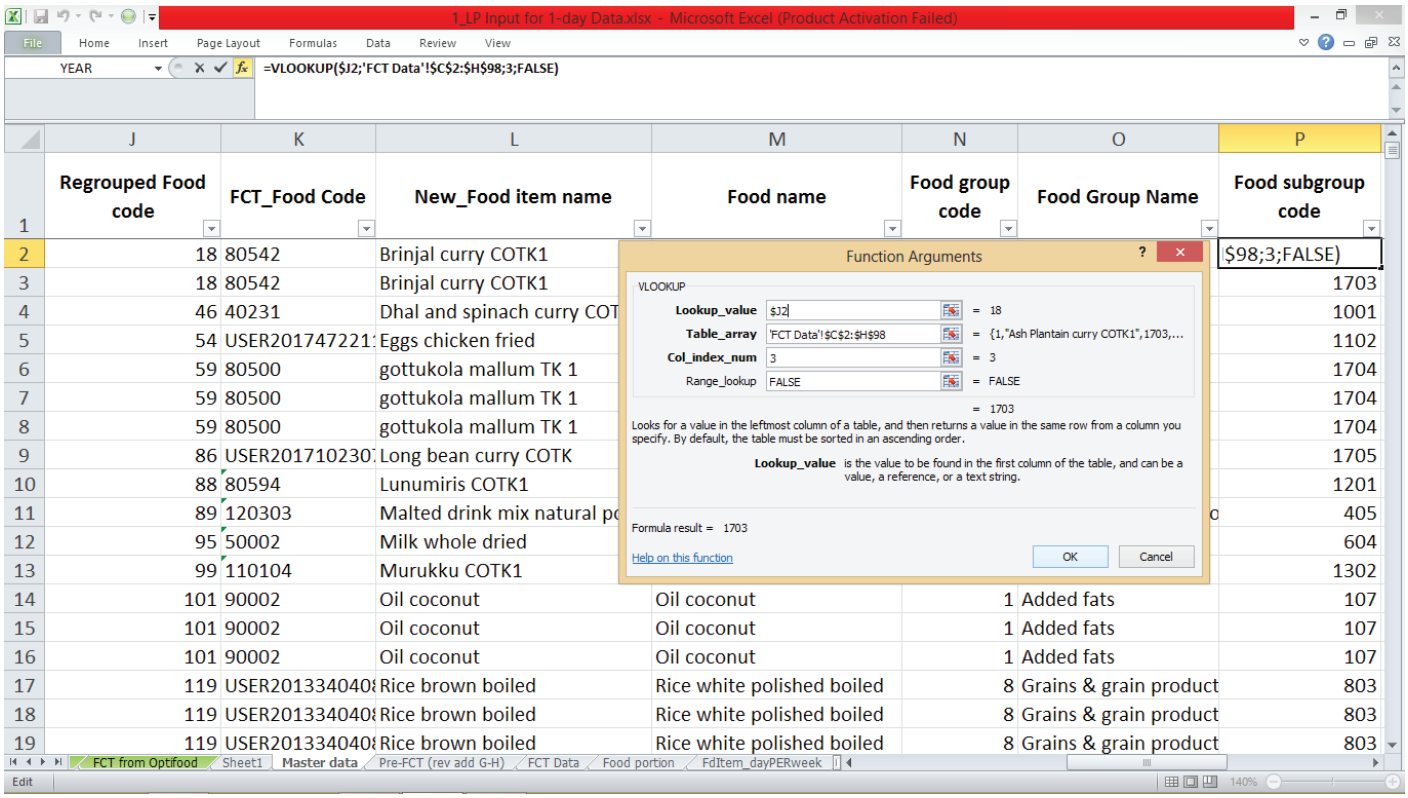
- Range_lookup is a FALSE (exact match).

9. In FCT Data sheet, **call on the code of food group** in the column "Food group code", as well as the **food group name** by performing VLOOKUP command from "Optifood Food Grouping" sheet into "FCT Data" sheet.

10. Now, our "FCT Data" sheet has information on initial food code, food item name, regrouped food code, new food item name, food sub-group code, food sub-group name, food group code, and food group name. In the meantime, we will leave our FCT Data sheet and continue completing our Master Data sheet, and then will come back again to finish the FCT Data sheet by providing the nutrient content for each food item per 100 grams.

11. In Master Data sheet, our columns on **food sub-group code, food sub-group name, food group code, and food group name** are still empty. Therefore, we need to fill that information by performing VLOOKUP command from "FCT Data" sheet into "Master Data" sheet by using **regrouped food code** as the reference for lookup values.

12. Now, our "Master Data" is almost complete.



	J	K	L	M	N	O	P
1	Regrouped Food code	FCT_Food Code	New_Food item name	Food name	Food group code	Food Group Name	Food subgroup code
2	18	80542	Brinjal curry COTK1				$98;3;FALSE)
3	18	80542	Brinjal curry COTK1				1703
4	46	40231	Dhal and spinach curry COT				1001
5	54	USER201747221	Eggs chicken fried				1102
6	59	80500	gottukola mallum TK 1				1704
7	59	80500	gottukola mallum TK 1				1704
8	59	80500	gottukola mallum TK 1				1704
9	86	USER201710230	Long bean curry COTK				1705
10	88	80594	Lunumiris COTK1				1201
11	89	120303	Malted drink mix natural pc				405
12	95	50002	Milk whole dried				604
13	99	110104	Murukku COTK1				1302
14	101	90002	Oil coconut	Oil coconut	1	Added fats	107
15	101	90002	Oil coconut	Oil coconut	1	Added fats	107
16	101	90002	Oil coconut	Oil coconut	1	Added fats	107
17	119	USER201334040	Rice brown boiled	Rice white polished boiled	8	Grains & grain product	803
18	119	USER201334040	Rice brown boiled	Rice white polished boiled	8	Grains & grain product	803
19	119	USER201334040	Rice brown boiled	Rice white polished boiled	8	Grains & grain product	803

Figure 3.12. Filling the food item information in Master Data by performing VLOOKUP command

We are ready to analyze the food pattern of our target population.

13. Calculating **food portion in gram** for each food item. Steps:

- In "Master Data" sheet, select all of the data (or just click the triangle in the left corner)
- Go to "Insert" and click "Pivot table"
- Select a table or range
- Tick "new sheet" for choice to place the Pivot Table report
- Click OK
- In Pivot Table Field List, drag the following fields into:
  - ✓ Row Labels box = "Regrouped food code" field,
  - ✓ Column Label box = "ID number of respondent" field.
  - ✓ Values = Amount (gram) field – with summarize value field by AVERAGE
  - ✓ Then click OK

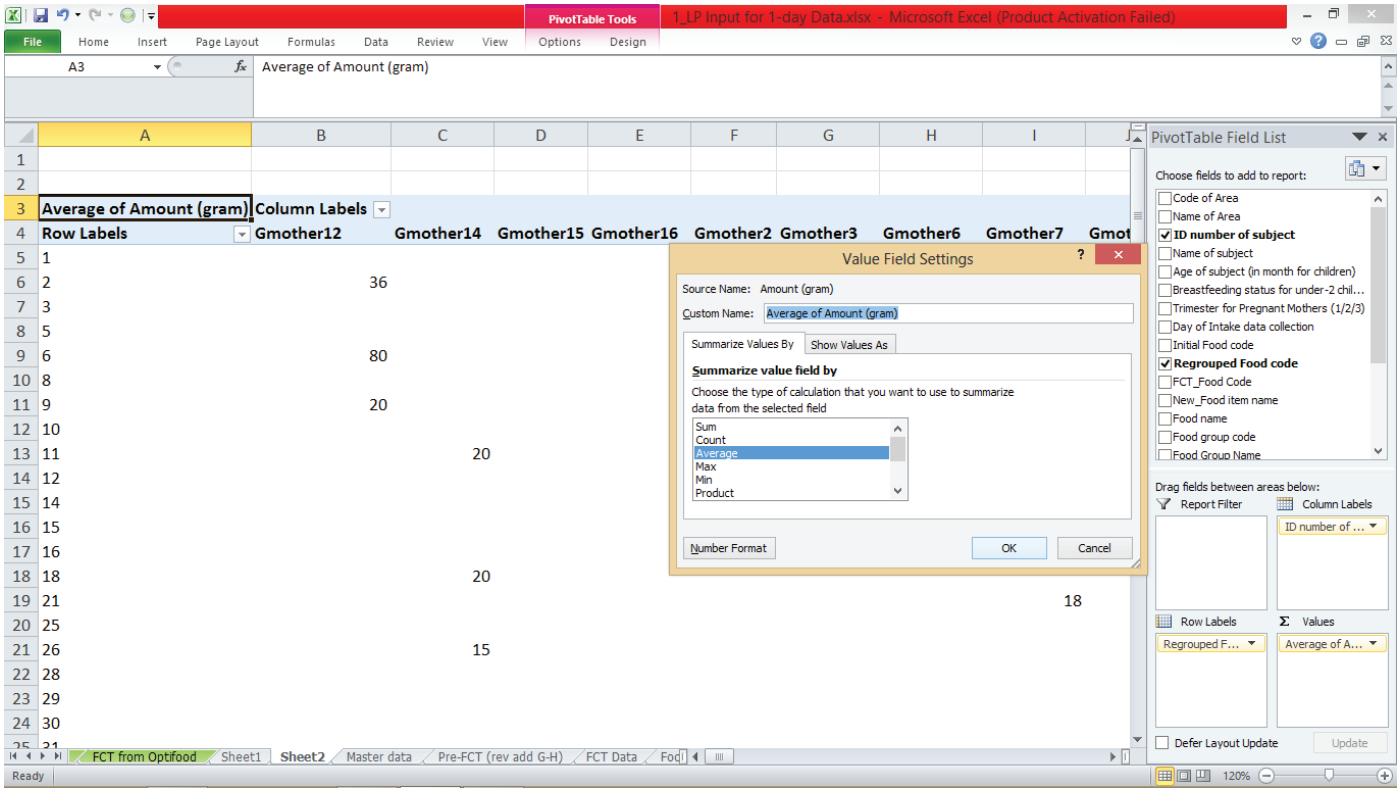


Figure 3.13. Food portion (in gram) calculation by performing PIVOT

- We can find in the Pivot worksheet the average portion (in gram) of food item consumed by each respondent.
- Move the Pivot Table result (copy-paste to other sheet and rename the sheet as **Food Portion Summary**) because in the Pivot Table sheet, we can't do any calculation formula.
- In Food Portion Summary sheet, insert new column after column A and rename the variable as **Median Portion.**
- **Calculate the median portion** for each food item among our target population**.** Do calculation by using **MEDIAN formula** – formula =MEDIAN (cell of the first respondent: cell of the last respondent).
- After the result is shown up, double click the right corner of the cell to duplicate the formula/command for the rest of food portion median.

14. **Calculate percentage of consumers for each food item to get the conversion factor of weekly food pattern (meal/ week).**
    - In "Master Data" sheet, select all the data (or just click the triangle in the left corner).
    - Go to "Insert" and click "Pivot table".
    - Select a table or range.
    - Click "new sheet" for choice to place the Pivot Table report .
    - Click OK.

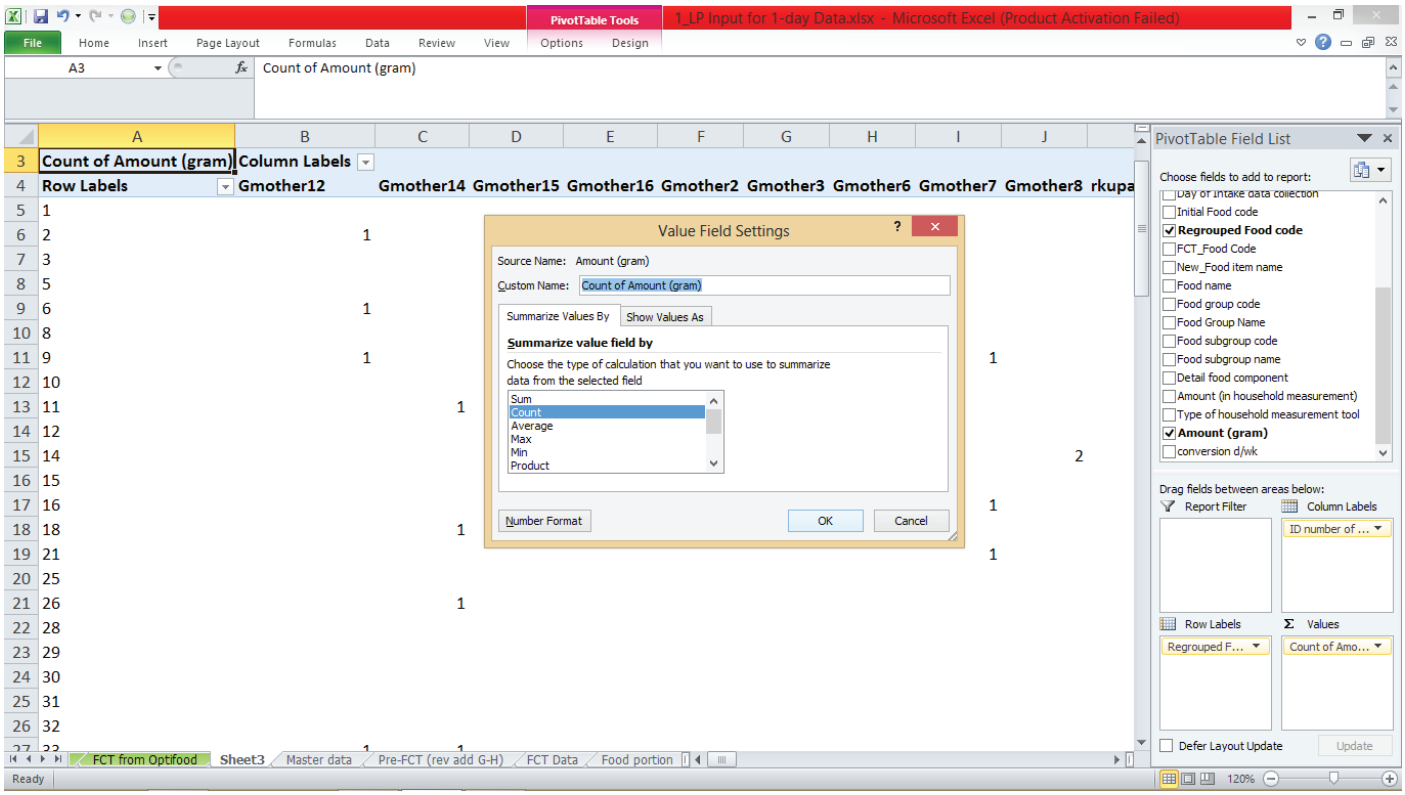


Figure 3.14. Food frequency per day (meal/day) calculation by performing PIVOT

- In Pivot Table Field List, drag the following fields into:
  - ✓ Row Labels box = "Regrouped food code" field.
  - ✓ Column Label box = "ID number of respondent" field.
  - ✓ Values = Amount (gram) – with summarize value field by COUNT.
  - ✓ Then click OK.
  - ✓ We can find in the Pivot worksheet the food frequency per day (meal/day) of food item consumed by each respondent.
- Move the Pivot Table result (copy-paste to other sheet and rename the sheet as **FoodItem_dayPERweek**) because in the Pivot Table sheet, we can't do any calculation formula.
- In FoodItem_dayPERweek sheet, insert 3 new columns after column A and rename the variable as **Number of consumers, Percent of consumers, and conversion factor day/week,** respectively**.**
- **Calculate number of consumers** by using **COUNT formula** – formula =COUNT (cell of the first respondent: cell of the last respondent). Double click the corner of the cell to duplicate the formula/command to the rest.

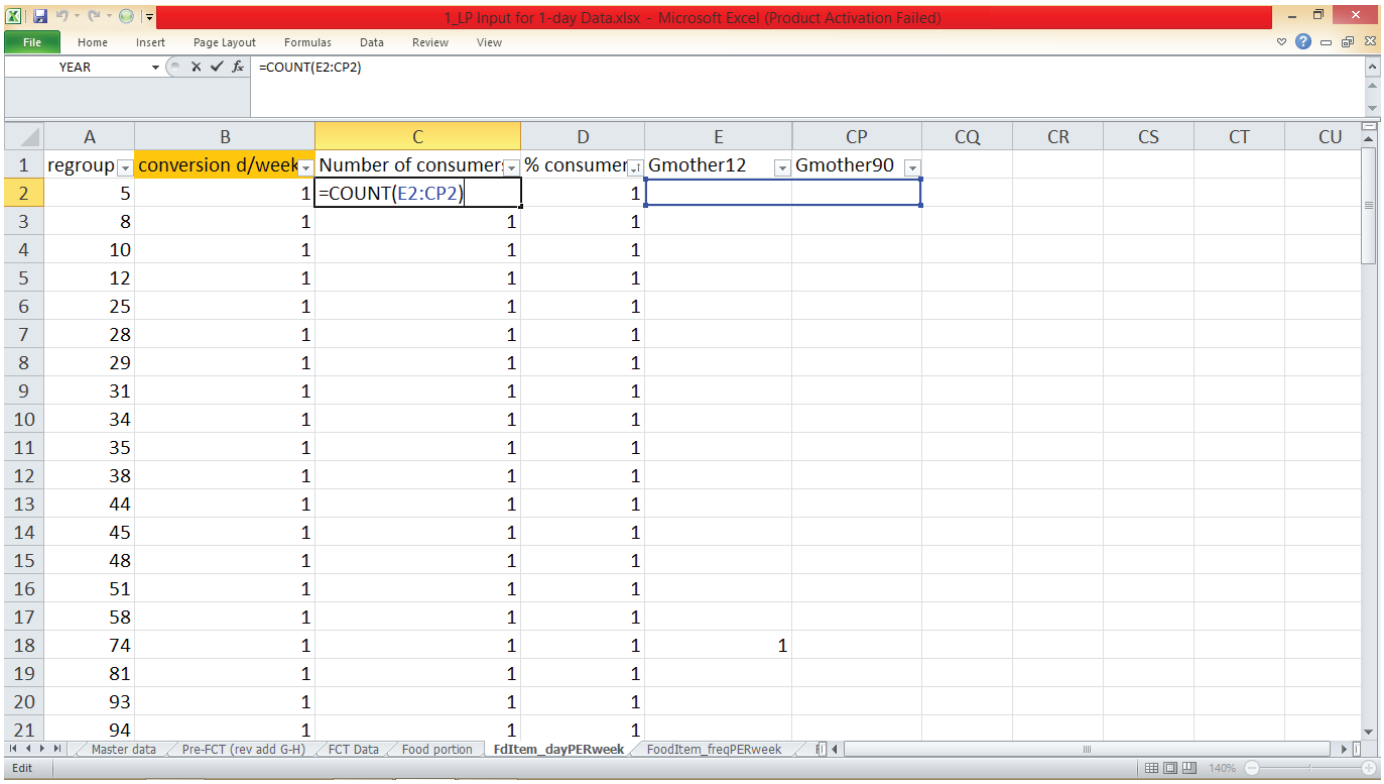
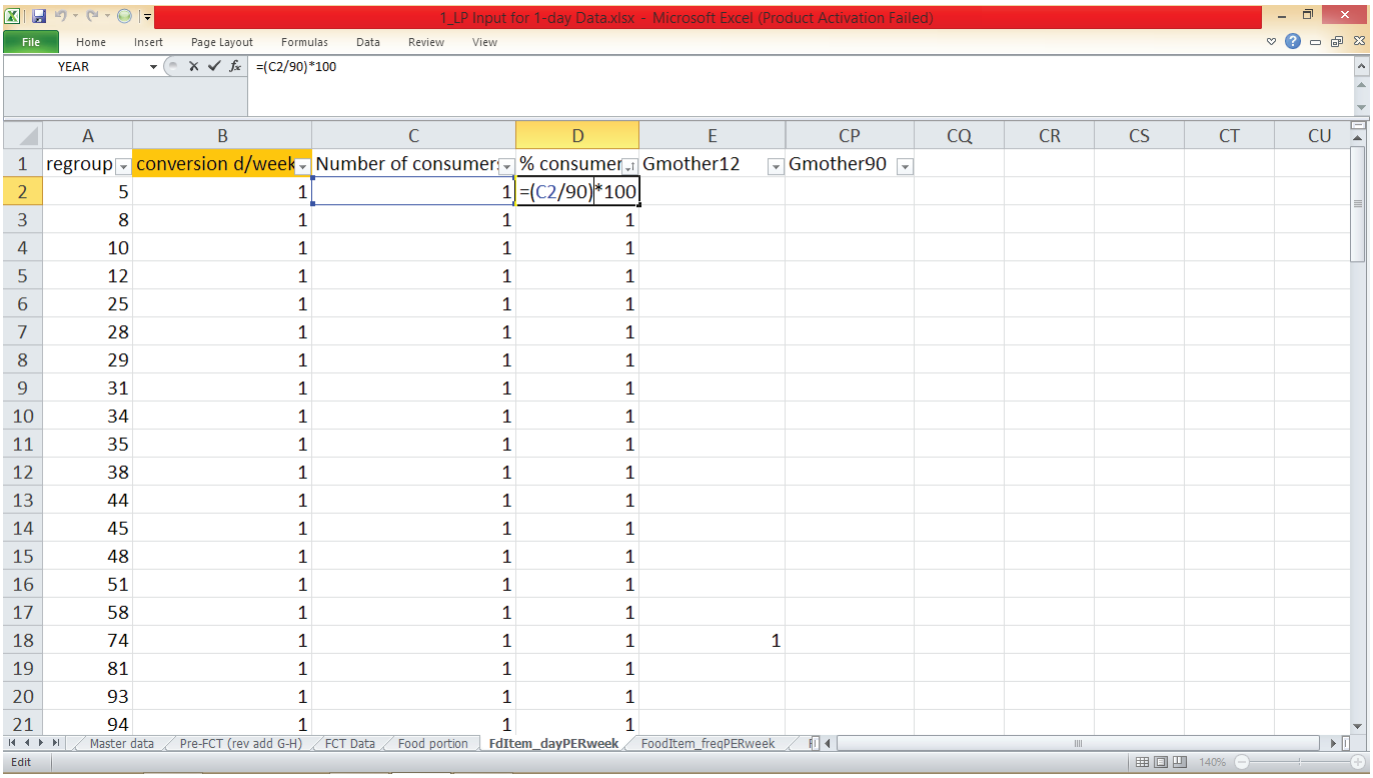


Figure 3.15. Calculate the number of consumers for each food item

- **Calculate percent of consumers** by using formula of number of consumers divided by total number of respondents, then multiplied by 100 to be percentage. Double click the bottom right corner of the cell to duplicate the formula/command to the rest.



	A	B	C	D	E	CP	CQ	CR	CS	CT	CU
1	regroup	conversion d/week	Number of consumer	% consumer	Gmother12	Gmother90					
2	5	1	1	=(C2/90)*100							
3	8	1	1	1							
4	10	1	1	1							
5	12	1	1	1							
6	25	1	1	1							
7	28	1	1	1							
8	29	1	1	1							
9	31	1	1	1							
10	34	1	1	1							
11	35	1	1	1							
12	38	1	1	1							
13	44	1	1	1							
14	45	1	1	1							
15	48	1	1	1							
16	51	1	1	1							
17	58	1	1	1							
18	74	1	1	1	1						
19	81	1	1	1							
20	93	1	1	1							
21	94	1	1	1							

Figure 3.16. Calculate the percent of consumer for each food item

- Sort the column of percentage of consumer from smallest to highest.

- In the column of Conversion Factor day/week, **assign the conversion factor value** referring to **Table 2.1.** Deriving food pattern from percentage of subjects who consumed the food when only 1-day data available.

15. In Master Data, **call on the conversion factor** values in the column of **Conversion Factor day/week** by performing VLOOKUP command from "FoodItem_dayPERweek" sheet into "Master Data" sheet.

- Lookup_value is the regrouped food code.

- Table_array is in "FoodItem_dayPERweek" sheet. Remember: always put dollar sign ($) in before and after the alphabet so that the table array is not moved to the next column or row.

- Col_index_num is the column in table array from which the matching value should be returned. Remember: The first column of values in the table is column 1. In this case, our target value is Conversion Factor day/week.
- Range_lookup is a FALSE (exact match).
- Double click the bottom right corner of the cell to duplicate the formula/ command to the rest.

16. Calculating **food frequency per week** (meal/week). Steps:
    - In "Master Data" sheet, select all of the data (or just click the triangle in the left corner).
    - Go to "Insert" and click "Pivot table".
    - Select a table or range.
    - Click "new sheet" for choice to place the Pivot Table report.
    - Click OK.
    - In Pivot Table Field List, drag the following fields into:
        - ✓ Row Labels box = "Regrouped food code" field.
        - ✓ Column Label box = "ID number of respondent" field.
        - ✓ Values = Conversion day/week field – with summarize value field by SUM.
        - ✓ Then click OK.
    - We can find in the Pivot worksheet the food frequency per week (meal/ week) of food item consumed by each respondent.
    - Move the Pivot Table result (copy-paste to other sheet and rename the sheet as **Food Item Summary**) because in the Pivot Table sheet, we can't do any calculation formula.
    - In Food Item Summary sheet, insert 2 new columns after column A and rename the variable as **Min. Frequency and Max. Frequency**, respectively.
    - Before we calculate the minimum and maximum frequency per week, we need to **replace blank cell into zero (0) values** for all respondent so those who are not consuming the food item will still be counted.
    - **Calculate the minimum frequency per week** for each food item among our target population**.** In Optifood, the minimum frequency refers to the **5th percentile** (=PERCENTILE):
        - ✓ Array is the array or range of data that defines relative standing. In this case, it will be the cell of our first to the last respondent.
        - ✓ K is the percentile value that is between 0 through 1, inclusive. In this case, 5th percentile is written as "0.05".
        - ✓ Click OK and double click the bottom right corner of the cell to duplicate the formula/command to the rest.

- **Calculate the maximum frequency per week** for each food item among our target population**.** In Optifood, the minimum frequency refers to the **95th percentile** (=PERCENTILE):

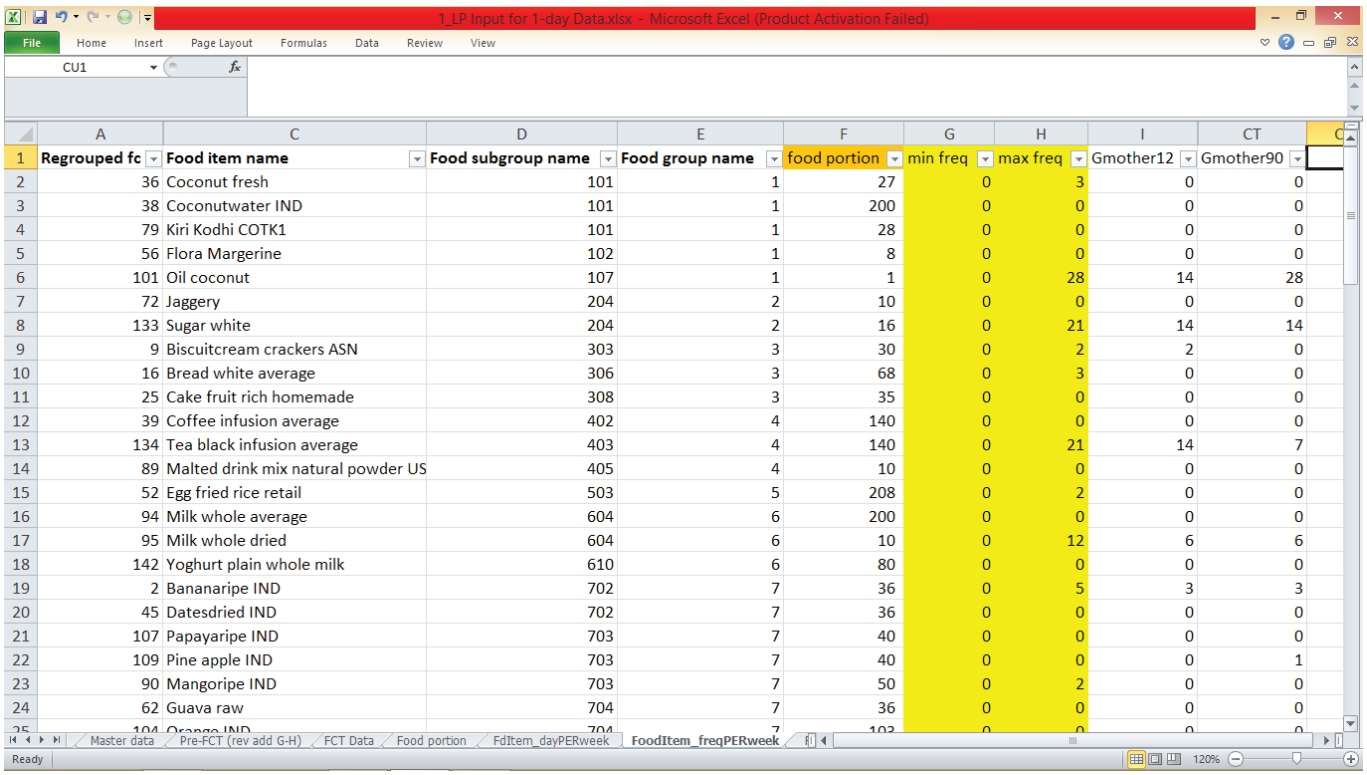
  ✓ Array is the array or range of data that defines relative standing. In this case, it will be the cell of our first to the last respondent.

  ✓ K is the percentile value that is between 0 through 1, inclusive. In this case, 95th percentile is written as "0.95".

  ✓ Click OK and double click the corner of the cell to duplicate the formula/ command to the rest.

17. **Combine/duplicate** the information on **food portion** in "Food Portion" sheet into one sheet in "Food Item Summary" sheet by performing VLOOKUP command.

18. In Food Item Summary sheet, complete the information on **food sub-group code, food sub-group name, food group code,** and **food group name** by performing VLOOKUP command from "FCT Data" sheet into "Food Item Summary" sheet and using **regrouped food code** as the reference for lookup values.



1_LP Input for 1-day Data.xlsx - Microsoft Excel (Product Activation Failed)

	A	C	D	E	F	G	H	I	CT
1	Regrouped fc	Food item name	Food subgroup name	Food group name	food portion	min freq	max freq	Gmother12	Gmother90
2	36	Coconut fresh	101	1	27	0	3	0	0
3	38	Coconutwater IND	101	1	200	0	0	0	0
4	79	Kiri Kodhi COTK1	101	1	28	0	0	0	0
5	56	Flora Margerine	102	1	8	0	0	0	0
6	101	Oil coconut	107	1	1	0	28	14	28
7	72	Jaggery	204	2	10	0	0	0	0
8	133	Sugar white	204	2	16	0	21	14	14
9	9	Biscuitcream crackers ASN	303	3	30	0	2	2	0
10	16	Bread white average	306	3	68	0	3	0	0
11	25	Cake fruit rich homemade	308	3	35	0	0	0	0
12	39	Coffee infusion average	402	4	140	0	0	0	0
13	134	Tea black infusion average	403	4	140	0	21	14	7
14	89	Malted drink mix natural powder US	405	4	10	0	0	0	0
15	52	Egg fried rice retail	503	5	208	0	2	0	0
16	94	Milk whole average	604	6	200	0	0	0	0
17	95	Milk whole dried	604	6	10	0	12	6	6
18	142	Yoghurt plain whole milk	610	6	80	0	0	0	0
19	2	Bananaripe IND	702	7	36	0	5	3	3
20	45	Datesdried IND	702	7	36	0	0	0	0
21	107	Papayaripe IND	703	7	40	0	0	0	0
22	109	Pine apple IND	703	7	40	0	0	0	1
23	90	Mangoripe IND	703	7	50	0	2	0	0
24	62	Guava raw	704	7	36	0	0	0	0

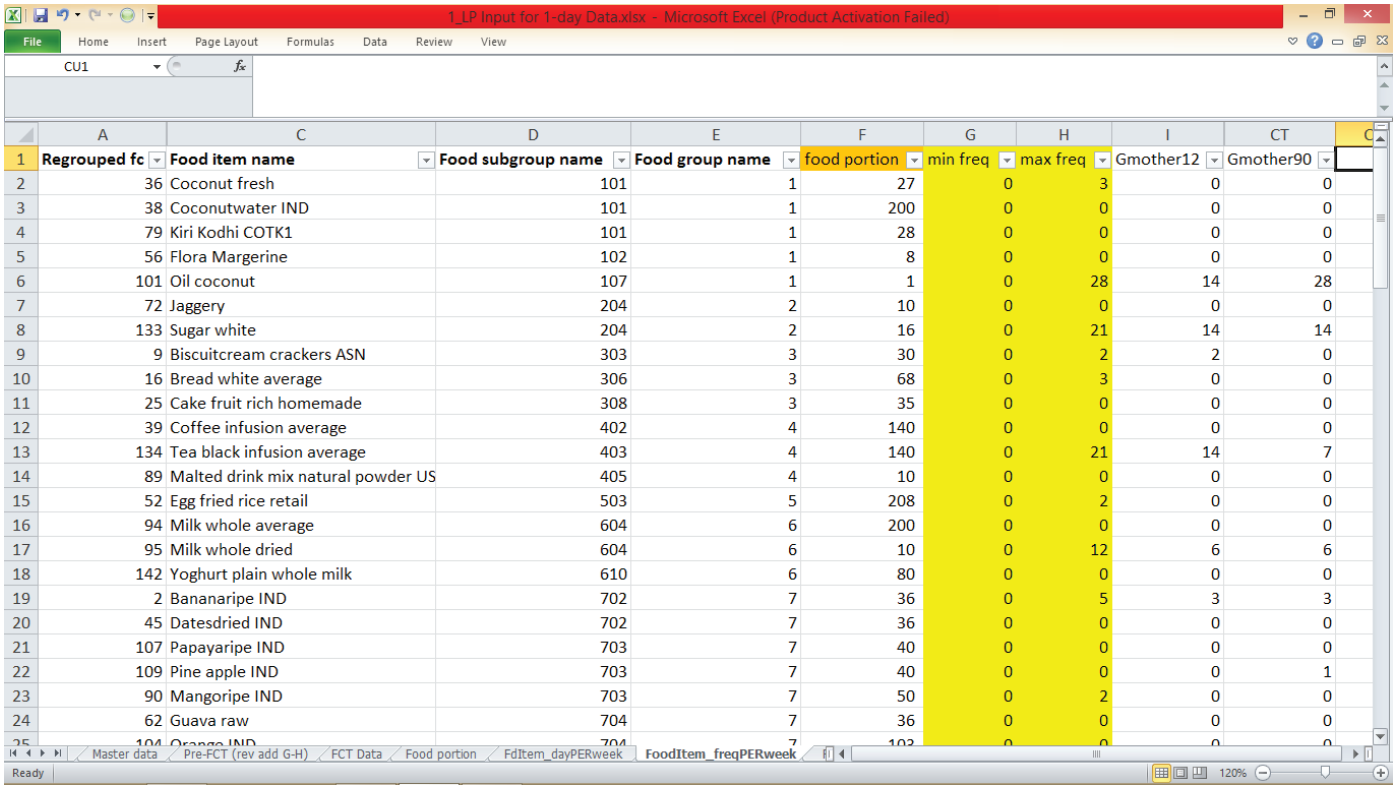
Figure 3.17. The complete sheet of Food Item Summary

19. Calculating **food sub-group frequency per week**. Steps:

- In "Master Data" sheet, select all the data (or just click the triangle in the left corner).
- Go to "Insert" and click "Pivot table".
- Select a table or range.
- Click "new sheet" for choice to place the Pivot Table report .
- Click OK.
- In Pivot Table Field List, drag the following fields into:
  - ✓ Row Labels box = "Food sub-group code" field.
  - ✓ Column Label box = "ID number of respondent" field.
  - ✓ Values = Conversion day/week field – with summarize value field by SUM.
  - ✓ Then click OK.
- We can find in the Pivot worksheet the food sub-group frequency per week (meal/week) consumed by each respondent.
- Move the Pivot Table result (copy-paste to other sheet and rename the sheet as **Food Sub-Group Summary**) because in the Pivot Table sheet, we can't do any calculation formula.
- In Food Sub-Group Summary sheet, insert 2 new columns after column A and rename the variable as **Min. Frequency and Max. Frequency**, respectively.
- Before we calculate the minimum and maximum frequency per week, we need to r**eplace blank cell into zero (0) values** for all respondent so those who are not consuming the food sub-group will be still counted.
- **Calculate the minimum frequency per week** for each food sub-group among our target population**.** In Optifood, the minimum frequency refers to the **5th percentile** (=PERCENTILE):
  - ✓ Array is the array or range of data that defines relative standing. In this case, it will be the cell of our first to the last respondent.
  - ✓ K is the percentile value that is between 0 through 1, inclusive. In this case, 5th percentile is written as "0.05".
  - ✓ Click OK and double click the bottom right corner of the cell to duplicate the formula/ command to the rest.
- **Calculate the maximum frequency per week** for each food sub-group among our target population**.** In Optifood, the minimum frequency refers to the **95th percentile** (=PERCENTILE):

- ✓ Array is the array or range of data that defines relative standing. In this case, it will be the cell of our first to the last respondent.
- ✓ K is the percentile value that is between 0 through 1, inclusive. In this case, 95th percentile is written as "0.95".
- ✓ Click OK and double click the bottom right corner of the cell to duplicate the formula/ command to the rest.

