



CREATED BY GUSNIP NTAE CENTER

Dietary Screener Questionnaire (DSQ) Quick Guide

Overview

The Gus Schumacher Nutrition Incentive Program's (GusNIP) Nutrition Incentive Program Training, Technical Assistance, Evaluation, and Information Center (NTAE) is tasked with providing reporting and evaluation support to grantees that launch, modify, or expand their projects. Apart from GusNIP NI Pilot Projects, all grantees from the GusNIP family of funding (i.e., GusNIP, GusCRR, ARPA, etc.; nutrition incentive [NI] and produce prescription [PPR] projects) are required to collect a set of core metrics including participant- and firm-level metrics to demonstrate the impact of incentive projects. One of these metrics is **fruit and vegetable (FV) intake**, as it is a primary outcome of interest for GusNIP.

What is the DSQ?

The Dietary Screener Questionnaire (DSQ) is used to assess FV intake of GusNIP and GusCRR participants.¹ The DSQ FV module is the chosen dietary assessment tool because it has been validated, was tested among low-income populations, can be self-administered, does not require participants to report serving size, is relatively precise and accurate, and is sensitive enough to change with small changes in dietary intake. A total of 10-items are asked via survey to measure FV intake of GusNIP and GusCRR participants. Responses to these dietary intake questions are converted to daily cup equivalent estimates (e.g., 1.2 cups of vegetables per day, 1.1 cups of fruit per day, 2.3 cups of FVs per day) of daily FV intake. The 2020-2025 United States Dietary Guidelines for Americans recommend consuming 2 to 3 cups of vegetables per day and 1.5 to 2 cups of fruit per day.

Collecting DSQ Data

FV intake is a participant-level core metric that measures the impact of GusNIP and GusCRR on participants. The 10-item DSQ scale collects intake frequency of fruits and vegetables from the past 30 days, including 100% fruit juice, fruit, salad, fried potatoes, other kinds of potatoes, cooked dried beans, other vegetables, salsa, pizza, and tomato sauce. Data are collected through survey responses from participants.

¹The entire DSQ is a 26-item tool developed by the National Cancer Institute (NCI) that captures intakes of FVs, dairy/calcium, added sugars, whole grains/fiber, red meat, and processed meat by asking participants about the frequency of intake in the past month.

DSQ FV Module Located in GusNIP NTAE Survey

Below are the instructions for the module, questions within the DSQ survey, and the response options.

Instructions: The next set of questions is about the different kinds of foods you ate or drank during the past month, that is, the past 30 days. When answering, please include meals and snacks eaten at home, at work or school, in restaurants, and anyplace else.

Questions and Responses

1. During the past month, how often did you drink 100% PURE FRUIT JUICES such as orange, apple, grape, etc.?
DO NOT INCLUDE fruit-flavored drinks with added sugars like Capri-Sun, Sunny D, or other fruit-flavored drinks.
 - Never
 - 1 time last month
 - 2-3 times last month
 - 1 time per week
 - 2 times per week
 - 3-4 times per week
 - 5-6 times per week
 - 1 time per day
 - 2-3 times per day
 - 4-5 times per day
 - 6 or more times a day
 - Don't know/Prefer not to answer
2. During the past month, how often did you eat FRUITS like apples, bananas, oranges, melon, or any other fruits?
INCLUDE fresh, frozen, canned, or dried fruit. DO NOT INCLUDE juices
 - Never
 - 1 time last month
 - 2-3 times last month
 - 1 time per week
 - 2 times per week
 - 3-4 times per week
 - 5-6 times per week
 - 1 time per day
 - 2 or more times per day
 - Don't know/Prefer not to answer
3. During the past month, how often did you eat a GREEN LEAFY OR LETTUCE SALAD, with or without other vegetables?

- Never
 - 1 time last month
 - 2-3 times last month
 - 1 time per week
 - 2 times per week
 - 3-4 times per week
 - 5-6 times per week
 - 1 time per day
 - 2 or more times per day
 - Don't know/Prefer not to answer
4. During the past month, how often did you eat any kind of FRIED POTATOES like French fries, tater tots, hash brown potatoes, or other fried potatoes?
- Never
 - 1 time last month
 - 2-3 times last month
 - 1 time per week
 - 2 times per week
 - 3-4 times per week
 - 5-6 times per week
 - 1 time per day
 - 2 or more times per day
 - Don't know/Prefer not to answer
5. During the past month, how often did you eat ANY OTHER KIND OF POTATOES that aren't fried like baked, boiled, mashed, or potatoes used in soups or stews?
- Never
 - 1 time last month
 - 2-3 times last month
 - 1 time per week
 - 2 times per week
 - 3-4 times per week
 - 5-6 times per week
 - 1 time per day
 - 2 or more times per day
 - Don't know/Prefer not to answer
6. During the past month, how often did you eat refried beans, baked beans, pinto beans, black beans, beans in soup, or any other type of COOKED BEANS?
INCLUDE canned or dry beans.
DO NOT INCLUDE green beans or string beans.
- Never

- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day
- Don't know/Prefer not to answer

7. During the past month, how often did you eat other VEGETABLES that were not deep-fried? These are vegetables like carrots, broccoli, collards, green beans, corn, or other vegetables that are not deep-fried.

INCLUDE canned, frozen, and fresh vegetables.

ALSO INCLUDE vegetables that are raw, boiled, broiled, baked, grilled, stir-fried, or microwaved.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day
- Don't know/Prefer not to answer

8. During the past month, how often did you eat packaged or homemade SALSA made with tomato?

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day
- Don't know/Prefer not to answer

9. During the past month, how often did you eat PIZZA?

INCLUDE frozen pizza, fast food pizza, and homemade pizza.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 3-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day
- Don't know/prefer not to answer

10. During the past month, how often did you eat TOMATO SAUCE in recipes such as spaghetti, lasagna, or other dishes?

DO NOT INCLUDE tomato sauce on pizza.

- Never
- 1 time last month
- 2-3 times last month
- 1 time per week
- 2 times per week
- 2-4 times per week
- 5-6 times per week
- 1 time per day
- 2 or more times per day
- Don't know/Prefer not to answer

Data Collection Tips for DSQ FV Module

The GusNIP NTAE developed a [Data Collection Training](#) for each grantee team to review and apply in their collection of participant-level surveys. The entire Data Collection Training includes important guidance for all aspects of the participant-level data collection. The guidance below is also included in the Data Collection Training and only applies to the DSQ aspect of the larger participant-level survey.

Dietary data can be challenging to collect as participants have many questions or lack specific recall. The tips below will help you to collect high quality dietary data:

- Read or have the participant read all the directions, questions, and response options. Do not skip or summarize any information.
- To reduce bias, do not place any judgment on the participant's responses. Remain neutral and do not express your feelings in response to the questions to reduce influence over answers.
- If a participant wants to choose an in between response, ask them to choose the response that they are more likely to engage in monthly.

- At times respondents may ask you to define words or to explain some part of a question. We have provided many definitions and explanations in the following slides and a dietary data guide. Make sure to follow these closely and do not add additional information.
- Discourage irrelevant conversation and keep the discussion focused on the interview by responding with a neutral answer such as “Okay.”
- If participants give general responses, nudge to be more specific with responses such as “Was this more than, less than, or the same as usual?”
- This survey asks participants to estimate their intake of ALL foods and drinks that include fruits and vegetables over the past 30 days. Asking for intake during the past month strives to understand usual dietary intake.
- If reading the survey to the participant, read all the response options. Stop reading responses if participant states a response and then confirm response. The number of eating occasions is relevant, not the portion size. Make sure that the participant selects ONE of the options.
- Specific to each item, keep the following in mind:
 - 100% PURE FRUIT JUICES means that there is no added sugar or other ingredients than fruit. Do not include fruit-flavored drinks with added sugar or other ingredients. Do not include juices that are not 100% pure fruit.
 - For FRUITS, remember that fruits can be fresh, frozen, canned, or dried. Example fruits are listed with the question and include any other fruits.
 - For GREEN LEAFY OR LETTUCE SALAD, remember GREEN LEAFY OR LETTUCE SALAD that can be eaten with or without other vegetables. Salad greens are the focus of this question and include kale, arugula, spinach, mixed greens, etc. Greens leafy or lettuce salad can include added ingredients such as sugar, sauces, dressings, spices, flavorings, preservatives, etc.
 - For FRIED POTATOES, remember that FRIED POTATOES are white potatoes. Any form of fried potato counts, including French fries, tater tots, hash brown potatoes.
 - For COOKED BEANS, remember that COOKED BEANS include canned or dry beans. Cooked beans do not include green beans or string beans. Cooked beans include refried beans, baked beans, pinto beans, black beans, beans in soup, or any other type.
 - For VEGETABLES, remember that VEGETABLES should not be deep-fried to be counted in this category. Carrots, broccoli, collards, green beans, corn, or other vegetables can be counted if they are not deep-fried. Include canned, frozen, or fresh vegetables. Include vegetables that are raw, boiled, broiled, baked, grilled, stir-fried, or microwaved. Do not count greens used for a salad here. Example vegetables are listed on this slide and include any other vegetables.
 - For SALSA, remember that SALSA is a tomato-based condiment that typically includes other vegetables (e.g., onion) and herbs (e.g., cilantro).
 - For PIZZA, remember that PIZZA includes frozen, fast food, and homemade pizza. The size of crust or type of topping is not relevant.
 - For TOMATO SAUCE, remember that TOMATO SAUCE is a tomato-based sauce served with dishes often referred to as pasta sauce, marinara, red sauce.