- In Food Sub-Group Summary sheet, complete the information on **food sub-group name, food group code,** and **food group name** by performing VLOOKUP command from "Optifood Food Grouping" sheet into "Food Sub-Group Summary" sheet and using **food sub-group code** as the reference for lookup values.



1_LP Input for 1-day Data.xlsx - Microsoft Excel (Product Activation Failed)

	A	C	D	E	F	G	H	I	CT
1	Regrouped fc	Food item name	Food subgroup name	Food group name	food portion	min freq	max freq	Gmother12	Gmother90
2	36	Coconut fresh	101	1	27	0	3	0	0
3	38	Coconutwater IND	101	1	200	0	0	0	0
4	79	Kiri Kodhi COTK1	101	1	28	0	0	0	0
5	56	Flora Margerine	102	1	8	0	0	0	0
6	101	Oil coconut	107	1	1	0	28	14	28
7	72	Jaggery	204	2	10	0	0	0	0
8	133	Sugar white	204	2	16	0	21	14	14
9	9	Biscuitcream crackers ASN	303	3	30	0	2	2	0
10	16	Bread white average	306	3	68	0	3	0	0
11	25	Cake fruit rich homemade	308	3	35	0	0	0	0
12	39	Coffee infusion average	402	4	140	0	0	0	0
13	134	Tea black infusion average	403	4	140	0	21	14	7
14	89	Malted drink mix natural powder US	405	4	10	0	0	0	0
15	52	Egg fried rice retail	503	5	208	0	2	0	0
16	94	Milk whole average	604	6	200	0	0	0	0
17	95	Milk whole dried	604	6	10	0	12	6	6
18	142	Yoghurt plain whole milk	610	6	80	0	0	0	0
19	2	Bananaripe IND	702	7	36	0	5	3	3
20	45	Datesdried IND	702	7	36	0	0	0	0
21	107	Papayaripe IND	703	7	40	0	0	0	0
22	109	Pine apple IND	703	7	40	0	0	0	1
23	90	Mangoripe IND	703	7	50	0	2	0	0
24	62	Guava raw	704	7	36	0	0	0	0

Master data | Pre-FCT (rev add G-H) | FCT Data | Food portion | FdItem_dayPERweek | FoodItem_freqPERweek

Ready

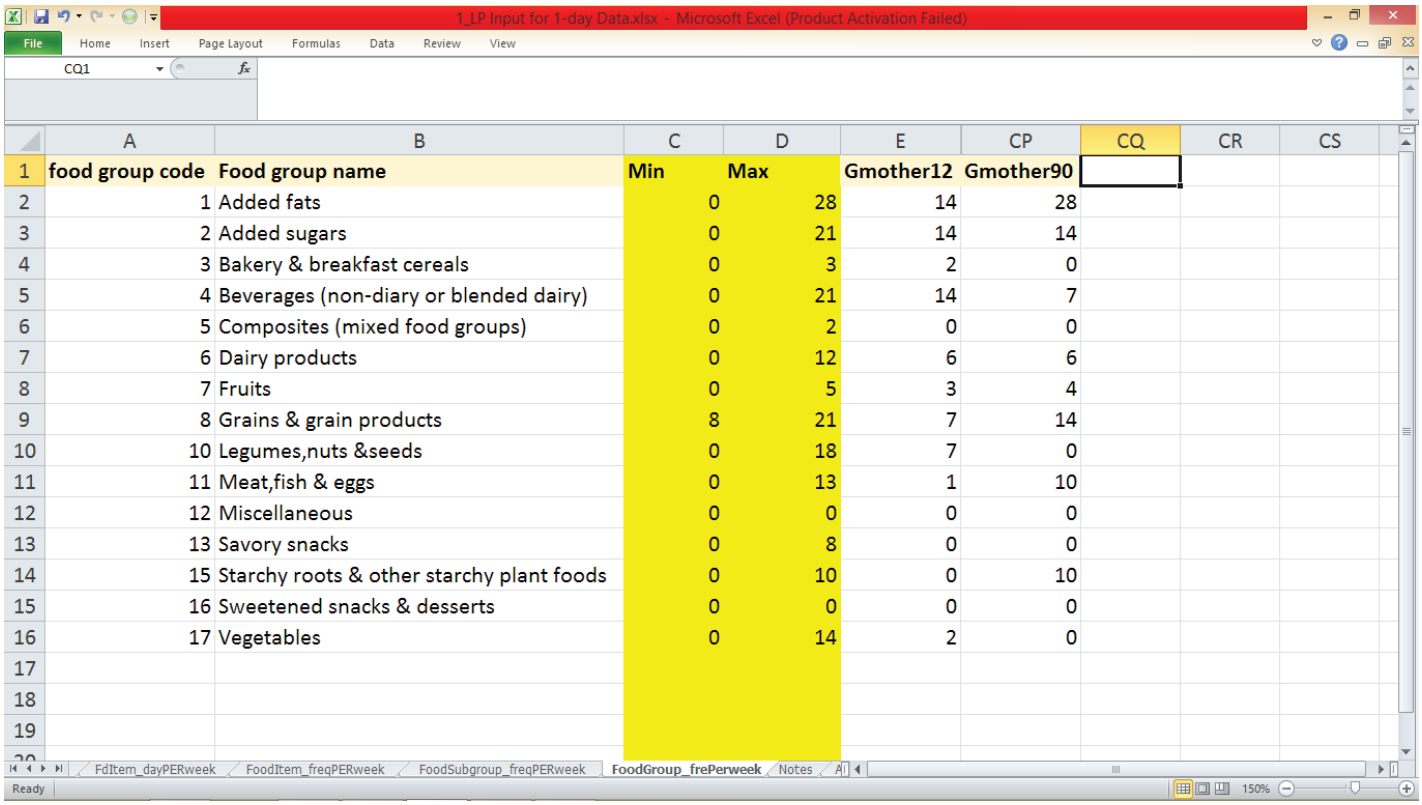
Figure 3.18. The complete sheet of Food Sub-Group Summary

20. Calculating **food group frequency per week**. Steps:

- In "Master Data" sheet, select all the data (or just click the triangle in the top left corner).
- Go to "Insert" and click "Pivot table".
- Select a table or range.
- Click "new sheet" for choice to place the Pivot Table report.
- Click OK.

- In Pivot Table Field List, drag the following fields into:
  - ✓ Row Labels box = "Food group code" field.
  - ✓ Column Label box = "ID number of respondent" field.
  - ✓ Values = Conversion day/week field – with summarize value field by SUM.
  - ✓ Then click OK.
- We can find in the Pivot worksheet the food group frequency per week (meal/ week) consumed by each respondent.
- Move the Pivot Table result (copy-paste to other sheet and rename the sheet as **Food Group Summary**) because in the Pivot Table sheet, we can't do any calculation formula.
- In Food Group Summary sheet, insert 2 new columns after column A and rename the variable as **Min. Frequency and Max. Frequency,** respectively**.**
- Before we calculate the minimum and maximum frequency per week, we need to **replace blank cell into zero (0) values** for all respondent so those who are not consuming the food group will be still counted.
- **Calculate the minimum frequency per week** for each food group among our target population**.** In Optifood, the minimum frequency refers to the **5th percentile** (=PERCENTILE):
  - ✓ Array is the array or range of data that defines relative standing. In this case, it will be the cell of our first to the last respondent.
  - ✓ K is the percentile value that is between 0 through 1, inclusive. In this case, 5th percentile is written as "0.05".
  - ✓ Click OK and double click the bottom right corner of the cell to duplicate the formula/ command to the rest.
- **Calculate the maximum frequency per week** for each food group among our target population**.** In Optifood, the minimum frequency refers to the **95th percentile** (=PERCENTILE):
  - ✓ Array is the array or range of data that defines relative standing. In this case, it will be the cell of our first to the last respondent.
  - ✓ K is the percentile value that is between 0 through 1, inclusive. In this case, 95th percentile is written as "0.95".
  - ✓ Click OK and double click the bottom right corner of the cell to duplicate the formula/command to the rest.

- In Food Group Summary sheet, complete the information on **food group name** by performing VLOOKUP command from "Optifood Food Grouping" sheet into "Food Group Summary" sheet and using **food group code** as the reference for lookup values.



	A	B	C	D	E	CP	CQ	CR	CS
1	food group code	Food group name	Min	Max	Gmother12	Gmother90			
2	1	Added fats	0	28	14	28			
3	2	Added sugars	0	21	14	14			
4	3	Bakery & breakfast cereals	0	3	2	0			
5	4	Beverages (non-diary or blended dairy)	0	21	14	7			
6	5	Composites (mixed food groups)	0	2	0	0			
7	6	Dairy products	0	12	6	6			
8	7	Fruits	0	5	3	4			
9	8	Grains & grain products	8	21	7	14			
10	10	Legumes,nuts &seeds	0	18	7	0			
11	11	Meat,fish & eggs	0	13	1	10			
12	12	Miscellaneous	0	0	0	0			
13	13	Savory snacks	0	8	0	0			
14	15	Starchy roots & other starchy plant foods	0	10	0	10			
15	16	Sweetened snacks & desserts	0	0	0	0			
16	17	Vegetables	0	14	2	0			

Figure 3.19. The complete sheet of Food Group Summary

21. Now, we have finished our Master LP Optifood Input file.

22. Final step before entering the Optifood Software is moving our summary sheets (food item, food sub-group, and food group) into individual excel file and **save them as .CSV format** so it can be read by Optifood. Please refer the Optifood template of food item, food sub-group, and food group in the **Annex 4.**

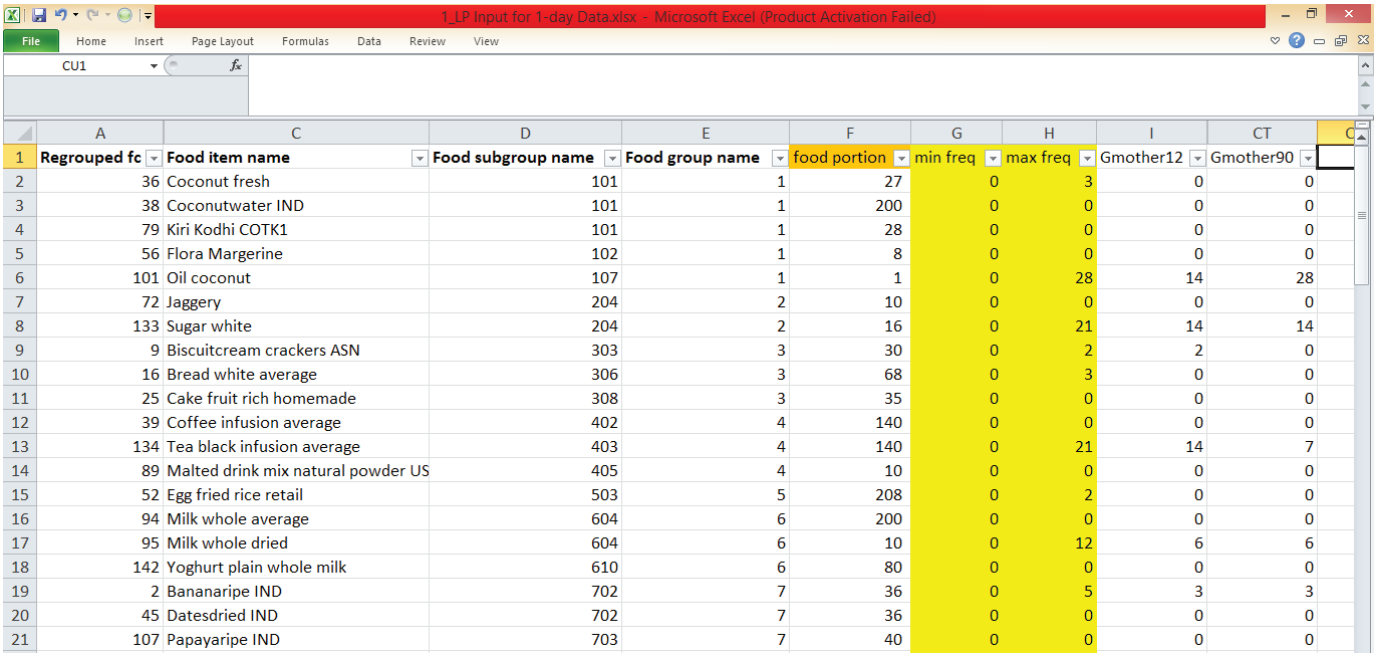
C. Preparing LP Optifood Input from 7-day Dietary Data

1. Basically, the steps in preparing LP Optifood Input from 7-day dietary data are similar with those from 1-day dietary data.
2. We can follow steps 1 to 13 of LP Optifood Input preparation from 1-day dietary data.
3. Because the data is obtained from 7-day dietary data, so we don't need to make conversion of daily meal frequency into weekly meal frequency. Therefore, we can skip the 14th and 15th steps.
4. During this stage, we have already had the summary of food portion (in gram) for each food item consumed by our target population.
5. Calculating **food frequency per week** (meal/week). Steps:
    - In "Master Data" sheet, select all the data (or just click the triangle in the top left corner).
    - Go to "Insert" and click "Pivot table".
    - Select a table or range.
    - Click "new sheet" for choice to place the Pivot Table report.
    - Click OK.
    - In Pivot Table Field List, drag the following fields into:
        - ✓ Row Labels box = "Regrouped food code" field.
        - ✓ Column Label box = "ID number of respondent" field.
        - ✓ Values = "Regrouped food code" – with summarize value field by COUNT.
        - ✓ Then click OK.
    - We can find in the Pivot worksheet the food frequency per week (meal/week) of food item consumed by each respondent.
    - Move the Pivot Table result (copy-paste to other sheet and rename the sheet as **Food Item Summary**) because in the Pivot Table sheet, we can't do any calculation formula.
    - In Food Item Summary sheet, insert 2 new columns after column A and rename the variable as **Min. Frequency and Max. Frequency**, respectively.
    - Before we calculate the minimum and maximum frequency per week, we need to **replace blank cell into zero (0) values** for all respondent so those who are not consuming the particular food item will be still counted.
    - **Calculate the minimum frequency per week** for each food item among our target population**.** In Optifood, the minimum frequency refers to the **5th percentile** (=PERCENTILE):

- ✓ Array is the array or range of data that defines relative standing. In this case, it will be the cell of our first to the last respondent.
- ✓ K is the percentile value that is between 0 through 1, inclusive. In this case, 5th percentile is written as "0.05".
- ✓ Click OK and double click the bottom right corner of the cell to duplicate the formula/ command to the rest.

- **Calculate the maximum frequency per week** for each food item among our target population**.** In Optifood, the minimum frequency refers to the **95th percentile** (=PERCENTILE):
  - ✓ Array is the array or range of data that defines relative standing. In this case, it will be the cell of our first to the last respondent.
  - ✓ K is the percentile value that is between 0 through 1, inclusive. In this case, 95th percentile is written as "0.95".
  - ✓ Click OK and double click the bottom right corner of the cell to duplicate the formula/ command to the rest.

6. **Combine/duplicate** the information on **food portion** in "Food Portion" sheet into one sheet in "Food Item Summary" sheet by performing VLOOKUP command.
7. In Food Item Summary sheet, complete the information on **food sub-group code, food sub-group name, food group code, and food group name** by performing VLOOKUP command from "FCT Data" sheet into "Food Item Summary" sheet and using **regrouped food code** as the reference for lookup values.



	A	C	D	E	F	G	H	I	CT
1	Regrouped fc	Food item name	Food subgroup name	Food group name	food portion	min freq	max freq	Gmother12	Gmother90
2	36	Coconut fresh	101	1	27	0	3	0	0
3	38	Coconutwater IND	101	1	200	0	0	0	0
4	79	Kiri Kodhi COTK1	101	1	28	0	0	0	0
5	56	Flora Margerine	102	1	8	0	0	0	0
6	101	Oil coconut	107	1	1	0	28	14	28
7	72	Jaggery	204	2	10	0	0	0	0
8	133	Sugar white	204	2	16	0	21	14	14
9	9	Biscuitcream crackers ASN	303	3	30	0	2	2	0
10	16	Bread white average	306	3	68	0	3	0	0
11	25	Cake fruit rich homemade	308	3	35	0	0	0	0
12	39	Coffee infusion average	402	4	140	0	0	0	0
13	134	Tea black infusion average	403	4	140	0	21	14	7
14	89	Malted drink mix natural powder US	405	4	10	0	0	0	0
15	52	Egg fried rice retail	503	5	208	0	2	0	0
16	94	Milk whole average	604	6	200	0	0	0	0
17	95	Milk whole dried	604	6	10	0	12	6	6
18	142	Yoghurt plain whole milk	610	6	80	0	0	0	0
19	2	Bananaripe IND	702	7	36	0	5	3	3
20	45	Datesdried IND	702	7	36	0	0	0	0
21	107	Papayaripe IND	703	7	40	0	0	0	0

Figure 3.20. The complete sheet of Food Item Summary

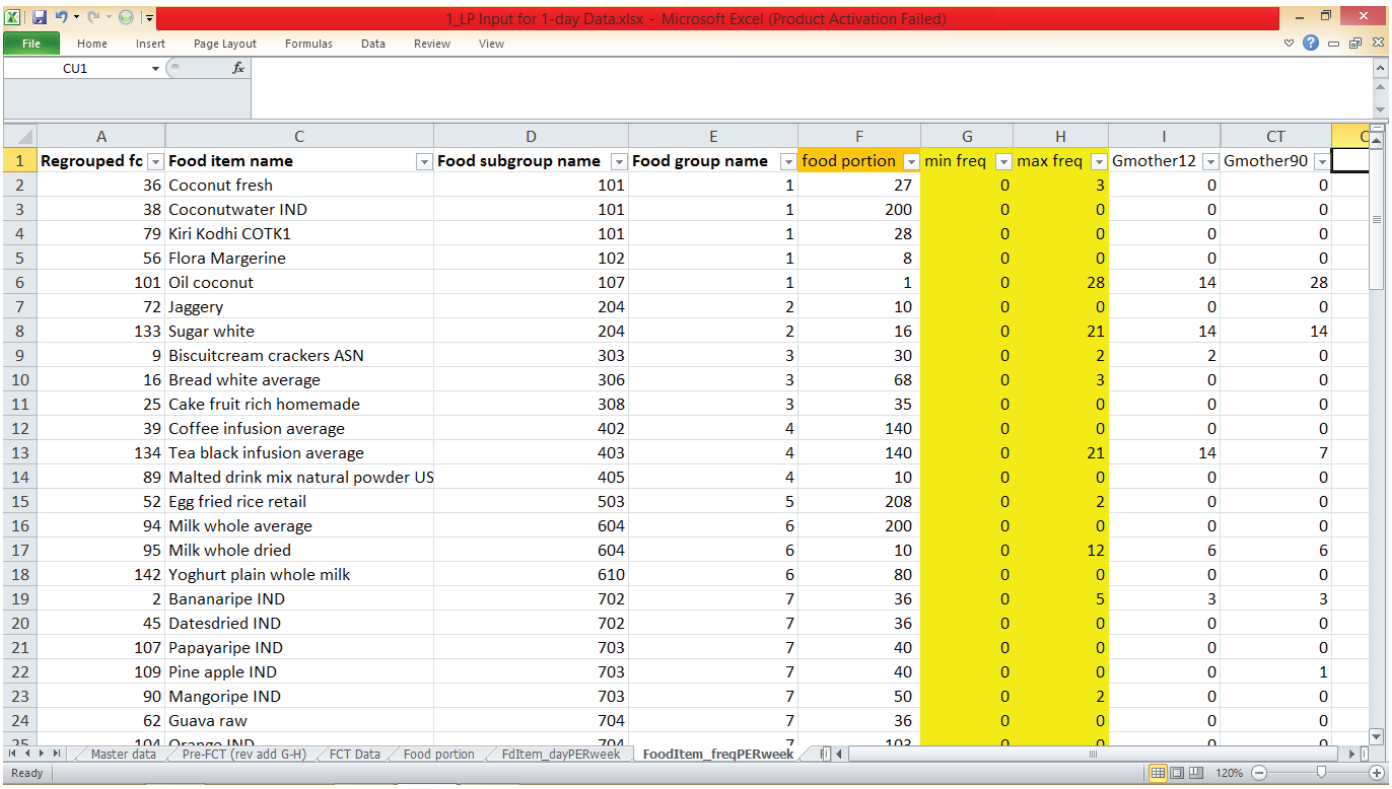
8. Calculating **food sub-group frequency per week**. Steps:

   - In "Master Data" sheet, select all the data (or just click the triangle in the top left corner).
   - Go to "Insert" and click "Pivot table".
   - Select a table or range.
   - Click "new sheet" for choice to place the Pivot Table report.
   - Click OK.
   - In Pivot Table Field List, drag the following fields into:
     - ✓ Row Labels box = "Food sub-group code" field.
     - ✓ Column Label box = "ID number of respondent" field.
     - ✓ Values = "Food sub-group code" – with summarize value field by COUNT.
     - ✓ Then click OK.
   - We can find in the Pivot worksheet the food sub-group frequency per week (meal/week) consumed by each respondent.
   - Move the Pivot Table result (copy-paste to other sheet and rename the sheet as **Food Sub-Group Summary**) because in the Pivot Table sheet, we can't do any calculation formula.
   - In Food Sub-Group Summary sheet, insert 2 new columns after column A and rename the variable as **Min. Frequency and Max. Frequency,** respectively**.**
   - Before we calculate the minimum and maximum frequency per week, we need to **replace blank cell into zero (0) values** for all respondent so those who are not consuming the particular food sub-group will be still counted.
   - **Calculate the minimum frequency per week** for each food sub-group among our target population**.** In Optifood, the minimum frequency refers to the **5th percentile** (=PERCENTILE):
     - ✓ Array is the array or range of data that defines relative standing. In this case, it will be the cell of our first to the last respondent.
     - ✓ K is the percentile value that is between 0 through 1, inclusive. In this case, 5th percentile is written as "0.05".
     - ✓ Click OK and double click the bottom right corner of the cell to duplicate the formula/ command to the rest.
   - **Calculate the maximum frequency per week** for each food sub-group among our target population**.** In Optifood, the minimum frequency refers to the **95th percentile** (=PERCENTILE):
     - ✓ Array is the array or range of data that defines relative standing. In this case, it will be the cell of our first to the last respondent.

✓ K is the percentile value that is between 0 through 1, inclusive. In this case, 95th percentile is written as "0.95".

✓ Click OK and double click the bottom right corner of the cell to duplicate the formula/ command to the rest.

- In Food Sub-Group Summary sheet, complete the information on **food sub-group name, food group code, and food group name** by performing VLOOKUP command from "Optifood Food Grouping" sheet into "Food Sub-Group Summary" sheet and using **food sub-group code** as the reference for lookup values.



1_LP Input for 1-day Data.xlsx - Microsoft Excel (Product Activation Failed)

	A	C	D	E	F	G	H	I	CT
1	Regrouped fc	Food item name	Food subgroup name	Food group name	food portion	min freq	max freq	Gmother12	Gmother90
2	36	Coconut fresh	101	1	27	0	3	0	0
3	38	Coconutwater IND	101	1	200	0	0	0	0
4	79	Kiri Kodhi COTK1	101	1	28	0	0	0	0
5	56	Flora Margerine	102	1	8	0	0	0	0
6	101	Oil coconut	107	1	1	0	28	14	28
7	72	Jaggery	204	2	10	0	0	0	0
8	133	Sugar white	204	2	16	0	21	14	14
9	9	Biscuitcream crackers ASN	303	3	30	0	2	2	0
10	16	Bread white average	306	3	68	0	3	0	0
11	25	Cake fruit rich homemade	308	3	35	0	0	0	0
12	39	Coffee infusion average	402	4	140	0	0	0	0
13	134	Tea black infusion average	403	4	140	0	21	14	7
14	89	Malted drink mix natural powder US	405	4	10	0	0	0	0
15	52	Egg fried rice retail	503	5	208	0	2	0	0
16	94	Milk whole average	604	6	200	0	0	0	0
17	95	Milk whole dried	604	6	10	0	12	6	6
18	142	Yoghurt plain whole milk	610	6	80	0	0	0	0
19	2	Bananaripe IND	702	7	36	0	5	3	3
20	45	Datesdried IND	702	7	36	0	0	0	0
21	107	Papayaripe IND	703	7	40	0	0	0	0
22	109	Pine apple IND	703	7	40	0	0	0	1
23	90	Mangoripe IND	703	7	50	0	2	0	0
24	62	Guava raw	704	7	36	0	0	0	0

Master data | Pre-FCT (rev add G-H) | FCT Data | Food portion | FdItem_dayPERweek | FoodItem_freqPERweek

Ready

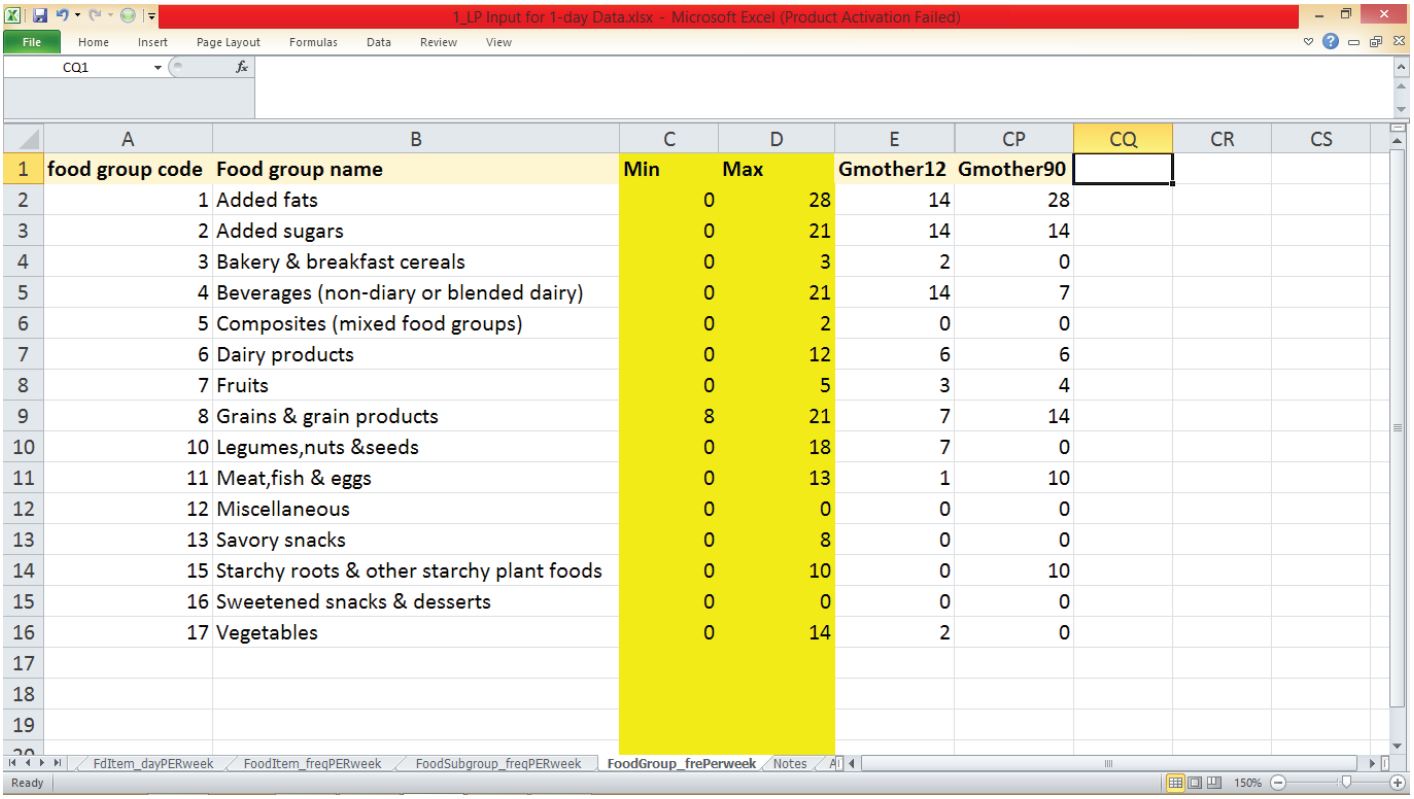
Figure 3.21. The complete sheet of Food Sub-Group Summary

9. Calculating **food group frequency per week**. Steps:

- In "Master Data" sheet, select all of the data (or just click the triangle in the top left corner).
- Go to "Insert" and click "Pivot table".
- Select a table or range.
- Click "new sheet" for choice to place the Pivot Table report.
- Click OK.

- In Pivot Table Field List, drag the following fields into:
  - ✓ Row Labels box = "Food group code" field.
  - ✓ Column Label box = "ID number of respondent" field.
  - ✓ Values = "Food group code" – with summarize value field by COUNT.
  - ✓ Then click OK.
- We can find in the Pivot worksheet the food group frequency per week (meal/ week) consumed by each respondent.
- Move the Pivot Table result (copy-paste to other sheet and rename the sheet as **Food Group Summary**) because in the Pivot Table sheet, we can't do any calculation formula.
- In Food Group Summary sheet, insert 2 new columns after column A and rename the variable as **Min. Frequency and Max. Frequency,** respectively**.**
- Before we calculate the minimum and maximum frequency per week, we need to **replace blank cell into zero (0) values** for all respondent so those who are not consuming the particular food group will be still counted.
- **Calculate the minimum frequency per week** for each food group among our target population**.** In Optifood, the minimum frequency refers to the **5th percentile** (=PERCENTILE):
  - ✓ Array is the array or range of data that defines relative standing. In this case, it will be the cell of our first to the last respondent.
  - ✓ K is the percentile value that is between 0 through 1, inclusive. In this case, 5th percentile is written as "0.05".
  - ✓ Click OK and double click the bottom right corner of the cell to duplicate the formula/ command to the rest.
- **Calculate the maximum frequency per week** for each food group among our target population**.** In Optifood, the minimum frequency refers to the **95th percentile** (=PERCENTILE):
  - ✓ Array is the array or range of data that defines relative standing. In this case, it will be the cell of our first to the last respondent.
  - ✓ K is the percentile value that is between 0 through 1, inclusive. In this case, 95th percentile is written as "0.95".
  - ✓ Click OK and double click the bottom right corner of the cell to duplicate the formula/ command to the rest.

- In Food Group Summary sheet, complete the information on **food group name** by performing VLOOKUP command from "Optifood Food Grouping" sheet into "Food Group Summary" sheet and using **food group code** as the reference for lookup values.



1_LP Input for 1-day Data.xlsx - Microsoft Excel (Product Activation Failed)

	A	B	C	D	E	CP	CQ	CR	CS
1	food group code	Food group name	Min	Max	Gmother12	Gmother90			
2	1	Added fats	0	28	14	28			
3	2	Added sugars	0	21	14	14			
4	3	Bakery & breakfast cereals	0	3	2	0			
5	4	Beverages (non-diary or blended dairy)	0	21	14	7			
6	5	Composites (mixed food groups)	0	2	0	0			
7	6	Dairy products	0	12	6	6			
8	7	Fruits	0	5	3	4			
9	8	Grains & grain products	8	21	7	14			
10	10	Legumes,nuts &seeds	0	18	7	0			
11	11	Meat,fish & eggs	0	13	1	10			
12	12	Miscellaneous	0	0	0	0			
13	13	Savory snacks	0	8	0	0			
14	15	Starchy roots & other starchy plant foods	0	10	0	10			
15	16	Sweetened snacks & desserts	0	0	0	0			
16	17	Vegetables	0	14	2	0			
17									
18									
19									

FdItem_dayPERweek | FoodItem_freqPERweek | FoodSubgroup_freqPERweek | FoodGroup_frePerweek | Notes

Ready 150%

Figure 3.22. The complete sheet of Food Group Summary

10. Now, we are finished with our Master LP Optifood Input file.

11. Final step before entering the Optifood Software is moving our summary sheets (food item, food sub-group, and food group) into individual excel file and **save them as .CSV format** so it can be read by Optifood. Please refer the Optifood template of food item, food sub-group, and food group in the **Annex 4.**

HOW TO INSTALL OPTIFOOD

CHAPTER 4

CHAPTER 4.

HOW TO INSTALL OPTIFOOD

Installation of Optifood Software

Several steps need to be taken before running the linear programming. The procedure is:

1. Ensure to have up to date Windows updates in your computer.
2. Download and install the MATLAB® Runtime software which most compatible to your Windows version. The MATLAB Compiler Runtime is a high-performance language for technical computing where problems and solutions are expressed in familiar mathematical notation. It enables the execution of compiled MATLAB application or components on computers.
3. Download and run the WHO Optifood installer package.
4. Additional software may be needed to support your computer to successfully install the WHO Optifood, here is the following:
   a. The Microsoft .NET Framework 4 installation package works side by side with other software to improve in data access and modeling.
   b. The Microsoft SQL Server Compact 4.0 includes both 32-bit and 64-bit support.
5. WHO Optifood icon will appear on your desktop or in the start menu.

Important Note:

To date, Optifood software can only operate on Windows Operating System.

LP-OPTIFOOD: MODULE I

CHAPTER 5

CHAPTER 5.

LP-OPTIFOOD MODULE I:
Checking Feasibility of Dietary Data

After successful installation you should open Optifood to perform the analysis. The home page displays the overview on how the analysis should be done (Figure 1). Module I covers step A to C which are (A) creating a target group, (B) inputting food and diet data, and (C) checking the data entered.

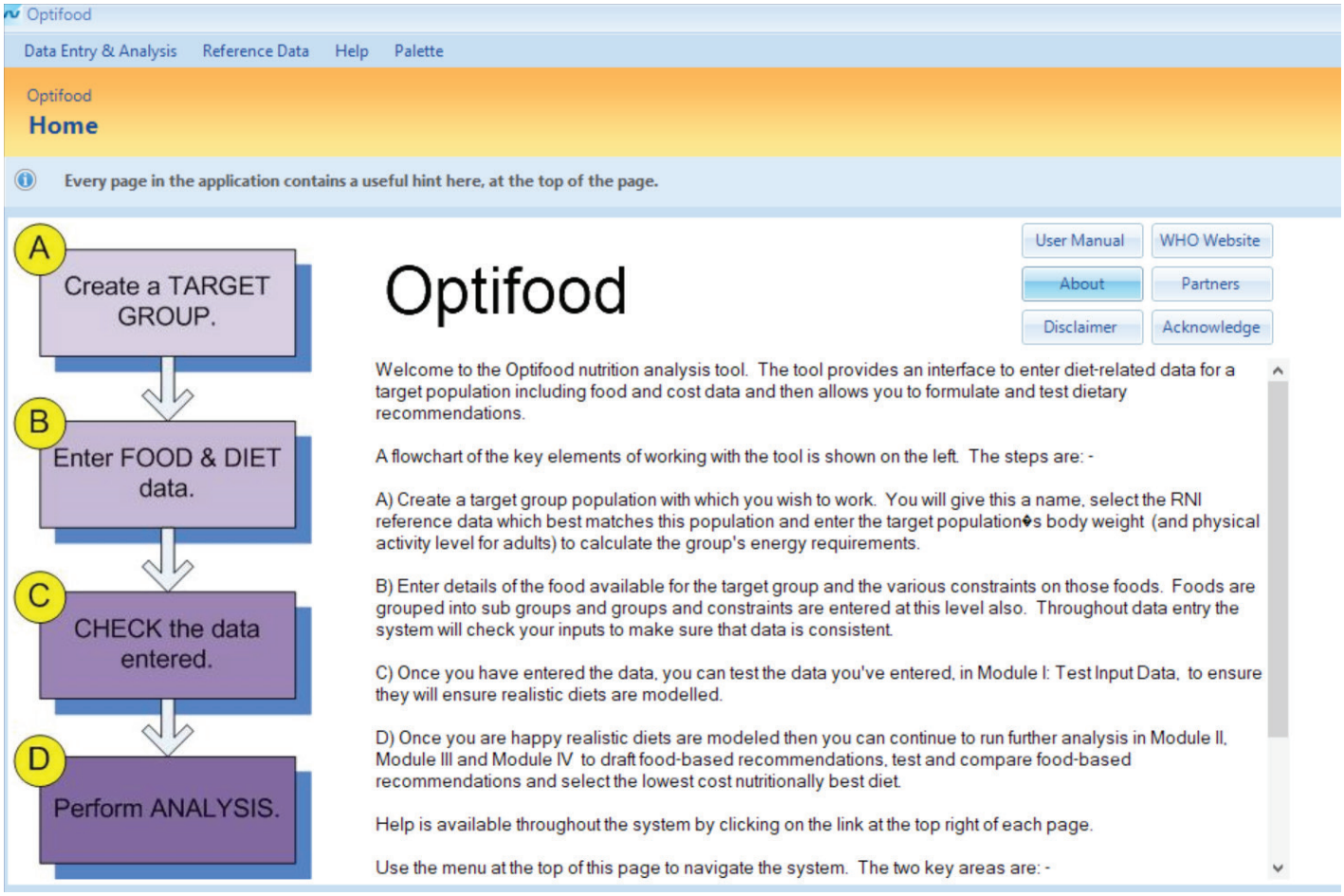


Figure 5.1. The home page displayed in Optifood

A. Target Group Creation

A target group is a population you are working on or group of people you have interest in. Optifood allows you to set up different target groups based on nutrient recommendation group.

Box 5.1. Example of target group

Example 1:

Your target group of people: Study among children aged 12-23 months of children.
RNI group: Children 1-3 years.

Example 2:

Your target group of people: Study among senior high school students aged 16-18 years.
RNI group: It belongs to 2 different RNI groups which are adolescent females 15-18 years and adolescent males 15-18 years.

To create new target group, the following should be done:

1. Go to the menu bar, choose "Data Entry & Analysis".

Figure 5.2. Menu bar displayed for creating new target group

2. From the dropdown, select "New Target Group".

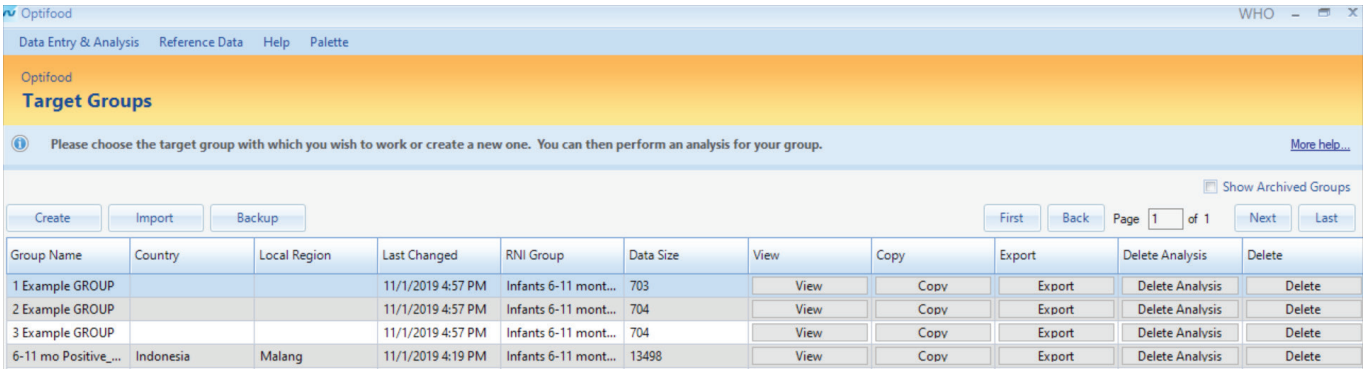


Figure 5.3. Target group list

A "Create" button is available to add new – empty target group. You can also import target group and all its data using "Import" button. If you want to create new target group based on existing one, you can click "Copy". Note that any analysis will not be included when you copy target group. Functions of "Backup" and "Export" exist for us to save a fully backed up target group in an XML format.

3. Several components need to be fulfilled and done as depicted in the target group page (Figure 3). There are: (1) Target Group Details, (2) Foods, (3) Group Constraints, (4) Sub Group Constraint, (5) Nutrients, (6) Check Diets, and (7) Create Analysis.

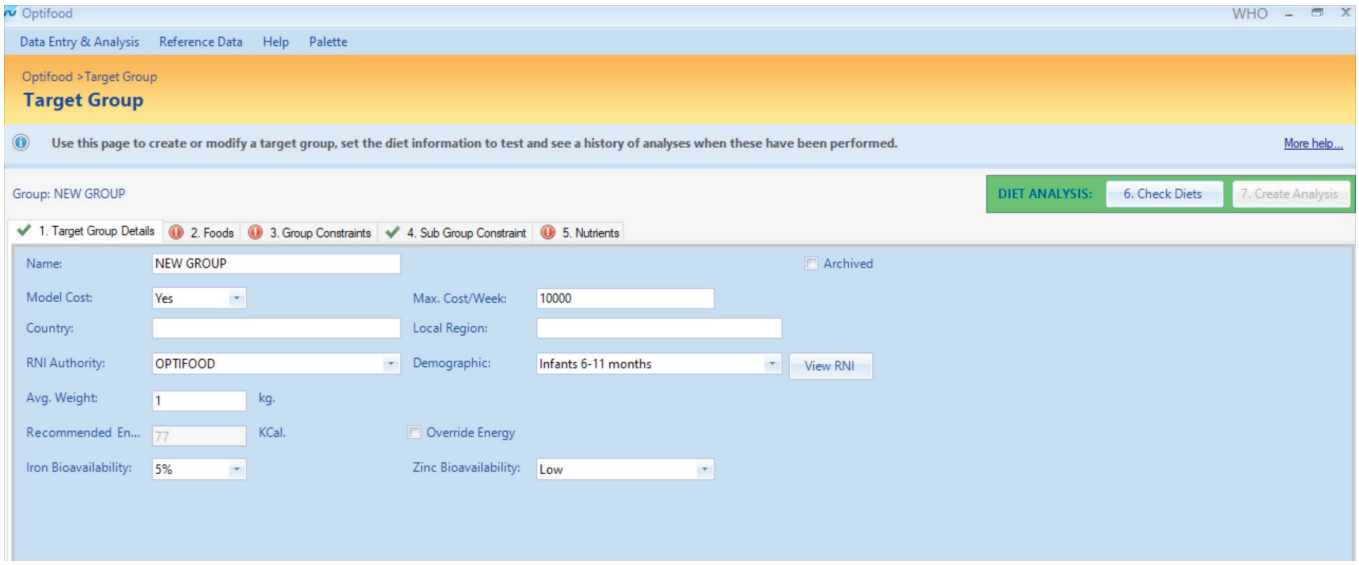


Figure 5.4. Target group page

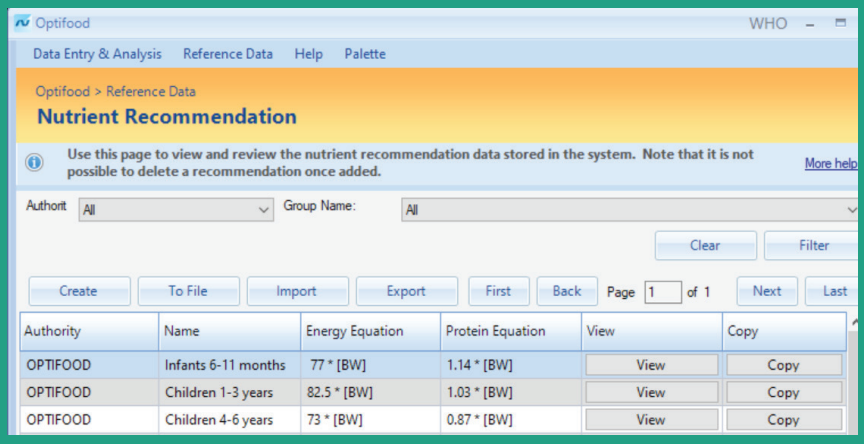
4. **Target Group Details (1)** contains general information about your target group. Fill in all boxes as follows:

Components	Description / Instruction
Name	The name of your target group.
Model Cost	Optifood gives option whether we want to run cost analysis or not. If you choose yes, you need to enter cost information.
Max. Cost/Week	Define the maximum cost to provide 1-week diets per person as recommended. The cost is set to local currency which cost per 100gr edible portion was entered in the Foods detail.
Country	Country of the target group.
Local Region	Region in country of the target group.

Components	Description / Instruction
RNI Authority	The RNI database chosen which best matches your group's demographic. Choose "OPTIFOOD" if you use RNI defined by FAO. Choose "USER DEFINED" if you want to use specific RNI, such as country-specific RNI.
Demographic	Choose the RNI group which best matches your target group. The list of RNI group is available based on age-group, gender, and physiological conditions.
Avg. Weight	Write the average body weight (in kilogram) of your target population based on your data.
Recommended En..	The recommended energy is automatically calculated based on body weight and the energy equation set for the chosen RNI group.
Override Energy	Tick this box if you want to add your own energy value, eg. your country-specific energy requirement. Energy value is set in Kcal.
Iron Bioavailability	Optifood provides four levels of iron bioavailability which are 5%, 10%, 12%, 15%. You can choose the most suitable level based on the group you are studying.
Zinc Bioavailability	Information on zinc bioavailability from your target group is also needed. The options provided by Optifood are low, moderate, and high bioavailability.

Box 5.2. "USER DEFINED" RNI

Optifood needs RNI of target group to perform the analysis. You may add the most suitable RNI data for your target group to Optifood via the *Reference Data >> Nutrient Recommendation >> Create or Import* from other database.



Information on % fat as well as energy and protein equations should be provided to Optifood. Body weight and physical activity level can also be used to calculate energy and protein recommendations.

Box 5.3. Iron and Zinc Bioavailability

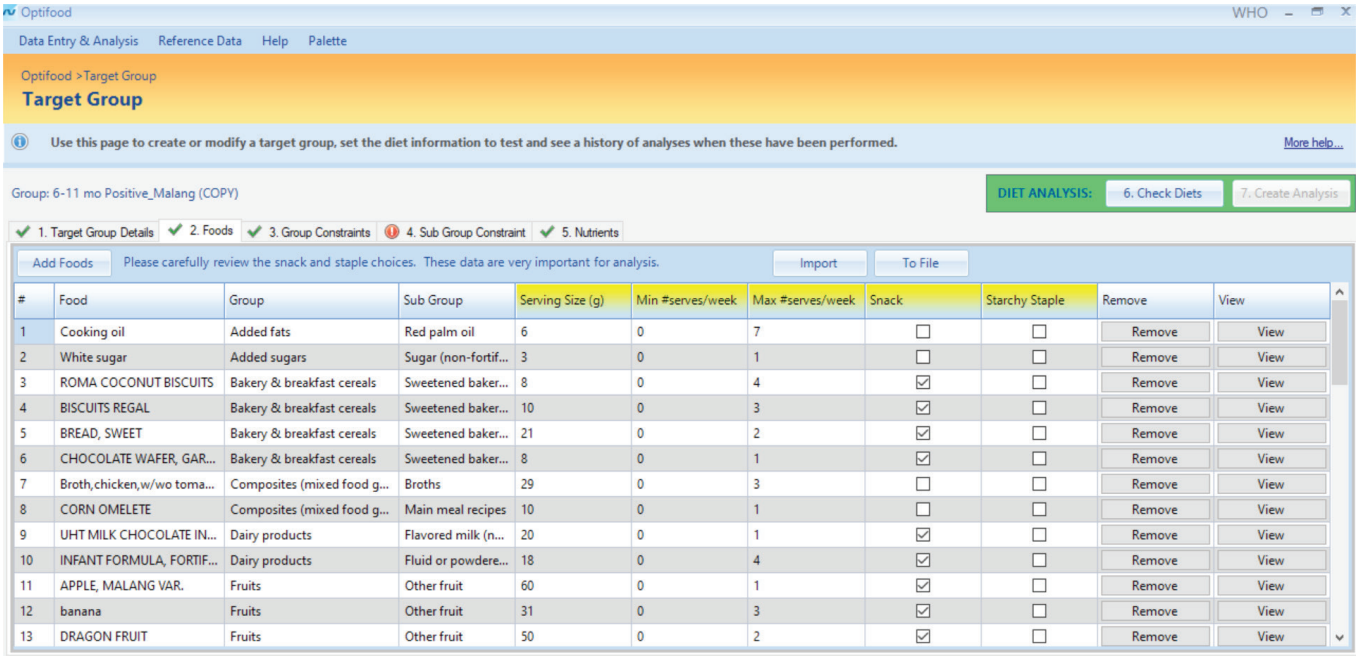
Bioavailability is a measure of absorption and utilization of nutrient and is commonly expressed in a percentage or fraction. Dietary nutrient availability proposed varies depending on the diet composition. The highest bioavailability value is for diet rich in meat (for both iron- and zinc-bioavailability) and/or ascorbic acid (dietary iron enhancers). The lowest bioavailability value is for cereal, tubers, and/or legumes based diet with no meat or ascorbic acid-rich foods. Phytate-containing foods play as inhibitor for both iron- and zinc-bioavailability in human (EFSA NDA Panel, 2015; WHO/FAO, 2004).

B. Food and Diet Data Input

1. The second tab, **Foods (2)**, will include the list of foods consumed by your target group. Every row shows each food item which should have information on:

Components	Description
Group	The food group where the food item belongs. [a]
Sub Group	The food sub-group where the food item belongs. [a]
Serving Size (g)*	Amount of food item can be consumed by target population in grams per serving which is usually calculated as median population consumption.
Min #serves/week*	The minimum serving of food item per week consumed by target population. [b]
Max #serves/week*	The maximum serving of food item per week consumed by target population. [b]
Cost/100g*	The cost of food item per 100 g edible portion in local currency. This column will only appear when you choose "*yes*" in *Model Cost of 1. Target Group Details.*
Snack*	Tick if the food is considered a snack in the location where your target group belongs. [c]
Starchy Staple*	Tick if the food is considered a staple food in the location where your target group belongs. [c]
Remove	Used if you want to remove each food from the list.
View	Used to see the detail of nutrient values for selected food.

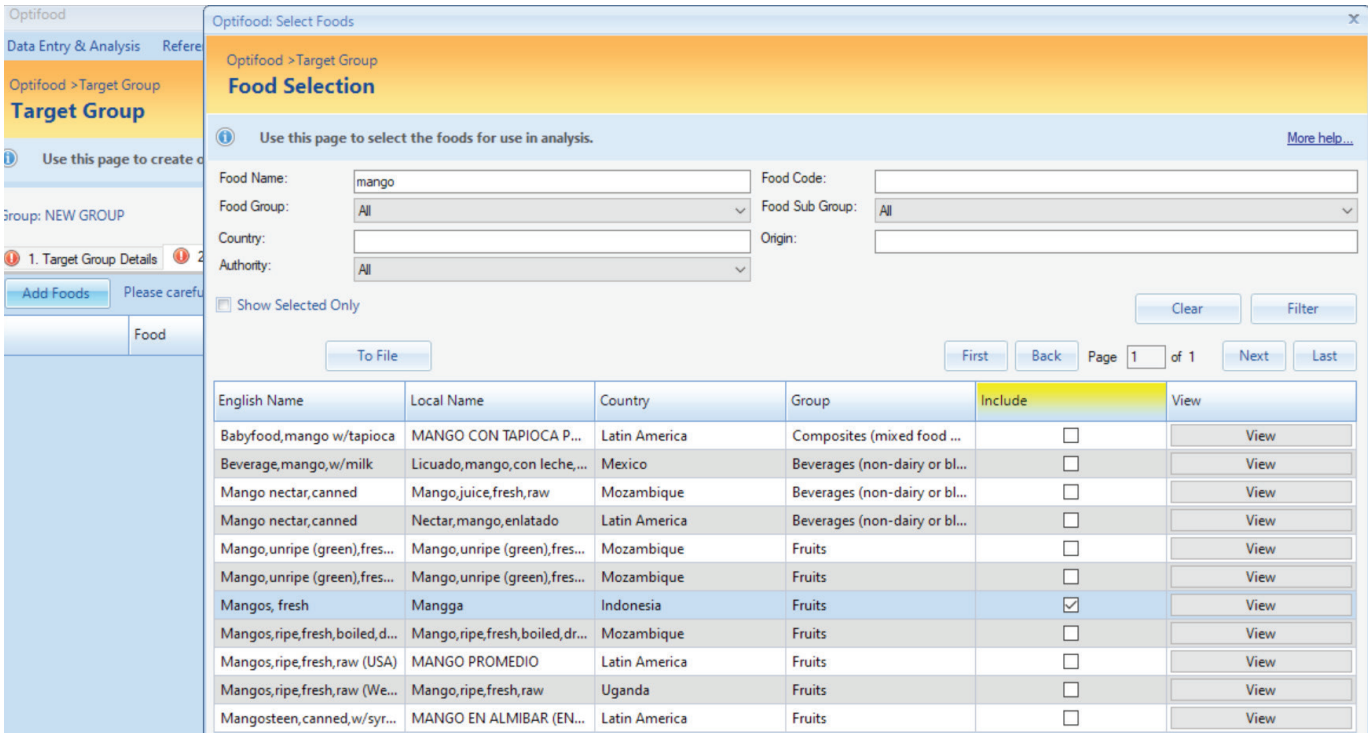
Note: *) these yellow columns are editable before you click 7. *Create Analysis.* [a]) there are list of food sub-groups and food groups provided by Optifood (see attachment). [b]) the number of frequencies should be different between minimum and maximum of serving per week. [c]) the food is classified as only snack, only starchy staple, or both snack-starchy staple depending on local food use.



#	Food	Group	Sub Group	Serving Size (g)	Min #serves/week	Max #serves/week	Snack	Starchy Staple	Remove	View
1	Cooking oil	Added fats	Red palm oil	6	0	7	☐	☐	Remove	View
2	White sugar	Added sugars	Sugar (non-fortif...	3	0	1	☐	☐	Remove	View
3	ROMA COCONUT BISCUITS	Bakery & breakfast cereals	Sweetened baker...	8	0	4	☑	☐	Remove	View
4	BISCUITS REGAL	Bakery & breakfast cereals	Sweetened baker...	10	0	3	☑	☐	Remove	View
5	BREAD, SWEET	Bakery & breakfast cereals	Sweetened baker...	21	0	2	☑	☐	Remove	View
6	CHOCOLATE WAFER, GAR...	Bakery & breakfast cereals	Sweetened baker...	8	0	1	☑	☐	Remove	View
7	Broth,chicken,w/wo toma...	Composites (mixed food g...	Broths	29	0	3	☐	☐	Remove	View
8	CORN OMELETE	Composites (mixed food g...	Main meal recipes	10	0	1	☐	☐	Remove	View
9	UHT MILK CHOCOLATE IN...	Dairy products	Flavored milk (n...	20	0	1	☑	☐	Remove	View
10	INFANT FORMULA, FORTIF...	Dairy products	Fluid or powdere...	18	0	4	☑	☐	Remove	View
11	APPLE, MALANG VAR.	Fruits	Other fruit	60	0	1	☑	☐	Remove	View
12	banana	Fruits	Other fruit	31	0	3	☑	☐	Remove	View
13	DRAGON FRUIT	Fruits	Other fruit	50	0	2	☑	☐	Remove	View

Figure 5.5. Display of 2. *Foods page*

There are 2 ways to add a set of foods in this section which are (1) via *Add Foods* >> find the food >> tick *Include* >> *Add* >> enter the data on Serving Size (g), Min #serves/ week, Max #serves/week, Cost/100g, and Snack/ Starchy Staple (see Figure 6) or (2) by importing the whole list of food items from Optifood input.



English Name	Local Name	Country	Group	Include	View
Babyfood,mango w/tapioca	MANGO CON TAPIOCA P...	Latin America	Composites (mixed food ...	☐	View
Beverage,mango,w/milk	Licuado,mango,con leche,...	Mexico	Beverages (non-dairy or bl...	☐	View
Mango nectar,canned	Mango,juice,fresh,raw	Mozambique	Beverages (non-dairy or bl...	☐	View
Mango nectar,canned	Nectar,mango,enlatado	Latin America	Beverages (non-dairy or bl...	☐	View
Mango,unripe (green),fres...	Mango,unripe (green),fres...	Mozambique	Fruits	☐	View
Mango,unripe (green),fres...	Mango,unripe (green),fres...	Mozambique	Fruits	☐	View
Mangos, fresh	Mangga	Indonesia	Fruits	☑	View
Mangos,ripe,fresh,boiled,d...	Mango,ripe,fresh,boiled,dr...	Mozambique	Fruits	☐	View
Mangos,ripe,fresh,raw (USA)	MANGO PROMEDIO	Latin America	Fruits	☐	View
Mangos,ripe,fresh,raw (We...	Mango,ripe,fresh,raw	Uganda	Fruits	☐	View
Mangosteen,canned,w/syr...	MANGO EN ALMIBAR (EN...	Latin America	Fruits	☐	View

Figure 5.6. Manual food selection

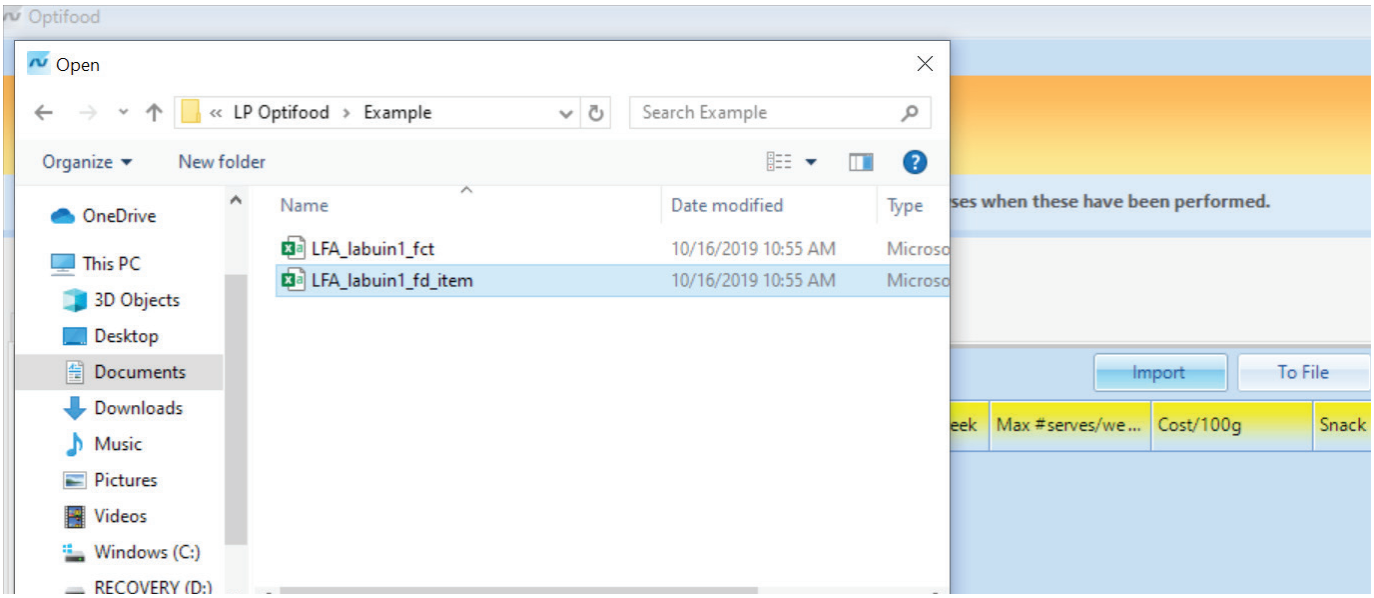


Figure 5.7. Importing food item from CSV file to Optifood

The process of importing data into Optifood is done in two steps. In the first step, create *comma delimited or comma-separated value* (CSV) file from excel for Optifood input in food item level. In the second step, import this CSV file into "2. Foods" tab via *Import* >> by "*File name*:" select file format in "*Comma Separator Value (*.csv)* and then browse to find and select your relevant file name >> *Open* (depicted in Figure 7).

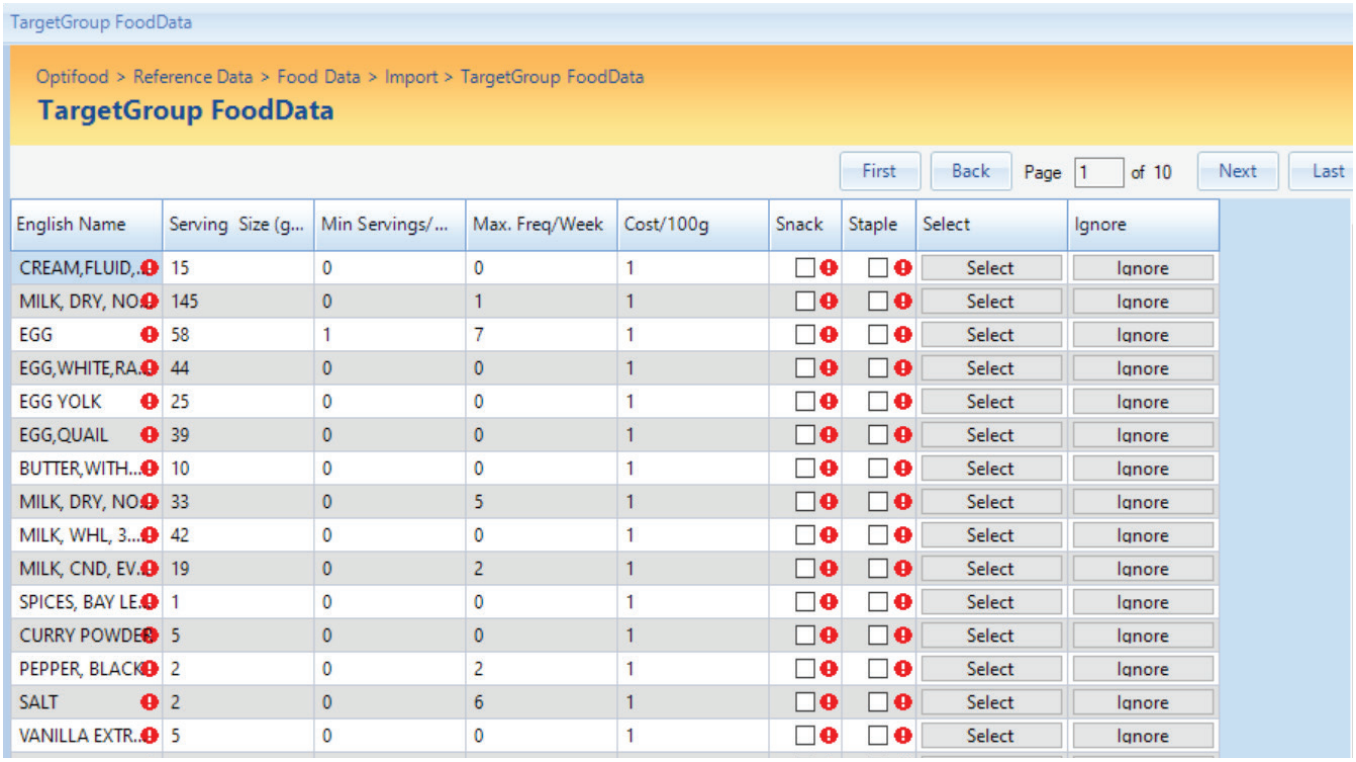


Figure 5.8. Problems occur during data import

If there is red warning sign "❗" in *English Name* of food, then hover over it to find the reason for the warning. These warnings occur because (1) there is not a corresponding food or there is more than one corresponding food in Optifood's *Food Composition* database (FCT), (2) the food name does not correspond with the available foods in Optifood's FCT, or (3) there is missing cell in the FCT. To resolve it, you have to select appropriate food in Optifood by clicking *Select* >> choose the right food item >> *Select* (see example below).

If you instead click on "*Ignore*" (see above) then the food will not be uploaded into the 2. Foods tab in Optifood.

If the sign "❗" is in *Snack and Staple* columns, it means the data is invalid or no information available whether the food is classified as only snack, only starchy staple, or both snack-starchy staple. You can leave it as it is because you can fill it up after importing all food items into the *2. Foods* tab in Optifood.

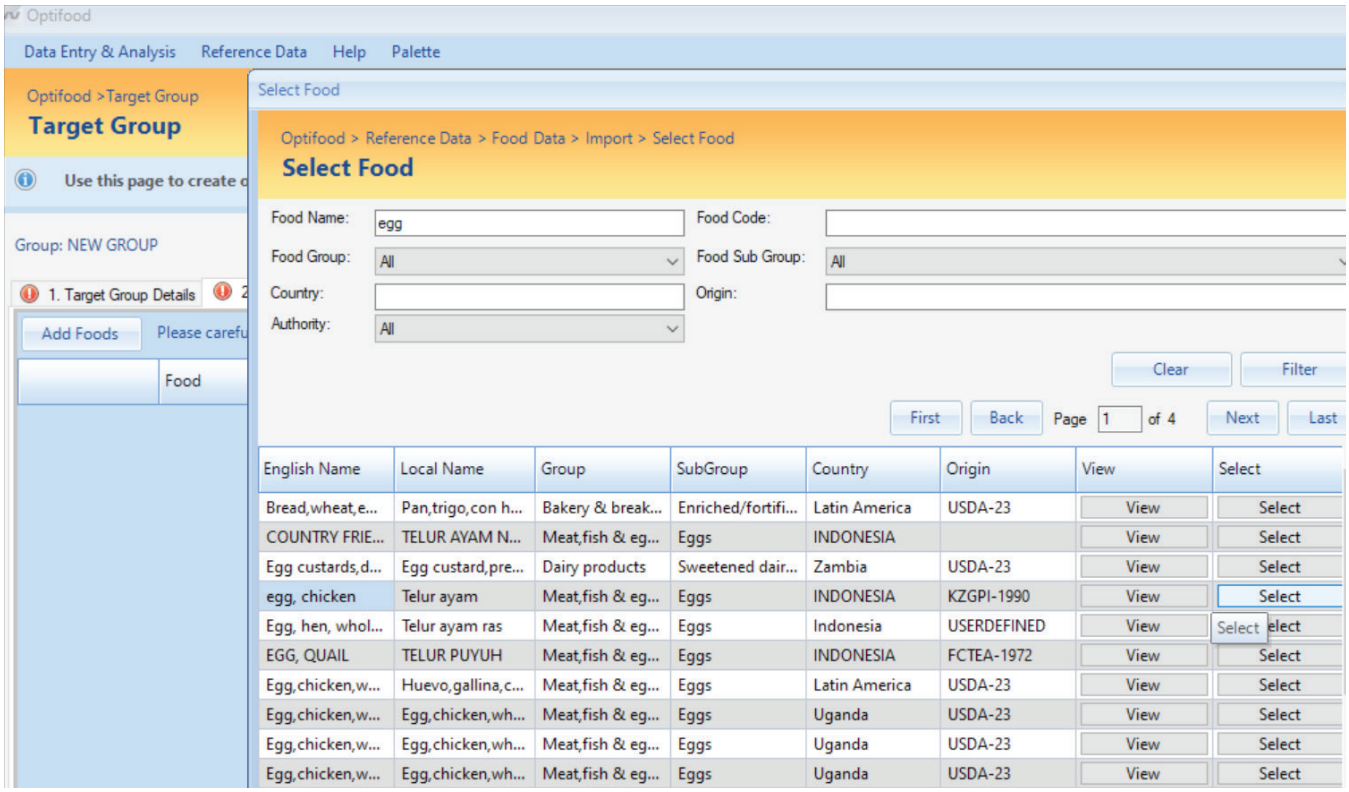
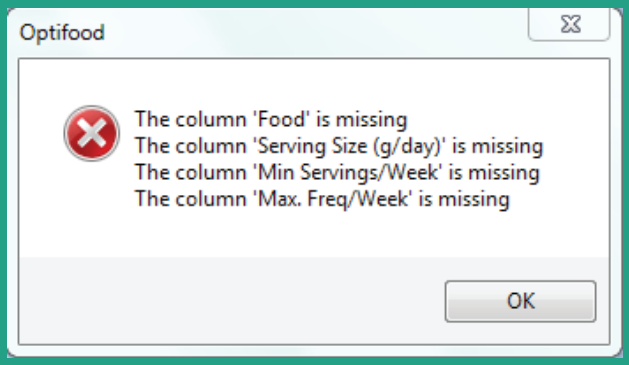


Figure 5.9. Selecting food item from Optifood *Food Composition* database

Once all red warning signs in food name have been resolved, then click on "*Import All*" (button on the bottom left hand side of the sheet) to import your food data. Your food data are now uploaded into Optifood. Check to make sure that all data loaded and fulfilled properly (see Figure 5). At this point you can continue entering data in *3. Group Constraints* and *4. Sub Group Constraint tabs.*

Box 5.4. Fail to import food items data (.csv) in Optifood

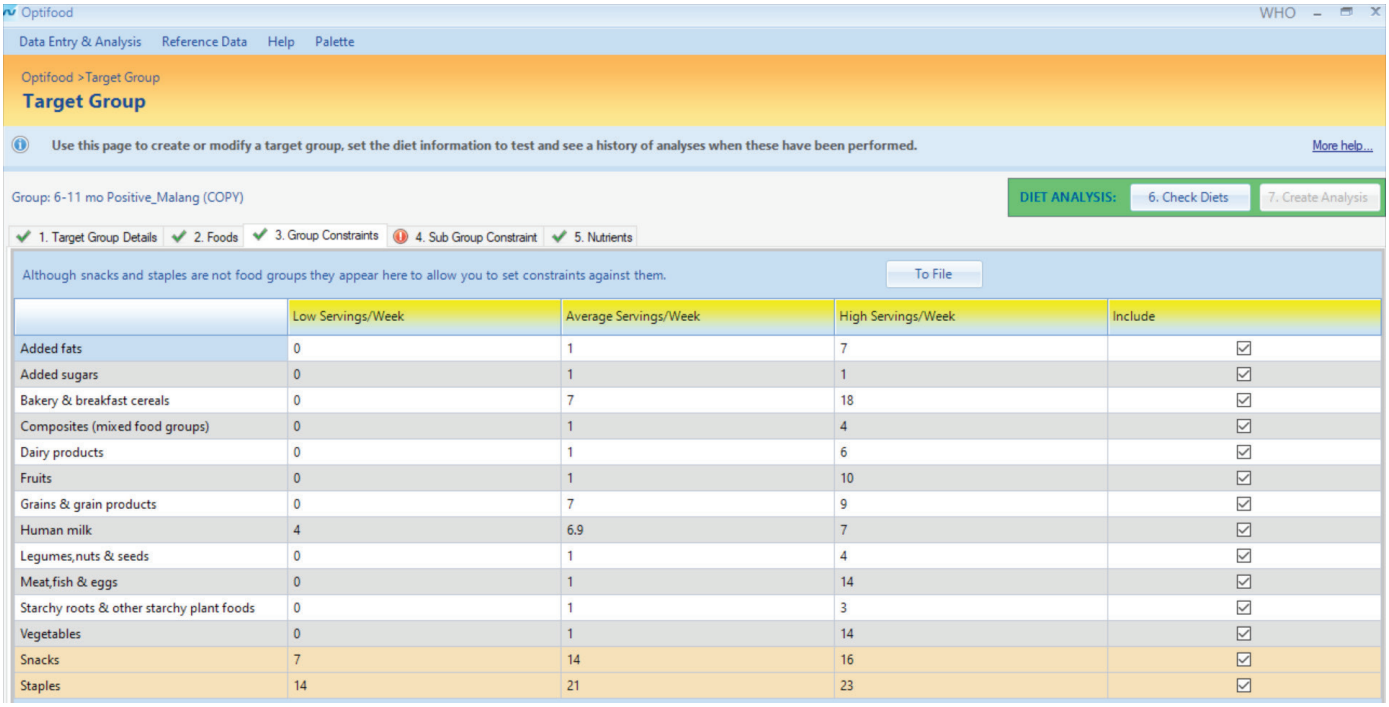
The average servings of snack and staple per week is usually calculated based on daily recommendation times to 7 days. While the low and high servings show how many the least and highest frequency to consume snack and staple foods per week.



This pop-up message will show when there is a problem in importing foods data into Optifood. You have to review and ensure (1) the spelling of food – food sub-group – food group names and column titles are correct and the same as in Optifood, and (2) every food is categorized into appropriate food sub-group and food group.

2. **Group Constraints (3)** is the constraint occurred at the food group level based on food list you have been entered in the second tab – *2. Foods.*

   Optifood automatically extracted *Food Group* based on your 2. *Foods among* 17 available food groups. However, we must manually enter our data of *"Low Servings/Week"*, *"Average Servings/Week"*, and *"High Servings/Week"* which has been calculated during LP Optifood input preparation, as well as ticking *"Include"* if we want to include the food group in analysis. In addition, *Snacks* and *Staples* rows are available to allow you to set constraints against them during analysis.



	Low Servings/Week	Average Servings/Week	High Servings/Week	Include
Added fats	0	1	7	☑
Added sugars	0	1	1	☑
Bakery & breakfast cereals	0	7	18	☑
Composites (mixed food groups)	0	1	4	☑
Dairy products	0	1	6	☑
Fruits	0	1	10	☑
Grains & grain products	0	7	9	☑
Human milk	4	6.9	7	☑
Legumes,nuts & seeds	0	1	4	☑
Meat,fish & eggs	0	1	14	☑
Starchy roots & other starchy plant foods	0	1	3	☑
Vegetables	0	1	14	☑
Snacks	7	14	16	☑
Staples	14	21	23	☑

Figure 5.10. Display of 3. *Group Constraints page*

Box 5.5. Snacks and Staples in 3. Group Constraints

The average servings of snack and staple per week is usually calculated based on daily recommendation times to 7 days. While the low and high servings show how many the least and highest frequency to consume snack and staple foods per week.