- For an example about how to collect dietary data, check out the short clip in the [Data Collection Training](#) video demonstrating dietary data collection.

Using the DSQ FV Guide to Categorize Fruits and Vegetables into the Correct Question on the DSQ FV Module

The GusNIP NTAE regularly receives questions about where specific fruits and vegetables fit into the DSQ FV Module (Dietary Screener Questionnaire – Fruit and Vegetable Module). For example, do sweet potatoes count under the potatoes question? Thus, the [DSQ FV Guide](#) was developed to help survey participants and data collectors identify fruits and vegetables to include when completing the DSQ FV Module. Additionally, the guide clarifies whether certain foods are categorized as fruits, green leafy or lettuce salad, fried potatoes, any other kind of potatoes, cooked beans, or vegetables (not deep-fried).

Methods

In creating this guide, Gretchen Swanson Center for Nutrition staff used internet search engines to compile an initial list of fruits and vegetables. The list was cross-checked for completeness and reliability using [United States Department of Agriculture \(USDA\) MyPlate’s “Food Group Gallery”](#) and Goody and Drago’s (eds.) *Cultural Food Practices*. USDA MyPlate’s “Food Group Gallery” was used to categorize listed foods as either fruits or vegetables. In cases where there are multiple names for one food (e.g., “Asian pear” and “apple pear”), each name appears separately on the list. Additionally, several invested parties provided input into the completeness of the list to reflect diverse cultures and food practices. The list will be reviewed and updated annually.

The foods listed in this guide include fruits and vegetables alone, as well as some common preparations of potatoes and legumes. It is important to note that fruits and vegetables in prepared foods are NOT eligible for nutrition incentives but DO count as having eaten that food for the purposes of the DSQ. For example, fresh potatoes can be purchased with a nutrition incentive. Prepared roasted potatoes with added salt and fat cannot be purchased with a nutrition incentive but DO count toward potato consumption in the DSQ.

Fruits and vegetables eligible in the GusNIP Nutrition Incentive Program are canned, dried, or frozen fruits or vegetables without added sugars, fats, oils, and salt or sodium. Fruits and vegetables eligible in the GusNIP Produce Prescription Program are fresh fruits and vegetables. For clarification, please see the resource, [GusNIP Nutrition Incentive and Produce Prescription Project Eligible Fruits and Vegetables](#).

Instructions

The guide can be used to support survey administration of the DSQ within the core metrics. How and if this guide is used will depend on the method of survey administration.

- In-person surveying (electronic or pencil and paper)
 - Data collector will reference electronic or printed guide if a participant asks about a specific food
 - Data collector may provide a printed copy of the guide to survey participants to reference
- Phone surveying
 - Data collector will reference electronic or printed guide if a participant asks about a specific food
- Electronic surveys taken at home
 - This guide will be available on the Nutrition Incentive Hub website, but it will not be linked within the survey

Contact

If an item is missing from the DSQ FV Guide, please [click here](#) to alert our team.

References

1. Goody, Cynthia M., and Lorena Drago, editors. *Cultural Food Practices*. Academy of Nutrition and Dietetics, 2010.
2. U.S. Department of Agriculture, MyPlate. [Food Group Gallery](#). No date.

Analyzing DSQ Data

Developing Scoring Algorithms to Estimate FV Intake

To analyze participant responses, [scoring algorithms² that were created by the National Cancer Institute](#) can be applied. The GusNIP NTAE provides each grantee with their participant-level survey results annually, including the DSQ results by participant (raw data) and across participants (report). If a grantee desires to conduct the analysis independently or do an additional analysis, the GusNIP NTAE recommends working with an external evaluator and/or statistician to follow the steps provided by the [National Cancer Institute using their recommended Data Processing & Scoring Procedures](#). SAS software is required to use the publicly available scoring steps.