Example:

Your target group: Study among children aged 12-23 months.

Infant and Young Children Feeding (IYCF) recommendation: 2x snacks and 3x main meals per day. But you want them to consume at least 1x snack and 2x main meals per day and maximum 3x snacks and 4x main meals per day

Low Servings/Week: 1 x 7 days = 7x snacks AND 2 x 7 days = 14x staples

Average Servings/Week: 2 x 7 days = 14x snacks AND 3 x 7 days = 21x staples

High Servings/Week: 3 x 7 days = 21x snacks AND 4 x 7 days = 28x staples

Make sure that the number of servings are different between low, average, and high servings per week.

3. **Sub Group Constraint (4)** is the constraint occurred at the *food sub-group* level. Optifood automatically extracted Food Sub-Group based on your *2. Foods* among 103 available food sub-groups. However, we also have to manually enter our data of *"Low Servings/Week"* and *"High Servings/Week"* which has been calculated during LP Optifood input preparation.

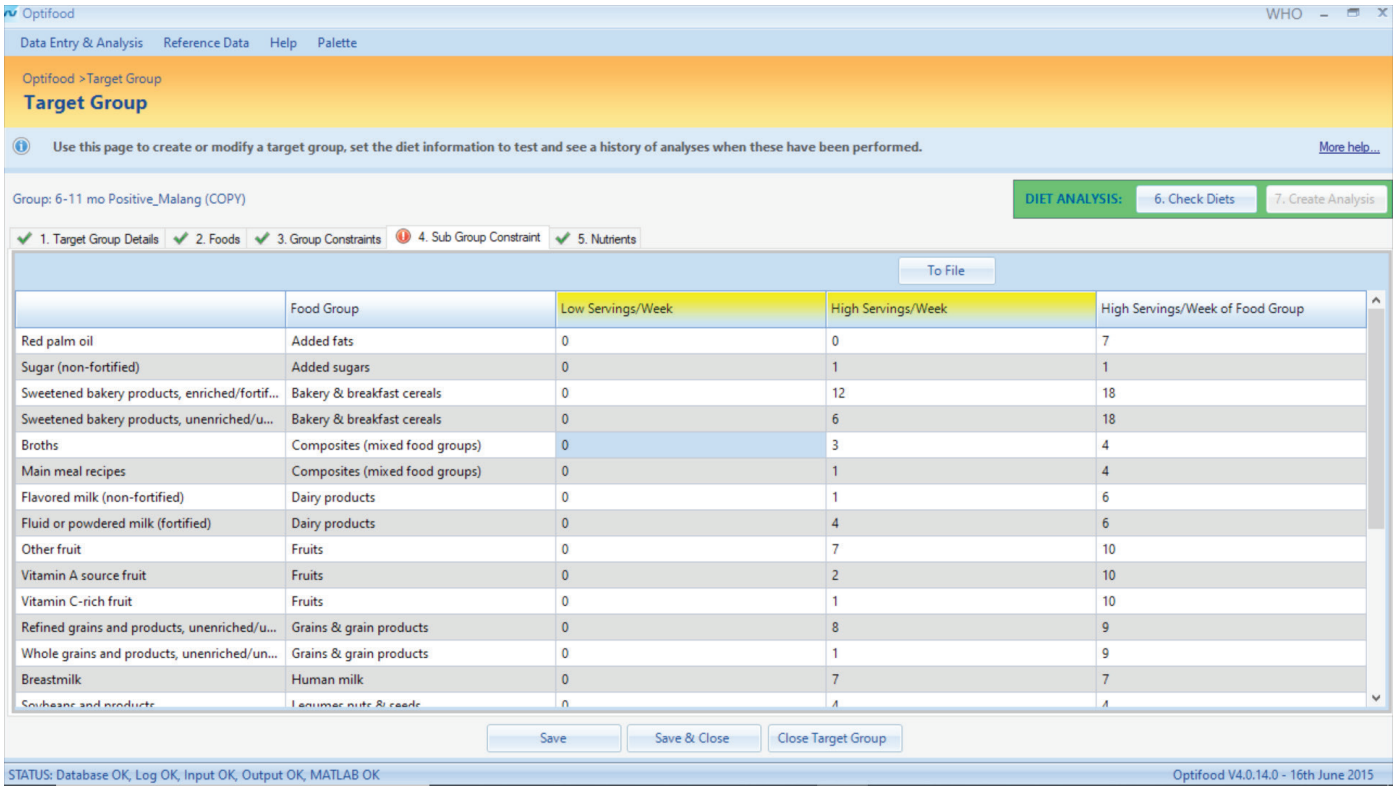
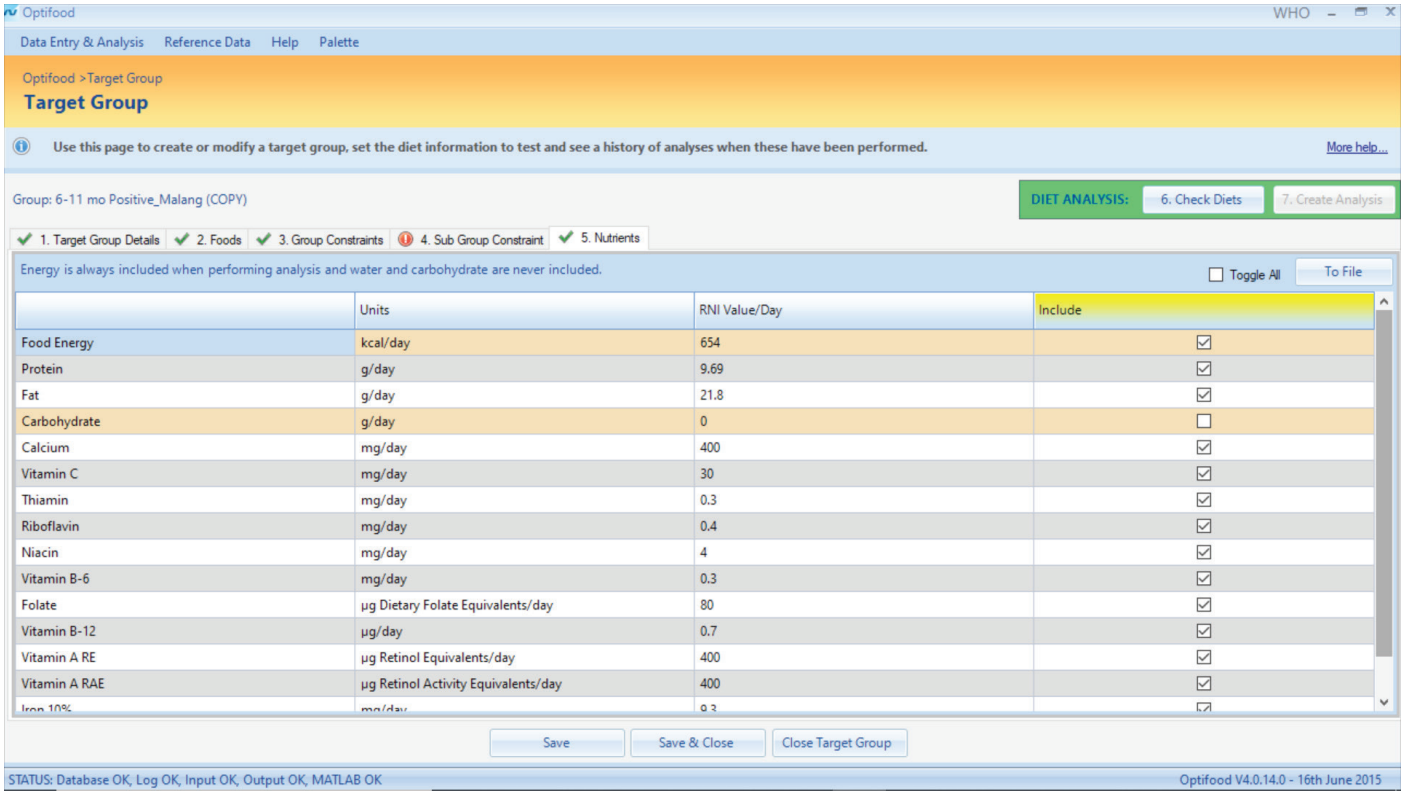


Figure 5.11. Display of 4. *Sub Group Constraints* page

In this page, there is an information on *"High Servings/Week of Food Group"*. Please note that the total of *"High Servings/Week"* of food sub-groups which belong to the same food group has to be the same or more than the *"High Servings/Week of Food Group"* (see example in Figure 11). To note, the number of servings should be different between low and high servings per week.



	Units	RNI Value/Day	Include
Food Energy	kcal/day	654	☑
Protein	g/day	9.69	☑
Fat	g/day	21.8	☑
Carbohydrate	g/day	0	☐
Calcium	mg/day	400	☑
Vitamin C	mg/day	30	☑
Thiamin	mg/day	0.3	☑
Riboflavin	mg/day	0.4	☑
Niacin	mg/day	4	☑
Vitamin B-6	mg/day	0.3	☑
Folate	µg Dietary Folate Equivalents/day	80	☑
Vitamin B-12	µg/day	0.7	☑
Vitamin A RE	µg Retinol Equivalents/day	400	☑
Vitamin A RAE	µg Retinol Activity Equivalents/day	400	☑
Iron 10%	mg/day	9.3	☑

Figure 5.12. Display of 5. *Nutrients page*

4. **Nutrients (5)** contains the list of nutrients that will be used in mathematical analysis. The nutrients are energy, macronutrients (protein, fat, carbohydrate), and micronutrients (calcium, vitamin C, thiamin, riboflavin, niacin, vitamin B-6, folate, vitamin B-12, vitamin A RE, vitamin A RAE, iron, and zinc). You can choose which nutrients to be included in analysis by ticking "*Include*", except Food Energy and Carbohydrate. Energy is always included in analysis, while carbohydrate is not analyzed because RNI for carbohydrate is not available.

C. Food and Diet Data Review

1. **Check Diets (6)** appears at the top right (the button is inside the green box – Figure 13) which has function to ensure that dietary solutions are feasible for further analysis. By clicking this button, Optifood automatically checks if there is any data input error by showing error commands (see example in Figure 14). These must be corrected before the analysis can proceed.

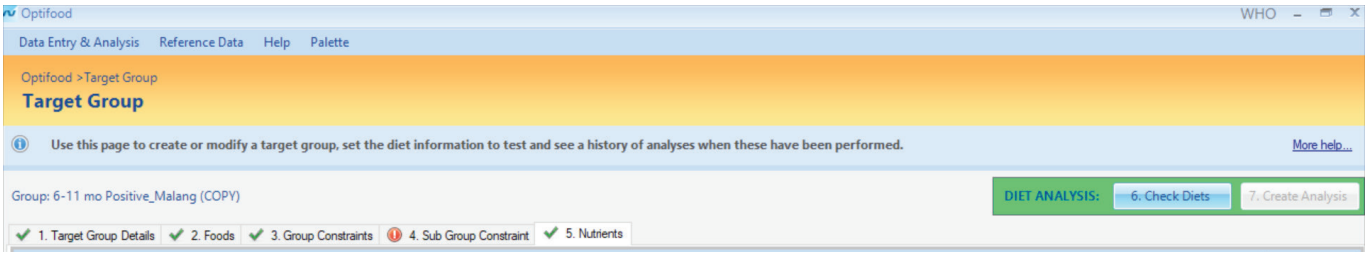


Figure 5.13. 6. Check Diets button

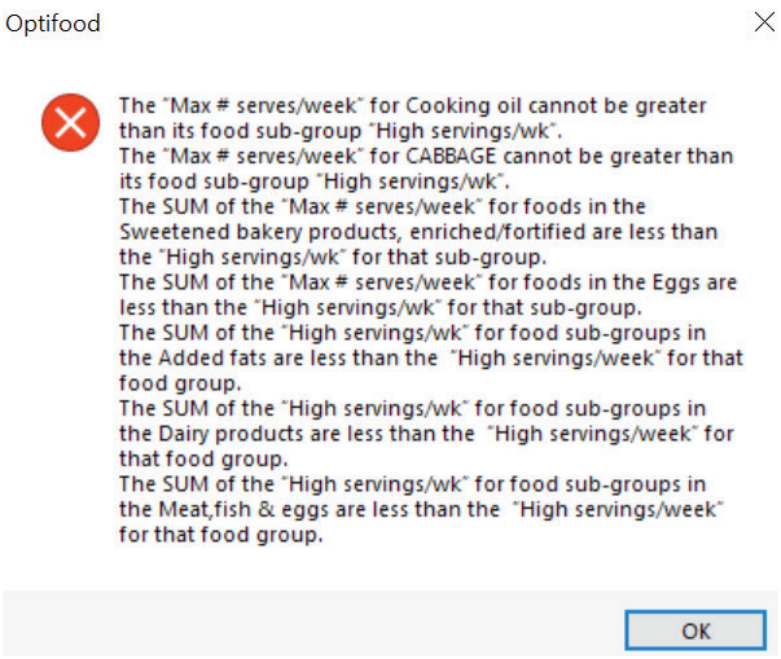


Figure 5.14. Example of error commands during checking diets

Box 5.6. Rules in resolving error commands

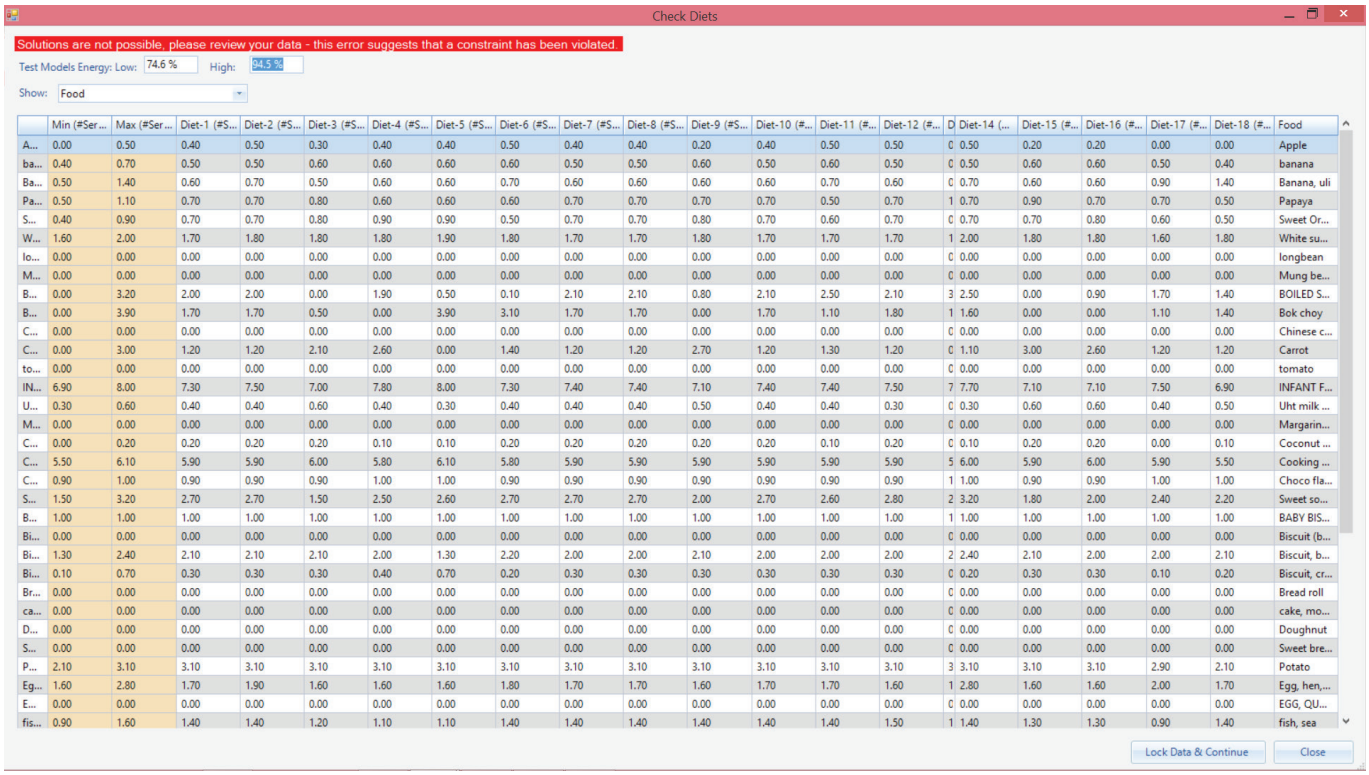
1. The frequencies within each *2. Foods*, *3. Group Constraints*, and *4. Sub Group Constraints* should be different between low, average, and high servings per week.
2. If Max #serves/week in *2. Foods* is 0 (zero), it means the food is consumed by <5% of population in your target group.
3. If the food is consumed by <5% AND it is nutrient dense, then keep the food. It may be potential positive deviance food which can be promoted.
4. If the food is consumed by <5% AND it is NOT nutrient dense, then it can be excluded. However, exclusion in *2. Foods* may influence the pattern on food sub-group and food group performed by Optifood.
5. If the low, average, and high servings per week in *3. Group Constraints* and *4. Sub Group Constraints* are 0 (zero), then keep "low" as 0, edit "average" to 0.5 and "high" to 1.
6. For breastfed children (e.g. children aged 6-23 months) to recommend breastfeeding everyday (7 days/week), then edit "low" as 6.9, edit "average" to 7 and "high" to 7.1 servings per week in *3. Group Constraints and 4. Sub Group Constraints.*
7. SUM of food items in one food sub-group has to be the SAME or MORE than the number in sub-group. It allows us to have alternative foods.
8. SUM of food sub-group in one food group also has to be the SAME or MORE than the number in group. It allows us to have alternative food sub-groups.
9. All data in *2. Foods* must be the original data. We should not change it. Modifications can only be done in either *3. Group Constraints or 4. Sub Group Constraints.*

Once the tabs of component 1 to 5 has changed into green tick "✔", analysis can be started via *6. Check Diets*. After that, Optifood will either show the test results or a message informing that the solutions are not possible.

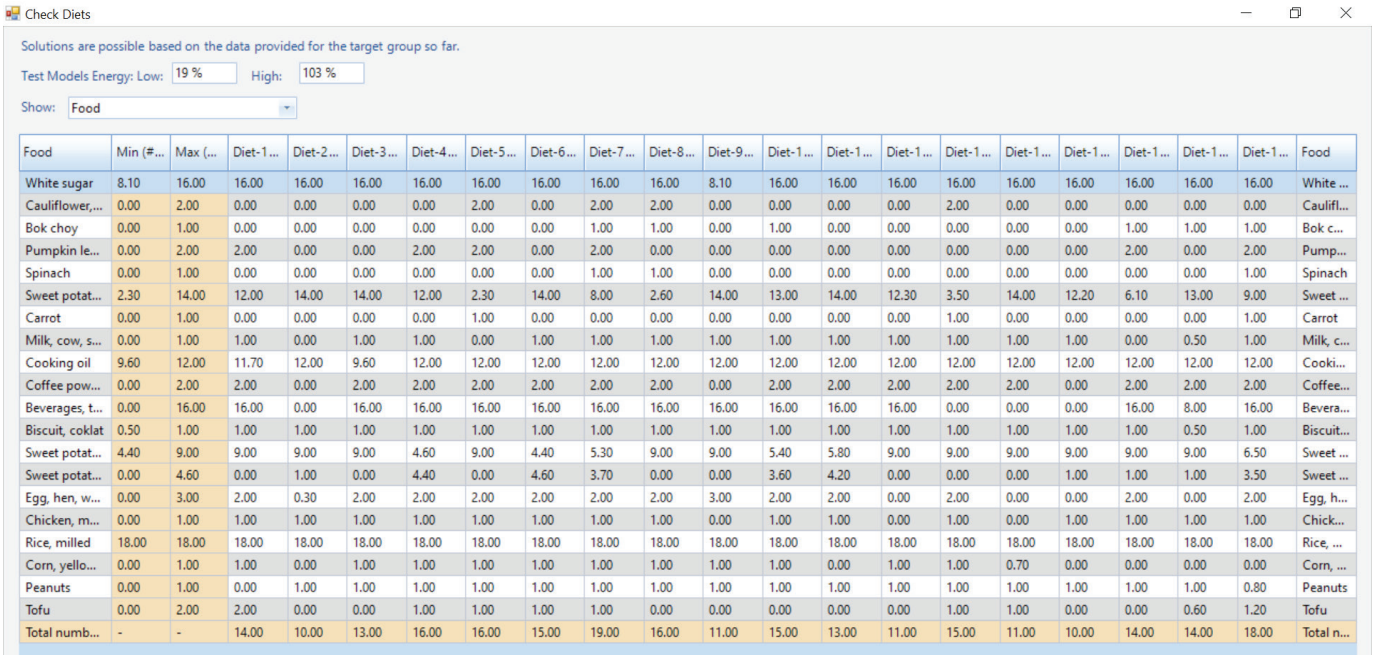
Box 5.7. What to do if solutions are not possible

a. Close the pop-up window of check diets.
b. Review and modify your "Snack" and "Starchy Staple" data which may constraint the energy range.
c. Check whether number of foods are too few which may cause too low energy.
d. Review the entered portion size and frequency of foods whether they are too high or have wrong number.
e. Use NO decimals in food's portion sizes.

(a)



(b)



Food	Min (#...	Max (...	Diet-1...	Diet-2...	Diet-3...	Diet-4...	Diet-5...	Diet-6...	Diet-7...	Diet-8...	Diet-9...	Diet-1...	Diet-1...	Diet-1...	Diet-1...	Diet-1...	Diet-1...	Diet-1...	Diet-1...	Diet-1...	Food
White sugar	8.10	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	8.10	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	White ...
Cauliflower,...	0.00	2.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00	2.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	Caulifl...
Bok choy	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	Bok c...
Pumpkin le...	0.00	2.00	2.00	0.00	0.00	2.00	2.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00	Pump...
Spinach	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	Spinach
Sweet potat...	2.30	14.00	12.00	14.00	14.00	12.00	2.30	14.00	8.00	2.60	14.00	13.00	14.00	12.30	3.50	14.00	12.20	6.10	13.00	9.00	Sweet ...
Carrot	0.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	Carrot
Milk, cow, s...	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.50	1.00	Milk, c...
Cooking oil	9.60	12.00	11.70	12.00	9.60	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	Cooki...
Coffee pow...	0.00	2.00	2.00	0.00	2.00	2.00	2.00	2.00	2.00	2.00	0.00	2.00	2.00	2.00	2.00	2.00	0.00	2.00	2.00	2.00	Coffee...
Beverages, t...	0.00	16.00	16.00	0.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	0.00	0.00	0.00	16.00	8.00	16.00	Bevera...
Biscuit, coklat	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.50	1.00	Biscuit...
Sweet potat...	4.40	9.00	9.00	9.00	9.00	4.60	9.00	4.40	5.30	9.00	9.00	5.40	5.80	9.00	9.00	9.00	9.00	9.00	9.00	6.50	Sweet ...
Sweet potat...	0.00	4.60	0.00	1.00	0.00	4.40	0.00	4.60	3.70	0.00	0.00	3.60	4.20	0.00	0.00	0.00	1.00	1.00	1.00	3.50	Sweet ...
Egg, hen, w...	0.00	3.00	2.00	0.30	2.00	2.00	2.00	2.00	2.00	2.00	3.00	2.00	2.00	0.00	2.00	0.00	0.00	2.00	0.00	2.00	Egg, h...
Chicken, m...	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	Chick...
Rice, milled	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	Rice, ...
Corn, yello...	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.70	0.00	0.00	0.00	0.00	Corn, ...
Peanuts	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	Peanuts
Tofu	0.00	2.00	2.00	0.00	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.60	1.20	Tofu
Total numb...	-	-	14.00	10.00	13.00	16.00	16.00	15.00	19.00	16.00	11.00	15.00	13.00	11.00	15.00	11.00	10.00	14.00	14.00	18.00	Total n...

Figure 5.15. a) Solutions are not yet possible drawn from your data.
b) Data has feasible solution for check diet

To get possible solutions, Test Models Energy usually follows these criteria: Low <100% AND High >100%. The bigger energy range means the bigger opportunity for improvement. Hereafter, you can continue for further analysis by clicking the "*Lock Data & Continue*" at the right bottom of the page. Once the data is locked, you cannot modify tab 1-5 in Target Group page.

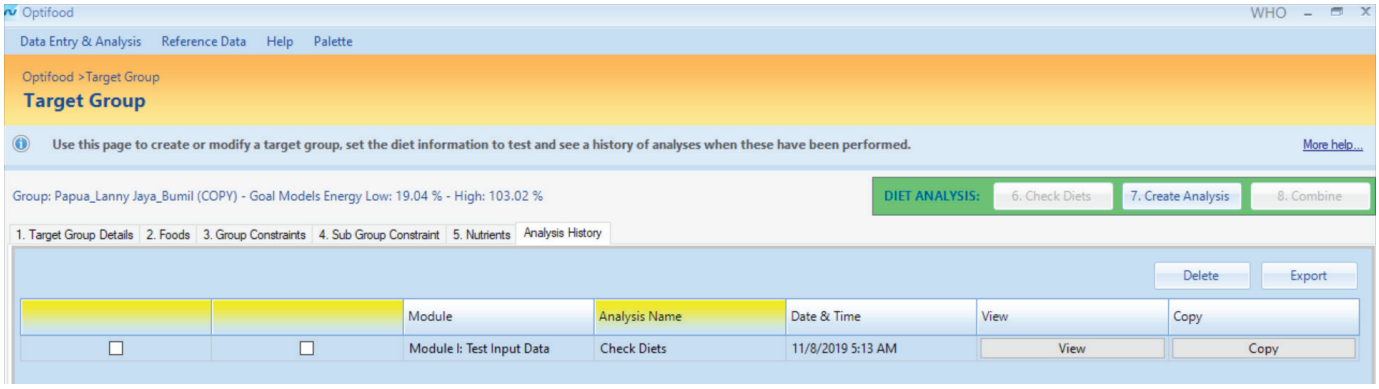


Figure 5.16. Optifood page after locking the data

After locking the data, you will return to the Target Group page with additional "Analysis" tab. At this point, the *6. Check Diets* button will be deactivated, the *7. Create Analysis* will be activated, and the *8. Combine* will appear but is not yet activated.In *Analysis* tab, you can review the details of check diets analysis by clicking "*View*" in the same row as *Module I: Test Input Data*. At this point, if you want to continue the analysis into Module II, you hit "Return to Analysis History" button >> *7. Create Analysis*.

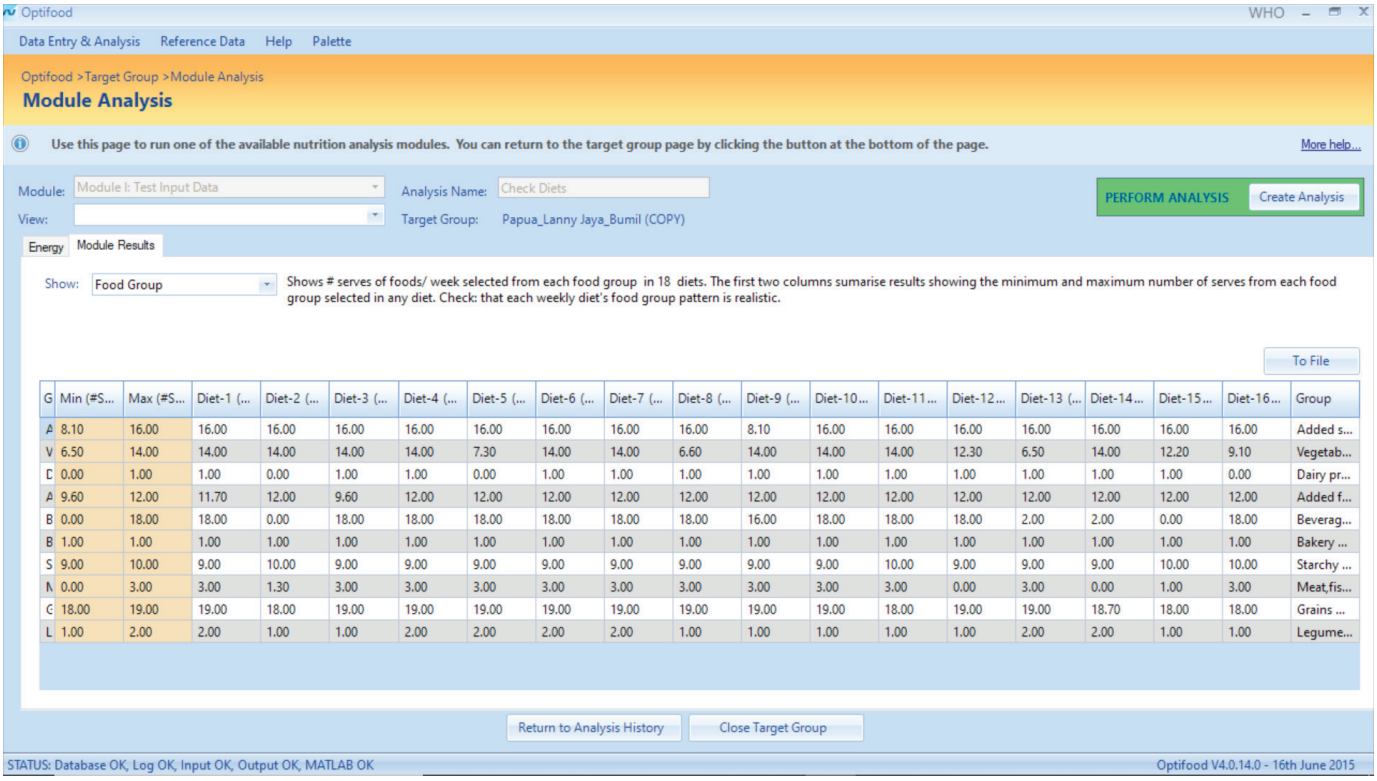


Figure 5.17. Check diets output

2. Create Analysis (7)

An **Analysis** tab will appear after locking the data. It contains the list of analysis performed, including Model I – IV. Once the 7. *Create Analysis* button is activated, you may proceed to the other three analysis, which are: (1) Identify draft recommendations, (2) Test food-based recommendations, and (3) Cost analysis.

LP-OPTIFOOD: MODULE II

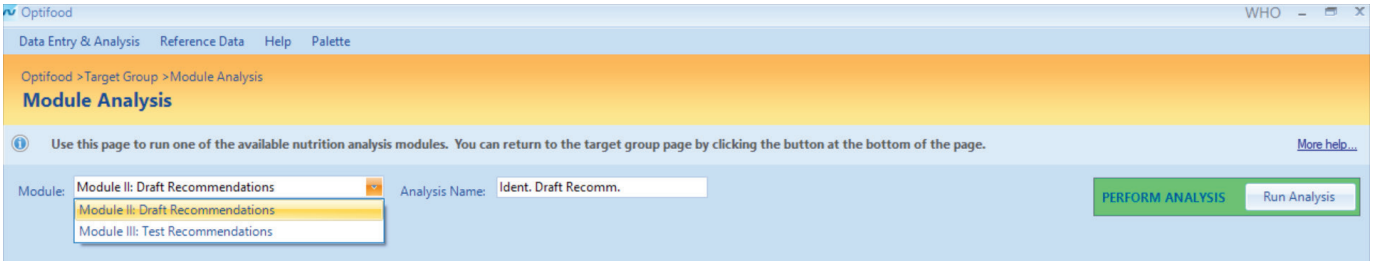
CHAPTER 6

CHAPTER 6.

LP-OPTIFOOD MODULE II: Identifying Problem Nutrient and Nutrient-Dense Food

At this stage, the analysis aims to identify draft recommendation by testing the 2-best diets or optimal-case scenario which has been mathematically analyzed by Optifood. Model II analysis can be done via 7. *Create Analysis* in Target Group page >> in *Module:* choose *"Module II: Draft Recommendation"* >> fill Analysis Name: with *"Ident. Draft Recomm."* >> *Run Analysis* in Module Analysis page >> choose *Yes* when there is a pop-up question *"Would you want all the minimized and maximized diets?"*. You have to remember that the Identify Draft Recommendation analysis can only be run one time for a target group. After that, *Module II: Draft Recommendation* will disappear from the drop-down choice of Modules.

(a)



(b)

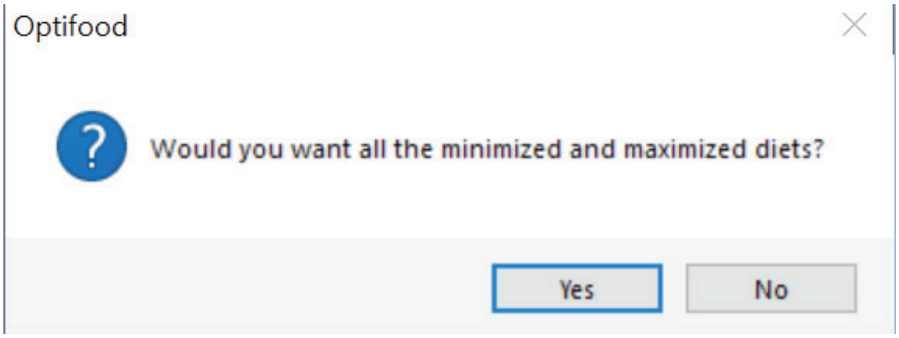


Figure 6.1.
a) Display of Module Analysis page,
b) Pop-up question after running the analysis

Box 6.1. Food Pattern VS No Food Pattern

Food Pattern (FP) is the best diet which is closest to the target group's average food patterns (median freq/week of the food group).

No Food Pattern (NFP), is the best diet which can deviate away or being optimized from the average food patterns, but it remains within the upper and lower range which has been inputted in Optifood. This aims to improve the nutritional content of the diet.

This module provides information on:

1. **Nutrients and foods.** *Nutrition* table displays data on energy and nutrients content in the 2-best diets (FP and NFP) and its %RNIs. This data can be used the determine the *Problem Nutrient (PN)* in target population. *Problem nutrient* is defined as nutrients that did not achieve 100% of their RNI in the best diet No Food Patterns (NFP). On the other hand, *Diet* table provides information on serving frequency per week of each food in the 2-best diets.

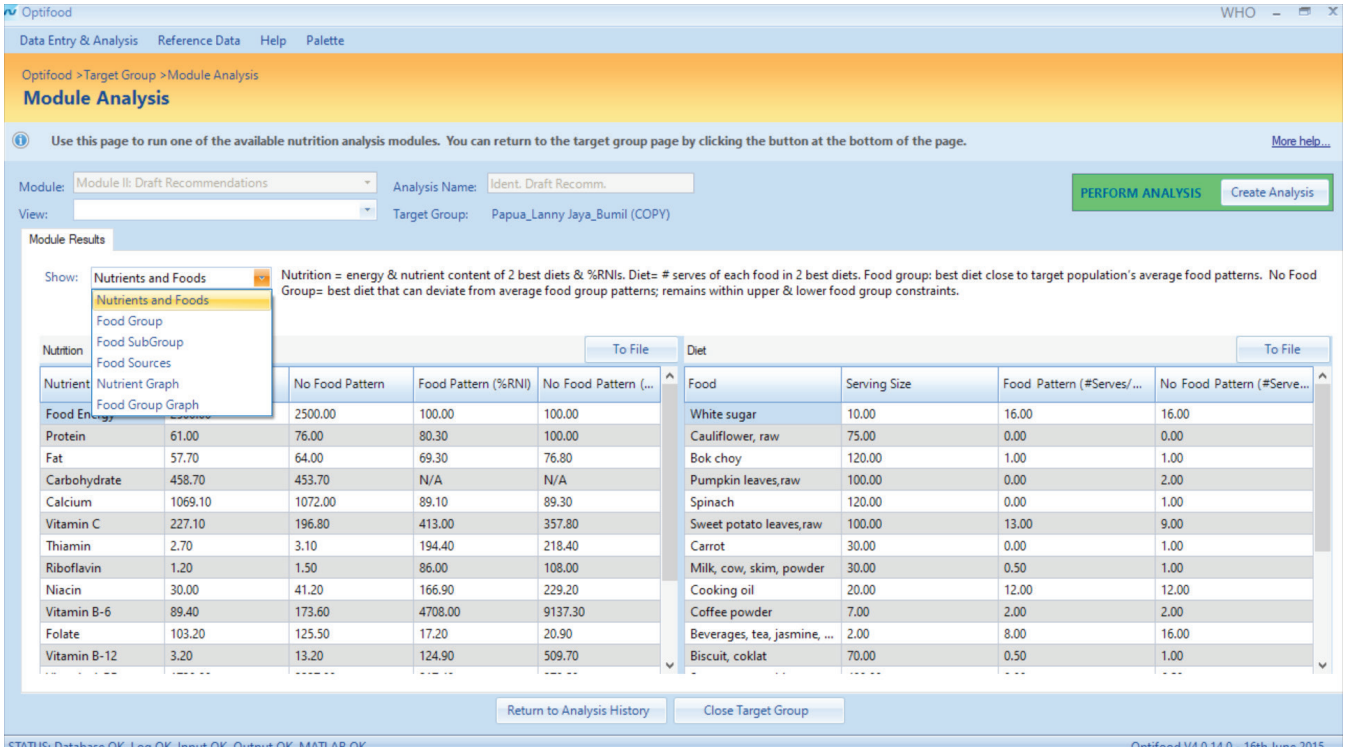


Figure 6.2. Example analysis: Problem nutrients defined from Nutrition table are fat, calcium, folate, vitamin A RAE

2. **Food Group**. This page shows the serving frequency per week of each food group in the 2-best diets. This information can help you to choose the potential recommended food groups when (1) frequency in NFP is bigger than its food group's FP; (2) the difference of frequency is quite big; and (3) the food groups are considered as nutrient-dense food group.

Show: Food Group — Shows # serves/wk of foods from each food group in 2 best diets. Food Pattern= best diet close to the target population's average food group patterns. No Food Pattern = best diet that can deviate away from the average food patterns; remains within upper & lower food group pattern constraint levels.

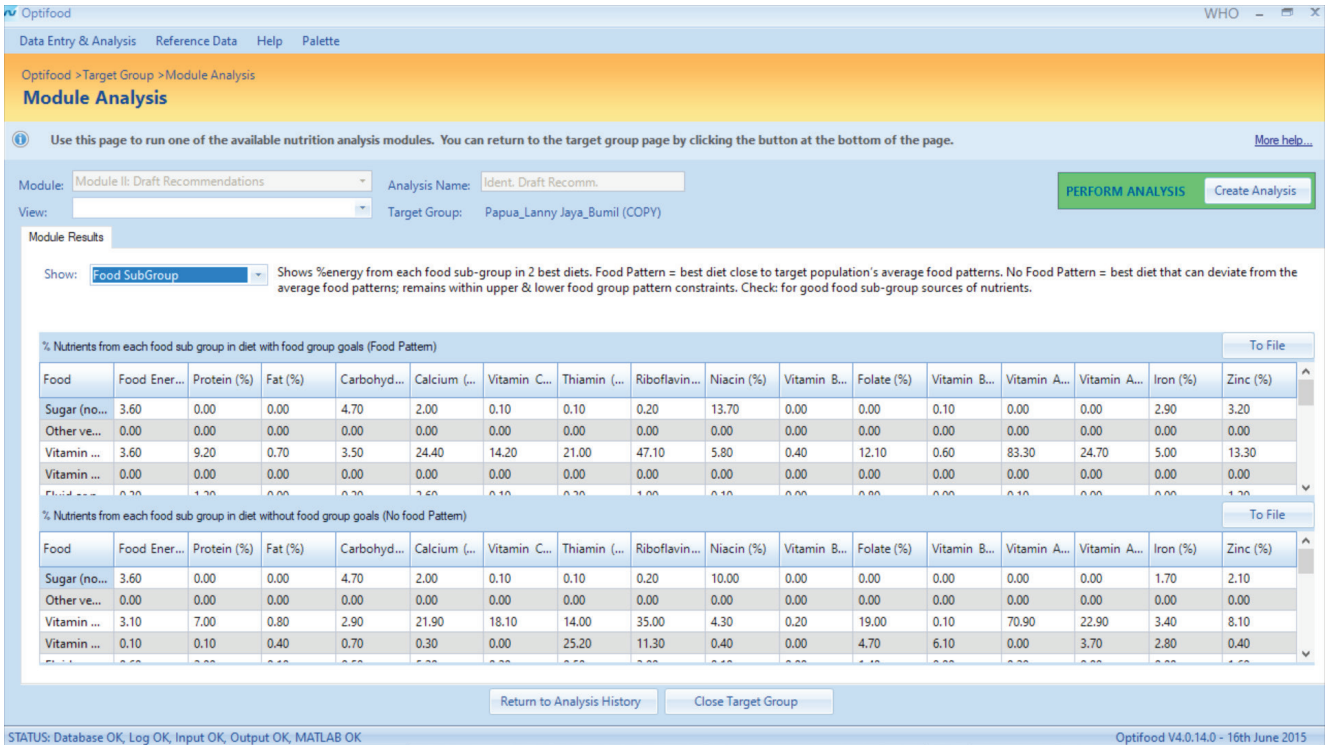
To File

Group	Food Pattern (#Serves/Wk)	No Food Pattern (#Serves/Wk)
Added sugars	16.00	16.00
Vegetables	14.00	14.00
Dairy products	0.50	1.00
Added fats	12.00	12.00
Beverages (non-dairy or blended dairy)	10.00	18.00
Bakery & breakfast cereals	0.50	1.00
Starchy roots & other starchy plant foods	10.00	10.00
Meat,fish & eggs	1.00	3.00
Grains & grain products	18.00	18.00
Legumes,nuts & seeds	1.60	2.00
Staples	28.00	28.00
Snacks	12.60	16.00

Figure 6.3. Example analysis: Potential recommended food groups are Meat, Fish, & Eggs

3. **Food SubGroup** and **Food Sources**. These tables inform us on the % nutrient contribution from each food sub-group and food item in the 2-best diets (FP and NFP). This data can be used the determine the top nutrient contributors which later can be utilized as potential recommended food sub-groups and food items in Module III analysis. Food sub-groups and food items can be categorized as potential sources if they contribute >5% nutrients in the best diet No Food Patterns (NFP). You can sort the data from largest to smallest %contribution in each nutrient to identify these nutrient-dense food subroups or items.

(a)



(b)

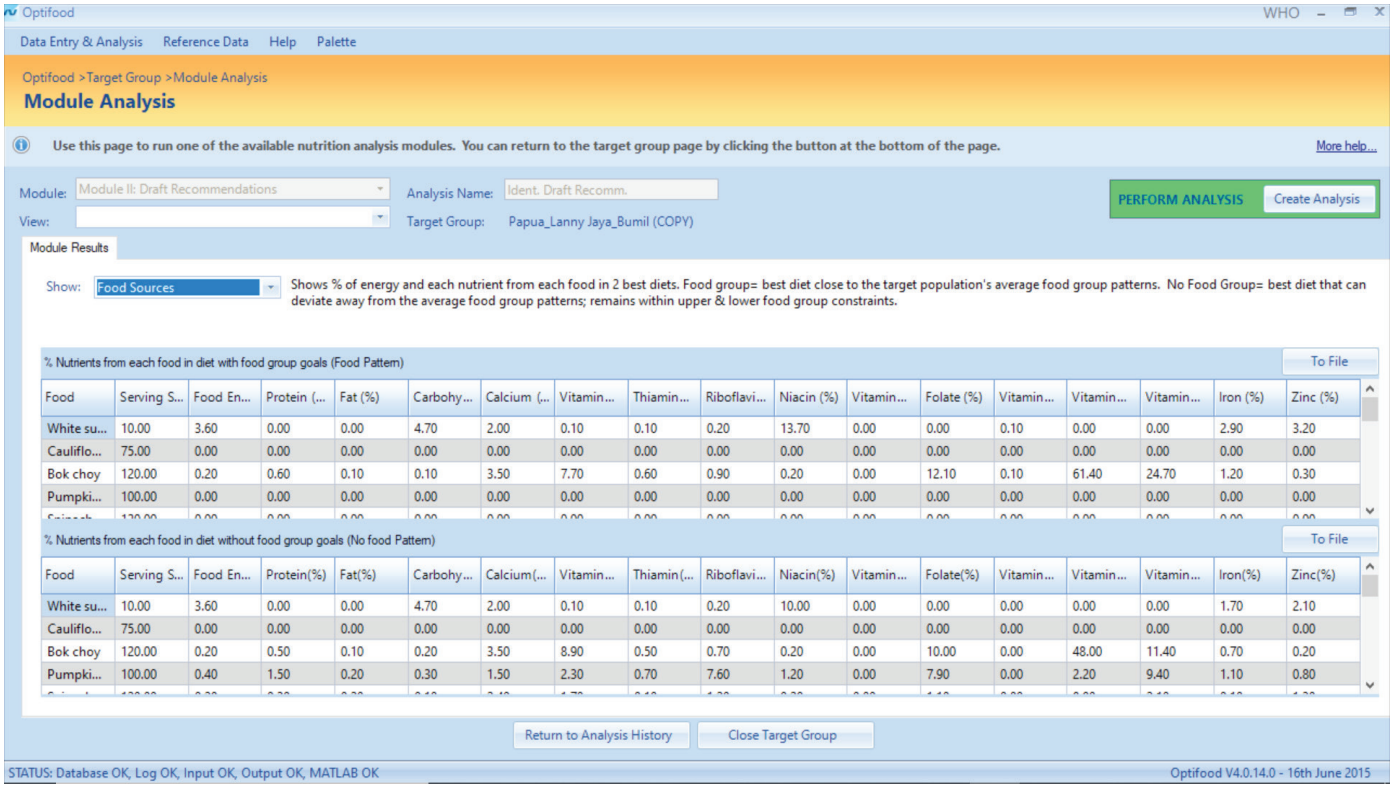


Figure 6.4. Example analysis: the top calcium contributors (a) from food sub-groups (ie.unfortified refined grains, vitamin A dark green leafy vegetables, other starchy plants, and non-fortified milk); and (b) from food sources (ie.rice, sweet potato leaves, sweet potato white, and cow milk).

4. **Nutrient Graph**. This graph shows the %RNI of each nutrient in the 2-best diets (FP and NFP). Hover your cursor in each bar to know the percentage. Capped values mean that the nutrient has reached ≥100% RNI in FP and/or NFP diets. This data can be the alternative source of information to determine the *Problem Nutrient (PN) in* target population with the same criteria as in **Nutrients and Diets**.

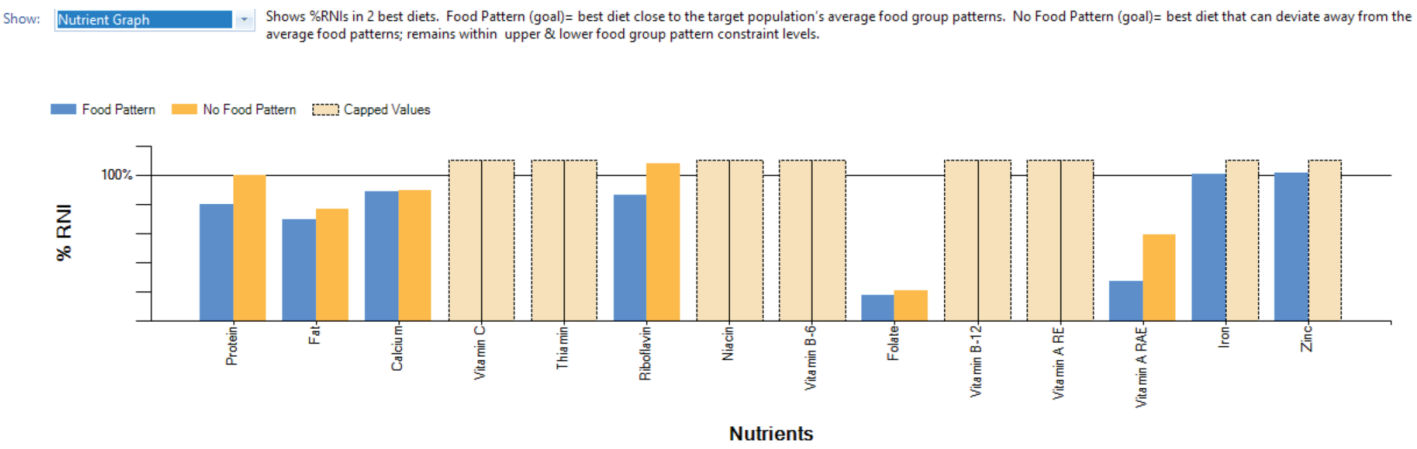


Figure 6.5. Problem nutrients identification using bar chart

5. **Food Group Graph**. This page shows the serving frequency per week of each food group in both FP and NFP diets in graph version.

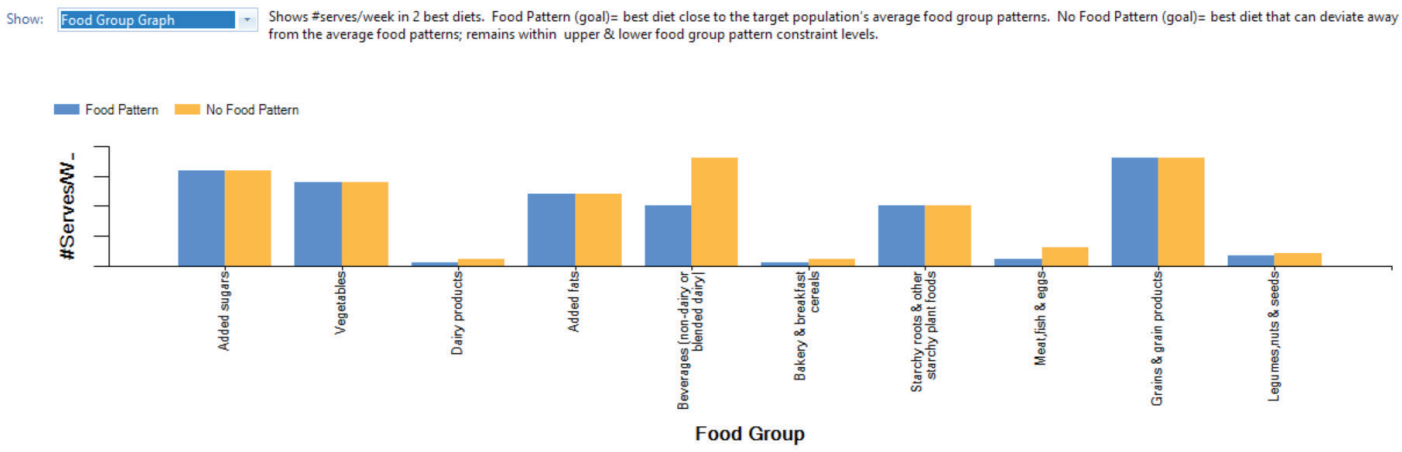


Figure 6.6. Problem nutrients identification using bar chart

LP-OPTIFOOD: MODULE III

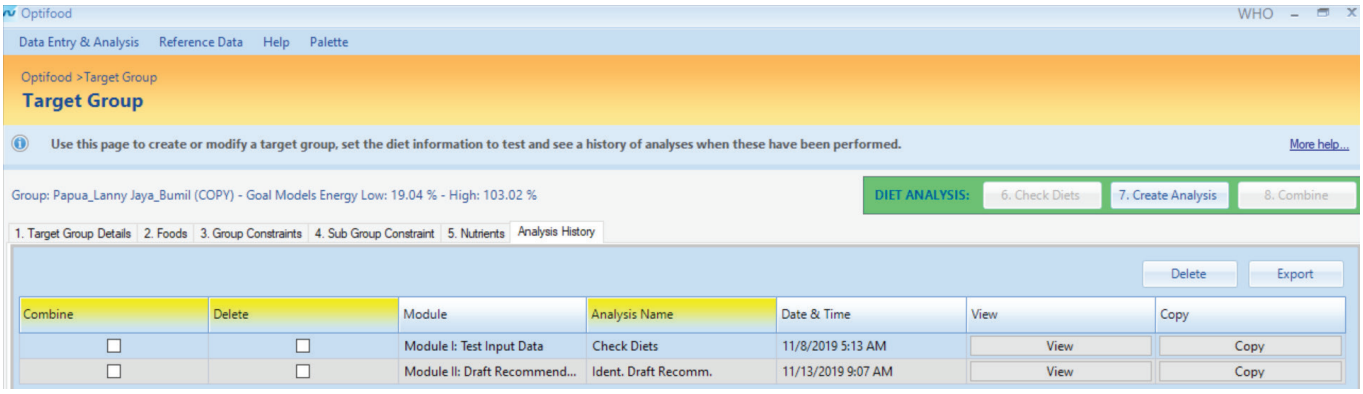
CHAPTER 7

CHAPTER 7.

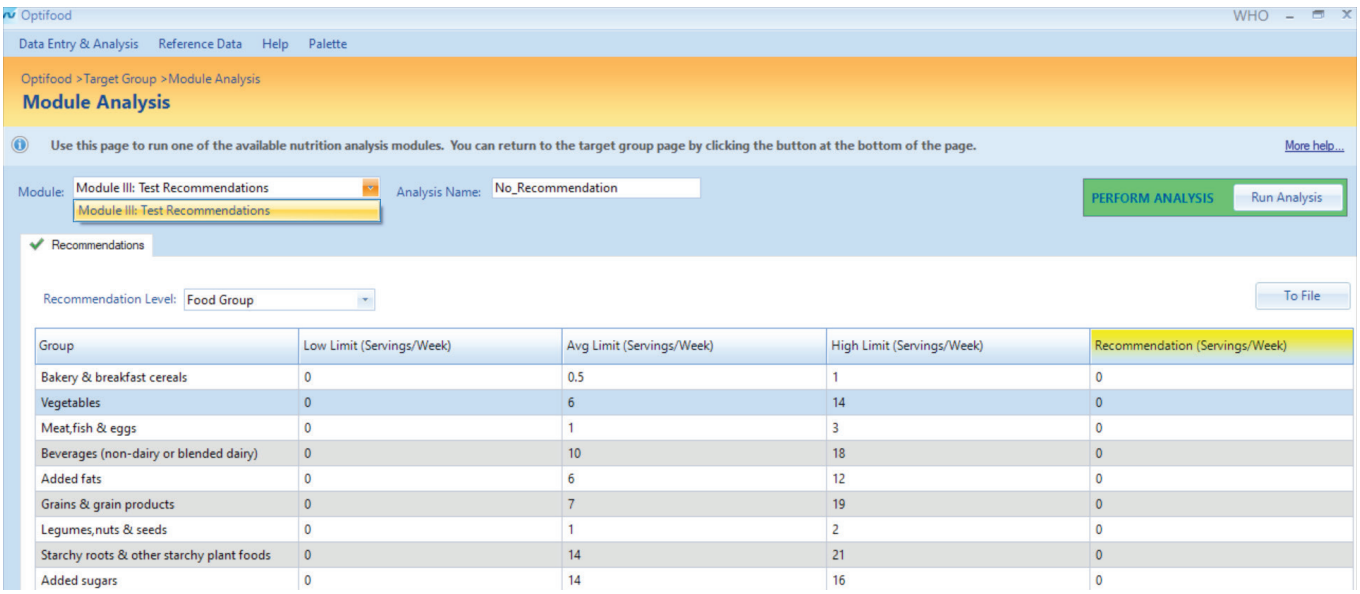
LP-OPTIFOOD MODULE III:
Creating Food-Based Recommendations

After identifying the problem nutrients our next aim is to test the worst-case scenario and compare the alternative food-based recommendations (FBRs). You must do 2 analysis as follows: (1) test the diet without any recommendation and (2) test the diet using potential recommended foods or food sub-groups or food group identified in Module II. The first analysis can be done via *7. Create Analysis* in Module Analysis page >> in *Module*: choose "*Module III: Test Recommendations*" >> fill *Analysis Name*: with "*No Recomm.*" >> *Run Analysis* >> choose *Yes* when there is a pop-up question "*You have not entered a recommendation to test. Do you would proceed?*" >> choose *Yes* when there is a pop-up question "*Would you want all the minimized and maximized diets?*".

(a)

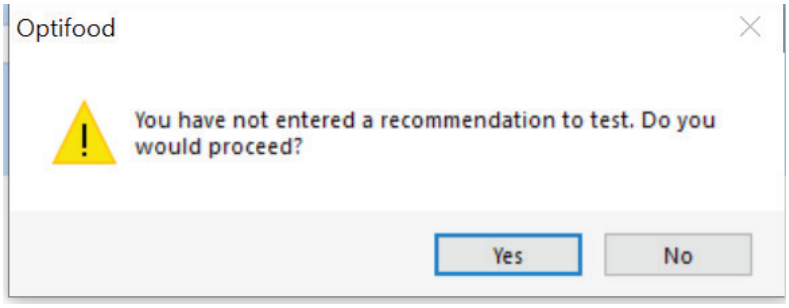


(b)



Group	Low Limit (Servings/Week)	Avg Limit (Servings/Week)	High Limit (Servings/Week)	Recommendation (Servings/Week)
Bakery & breakfast cereals	0	0.5	1	0
Vegetables	0	6	14	0
Meat,fish & eggs	0	1	3	0
Beverages (non-dairy or blended dairy)	0	10	18	0
Added fats	0	6	12	0
Grains & grain products	0	7	19	0
Legumes,nuts & seeds	0	1	2	0
Starchy roots & other starchy plant foods	0	14	21	0
Added sugars	0	14	16	0

(c)



(d)

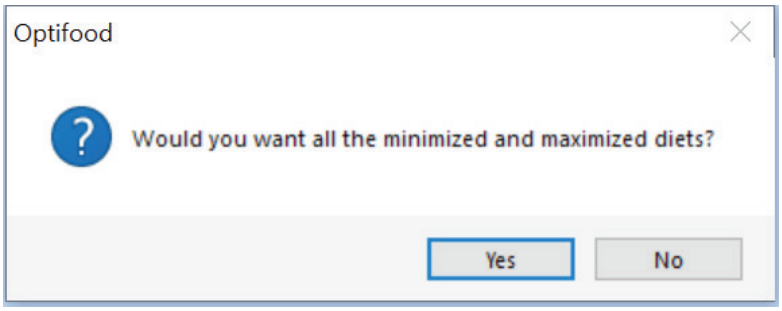


Figure 7.1 Step a-d to test the diet without any recommendation in Module III

This module provides information on:

1. **Nutrients** and **Graph**. Both table and graph give us information on %RNI for each nutrient when the nutrient content is minimized (worst-case scenario) and maximized (best-case scenario) in diets respecting FBR. This data can be used the determine the category of *Problem Nutrient (PN)* in target population. Hover your cursor in each bar to know the percentage.

Box 7.1. Types of Nutrients in Optifood Analysis

Absolute problem nutrient is a nutrient which requirements cannot be met in the 2-best diets (FP and NFP) AND the highest achievable level for that nutrient (best-case scenario) cannot meet 100% RNI.

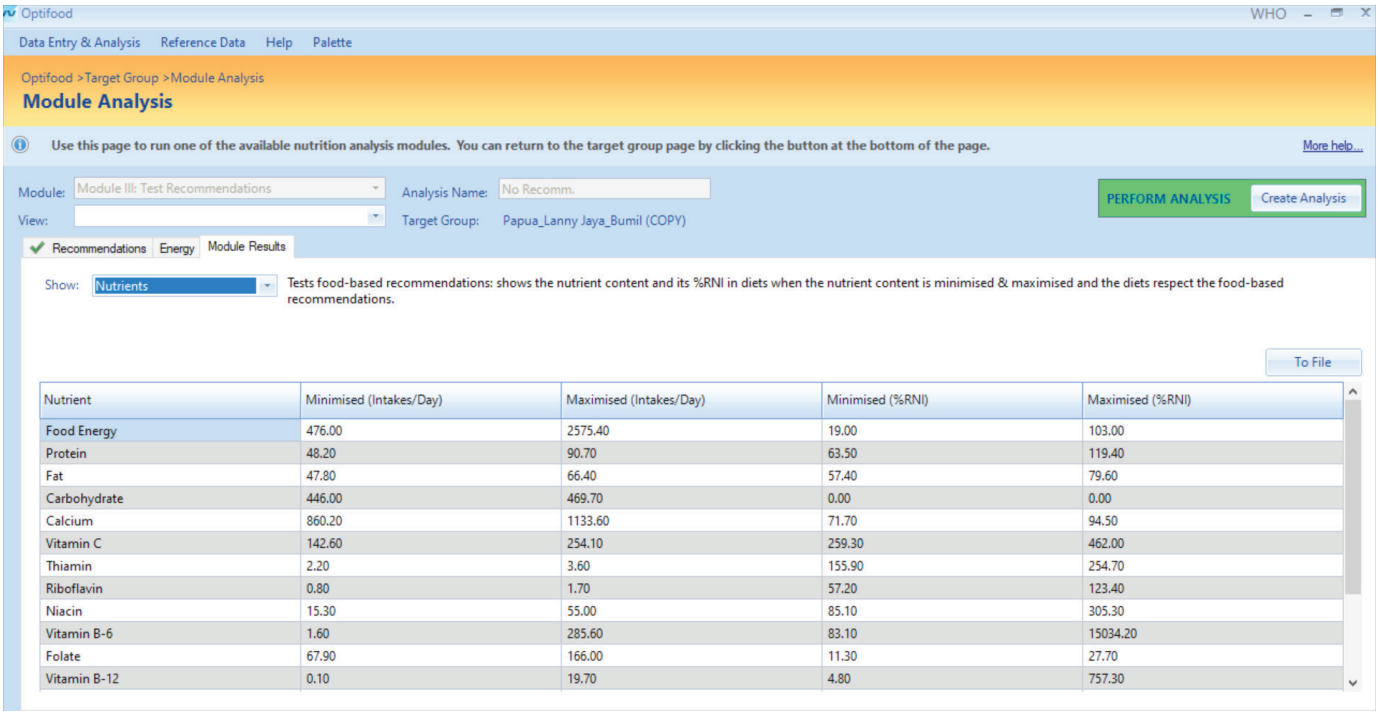
Partial problem nutrient is a nutrient that is <100% RNI in the 2-best diets, but can meet 100% RNI in the highest achievable level for that nutrient (best-case scenario).

Dietary inadequacy is defined when a nutrient which requirements can be met in the 2-best diets, but the lowest achievable level for that nutrient cannot meet at least 65% RNI (worst-case scenario).

Dietary adequacy is defined when the nutrient requirements (%RNI) can be met in all 2-best diets and can meet at least 65% RNI in the worst-case scenario.

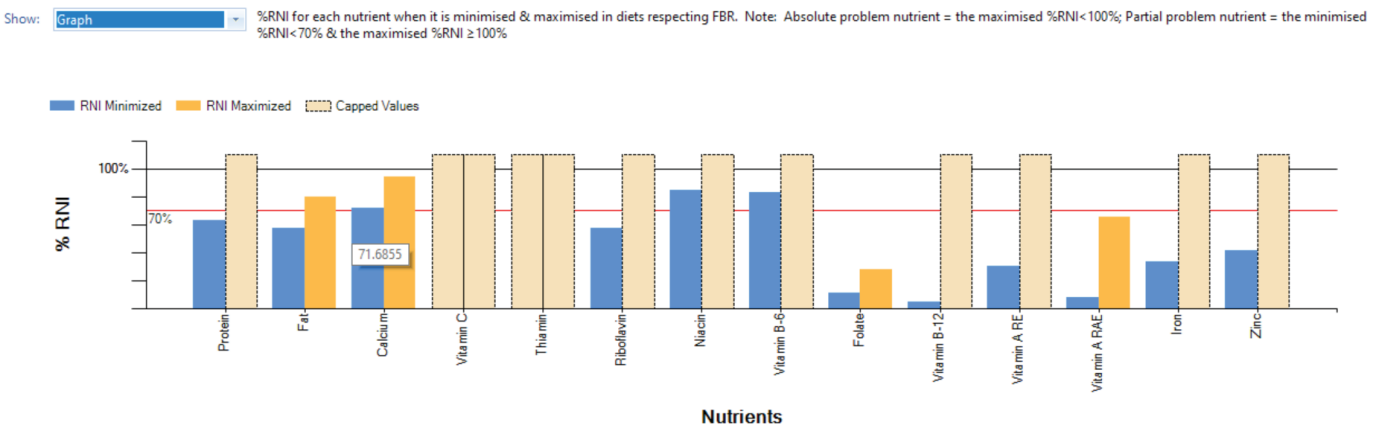
Note: The nutrient requirements of partial problem nutrient and nutrient inadequacy in most cases can be fulfilled using foods in the existing food basket of the target population, whereas absolute problem nutrient may require the food basket to be expanded to include other nutrient-dense foods (Note: this can be locally available but not yet consumed by the target population).

(a)



Nutrient	Minimised (Intakes/Day)	Maximised (Intakes/Day)	Minimised (%RNI)	Maximised (%RNI)
Food Energy	476.00	2575.40	19.00	103.00
Protein	48.20	90.70	63.50	119.40
Fat	47.80	66.40	57.40	79.60
Carbohydrate	446.00	469.70	0.00	0.00
Calcium	860.20	1133.60	71.70	94.50
Vitamin C	142.60	254.10	259.30	462.00
Thiamin	2.20	3.60	155.90	254.70
Riboflavin	0.80	1.70	57.20	123.40
Niacin	15.30	55.00	85.10	305.30
Vitamin B-6	1.60	285.60	83.10	15034.20
Folate	67.90	166.00	11.30	27.70
Vitamin B-12	0.10	19.70	4.80	757.30

(b)



(c)

	Best-diet	Best-case	Worst-case
Dietary adequacy	≥100%	≥100%	≥65%
Dietary inadequacy	≥100%	≥100%	<65%
Problem nutrient, partial	<100%	≥100%	<65%
Problem nutrient, absolute	<100%	<100%	<65%

Figure 7.2.

a) Display of Nutrients table;

b) Graph of %RNI in each nutrient;

c) Summary table to determine type of nutrients in Optifood Analysis

2. **Diet Min** and **Diet Max**. Information on the number of serving frequency per week of each food group in diets respecting the FBRs when nutrients were minimized or maximized.

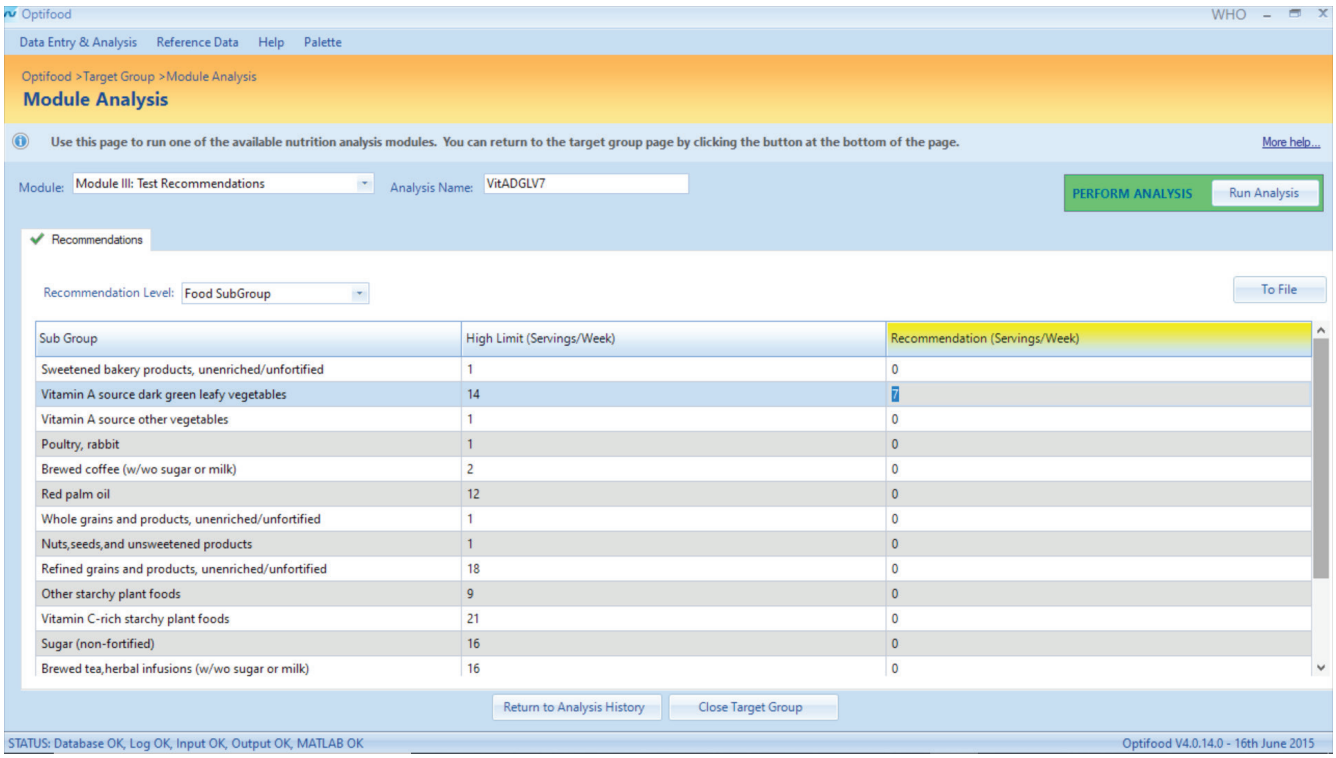
3. **Compare**. This Module Result page provides us the comparison results of the minimized nutrient (%RNI) for all food-based recommendations tested (including No Recommendation) and the optimized diets from Module II.

Analysis	Date & Time	Protein %	Fat %	Calcium %	Vitamin C %	Thiamin %	Riboflavin %	Niacin %	Vitamin B-6...	Folate %	Vitamin B-1...	Vitamin A RE...	Vitamin A RAE...	Iron %	Zinc %
Optimised Diets - without FG	11/13/2019...	100.00	76.80	89.30	357.80	218.40	108.00	229.20	9137.30	20.90	509.70	278.50	59.30	170.50	156.00
Optimised Diets - with FG	11/13/2019...	80.30	69.30	89.10	413.00	194.40	86.00	166.90	4708.00	17.20	124.90	217.40	27.50	100.80	101.60
No Recomm.	11/13/2019...	63.50	57.40	71.70	259.30	155.90	57.20	85.10	83.10	11.30	4.80	30.60	8.30	33.20	41.60

Figure 7.3. Display of no-recommendation tested and the optimized diets

Continuing the first analysis, testing alternative FBRs should be done through *7. Create Analysis* in Module Analysis page >> in *Module*: choose "*Module III: Test Recommendations*" >> fill *Analysis Name*: with potential food's name and frequency per week you want to recommend, example: "*VitADGLV7*" >> in Recommendation Level: choose between Food Group, Food SubGroup and Food based on your potential food >> fill in the yellow column "Recommendation" with your recommended serving frequency per week of selected potential food (its recommendation cannot exceed the high limit servings per week) >> *Run Analysis* >> choose *Yes* when there is a pop-up question "*Would you want all the minimized and maximized diets?*".

(a)



(b)

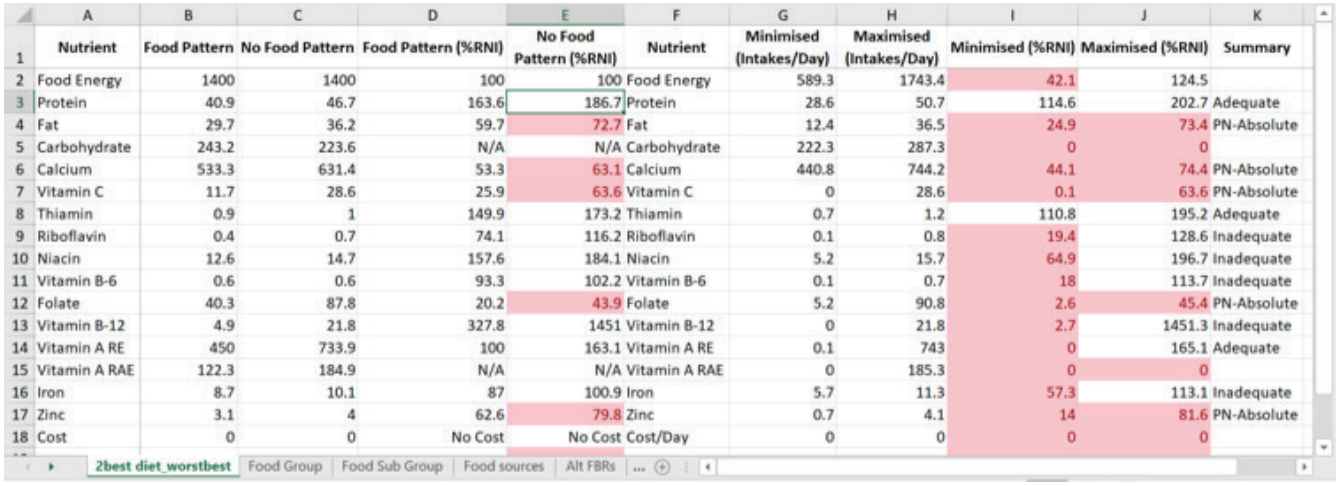
Analysis	Date & Time	Protein %	Fat %	Calcium %	Vitamin C %	Thiamin %	Riboflavin %	Niacin %	Vitamin B-6...	Folate %	Vitamin B-1...	Vitamin A RE...	Vitamin A RAE...	Iron %	Zinc %
Optimised Diets - with FG	11/13/2019...	80.30	69.30	89.10	413.00	194.40	86.00	166.90	4708.00	17.20	124.90	217.40	27.50	100.80	101.60
Optimised Diets - without FG	11/13/2019...	100.00	76.80	89.30	357.80	218.40	108.00	229.20	9137.30	20.90	509.70	278.50	59.30	170.50	156.00
No Recomm.	11/13/2019...	63.50	57.40	71.70	259.30	155.90	57.20	85.10	83.10	11.30	4.80	30.60	8.30	33.20	41.60
VitADGLV7	11/13/2019...	63.50	57.40	73.80	259.30	155.90	60.90	85.10	83.10	11.30	4.80	41.00	8.30	33.20	41.60

Figure 7.4. Example analysis: a) inputting recommendation in food sub-group level; b) comparing potential food recommended with no-recommendation tested and the optimized diets

Figure 4.b. shows small improvement of problem nutrients (calcium, folate, and vit. A RAE) after being recommended with vitamin A dark green leavy vegetables 7 servings per week compared to the no-recommendation tested. Therefore, you have to test other identified potential food item(s) or food sub-group(s) or food group(s) one-by-one separately, then you can combine several recommendations by ticking the boxes in Combine column >> *click 8. Combine*. The combined food-based recommendations should meet the goal which is at least 65% RNI of each nutrient.

Preparing LP Optifood output and extracting from Optifood to Excel file.

1. You can work for LP Optifood output in Microsoft Excel.
2. Sheet 1: **2-bestdiet_worst-best**
   - Open Optifood software >> Data Entry & Analysis >> Open Target Group >> select your target group for analysis >> View >> Analysis History.
   - Export the 2-best diet by opening the *Module II: Draft Recommendations* >> in Show: choose *Nutrients and Foods* >> click *To File* from the *Nutrition* table (left side) >> in the *Save as type* list, choose the *.CSV* file format >> click Save.
   - Export the worst-best scenario from the *Module III: Test Recommendations* >> in *Show*: choose Nutrients >> click *To File* >> in the *Save as type* list, choose the *.CSV* file format >> click Save.
   - Open the exported 2-best diet and worst-best files in Microsoft excel which can be directly opened or through these steps: open blank Excel sheet >> click *Data* in tools bar >> click *From Text/CSV* >> choose your file and click *Import* >> load your data into Excel sheet.
   - Combine the 2-best diet and worst-best data in one sheet.
   - Determine type of nutrients based on criteria in Figure 7.2.



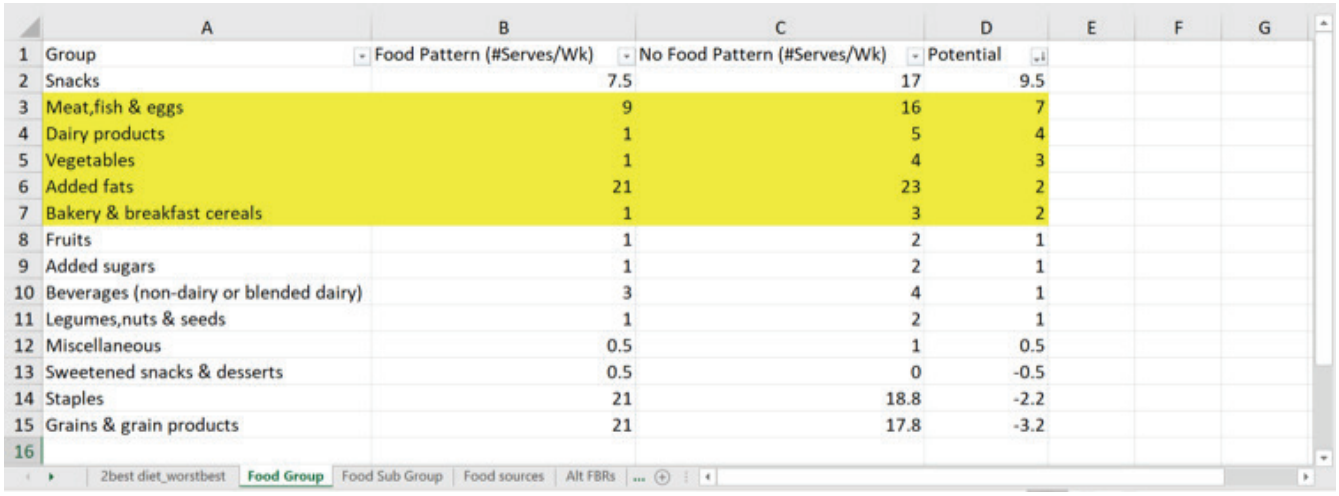
	A	B	C	D	E	F	G	H	I	J	K
1	Nutrient	Food Pattern	No Food Pattern	Food Pattern (%RNI)	No Food Pattern (%RNI)	Nutrient	Minimised (Intakes/Day)	Maximised (Intakes/Day)	Minimised (%RNI)	Maximised (%RNI)	Summary
2	Food Energy	1400	1400	100	100	Food Energy	589.3	1743.4	42.1	124.5	
3	Protein	40.9	46.7	163.6	186.7	Protein	28.6	50.7	114.6	202.7	Adequate
4	Fat	29.7	36.2	59.7	72.7	Fat	12.4	36.5	24.9	73.4	PN-Absolute
5	Carbohydrate	243.2	223.6	N/A	N/A	Carbohydrate	222.3	287.3	0	0	
6	Calcium	533.3	631.4	53.3	63.1	Calcium	440.8	744.2	44.1	74.4	PN-Absolute
7	Vitamin C	11.7	28.6	25.9	63.6	Vitamin C	0	28.6	0.1	63.6	PN-Absolute
8	Thiamin	0.9	1	149.9	173.2	Thiamin	0.7	1.2	110.8	195.2	Adequate
9	Riboflavin	0.4	0.7	74.1	116.2	Riboflavin	0.1	0.8	19.4	128.6	Inadequate
10	Niacin	12.6	14.7	157.6	184.1	Niacin	5.2	15.7	64.9	196.7	Inadequate
11	Vitamin B-6	0.6	0.6	93.3	102.2	Vitamin B-6	0.1	0.7	18	113.7	Inadequate
12	Folate	40.3	87.8	20.2	43.9	Folate	5.2	90.8	2.6	45.4	PN-Absolute
13	Vitamin B-12	4.9	21.8	327.8	1451	Vitamin B-12	0	21.8	2.7	1451.3	Inadequate
14	Vitamin A RE	450	733.9	100	163.1	Vitamin A RE	0.1	743	0	165.1	Adequate
15	Vitamin A RAE	122.3	184.9	N/A	N/A	Vitamin A RAE	0	185.3	0	0	
16	Iron	8.7	10.1	87	100.9	Iron	5.7	11.3	57.3	113.1	Inadequate
17	Zinc	3.1	4	62.6	79.8	Zinc	0.7	4.1	14	81.6	PN-Absolute
18	Cost	0	0	No Cost	No Cost	Cost/Day	0	0	0	0	

2best diet_worstbest | Food Group | Food Sub Group | Food sources | Alt FBRs

Figure 7.5. Example of data summary for Sheet 1: 2-best diets, worst-case (minimized) and best-case (maximized) scenarios

3. Sheet 2: **FoodGroup**

   - In *Analysis History*, click *Module II: Draft Recommendations* >> in *Show*: filter based on *Food Group* >> click *To File* >> in the *Save as type* list, choose the *.CSV* file format >> click Save.
   - Load the exported Food Group data in the second sheet of previous Excel workbook, namely FoodGroup.
   - Determine the potential food groups to be recommended which are indicated by calculating the difference i.e. The bigger the gap between No-FP and FP indicates more potential food group to be recommended. between No FP and FP in each food group.



	A	B	C	D	E	F	G
1	Group	Food Pattern (#Serves/Wk)	No Food Pattern (#Serves/Wk)	Potential			
2	Snacks	7.5	17	9.5			
3	Meat,fish & eggs	9	16	7			
4	Dairy products	1	5	4			
5	Vegetables	1	4	3			
6	Added fats	21	23	2			
7	Bakery & breakfast cereals	1	3	2			
8	Fruits	1	2	1			
9	Added sugars	1	2	1			
10	Beverages (non-dairy or blended dairy)	3	4	1			
11	Legumes,nuts & seeds	1	2	1			
12	Miscellaneous	0.5	1	0.5			
13	Sweetened snacks & desserts	0.5	0	-0.5			
14	Staples	21	18.8	-2.2			
15	Grains & grain products	21	17.8	-3.2			
16							

2best diet_worstbest | Food Group | Food Sub Group | Food sources | Alt FBRs

Figure 7.6. Example of data summary for Sheet 2: FoodGroup

4. Sheet 3: **FoodSubGroup**

   - In *Analysis History*, click *Module II: Draft Recommendations* >> in *Show*: filter based on *Food SubGroup* >> click *To File* from the *No Food Pattern* table (bottom part) >> in the *Save as type* list, choose the *.CSV* file format >> click Save.
   - Load the exported Food SubGroup data in the third sheet of previous Excel workbook, namely **FoodSubGroup.**
   - Determine the potential food sub groups to be recommended i.e. food group(s) which contribute to at least 5% of the total intake of particular nutrient (example is depicted in Figure 7.7. with green cells). Calculate how many nutrients contributed for >5% of the total intakefrom each food sub group using Excel formula as follows >> *=COUNTIF(range,"criteria").*

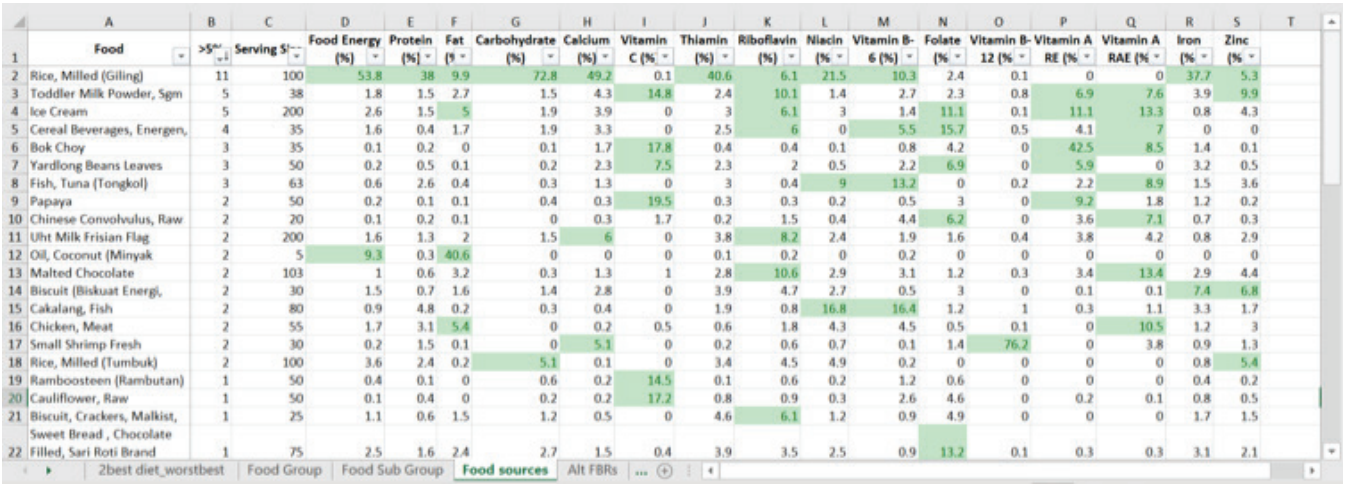
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Food	>5%	Food Energy (%)	Protein (%)	Fat (%	Carbohydrate (%)	Calcium (%)	Vitamin C (%)	Thiamin (%)	Riboflavin (%)	Niacin (%	Vitamin B-6 (%)	Folate (%)	Vitamin B-12 (%)	Vitamin A RE (%)	Iron (%	Zinc (%
2	Refined grains and products, unenriched/unfortified	10	54.2	38.3	10	73.3	49.2	0.1	40.8	6.2	21.6	10.4	2.8	0.1	0	37.9	5.5
3	Fish without bones	9	5.9	29.5	4.9	1.1	6.4	0	11.4	7.4	39.6	43.1	3.7	5	3.6	13.7	26.5
4	Fluid or powdered milk (fortified)	6	2.7	2.3	3.6	2.4	6.4	17	2.9	11.8	1.8	3.6	3.1	0.9	8.7	5.3	11.4
5	Vitamin A source dark green leafy vegetables	5	0.3	0.9	0.2	0.3	4.3	27	2.9	4	1.1	7.4	17.3	0	52	5.3	0.9
	Sweetened dairy products/desserts																
6	(flan,custard,sweetened yoghurt,ice cream)	4	2.6	1.5	5	1.9	3.9	0	3	6.1	3	1.4	11.1	0.1	11.1	0.8	4.3
7	Cereal-based beverages (w/wo milk and w/wo	3	1.6	0.4	1.7	1.9	3.3	0	2.5	6	0	5.5	15.7	0.5	4.1	0	0
8	Sweetened bakery products, unenriched/unfortified	3	3.6	2.2	3.8	3.9	1.9	0.4	8.5	9.7	3.7	1.7	18.1	0.1	0.3	4.7	3.7
9	Vitamin A source fruit	2	0.2	0.1	0.1	0.4	0.3	19.5	0.3	0.3	0.2	0.5	3	0	9.2	1.2	0.2
10	Fluid or powdered milk (non-fortified)	2	2.3	1.8	2.8	2.2	7.3	0.1	4	8.2	2.4	1.9	1.6	0.4	4.4	0.9	3.6
11	Sweetened bakery products, enriched/fortified	2	1.5	0.7	1.6	1.4	2.8	0	3.9	4.7	2.7	0.5	3	0	0.1	7.4	6.8
12	Eggs	2	1.5	3	4.4	0	1.7	0	1.5	6.2	0.1	2.4	0.2	15.6	0.9	4.1	3.5
13	Seafood	2	0.2	1.5	0.1	0	5.1	0	0.2	0.6	0.7	0.1	1.4	76.2	0	0.9	1.3
14	Whole grains and products, unenriched/unfortified	2	3.6	2.4	0.2	5.1	0.1	0	3.4	4.5	4.9	0.2	0	0	0	0.8	5.4
15	Soybeans and products	2	1.4	4.4	2.5	0.5	3.6	0.6	2.4	6.8	2.4	2.2	6.4	0	0.4	4.7	4.5
16	Other fruit	1	0.4	0.1	0	0.6	0.2	14.5	0.1	0.6	0.2	1.2	0.6	0	0	0.4	0.2
17	Other vegetables	1	0.1	0.4	0	0.2	0.2	17.2	0.8	0.9	0.3	2.6	4.6	0	0.2	0.8	0.5
18	Vegetable oil (unfortified)	1	9.3	0.3	40.6	0	0	0	0.1	0.2	0	0.2	0	0	0	0	0
19	Chocolate beverage or powder mix (non-dairy)	1	1	0.6	3.2	0.3	1.3	1	2.8	10.6	2.9	3.1	1.2	0.3	3.4	2.9	4.4
20	Poultry, rabbit	1	1.7	3.1	5.4	0	0.2	0.5	0.6	1.8	4.3	4.5	0.5	0.1	0	1.2	3
21	Red meat	1	0.7	2	1.9	0	0.1	0	0.4	1.1	1.4	2.6	0.4	0.5	0	1.4	5.3
22	Enriched/fortified grains and products, whole or	1	3.1	2.1	4.5	2.9	0.6	0.7	7.2	0.7	3.4	3.6	3.3	0.1	0.8	3.4	3.8
23	Honey,syrup,nectar	0	0.4	0	0	0.7	0	0	0	0	0	0	0	0	0	0	4.2
24	Sugar (non-fortified)	0	0.4	0.1	0.4	0.5	0.2	0	0	0	0	0.1	0	0	0	0.4	0
25	Other added fats	0	0.6	0.3	1.8	0.2	0.3	0.4	0.1	0.1	0.2	0.4	1.4	0	0	0.1	0.6

2best diet_worstbest | Food Group | Food Sub Group | Food sources | Alt FBRs | ...

Figure 7.7. Example of data summary for Sheet 3: FoodSubGroup.
Note: Excel formula used in this example is *=COUNTIF(D2:Q2,">4.9")*

5. Sheet 4: **FoodSources**

   - In *Analysis History*, click *Module II: Draft Recommendations* >> in *Show*: filter based on *Food Sources* >> click *To File* from the *No Food Pattern* table >> in the *Save as type* list, choose the *.CSV* file format >> click Save.
   - Load the exported Food Sources data in the fourth sheet of previous Excel workbook, namely **FoodSources.**
   - Determine the potential food sources to be recommended i.e. food item(s) which contribute to at least 5% of the total intake of particular nutrient. Calculate how many nutrients contributed for >5% of the total intake from each food using *=COUNTIF(range,"criteria")* formula in Excel.



	Food	>5%	Serving Si	Food Energy (%)	Protein (%)	Fat (%	Carbohydrate (%)	Calcium (%)	Vitamin C (%	Thiamin (%)	Riboflavin (%)	Niacin (%	Vitamin B-6 (%)	Folate (%	Vitamin B-12 (%	Vitamin A RE (%	Vitamin A RAE (%	Iron (%	Zinc (%
2	Rice, Milled (Giling)	11	100	53.8	38	9.9	72.8	49.2	0.1	40.6	6.1	21.5	10.3	2.4	0.1	0	0	37.7	5.3
3	Toddler Milk Powder, Sgm	5	38	1.8	1.5	2.7	1.5	4.3	14.8	2.4	10.1	1.4	2.7	2.3	0.8	6.9	7.6	3.9	9.9
4	Ice Cream	5	200	2.6	1.5	5	1.9	3.9	0	3	6.1	3	1.4	11.1	0.1	11.1	13.3	0.8	4.3
5	Cereal Beverages, Energen,	4	35	1.6	0.4	1.7	1.9	3.3	0	2.5	6	0	5.5	15.7	0.5	4.1	7	0	0
6	Bok Choy	3	35	0.1	0.2	0	0.1	1.7	17.8	0.4	0.4	0.1	0.8	4.2	0	42.5	8.5	1.4	0.1
7	Yardlong Beans Leaves	3	50	0.2	0.5	0.1	0.2	2.3	7.5	2.3	2	0.5	2.2	6.9	0	5.9	0	3.2	0.5
8	Fish, Tuna (Tongkol)	3	63	0.6	2.6	0.4	0.3	1.3	0	3	0.4	9	13.2	0	0.2	2.2	8.9	1.5	3.6
9	Papaya	2	50	0.2	0.1	0.1	0.4	0.3	19.5	0.3	0.3	0.2	0.5	3	0	9.2	1.8	1.2	0.2
10	Chinese Convolvulus, Raw	2	20	0.1	0.2	0.1	0	0.3	1.7	0.2	1.5	0.4	4.4	6.2	0	3.6	7.1	0.7	0.3
11	Uht Milk Frisian Flag	2	200	1.6	1.3	2	1.5	6	0	3.8	8.2	2.4	1.9	1.6	0.4	3.8	4.2	0.8	2.9
12	Oil, Coconut (Minyak	2	5	9.3	0.3	40.6	0	0	0	0.1	0.2	0	0.2	0	0	0	0	0	0
13	Malted Chocolate	2	103	1	0.6	3.2	0.3	1.3	1	2.8	10.6	2.9	3.1	1.2	0.3	3.4	13.4	2.9	4.4
14	Biscuit (Biskuat Energi,	2	30	1.5	0.7	1.6	1.4	2.8	0	3.9	4.7	2.7	0.5	3	0	0.1	0.1	7.4	6.8
15	Cakalang, Fish	2	80	0.9	4.8	0.2	0.3	0.4	0	1.9	0.8	16.8	16.4	1.2	1	0.3	1.1	3.3	1.7
16	Chicken, Meat	2	55	1.7	3.1	5.4	0	0.2	0.5	0.6	1.8	4.3	4.5	0.5	0.1	0	10.5	1.2	3
17	Small Shrimp Fresh	2	30	0.2	1.5	0.1	0	5.1	0	0.2	0.6	0.7	0.1	1.4	76.2	0	3.8	0.9	1.3
18	Rice, Milled (Tumbuk)	2	100	3.6	2.4	0.2	5.1	0.1	0	3.4	4.5	4.9	0.2	0	0	0	0	0.8	5.4
19	Ramboosteen (Rambutan)	1	50	0.4	0.1	0	0.6	0.2	14.5	0.1	0.6	0.2	1.2	0.6	0	0	0	0.4	0.2
20	Cauliflower, Raw	1	50	0.1	0.4	0	0.2	0.2	17.2	0.8	0.9	0.3	2.6	4.6	0	0.2	0.1	0.8	0.5
21	Biscuit, Crackers, Malkist,	1	25	1.1	0.6	1.5	1.2	0.5	0	4.6	6.1	1.2	0.9	4.9	0	0	0	1.7	1.5
22	Sweet Bread , Chocolate Filled, Sari Roti Brand	1	75	2.5	1.6	2.4	2.7	1.5	0.4	3.9	3.5	2.5	0.9	13.2	0.1	0.3	0.3	3.1	2.1

2best diet_worstbest | Food Group | Food Sub Group | Food sources | Alt FBRs | ...

Figure 7.8. Example of data summary for Sheet 4: FoodSources

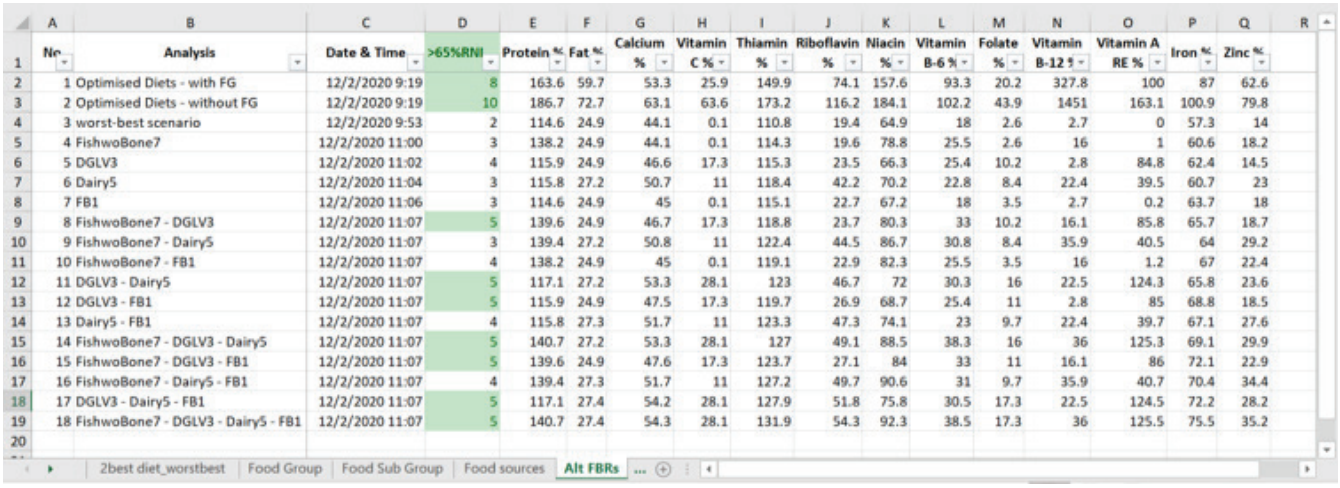
6. Sheet 5: **AlternativeFBRs**

   - After running analysis in *Module III: Test Recommendations* >> click View in any FBR >> in *Show*: choose *Compare* >> click *To File* >> in the *Save as type* list, choose the *.CSV* file format >> click Save.

   - Load the alternative FBRs in the fifth sheet of previous Excel workbook, namely **AlternativeFBRs**.

7. Transfer your most optimum FBR into messages that is easy to understand and remember in Sheet 6: **FBR-Messages.**

   - Determine the most optimum FBR which by calculating how many nutrients contributed for >65% RNI from each alternative FBR using *=COUNTIF(range,"criteria")* formula in Excel.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	No	Analysis	Date & Time	>65%RNI	Protein %	Fat %	Calcium %	Vitamin C %	Thiamin %	Riboflavin %	Niacin %	Vitamin B-6 %	Folate %	Vitamin B-12 %	Vitamin A RE %	Iron %	Zinc %	
2	1	Optimised Diets - with FG	12/2/2020 9:19	8	163.6	59.7	53.3	25.9	149.9	74.1	157.6	93.3	20.2	327.8	100	87	62.6	
3	2	Optimised Diets - without FG	12/2/2020 9:19	10	186.7	72.7	63.1	63.6	173.2	116.2	184.1	102.2	43.9	1451	163.1	100.9	79.8	
4	3	worst-best scenario	12/2/2020 9:53	2	114.6	24.9	44.1	0.1	110.8	19.4	64.9	18	2.6	2.7	0	57.3	14	
5	4	FishwoBone7	12/2/2020 11:00	3	138.2	24.9	44.1	0.1	114.3	19.6	78.8	25.5	2.6	16	1	60.6	18.2	
6	5	DGLV3	12/2/2020 11:02	4	115.9	24.9	46.6	17.3	115.3	23.5	66.3	25.4	10.2	2.8	84.8	62.4	14.5	
7	6	Dairy5	12/2/2020 11:04	3	115.8	27.2	50.7	11	118.4	42.2	70.2	22.8	8.4	22.4	39.5	60.7	23	
8	7	FB1	12/2/2020 11:06	3	114.6	24.9	45	0.1	115.1	22.7	67.2	18	3.5	2.7	0.2	63.7	18	
9	8	FishwoBone7 - DGLV3	12/2/2020 11:07	5	139.6	24.9	46.7	17.3	118.8	23.7	80.3	33	10.2	16.1	85.8	65.7	18.7	
10	9	FishwoBone7 - Dairy5	12/2/2020 11:07	3	139.4	27.2	50.8	11	122.4	44.5	86.7	30.8	8.4	35.9	40.5	64	29.2	
11	10	FishwoBone7 - FB1	12/2/2020 11:07	4	138.2	24.9	45	0.1	119.1	22.9	82.3	25.5	3.5	16	1.2	67	22.4	
12	11	DGLV3 - Dairy5	12/2/2020 11:07	5	117.1	27.2	53.3	28.1	123	46.7	72	30.3	16	22.5	124.3	65.8	23.6	
13	12	DGLV3 - FB1	12/2/2020 11:07	5	115.9	24.9	47.5	17.3	119.7	26.9	68.7	25.4	11	2.8	85	68.8	18.5	
14	13	Dairy5 - FB1	12/2/2020 11:07	4	115.8	27.3	51.7	11	123.3	47.3	74.1	23	9.7	22.4	39.7	67.1	27.6	
15	14	FishwoBone7 - DGLV3 - Dairy5	12/2/2020 11:07	5	140.7	27.2	53.3	28.1	127	49.1	88.5	38.3	16	36	125.3	69.1	29.9	
16	15	FishwoBone7 - DGLV3 - FB1	12/2/2020 11:07	5	139.6	24.9	47.6	17.3	123.7	27.1	84	33	11	16.1	86	72.1	22.9	
17	16	FishwoBone7 - Dairy5 - FB1	12/2/2020 11:07	4	139.4	27.3	51.7	11	127.2	49.7	90.6	31	9.7	35.9	40.7	70.4	34.4	
18	17	DGLV3 - Dairy5 - FB1	12/2/2020 11:07	5	117.1	27.4	54.2	28.1	127.9	51.8	75.8	30.5	17.3	22.5	124.5	72.2	28.2	
19	18	FishwoBone7 - DGLV3 - Dairy5 - FB1	12/2/2020 11:07	5	140.7	27.4	54.3	28.1	131.9	54.3	92.3	38.5	17.3	36	125.5	75.5	35.2	
20																		

2best diet_worstbest | Food Group | Food Sub Group | Food sources | Alt FBRs | ...

Figure 7.9. Example of data summary for Sheet 5: AlternativeFBRs. Note: Excel formula used in this example is =*COUNTIF(D2:Q2,">64.9")*

LP-OPTIFOOD: MODULE IV

CHAPTER 8

CHAPTER 8.

LP-OPTIFOOD MODULE IV:
Cost Analysis

Cost analysis (Module IV) in Optifood will provide the following information about the FBR:

1. Nutrients & Cost. This output shows the cost, nutrient content and %RNI of the lowest cost diet. For each nutrient, if %RNI is less than 100% it means the nutrient cannot achieve its 100% RNI using the food basket used in the LP analysis.

2. Food. This output shows number of each food selected in the lowest cost diet, its cost/week and its percentage of overall costs.

3. Cost RNI One. This output shows cost of lowest cost diet selected to achieve energy requirement and one other nutrient at a decreasing percentage of its RNI. Columns show the %RNI modeled, whereas rows show the nutrient modeled. Fat and carbohydrate were not modeled in this analysis.

4. Cost RNI One Graph. The graph visualizes the output from model 1 i.e. cost impact of achieving energy requirement and one other nutrient at a decreasing percentage of its RNI. You can hover the lines to see the nutrient and the cost of achieving it at different % of its RNIs.

5. Cost RNI All. This output shows cost of lowest diet achieving energy requirement and all other nutrients (or highest level) but one that is progressively decreased. Columns show the %RNI of selected nutrient whereas rows show the nutrient modeled. Fat and carbohydrate was not modeled in this analysis.

Below is the example of cost analysis of FBRs:

1. Nutrients & Cost (**Table 8.1.**). In this example, using the food basket the RNIs of all nutrients can be achieved since the %RNIs all meet 100% or higher.

2. Food (**Table 8.2.**). This output shows the foods ordered from the highest to lowest percentage of overall costs. In this example the highest and lowest cost is spent for rice porridge (17.7% of total cost) and tofu (0.6% of total cost). Using this output, you can sum by food group the total cost for staple, MFPE, legume and fruits & vegetables, which are highest for staple (53.0%), followed by fruits and vegetables (19.8%), MFPE (15.1%) and legumes (12.3%).

3. Cost RNI One (**Table 8.3.** and **Figure 8.1**). The table and figure show that nutrients which are quite expensive or difficult to meet for their RNIs are calcium, folate and iron, as shown by the high increase in the cost when 100% RNI is to be achieved.

4. Cost RNI All (**Table 8.4.**). In this example calcium, niacin, thiamin and folate are the nutrients which are most likely to not have their RNIs met when the FBR is to meet 100% RNI of energy and all nutrients.

Table 8.1. Nutrient and cost output table

Variable	Unit	Intakes/Day	%RNI
Cost	IDR	3445	-
Food Energy	Kcal	759	100
Protein	gram	19.5	205.8
Fat	gram	26.4	-
Carbohydrate	gram	112.2	-
Calcium	mg	500	100
Vitamin C	mg	43.9	146.3
Thiamin	mg	0.5	100
Riboflavin	mg	0.5	106
Niacin	mg	6	100
Vitamin B-6	mg	0.5	100.4
Folate	mcg	150	100
Vitamin B-12	mg	2.1	228.6
Vitamin A RE	mg	911.6	227.9
Vitamin A RAE	mg	706.9	-
Iron	mg	7.3	126
Zinc	mg	4.1	100

Table 8.2. Food output table, showing only the foods selected in the LP analysis in decreasing percentage to total cost

Food	#Servings/ Week	Cost/ Week	%Cost/ Week	Staple	Fruits & vegetables	MFPE	Legume
Rice porridge	3.4	4260.6	17.7	17.7			
Rice, white, cooked	9	4248.8	17.6	17.6			
Spinach, red	3	2208	9.2		9.2		
Tofu	2	1876	7.8				7.8
Manufactured infant cereal	0.6	1713.3	7.1	7.1			
Noodle, with meatball	1	1662	6.9	6.9			
Spinach	2	1377.6	5.7		5.7		
Egg, duck	1	1112.8	4.6			4.6	
Beef, dried	1	1014.6	4.2			4.2	
Chicken liver	0.8	983	4.1			4.1	
Mungbean, cooked with coconut milk	1	948	3.9				3.9
Rice flour porridge	1	891	3.7	3.7			
Water spinach, stir-fried	1	764	3.2		3.2		
Anchovy	1	520	2.2			2.2	
Chinese cabbage	1	398.5	1.7		1.7		
Tofu, fried	0.2	137	0.6				0.6
				53	19.8	15.1	12.3

Table 8.3. Cost RNI One (A) Original output, (B) Output calculated as %of the 100%RNI cost

Nutrient	Cost/week									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
A. Original output										
Protein	6,594	6,594	6,594	6,594	6,594	6,594	6,594	6,594	6,594	6,594
Fat	-	-	-	-	-	-	-	-	-	-
Carbohydrate	-	-	-	-	-	-	-	-	-	-
Calcium	6,594	6,594	6,594	6,594	6,594	6,594	7,849	9,323	11,694	15,845
Vitamin C	6,594	6,594	6,594	6,594	6,594	6,594	6,618	6,797	6,980	7,162
Thiamin	6,594	6,594	6,594	6,594	6,594	6,594	6,612	7,198	7,784	8,370
Riboflavin	6,594	6,594	6,594	6,594	6,594	6,594	6,594	6,615	6,855	7,109
Niacin	6,594	6,594	6,594	6,594	6,594	6,595	6,903	7,211	7,658	8,233
Vitamin B-6	6,594	6,594	6,594	6,594	6,623	6,750	6,876	7,002	7,312	7,972
Folate	6,594	6,594	6,594	6,594	6,594	6,672	7,326	8,070	9,552	11,516
Vitamin B-12	6,594	6,594	6,594	6,594	6,594	6,594	6,594	6,635	6,803	6,972
Vitamin A RE	6,594	6,594	6,594	6,594	6,594	6,594	6,594	6,594	6,594	6,731
Iron	6,594	6,594	6,594	6,594	6,594	6,638	7,068	7,497	7,927	8,356
Zinc	6,594	6,594	6,594	6,594	6,594	6,594	6,594	6,594	6,839	7,582
B. Output calculated as %of the 100%RNI cost										
Protein	100	100	100	100	100	100	100	100	100	100
Fat	-	-	-	-	-	-	-	-	-	-
Carbohydrate	-	-	-	-	-	-	-	-	-	-
Calcium	42	42	42	42	42	42	50	59	74	100
Vitamin C	92	92	92	92	92	92	92	95	97	100
Thiamin	79	79	79	79	79	79	79	86	93	100
Riboflavin	93	93	93	93	93	93	93	93	96	100
Niacin	80	80	80	80	80	80	84	88	93	100
Vitamin B-6	83	83	83	83	83	85	86	88	92	100
Folate	57	57	57	57	57	58	64	70	83	100
Vitamin B-12	95	95	95	95	95	95	95	95	98	100
Vitamin A RE	98	98	98	98	98	98	98	98	98	100
Iron	79	79	79	79	79	79	85	90	95	100
Zinc	87	87	87	87	87	87	87	87	90	100

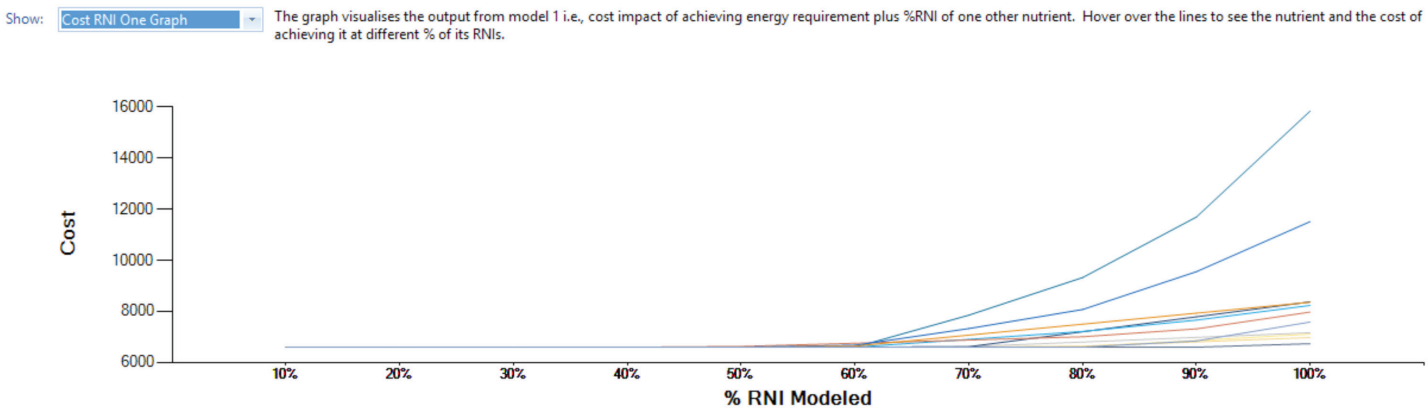


Figure 8.1. Cost RNI One

The utilization of Cost Analysis (Module IV) can be used to identify which nutrient(s) is/ are relatively more expensive to meet for the RNIs and to compare the cost implication of the optimized FBR when cheaper but nutrient-dense foods are introduced such as under-utilized foods which are nutrient-dense, or subsidized fortified infant cereal. This can also be used to assess the implication of change in price of nutrient-dense foods in meeting the nutrient requirements of the problem nutrients.

Table 8.4. Cost RNI All (A) Original output, (B) Output calculated as % of the 100%RNI cost

Nutrient	Cost/week									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
A.Original output										
Protein	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115
Fat	-	-	-	-	-	-	-	-	-	-
Carbohydrate	-	-	-	-	-	-	-	-	-	-
Calcium	4,200	4,200	4,200	4,200	4,200	4,200	4,320	4,954	17,646	24,115
Vitamin C	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115
Thiamin	21,694	1,694	21,694	21,694	21,694	21,694	21,694	21,815	2,959	24,115
Riboflavin	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115

Nutrient	Cost/week									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Niacin	21,041	21,041	21,041	21,041	21,041	21,041	21,241	21,995	22,748	24,115
Vitamin B-6	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115
Folate	3,099	3,099	3,099	3,099	3,099	3,099	3,099	3,099	23,313	24,115
Vitamin B-12	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115
Vitamin A RE	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115
Iron	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115	24,115
Zinc	24,095	24,095	24,095	24,095	24,095	24,095	24,095	24,095	24,095	24,115
B. Output calculated as %of the 100%RNI cost										
Protein	100	100	100	100	100	100	100	100	100	100
Fat	-	-	-	-	-	-	-	-	-	-
Carbohydrate	-	-	-	-	-	-	-	-	-	-
Calcium	59	59	59	59	59	59	59	62	73	100
Vitamin C	100	100	100	100	100	100	100	100	100	100
Thiamin	90	90	90	90	90	90	90	90	95	100
Riboflavin	100	100	100	100	100	100	100	100	100	100
Niacin	87	87	87	87	87	87	88	91	94	100
Vitamin B-6	100	100	100	100	100	100	100	100	100	100

Nutrient	Cost/week									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Folate	96	96	96	96	96	96	96	96	97	100
Vitamin B-12	100	100	100	100	100	100	100	100	100	100
Vitamin A RE	100	100	100	100	100	100	100	100	100	100
Iron										
Zinc	100	100	100	100	100	100	100	100	100	100

PILOT TESTING THE FBRs AND ASSESSING EFFECTIVENESS OF THE FBR

CHAPTER 9

CHAPTER 9.

PILOT TESTING THE FBRs AND ASSESSING EFFECTIVENESS OF THE FBR

Prior to finalizing the FBR into intervention, pilot testing can be done following for instance Trial of Improved Practices (TIPs) approach by asking the target group to practice the FBR for one week. Before and after the trial 24-hour dietary recall and FFQ of the proceeding week can be assessed. After the 1-week trial we can also explore what was easy and was difficult to implement from the FBR to confirm or adjust the FBR to be more acceptable.

To assess the effectiveness of local-specific food-based recommendations developed using LP approach, we can use qualitative as well as quantitative approaches. With the qualitative approach, the purpose is to assess whether there is improvement in the dietary patterns toward food sub-group (s) or food item (s) promoted in the FBR or to assess the proportions of subjects who can comply with each of the FBR messages. An example of presentation for this qualitative approach is shown in **Table 9.1**.

Table 9.1. The number of days per week on which nutrient-dense foods were fed to the study subjects after the 6 month intervention, by intervention group[1]

Nutrient-dense foods	Non-CFR (n=216)	CFR (n=239)	p2
Liver	0 (0-1)	1 (0-2)	<0.001
Fish	3 (2-4)	3 (2-5)	0.004
Anchovy	0 (0-1)	0 (0-1)	0.102
Other animal protein	2 (2-4)	3 (2-4)	0.029
Tofu	2 (2-3)	3 (2-4)	0.018
Other plant protein	2 (1-3)	3 (2-4)	0.034
Green leafy vegetables	3 (2-5)	4 (3-6)	0.068
Other vegetables	2 (1-2)	2 (1-3)	0.004
Fortified snacks	4 (3-7)	7 (4-7)	0.001

[1] Median (25th – 75th percentiles) 2 Kruskal – Wallis H test

Source: Fahmida *et al* (Am J Clin Nutr 2015)

For the quantitative approach, it is first necessary to understand the four levels of objectives in dietary assessment. There are four **levels of objectives in dietary assessment**: Level 1 and Level 2 refer to nutrient intake data at group level, whereas Level 3 and Level 4 will provide sufficient information and interpretation at individual level.

1. **Level 1:** Mean intake of a group. This is the level when you want to compare the difference in mean or median energy and nutrient intakes between the intervention groups (group receiving nutrition education with the local specific FBR) and the control group (group receiving standard public health message).

2. **Level 2:** Proportion "at risk" to inadequate intakes. In level 2, you can assess the difference between the intervention and control group in terms of the percentage of the subjects whose intakes of nutrients are below the adequacy level i.e. the Estimated Average Requirement (EAR).

3. **Level 3:** Rank intakes of subjects within the distribution. This is the level of objective chosen if you want to show that degree of compliance to the FBR messages (e.g. poor compliance, moderate compliance, high compliance) is associated with other nutritional outcomes (e.g. biomarkers of the problem nutrients).

4. **Level 4:** Usual intakes for correlations or counseling. This is the highest level in dietary assessment and is used when you want to correlate continuous indicators in diet with nutritional and health outcomes. For instance, if you have developed score for compliance to FBR, you may want to assess whether the score is positively associated with better biomarkers of the problem nutrients.

Since local specific FBRs are the translation of more generic nation-wide FBDG, levels of objectives at the population level (levels 1 and 2) will be sufficient to assess effectiveness of the local specific FBRs in most cases. Table 9.2. shows the methods to choose depending on the level of objective, and example of presentation for this quantitative approach is shown in Table 9.3.

In summary, to assess the effectiveness of FBR developed using LP approach, we can assess the improvement in (1) dietary diversity score (e.g. following the 7 food groupings for under-two children); (2) compliance to FBR including number of servings/week the recommended nutrient-dense food groups, subgroups and food items were consumed; (3) median nutrient intakes; (4) proportions at risk of inadequate intakes; and for under-two children; (5) nutrient density (i.e. nutrient per 100 kcal) of the complementary feeding diet.

Table 9.2. Recommended approach and alternative dietary assessment methods based on the level of objectives

Level of objectives	Approach	Alternative dietary assessment method(s)[1]
Level 1: Mean intake of a group	Measure food intake of each subject for one day only. Ensure all days of the week are proportionately represented in final sample	1-day 24HR or FR
Level 2: Proportion "at risk" to inadequate intakes	Measure food intake for at least two days on sub-sample (30-40 subjects) Non-consecutive days should be used when using two repeats. If non-consecutive days not possible, then three consecutive days are needed	1-day 24HR or FR, with sub-sample repeated for the second day (non-consecutive days)
Level 3: Rank intakes of subjects within the distribution	Multiple replicates of 24-hour recalls/ diet records/ diet history. Alternatively, semi-quantitative FFQ can be used	Repeated 24HRs or FRs, spread over one month interval SQ-FFQ specifically designed and validated for the nutrients of interest (the problem nutrients)[2]
Level 4: Usual intakes for correlations or counseling	Larger number of replicates required. Alternatively, semi-quantitative FFQ or diet history can be used	Repeated 24HRs or FRs, spread over one month interval SQ-FFQ specifically designed and validated for the nutrients of interest (the problem nutrients)[2]

[1] 24HR=Repeated 24-hour dietary recalls; FR=food records; SQ-FFQ=semi-quantitative food frequency questionnaire.

[2] The number of days required depends on both intra- and inter- individual variation. Intra-individual variation is individual's day-to-day variation while inter-individual variation refers to the degree to which various individuals differ from one another in their nutrient intake.

Table 9.3. Nutrient intakes after the 6-month intervention, by intervention group[1]

Nutrients	Non-CFR (n=216)	CFR (n=239)	P[2]
Energy (kcal)	514 (385-653)	591 (460-732)	<0.001
Protein (g)	14.2 (9.5-20.0)	19.0 (14.0-25.0)	<0.001
Vitamin A (µg)	257 (130-696)	553 (236-1,064)	<0.001
Thiamin (mg)	0.3 (0.2-0.4)	0.4 (0.3-0.5)	<0.001
Riboflavin (mg)	0.3 (0.2-0.5)	0.5 (0.3-0.7)	<0.001
Niacin (mg)	3.3 (2.2-4.9)	4.4 (3.0-6.5)	<0.001
Vitamin B-6 (mg)	0.4 (0.3-0.6)	0.5 (0.4-0.7)	<0.001
Folate (µg)	50 (36-67)	64 (40-91)	<0.001
Vitamin B-12 (µg)	1.1 (0.5-2.0)	1.7 (1.1-2.9)	<0.001
Vitamin C (mg)	8 (3-17)	12 (5-2)	<0.001
Calcium	100 (58-178)	139 (79-213)	<0.001
Iron (mg)	2.4 (1.7-3.7)	3.3 (2.3-5.0)	<0.001
Zinc (mg)	2.2 (1.5-3.6)	2.9 (1.9-3.9)	<0.001

[1] Median (25th – 75th percentiles).

[2] Mann-Whitney U test.

Source: Fahmida *et al* (Am J Clin Nutr 2015).

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ANNEXES

Annex 1. Optifood Food Groups and Food Sub-Groups

Grp	FoodGroup_ Values_Label_ English	Group_ subgroup	FoodSubGroup_Values_Label_English
1	Added fats	101	Butter, ghee, margarine (unfortified)
		102	Margarine (fortified)
		103	MyFoods_Special Fats
		104	Other added fats
		105	Red palm oil
		106	Vegetable oil (fortified)
		107	Vegetable oil (unfortified)
2	Added sugars	201	Honey, syrup, nectar
		202	MyFoods_Special Sugars
		203	Sugar (fortified)
		204	Sugar (non-fortified)
3	Bakery & breakfast cereals	301	Enriched/fortified bread, whole or refined grain
		302	MyFoods_Special Bakery
		303	Pancake, waffles, scones, crackers
		304	Ready-to-eat (RTE) cereals, fortified
		305	Ready-to-eat (RTE) cereals, unfortified
		306	Refined grain bread, unenriched/unfortified
		307	Sweetened bakery products, enriched/ fortified
		308	Sweetened bakery products, unenriched/ unfortified
		309	Whole grain bread, unernriched/unfortified

Grp	FoodGroup_ Values_Label_ English	Group_ subgroup	FoodSubGroup_Values_Label_English
4	Beverages (non-diary or blended dairy)	401	Alcoholic beverages
		402	Brewed coffee (w/wo sugar or milk)
		403	Brewed tea, herbal infusions (w/wo sugar or milk)
		404	Cereal-based beverages (w/wo milk and w/wo fermentation)
		405	Chocolate beverage or powder mix (non-dairy)
		406	Fortified beverage or powder mix
		407	Fruit/dairy-containing blended beverages
		408	Juices -commercial, pure, other
		409	Juices -commercial, pure, Vitamin A source
		410	Juices -commercial, pure, Vitamin C rich
		411	MyFoods_Special Beverages
		412	Other beverages
		413	Sugar-sweetened beverages (soda, processed or artifical juices)
5	Composites (mixed food groups)	501	Broths
		502	Grain products w/fillings (sandwiches, burgers, samosas, enchiladas)
		503	Main meal recipes
		504	MyFoods_Special Composites
		505	Other composites
		506	Salads w/mixed food group ingredients
		507	Soups

Grp	FoodGroup_ Values_Label_ English	Group_ subgroup	FoodSubGroup_Values_Label_English
6	Dairy products	601	Cheese
		602	Cream, sour cream
		603	Flavored milk (non-fortified)
		604	Fluid or powdered milk (fortified)
		605	Fluid or powdered milk (non-fortified)
		606	Infant formula (fortified)
		607	MyFoods_Special Dairy
		608	Other dairy excluding butter
		609	Sweetened dairy products/desserts (flan, custard, sweetened yoghurt, ice cream)
		610	Yoghurt, solid and drinkable
7	Fruits	701	MyFoods_Special Fruits
		702	Other fruit
		703	Vitamin A source fruit
		704	Vitamin C-rich fruit
8	Grains & grain products	801	Enriched/fortified grains and products, whole or refined
		802	MyFoods_Special Grains
		803	Refined grains and products, unenriched/ unfortified
		804	Whole grains products, unenriched/ unfortified
9	Human milk	901	Breastmilk
10	Legumes,nuts &seeds	1001	Cooked beans, lentils, peas
		1002	MyFoods_Special Legumes
		1003	Nuts, seeds,and unsweetened products
		1004	Soybeans and products
		1005	Sweetened legume, nut, seed products

Grp	FoodGroup_ Values_Label_ English	Group_ subgroup	FoodSubGroup_Values_Label_English
11	Meat,fish & eggs	1101	Blood, blood sausage
		1102	Eggs
		1103	Fish without bones
		1104	Insects, grubs
		1105	MyFoods_Special Meats
		1106	Organ meat
		1107	Other animal parts
		1108	Pork
		1109	Poultry, rabbit
		1110	Processed meat
		1111	Red meat
		1112	Reptiles
		1113	Seafood
		1114	Small, whole fish, with bones
12	Miscellaneous	1201	Condiments, herbs, spices
		1202	MyFoods_Special Miscellaneous
		1203	Other miscellaneous
		1204	Savory spreads, sauces, pastes, salad dressing,pickles
		1205	Sweet sauce, jams, pastes, spreads
13	Savory snacks	1301	MyFoods_Special Savory Snacks
		1302	Savory snacks, salted, spiced, fried
14	Special fortified products (targeted)	1401	Fortified special biscuits
		1402	Lipid-based Nutrient Supplement
		1403	Multiple Micronutrient Powders
		1404	MyFoods_Special Fortified Products
		1405	Other special fortified products

Grp	FoodGroup_Values_Label_English	Group_subgroup	FoodSubGroup_Values_Label_English
15	Starchy roots & other starchy plant foods	1501	MyFoods_Special Starchy Plant Foods
		1502	Other starchy plant foods
		1503	Vitamin A source starchy plant foods
		1504	Vitamin C-rich starchy plant foods
16	Sweetened snacks & desserts	1601	MyFoods_Special Sweetened Snacks and Desserts
		1602	Other sweetened desserts (gelatine, non-diary ice)
		1603	Sweet snack foods (candy and chocolate)
17	Vegetables	1701	Condiment vegetables
		1702	MyFoods_Special Vegetables
		1703	Other vegetables
		1704	Vitamin A source dark green leafy vegetables
		1705	Vitamin A source other vegetables
		1706	Vitamin C-rich vegetables

Annex 2. Form for WFR, 24HR Dietary Recall, and Food Tally

FORM OF WEIGHED FOOD RECORD (WFR) METHOD

Name of respondent (ID) : _____ ( )

Interviewer : _____

Day, date of weighing (dd/mm/yyyy) : _____

Place eaten	Time	Name of Dish/ Menu	Description of foods/ drinks *(methods of cooking; breakdown ingredients and give brand name if applicable)*	Weight of food consumed (edible)		Food consumed (Served-Waste)
				Served (g)	Waste (g)	

Additional questions:

Was intake unusual in any way? Yes (___) No (___) If yes, in what way?

Do you take vitamin or mineral supplements? Yes (___) No (___)

If yes, how many per day? (___) per week? (___)

If yes, what kind? (give brand if possible)

Multivitamin Iron Ascorbic Acid Other (list)

Additional information *(for quality control measures)*:

Respondent's: Sex M/F Age ___ yr weight _____ kg height _____ cm

FORM OF 24-HR FOOD RECALL METHOD

Name of respondent (ID) : _____ ( )

Interviewer : _____

Day, date of Interview (dd/mm/yyyy) : _____

(Note: data is for foods consumed from 00.00 to 24.00 on the previous day)

Place eaten	**Time**	**Name of Dish/Menu**	**Description of foods/drinks** *(methods of cooking; breakdown ingredients and give brand name if applicable)*	**Weight of food consumed (edible)**	
				HH Unit	**Gram**

Additional questions:

Was intake unusual in any way? Yes (___) No (___) If yes, in what way?

Do you take vitamin or mineral supplements? Yes (___) No (___)

If yes, how many per day? (___) per week? (___)

If yes, what kind? (give brand if possible)

Multivitamin Iron Ascorbic Acid Other (list)

Additional information *(for quality control measures)*:

Respondent's: Sex M/F Age ___ yr weight ____ kg height ____ cm

FORM OF FOOD TALLY

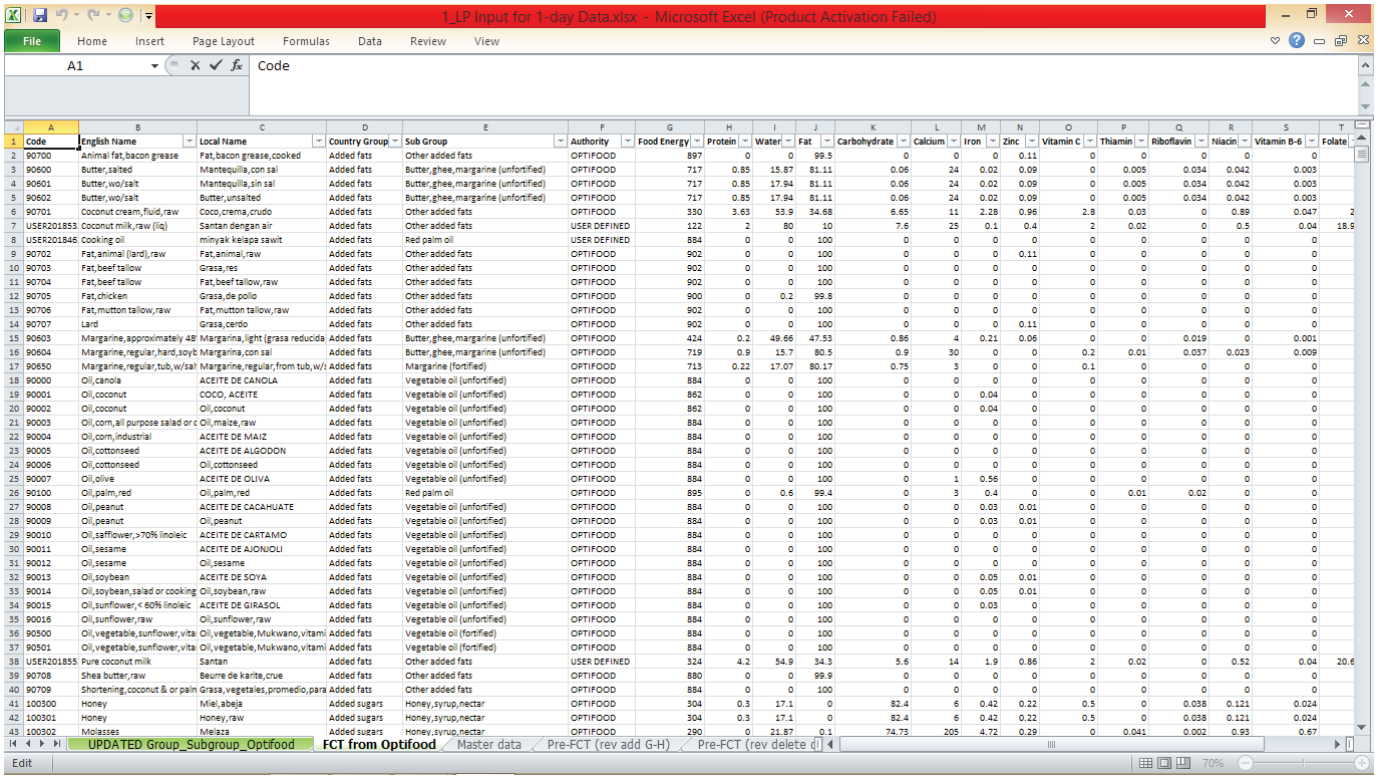
Name of respondent (ID) : _____ ( )

Date :

(**Instruction**: Write down all foods and beverages consumed in daily for 5-days)

Day 1 / 2 / 3 / 4 / 5 (circle the day of food tally)			
Place eaten	**Time**	**Name of Dish/ Menu**	**Description of foods/drinks (methods of cooking; breakdown ingredients and give brand name if applicable)**
	Breakfast		
	Snack		
	Lunch		
	Snack		
	Dinner		

Annex 3. FCT Optifood Template



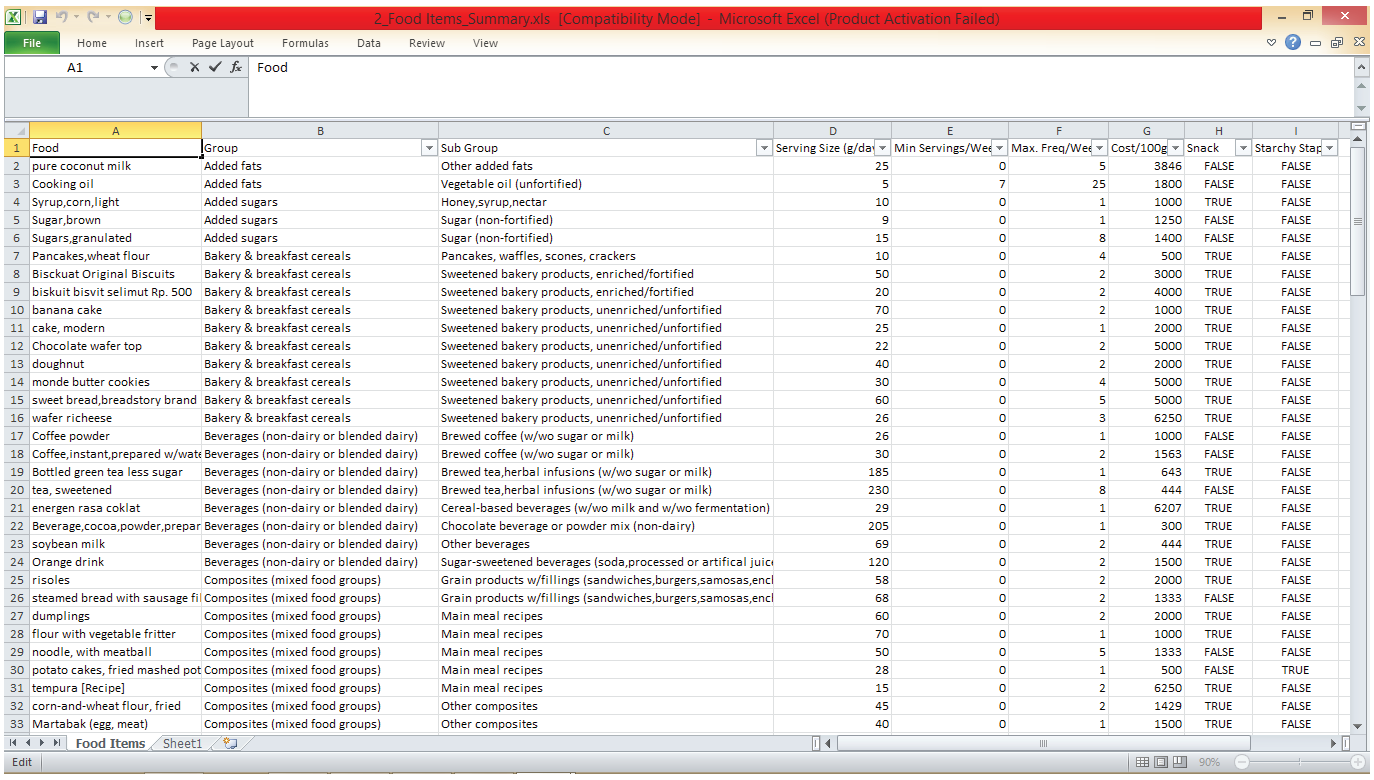
1_LP Input for 1-day Data.xlsx - Microsoft Excel (Product Activation Failed)

Code	English Name	Local Name	Country Group	Sub Group	Authority	Food Energy	Protein	Water	Fat	Carbohydrate	Calcium	Iron	Zinc	Vitamin C	Thiamin	Riboflavin	Niacin	Vitamin B-6	Folate
90700	Animal fat,bacon grease	Fat,bacon grease,cooked	Added fats	Other added fats	OPTIFOOD	897	0	0	99.5	0	0	0	0.11	0	0	0	0	0	
90600	Butter,salted	Mantequilla,con sal	Added fats	Butter,ghee,margarine (unfortified)	OPTIFOOD	717	0.85	15.87	81.11	0.06	24	0.02	0.09	0	0.005	0.034	0.042	0.003	
90601	Butter,wo/salt	Mantequilla,sin sal	Added fats	Butter,ghee,margarine (unfortified)	OPTIFOOD	717	0.85	17.94	81.11	0.06	24	0.02	0.09	0	0.005	0.034	0.042	0.003	
90602	Butter,wo/salt	Butter,unsalted	Added fats	Butter,ghee,margarine (unfortified)	OPTIFOOD	717	0.85	17.94	81.11	0.06	24	0.02	0.09	0	0.005	0.034	0.042	0.003	
90701	Coconut cream,fluid,raw	Coco,crema,crudo	Added fats	Other added fats	OPTIFOOD	330	3.63	53.9	34.68	6.65	11	2.28	0.96	2.8	0.03	0	0.89	0.047	2
USER201853	Coconut milk,raw (liq)	Santan dengan air	Added fats	Other added fats	USER DEFINED	122	2	80	10	7.6	25	0.1	0.4	2	0.02	0	0.5	0.04	18.9
USER201846	Cooking oil	minyak kelapa sawit	Added fats	Red palm oil	USER DEFINED	884	0	0	100	0	0	0	0	0	0	0	0	0	
90702	Fat,animal (lard),raw	Fat,animal,raw	Added fats	Other added fats	OPTIFOOD	902	0	0	100	0	0	0	0.11	0	0	0	0	0	
90703	Fat,beef tallow	Grasa,res	Added fats	Other added fats	OPTIFOOD	902	0	0	100	0	0	0	0	0	0	0	0	0	
90704	Fat,beef tallow	Fat,beef tallow,raw	Added fats	Other added fats	OPTIFOOD	902	0	0	100	0	0	0	0	0	0	0	0	0	
90705	Fat,chicken	Grasa,de pollo	Added fats	Other added fats	OPTIFOOD	900	0	0.2	99.8	0	0	0	0	0	0	0	0	0	
90706	Fat,mutton tallow,raw	Fat,mutton tallow,raw	Added fats	Other added fats	OPTIFOOD	902	0	0	100	0	0	0	0	0	0	0	0	0	
90707	Lard	Grasa,cerdo	Added fats	Other added fats	OPTIFOOD	902	0	0	100	0	0	0	0.11	0	0	0	0	0	
90603	Margarine,approximately 48	Margarina,light (grasa reducida	Added fats	Butter,ghee,margarine (unfortified)	OPTIFOOD	424	0.2	49.66	47.53	0.86	4	0.21	0.06	0	0	0.019	0	0.001	
90604	Margarine,regular,hard,soyb	Margarina,con sal	Added fats	Butter,ghee,margarine (unfortified)	OPTIFOOD	719	0.9	15.7	80.5	0.9	30	0	0	0.2	0.01	0.037	0.023	0.009	
90650	Margarine,regular,tub,w/sal	Margarine,regular,from tub,w/	Added fats	Margarine (fortified)	OPTIFOOD	713	0.22	17.07	80.17	0.75	3	0	0	0.1	0	0	0	0	
90000	Oil,canola	ACEITE DE CANOLA	Added fats	Vegetable oil (unfortified)	OPTIFOOD	884	0	0	100	0	0	0	0	0	0	0	0	0	
90001	Oil,coconut	COCO, ACEITE	Added fats	Vegetable oil (unfortified)	OPTIFOOD	862	0	0	100	0	0	0.04	0	0	0	0	0	0	
90002	Oil,coconut	Oil,coconut	Added fats	Vegetable oil (unfortified)	OPTIFOOD	862	0	0	100	0	0	0.04	0	0	0	0	0	0	
90003	Oil,corn,all purpose salad or c	Oil,maize,raw	Added fats	Vegetable oil (unfortified)	OPTIFOOD	884	0	0	100	0	0	0	0	0	0	0	0	0	
90004	Oil,corn,industrial	ACEITE DE MAIZ	Added fats	Vegetable oil (unfortified)	OPTIFOOD	884	0	0	100	0	0	0	0	0	0	0	0	0	
90005	Oil,cottonseed	ACEITE DE ALGODON	Added fats	Vegetable oil (unfortified)	OPTIFOOD	884	0	0	100	0	0	0	0	0	0	0	0	0	
90006	Oil,cottonseed	Oil,cottonseed	Added fats	Vegetable oil (unfortified)	OPTIFOOD	884	0	0	100	0	0	0	0	0	0	0	0	0	
90007	Oil,olive	ACEITE DE OLIVA	Added fats	Vegetable oil (unfortified)	OPTIFOOD	884	0	0	100	0	1	0.56	0	0	0	0	0	0	
90100	Oil,palm,red	Oil,palm,red	Added fats	Red palm oil	OPTIFOOD	895	0	0.6	99.4	0	3	0.4	0	0	0.01	0.02	0	0	
90008	Oil,peanut	ACEITE DE CACAHUATE	Added fats	Vegetable oil (unfortified)	OPTIFOOD	884	0	0	100	0	0	0.03	0.01	0	0	0	0	0	
90009	Oil,peanut	Oil,peanut	Added fats	Vegetable oil (unfortified)	OPTIFOOD	884	0	0	100	0	0	0.03	0.01	0	0	0	0	0	
90010	Oil,safflower,>70% linoleic	ACEITE DE CARTAMO	Added fats	Vegetable oil (unfortified)	OPTIFOOD	884	0	0	100	0	0	0	0	0	0	0	0	0	
90011	Oil,sesame	ACEITE DE AJONJOLI	Added fats	Vegetable oil (unfortified)	OPTIFOOD	884	0	0	100	0	0	0	0	0	0	0	0	0	
90012	Oil,sesame	Oil,sesame	Added fats	Vegetable oil (unfortified)	OPTIFOOD	884	0	0	100	0	0	0	0	0	0	0	0	0	
90013	Oil,soybean	ACEITE DE SOYA	Added fats	Vegetable oil (unfortified)	OPTIFOOD	884	0	0	100	0	0	0.05	0.01	0	0	0	0	0	
90014	Oil,soybean,salad or cooking	Oil,soybean,raw	Added fats	Vegetable oil (unfortified)	OPTIFOOD	884	0	0	100	0	0	0.05	0.01	0	0	0	0	0	
90015	Oil,sunflower,< 60% linoleic	ACEITE DE GIRASOL	Added fats	Vegetable oil (unfortified)	OPTIFOOD	884	0	0	100	0	0	0.03	0	0	0	0	0	0	
90016	Oil,sunflower,raw	Oil,sunflower,raw	Added fats	Vegetable oil (unfortified)	OPTIFOOD	884	0	0	100	0	0	0	0	0	0	0	0	0	
90500	Oil,vegetable,sunflower,vita	Oil,vegetable,Mukwano,vitami	Added fats	Vegetable oil (fortified)	OPTIFOOD	884	0	0	100	0	0	0	0	0	0	0	0	0	
90501	Oil,vegetable,sunflower,vita	Oil,vegetable,Mukwano,vitami	Added fats	Vegetable oil (fortified)	OPTIFOOD	884	0	0	100	0	0	0	0	0	0	0	0	0	
USER201855	Pure coconut milk	Santan	Added fats	Other added fats	USER DEFINED	324	4.2	54.9	34.3	5.6	14	1.9	0.86	2	0.02	0	0.52	0.04	20.6
90708	Shea butter,raw	Beurre de karite,crue	Added fats	Other added fats	OPTIFOOD	880	0	0	99.9	0	0	0	0	0	0	0	0	0	
90709	Shortening,coconut & or palm	Grasa,vegetales,promedio,para	Added fats	Other added fats	OPTIFOOD	884	0	0	100	0	0	0	0	0	0	0	0	0	
100300	Honey	Miel,abeja	Added sugars	Honey,syrup,nectar	OPTIFOOD	304	0.3	17.1	0	82.4	6	0.42	0.22	0.5	0	0.038	0.121	0.024	
100301	Honey	Honey,raw	Added sugars	Honey,syrup,nectar	OPTIFOOD	304	0.3	17.1	0	82.4	6	0.42	0.22	0.5	0	0.038	0.121	0.024	
100302	Molasses	Melaza	Added sugars	Honey,syrup,nectar	OPTIFOOD	290	0	21.87	0.1	74.73	205	4.72	0.29	0	0.041	0.002	0.93	0.67	

UPDATED Group_Subgroup_Optifood | FCT from Optifood | Master data | Pre-FCT (rev add G-H) | Pre-FCT (rev delete d

Annex 4. LP Optifood Input Template

Annex 4.1 Food item summary

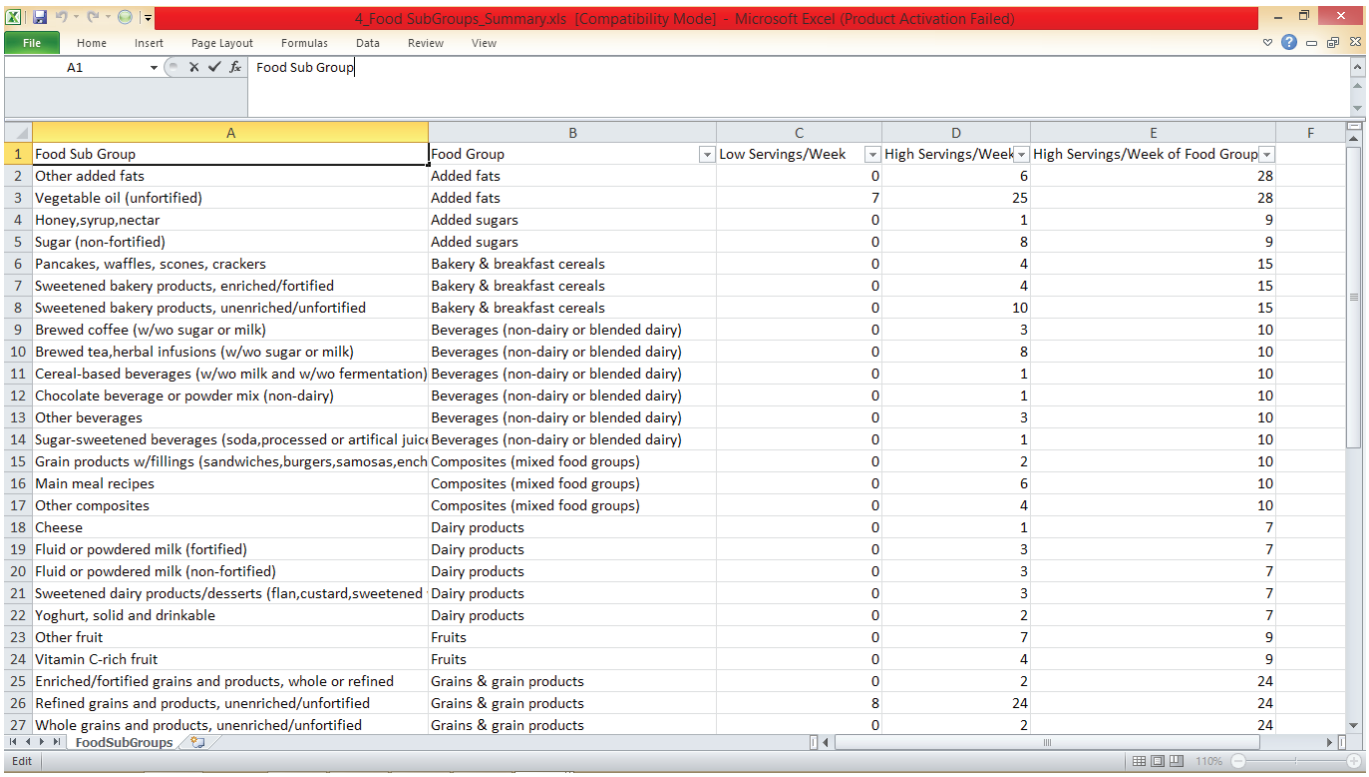


2_Food Items_Summary.xls [Compatibility Mode] - Microsoft Excel (Product Activation Failed)

Food	Group	Sub Group	Serving Size (g/da	Min Servings/Wee	Max. Freq/Wee	Cost/100g	Snack	Starchy Stap
pure coconut milk	Added fats	Other added fats	25	0	5	3846	FALSE	FALSE
Cooking oil	Added fats	Vegetable oil (unfortified)	5	7	25	1800	FALSE	FALSE
Syrup,corn,light	Added sugars	Honey,syrup,nectar	10	0	1	1000	TRUE	FALSE
Sugar,brown	Added sugars	Sugar (non-fortified)	9	0	1	1250	FALSE	FALSE
Sugars,granulated	Added sugars	Sugar (non-fortified)	15	0	8	1400	FALSE	FALSE
Pancakes,wheat flour	Bakery & breakfast cereals	Pancakes, waffles, scones, crackers	10	0	4	500	TRUE	FALSE
Bisckuat Original Biscuits	Bakery & breakfast cereals	Sweetened bakery products, enriched/fortified	50	0	2	3000	TRUE	FALSE
biskuit bisvit selimut Rp. 500	Bakery & breakfast cereals	Sweetened bakery products, enriched/fortified	20	0	2	4000	TRUE	FALSE
banana cake	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	70	0	2	1000	TRUE	FALSE
cake, modern	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	25	0	1	2000	TRUE	FALSE
Chocolate wafer top	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	22	0	2	5000	TRUE	FALSE
doughnut	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	40	0	2	2000	TRUE	FALSE
monde butter cookies	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	30	0	4	5000	TRUE	FALSE
sweet bread,breadstory brand	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	60	0	5	5000	TRUE	FALSE
wafer richeese	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified	26	0	3	6250	TRUE	FALSE
Coffee powder	Beverages (non-dairy or blended dairy)	Brewed coffee (w/wo sugar or milk)	26	0	1	1000	FALSE	FALSE
Coffee,instant,prepared w/wate	Beverages (non-dairy or blended dairy)	Brewed coffee (w/wo sugar or milk)	30	0	2	1563	FALSE	FALSE
Bottled green tea less sugar	Beverages (non-dairy or blended dairy)	Brewed tea,herbal infusions (w/wo sugar or milk)	185	0	1	643	TRUE	FALSE
tea, sweetened	Beverages (non-dairy or blended dairy)	Brewed tea,herbal infusions (w/wo sugar or milk)	230	0	8	444	FALSE	FALSE
energen rasa coklat	Beverages (non-dairy or blended dairy)	Cereal-based beverages (w/wo milk and w/wo fermentation)	29	0	1	6207	TRUE	FALSE
Beverage,cocoa,powder,prepar	Beverages (non-dairy or blended dairy)	Chocolate beverage or powder mix (non-dairy)	205	0	1	300	TRUE	FALSE
soybean milk	Beverages (non-dairy or blended dairy)	Other beverages	69	0	2	444	TRUE	FALSE
Orange drink	Beverages (non-dairy or blended dairy)	Sugar-sweetened beverages (soda,processed or artifical juic	120	0	2	1500	TRUE	FALSE
risoles	Composites (mixed food groups)	Grain products w/fillings (sandwiches,burgers,samosas,encl	58	0	2	2000	TRUE	FALSE
steamed bread with sausage fil	Composites (mixed food groups)	Grain products w/fillings (sandwiches,burgers,samosas,encl	68	0	2	1333	FALSE	FALSE
dumplings	Composites (mixed food groups)	Main meal recipes	60	0	2	2000	TRUE	FALSE
flour with vegetable fritter	Composites (mixed food groups)	Main meal recipes	70	0	1	1000	TRUE	FALSE
noodle, with meatball	Composites (mixed food groups)	Main meal recipes	50	0	5	1333	FALSE	FALSE
potato cakes, fried mashed pot	Composites (mixed food groups)	Main meal recipes	28	0	1	500	FALSE	TRUE
tempura [Recipe]	Composites (mixed food groups)	Main meal recipes	15	0	2	6250	TRUE	FALSE
corn-and-wheat flour, fried	Composites (mixed food groups)	Other composites	45	0	2	1429	TRUE	FALSE
Martabak (egg, meat)	Composites (mixed food groups)	Other composites	40	0	1	1500	TRUE	FALSE

Food Items | Sheet1

Annex 4.2 Food sub-group summary



4_Food SubGroups_Summary.xls [Compatibility Mode] - Microsoft Excel (Product Activation Failed)

File Home Insert Page Layout Formulas Data Review View

A1 Food Sub Group

	A	B	C	D	E	F
1	Food Sub Group	Food Group	Low Servings/Week	High Servings/Week	High Servings/Week of Food Group	
2	Other added fats	Added fats	0	6	28	
3	Vegetable oil (unfortified)	Added fats	7	25	28	
4	Honey,syrup,nectar	Added sugars	0	1	9	
5	Sugar (non-fortified)	Added sugars	0	8	9	
6	Pancakes, waffles, scones, crackers	Bakery & breakfast cereals	0	4	15	
7	Sweetened bakery products, enriched/fortified	Bakery & breakfast cereals	0	4	15	
8	Sweetened bakery products, unenriched/unfortified	Bakery & breakfast cereals	0	10	15	
9	Brewed coffee (w/wo sugar or milk)	Beverages (non-dairy or blended dairy)	0	3	10	
10	Brewed tea,herbal infusions (w/wo sugar or milk)	Beverages (non-dairy or blended dairy)	0	8	10	
11	Cereal-based beverages (w/wo milk and w/wo fermentation)	Beverages (non-dairy or blended dairy)	0	1	10	
12	Chocolate beverage or powder mix (non-dairy)	Beverages (non-dairy or blended dairy)	0	1	10	
13	Other beverages	Beverages (non-dairy or blended dairy)	0	3	10	
14	Sugar-sweetened beverages (soda,processed or artifical juic	Beverages (non-dairy or blended dairy)	0	1	10	
15	Grain products w/fillings (sandwiches,burgers,samosas,ench	Composites (mixed food groups)	0	2	10	
16	Main meal recipes	Composites (mixed food groups)	0	6	10	
17	Other composites	Composites (mixed food groups)	0	4	10	
18	Cheese	Dairy products	0	1	7	
19	Fluid or powdered milk (fortified)	Dairy products	0	3	7	
20	Fluid or powdered milk (non-fortified)	Dairy products	0	3	7	
21	Sweetened dairy products/desserts (flan,custard,sweetened	Dairy products	0	3	7	
22	Yoghurt, solid and drinkable	Dairy products	0	2	7	
23	Other fruit	Fruits	0	7	9	
24	Vitamin C-rich fruit	Fruits	0	4	9	
25	Enriched/fortified grains and products, whole or refined	Grains & grain products	0	2	24	
26	Refined grains and products, unenriched/unfortified	Grains & grain products	8	24	24	
27	Whole grains and products, unenriched/unfortified	Grains & grain products	0	2	24	

FoodSubGroups

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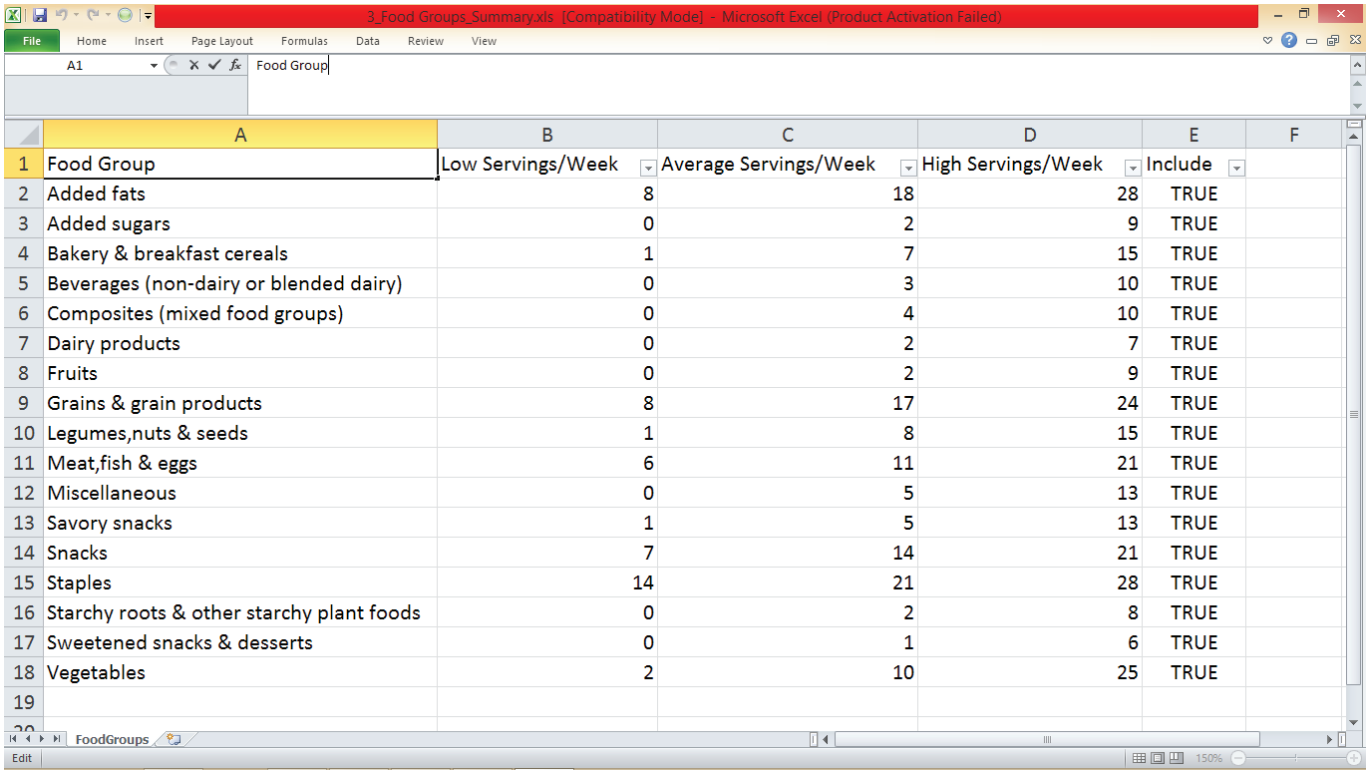
Annex 4.3 Food group summary



3_Food Groups_Summary.xls [Compatibility Mode] - Microsoft Excel (Product Activation Failed)

File Home Insert Page Layout Formulas Data Review View

A1 Food Group

	A	B	C	D	E	F
1	Food Group	Low Servings/Week	Average Servings/Week	High Servings/Week	Include	
2	Added fats	8	18	28	TRUE	
3	Added sugars	0	2	9	TRUE	
4	Bakery & breakfast cereals	1	7	15	TRUE	
5	Beverages (non-dairy or blended dairy)	0	3	10	TRUE	
6	Composites (mixed food groups)	0	4	10	TRUE	
7	Dairy products	0	2	7	TRUE	
8	Fruits	0	2	9	TRUE	
9	Grains & grain products	8	17	24	TRUE	
10	Legumes,nuts & seeds	1	8	15	TRUE	
11	Meat,fish & eggs	6	11	21	TRUE	
12	Miscellaneous	0	5	13	TRUE	
13	Savory snacks	1	5	13	TRUE	
14	Snacks	7	14	21	TRUE	
15	Staples	14	21	28	TRUE	
16	Starchy roots & other starchy plant foods	0	2	8	TRUE	
17	Sweetened snacks & desserts	0	1	6	TRUE	
18	Vegetables	2	10	25	TRUE	
19						

FoodGroups

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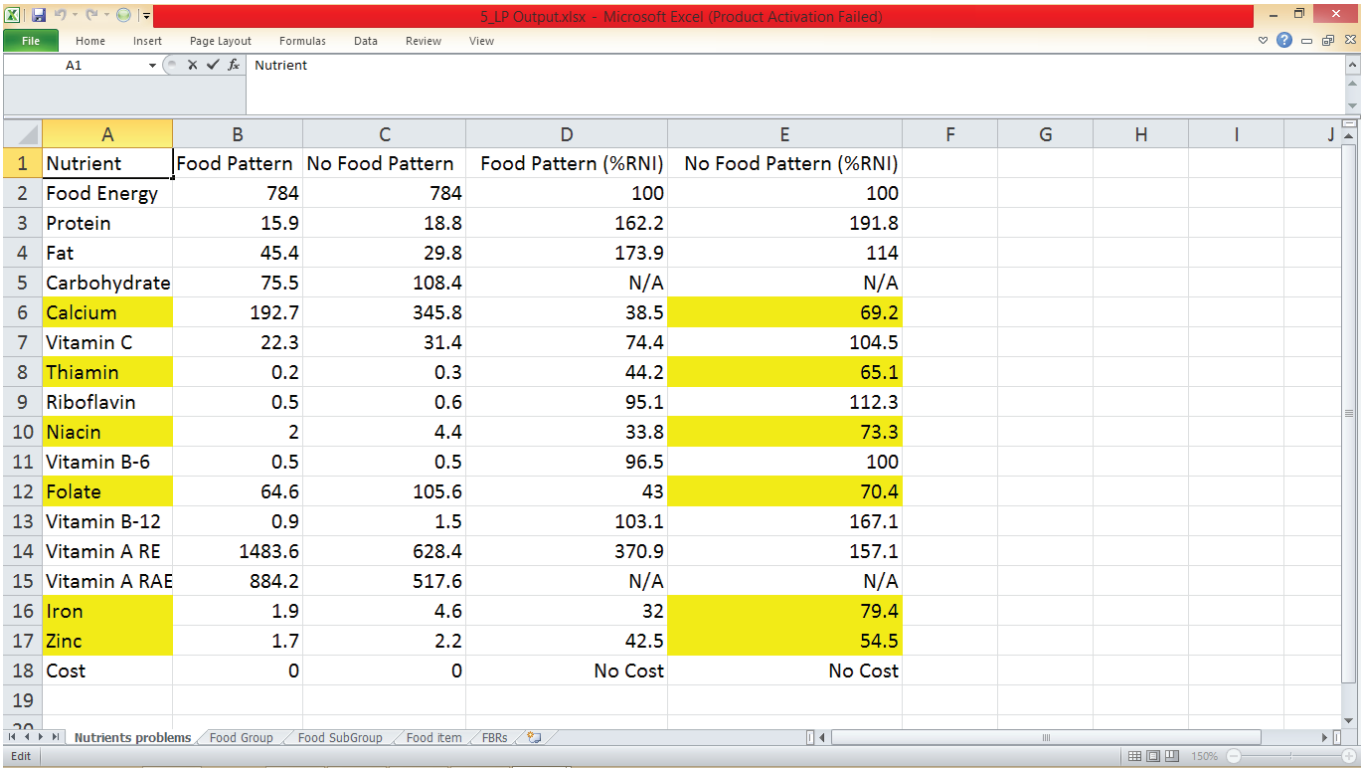
Annex 5. LP Output: examples

Annex 5.1 Problem nutrient



5_LP Output.xlsx - Microsoft Excel (Product Activation Failed)

File Home Insert Page Layout Formulas Data Review View

A1 Nutrient

	A	B	C	D	E	F	G	H	I	J
1	Nutrient	Food Pattern	No Food Pattern	Food Pattern (%RNI)	No Food Pattern (%RNI)					
2	Food Energy	784	784	100	100					
3	Protein	15.9	18.8	162.2	191.8					
4	Fat	45.4	29.8	173.9	114					
5	Carbohydrate	75.5	108.4	N/A	N/A					
6	Calcium	192.7	345.8	38.5	69.2					
7	Vitamin C	22.3	31.4	74.4	104.5					
8	Thiamin	0.2	0.3	44.2	65.1					
9	Riboflavin	0.5	0.6	95.1	112.3					
10	Niacin	2	4.4	33.8	73.3					
11	Vitamin B-6	0.5	0.5	96.5	100					
12	Folate	64.6	105.6	43	70.4					
13	Vitamin B-12	0.9	1.5	103.1	167.1					
14	Vitamin A RE	1483.6	628.4	370.9	157.1					
15	Vitamin A RAE	884.2	517.6	N/A	N/A					
16	Iron	1.9	4.6	32	79.4					
17	Zinc	1.7	2.2	42.5	54.5					
18	Cost	0	0	No Cost	No Cost					
19										

Nutrients problems | Food Group | Food SubGroup | Food item | FBRs

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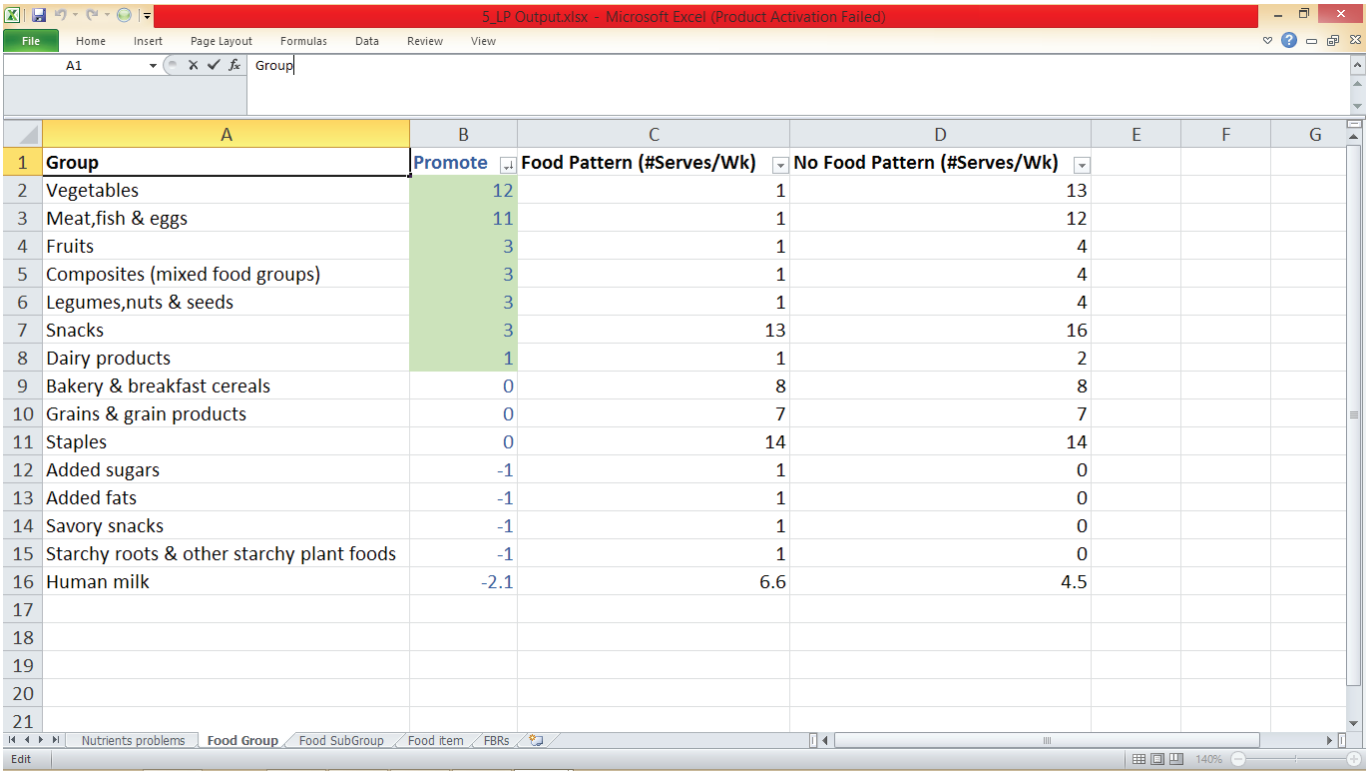
Annex 5.2 Food group potentially to be promoted



5_LP Output.xlsx - Microsoft Excel (Product Activation Failed)

File Home Insert Page Layout Formulas Data Review View

A1 Group

	A	B	C	D	E	F	G
1	Group	Promote	Food Pattern (#Serves/Wk)	No Food Pattern (#Serves/Wk)			
2	Vegetables	12	1	13			
3	Meat,fish & eggs	11	1	12			
4	Fruits	3	1	4			
5	Composites (mixed food groups)	3	1	4			
6	Legumes,nuts & seeds	3	1	4			
7	Snacks	3	13	16			
8	Dairy products	1	1	2			
9	Bakery & breakfast cereals	0	8	8			
10	Grains & grain products	0	7	7			
11	Staples	0	14	14			
12	Added sugars	-1	1	0			
13	Added fats	-1	1	0			
14	Savory snacks	-1	1	0			
15	Starchy roots & other starchy plant foods	-1	1	0			
16	Human milk	-2.1	6.6	4.5			
17							
18							
19							
20							
21							

Nutrients problems | Food Group | Food SubGroup | Food item | FBRs

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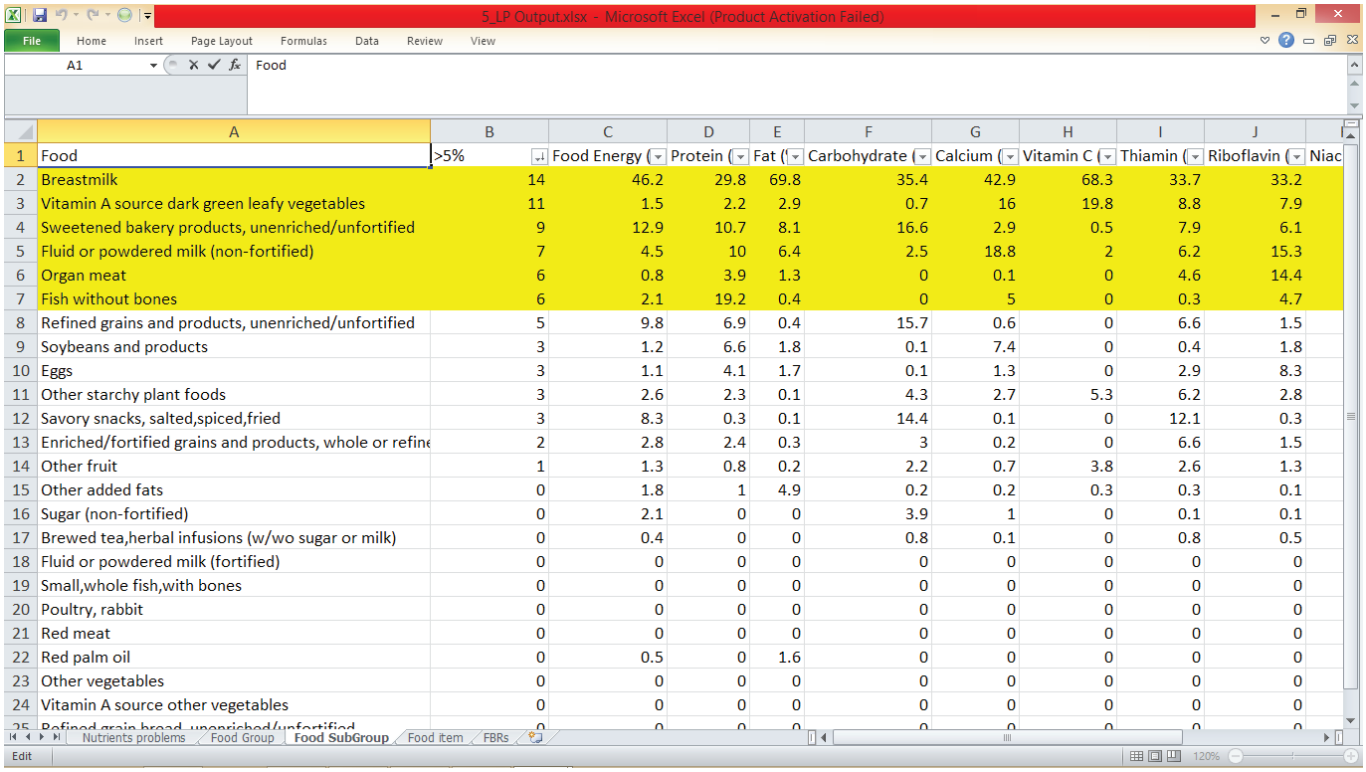
Annex 5.3 Food sub-group potentially to be promoted

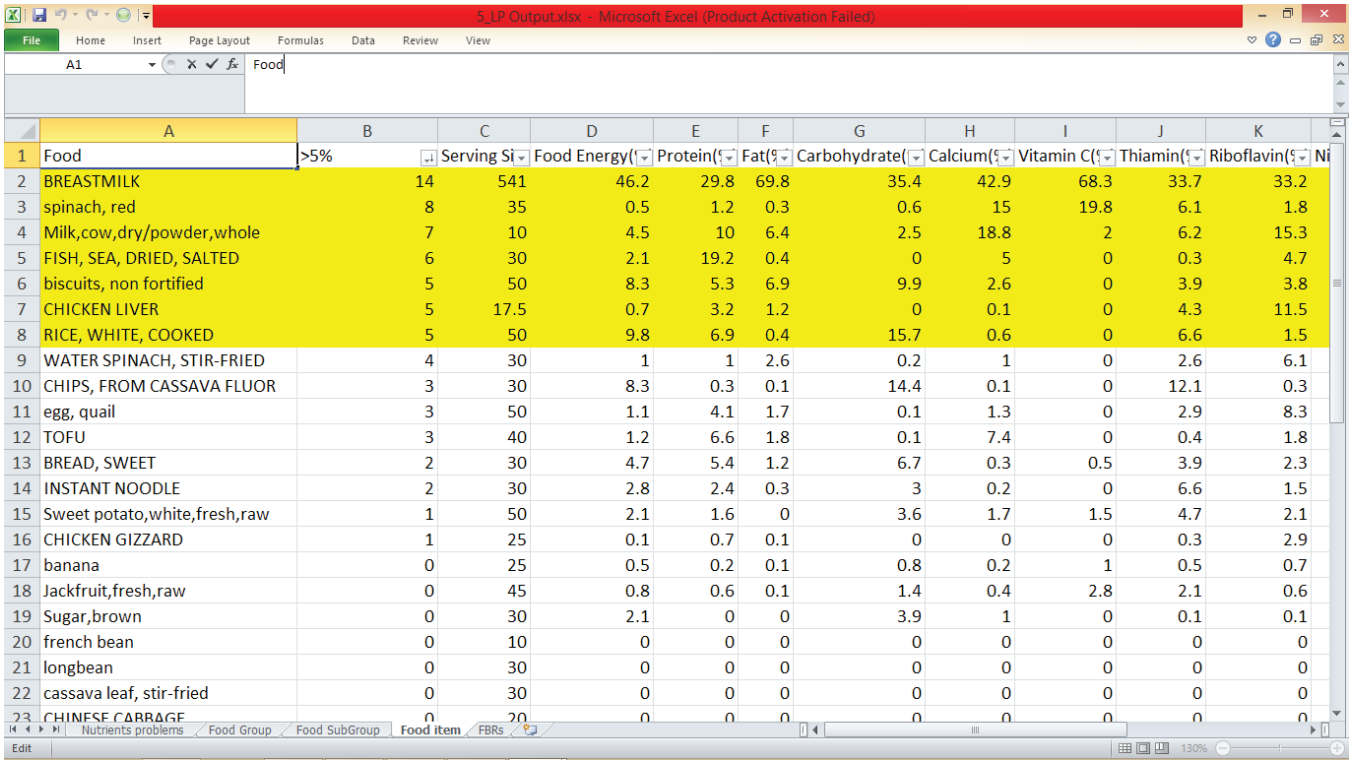


5_LP Output.xlsx - Microsoft Excel (Product Activation Failed)

	A	B	C	D	E	F	G	H	I	J
1	Food	>5%	Food Energy (	Protein (	Fat (	Carbohydrate (	Calcium (	Vitamin C (	Thiamin (	Riboflavin (	Niac
2	Breastmilk	14	46.2	29.8	69.8	35.4	42.9	68.3	33.7	33.2	
3	Vitamin A source dark green leafy vegetables	11	1.5	2.2	2.9	0.7	16	19.8	8.8	7.9	
4	Sweetened bakery products, unenriched/unfortified	9	12.9	10.7	8.1	16.6	2.9	0.5	7.9	6.1	
5	Fluid or powdered milk (non-fortified)	7	4.5	10	6.4	2.5	18.8	2	6.2	15.3	
6	Organ meat	6	0.8	3.9	1.3	0	0.1	0	4.6	14.4	
7	Fish without bones	6	2.1	19.2	0.4	0	5	0	0.3	4.7	
8	Refined grains and products, unenriched/unfortified	5	9.8	6.9	0.4	15.7	0.6	0	6.6	1.5	
9	Soybeans and products	3	1.2	6.6	1.8	0.1	7.4	0	0.4	1.8	
10	Eggs	3	1.1	4.1	1.7	0.1	1.3	0	2.9	8.3	
11	Other starchy plant foods	3	2.6	2.3	0.1	4.3	2.7	5.3	6.2	2.8	
12	Savory snacks, salted,spiced,fried	3	8.3	0.3	0.1	14.4	0.1	0	12.1	0.3	
13	Enriched/fortified grains and products, whole or refine	2	2.8	2.4	0.3	3	0.2	0	6.6	1.5	
14	Other fruit	1	1.3	0.8	0.2	2.2	0.7	3.8	2.6	1.3	
15	Other added fats	0	1.8	1	4.9	0.2	0.2	0.3	0.3	0.1	
16	Sugar (non-fortified)	0	2.1	0	0	3.9	1	0	0.1	0.1	
17	Brewed tea,herbal infusions (w/wo sugar or milk)	0	0.4	0	0	0.8	0.1	0	0.8	0.5	
18	Fluid or powdered milk (fortified)	0	0	0	0	0	0	0	0	0	
19	Small,whole fish,with bones	0	0	0	0	0	0	0	0	0	
20	Poultry, rabbit	0	0	0	0	0	0	0	0	0	
21	Red meat	0	0	0	0	0	0	0	0	0	
22	Red palm oil	0	0.5	0	1.6	0	0	0	0	0	
23	Other vegetables	0	0	0	0	0	0	0	0	0	
24	Vitamin A source other vegetables	0	0	0	0	0	0	0	0	0	
25	Refined grain bread, unenriched/unfortified	0	0	0	0	0	0	0	0	0	

Nutrients problems | Food Group | Food SubGroup | Food item | FBRs

Annex 5.4 Food item potentially to be promoted

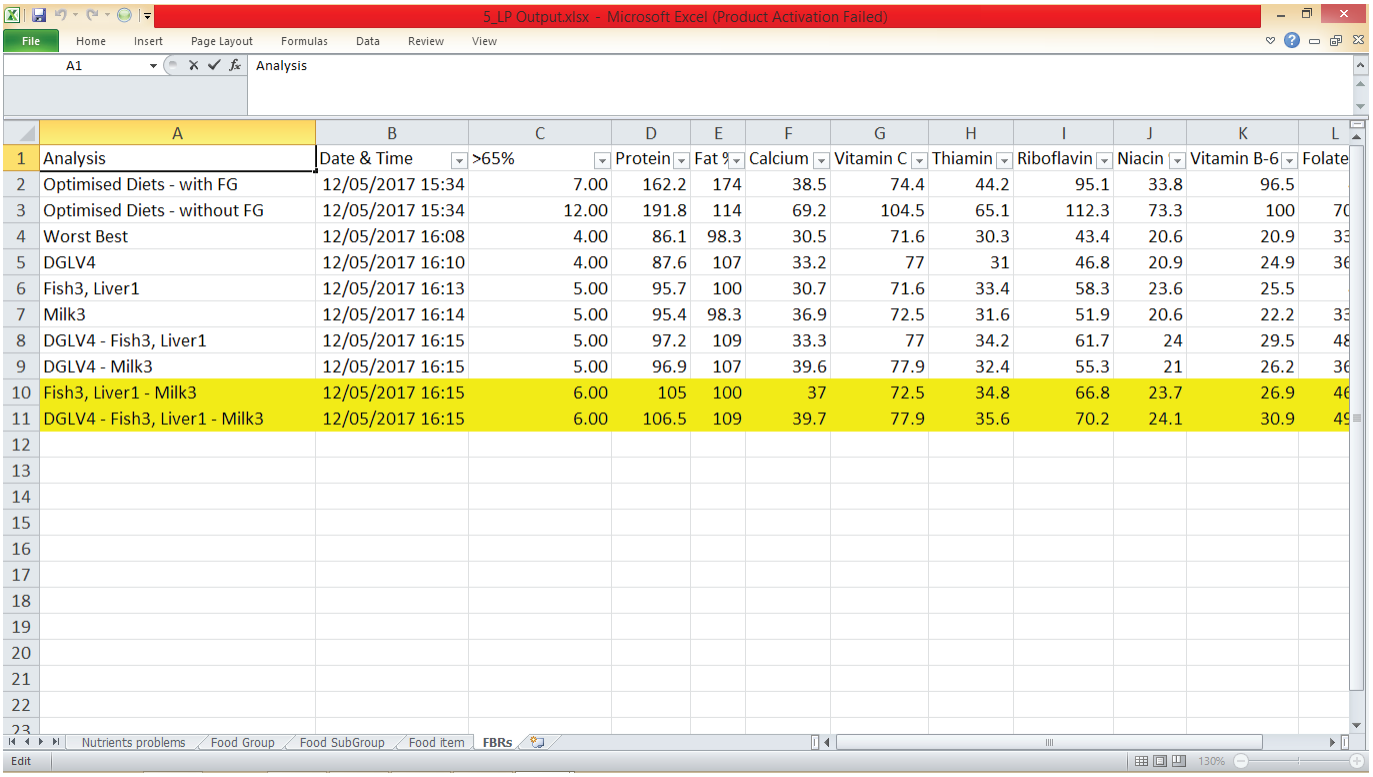


5_LP Output.xlsx - Microsoft Excel (Product Activation Failed)

	A	B	C	D	E	F	G	H	I	J	K
1	Food	>5%	Serving Si	Food Energy(	Protein(	Fat(	Carbohydrate(	Calcium(	Vitamin C(	Thiamin(	Riboflavin(	Ni
2	BREASTMILK	14	541	46.2	29.8	69.8	35.4	42.9	68.3	33.7	33.2	
3	spinach, red	8	35	0.5	1.2	0.3	0.6	15	19.8	6.1	1.8	
4	Milk,cow,dry/powder,whole	7	10	4.5	10	6.4	2.5	18.8	2	6.2	15.3	
5	FISH, SEA, DRIED, SALTED	6	30	2.1	19.2	0.4	0	5	0	0.3	4.7	
6	biscuits, non fortified	5	50	8.3	5.3	6.9	9.9	2.6	0	3.9	3.8	
7	CHICKEN LIVER	5	17.5	0.7	3.2	1.2	0	0.1	0	4.3	11.5	
8	RICE, WHITE, COOKED	5	50	9.8	6.9	0.4	15.7	0.6	0	6.6	1.5	
9	WATER SPINACH, STIR-FRIED	4	30	1	1	2.6	0.2	1	0	2.6	6.1	
10	CHIPS, FROM CASSAVA FLUOR	3	30	8.3	0.3	0.1	14.4	0.1	0	12.1	0.3	
11	egg, quail	3	50	1.1	4.1	1.7	0.1	1.3	0	2.9	8.3	
12	TOFU	3	40	1.2	6.6	1.8	0.1	7.4	0	0.4	1.8	
13	BREAD, SWEET	2	30	4.7	5.4	1.2	6.7	0.3	0.5	3.9	2.3	
14	INSTANT NOODLE	2	30	2.8	2.4	0.3	3	0.2	0	6.6	1.5	
15	Sweet potato,white,fresh,raw	1	50	2.1	1.6	0	3.6	1.7	1.5	4.7	2.1	
16	CHICKEN GIZZARD	1	25	0.1	0.7	0.1	0	0	0	0.3	2.9	
17	banana	0	25	0.5	0.2	0.1	0.8	0.2	1	0.5	0.7	
18	Jackfruit,fresh,raw	0	45	0.8	0.6	0.1	1.4	0.4	2.8	2.1	0.6	
19	Sugar,brown	0	30	2.1	0	0	3.9	1	0	0.1	0.1	
20	french bean	0	10	0	0	0	0	0	0	0	0	
21	longbean	0	30	0	0	0	0	0	0	0	0	
22	cassava leaf, stir-fried	0	30	0	0	0	0	0	0	0	0	
23	CHINESE CABBAGE	0	20	0	0	0	0	0	0	0	0	

Nutrients problems | Food Group | Food SubGroup | Food item | FBRs

Annex 5.5 Alternative FBRs



5_LP Output.xlsx - Microsoft Excel (Product Activation Failed)

File Home Insert Page Layout Formulas Data Review View

A1 Analysis

	A	B	C	D	E	F	G	H	I	J	K	L
1	Analysis	Date & Time	>65%	Protein	Fat %	Calcium	Vitamin C	Thiamin	Riboflavin	Niacin	Vitamin B-6	Folate
2	Optimised Diets - with FG	12/05/2017 15:34	7.00	162.2	174	38.5	74.4	44.2	95.1	33.8	96.5	
3	Optimised Diets - without FG	12/05/2017 15:34	12.00	191.8	114	69.2	104.5	65.1	112.3	73.3	100	70
4	Worst Best	12/05/2017 16:08	4.00	86.1	98.3	30.5	71.6	30.3	43.4	20.6	20.9	33
5	DGLV4	12/05/2017 16:10	4.00	87.6	107	33.2	77	31	46.8	20.9	24.9	36
6	Fish3, Liver1	12/05/2017 16:13	5.00	95.7	100	30.7	71.6	33.4	58.3	23.6	25.5	
7	Milk3	12/05/2017 16:14	5.00	95.4	98.3	36.9	72.5	31.6	51.9	20.6	22.2	33
8	DGLV4 - Fish3, Liver1	12/05/2017 16:15	5.00	97.2	109	33.3	77	34.2	61.7	24	29.5	48
9	DGLV4 - Milk3	12/05/2017 16:15	5.00	96.9	107	39.6	77.9	32.4	55.3	21	26.2	36
10	Fish3, Liver1 - Milk3	12/05/2017 16:15	6.00	105	100	37	72.5	34.8	66.8	23.7	26.9	46
11	DGLV4 - Fish3, Liver1 - Milk3	12/05/2017 16:15	6.00	106.5	109	39.7	77.9	35.6	70.2	24.1	30.9	49
12												
13												
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21												
22												
23												

Nutrients problems | Food Group | Food SubGroup | Food item | FBRs

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