²Based on the What We Eat in America 24-hour dietary recall (24HR) data from the 2009-2010 National Health and Nutrition Examination Survey (NHANES)

The DSQ algorithm converts a participant’s survey responses to cup equivalent estimates of average daily dietary intake for fruits and/or vegetables (e.g., 1.2 cups of vegetables per day, 1.1 cups of fruit per day, 2.3 cups of FVs per day).

The algorithm uses an age and sex/gender coefficient, so it is important that participants also complete survey questions about age and sex/gender in order to calculate results. The Dietary Screener Questionnaire only accounts for cis-gender responses (male/female) in their algorithm, and does not account for non-cis gendered individuals in the algorithms that calculate cup equivalents. To ensure inclusivity, the GusNIP NTAE built in non-cis gendered response options. For these responses, a frequency score is calculated (e.g., how many times individuals reported 1 time last month).

Instructions for Computing Dietary Screener Questionnaire (DSQ) Results

The Dietary Screener Questionnaire (DSQ) requires a statistical package to convert participant responses to cups of fruits and/or vegetables consumed per day. SAS programming can be found here: <https://epi.grants.cancer.gov/nhanes/dietscreen/programs.html>. Instructions below are derived from the linked National Health and Nutrition Examination Survey (NHANES) instructions and SAS program.

1. Convert all frequency responses to cups units according to the following table: <https://epi.grants.cancer.gov/nhanes/dietscreen/scoring/current/convert.html>
2. Convert all ages to the following age groups with “agegrp” as the variable:

Age	agegrp
2-3 years	1
4-5 years	2
6-7 years	3
8-9 years	4
10-11 years	5
12-13 years	6
14-15 years	7

16-17	
years	8
18-25	
years	9
26-35	
years	10
36-45	
years	11
46-60	
years	12
61-69	
years	13
70-99	
years	14

3. Create a flag called “kidgrp” for those 2-11 years old and “teengrp” for those 12-17 years old. Within each group, the flag is 1 for each participant in those categories and 0 otherwise.
4. Create a variable named “gender” where 1 = male and 2 = female.
5. Download the current (recommended) necessary portion size and regression coefficient data from the zip file in this location:
<https://epi.grants.cancer.gov/nhanes/dietscreen/programs.html>. Any of the files will do as the portion size and regression coefficient data is the same.
 - a. Calib.equation.coeff.xlsx contains the regression coefficient data
 - b. Calib.portion.size.xlsx contains the portion size data
6. Merge the portion size file (calib.portion.size.xlsx) by gender and agegrp with the questionnaire results dataset.

7. Determine the portion size adjustment values used based on the results desired (fruit analyses, vegetable analyses, or fruit and vegetable analyses):

Food group	Fruit analyses	Vegetable analyses	Fruit and vegetable analyses
Fruit juice	fadj5		padj5
Fruit	fadj8		padj8
Salad		vadj9	padj9
Fried potatoes		vadj10	padj10
Other potatoes		vadj11	padj11
Dried beans		vadj12	padj12
Other vegetables		vadj13	padj13
Pizza		vadj14	padj14
Salsa		vadj15	padj15
Tomato sauce		vadj16	padj16

8. Multiply the cup conversion value from step 1 by the portion size adjustment for each gender/age group combination as determined in step 7.
9. Merge the equation coefficients file (calib.equation.coeff.xlsx) by gender with the merged questionnaire results dataset.
10. Produce the results for the regression equation based on desired results:
- Fruits only
 - $\text{cups_fruits} = \text{mrintercept} + (\text{kidgrp} * \text{mrkidb}) + (\text{teengrp} * \text{mrteenb}) + (\text{ffrtjc} * \text{mrfjcb}) + (\text{ffruit} * \text{mrfruitb})$
 - Vegetables only with fries
 - $\text{cups_veg_fries} = \text{mvintercept} + (\text{kidgrp} * \text{mvkidb}) + (\text{teengrp} * \text{mvteenb}) + (\text{vsalad} * \text{mvsaladb}) + (\text{vothpot} * \text{mvothptb}) + (\text{vbean} * \text{mvbeanb}) + (\text{vpizza} * \text{mvpizzab}) + (\text{vothveg} * \text{mvothvgb}) + (\text{vfrfry} * \text{mvfrfrb}) + (\text{vtomsc} * \text{mvtomscb}) + (\text{vsalsa} * \text{mvsalsab})$
 - Vegetables only without fries
 - $\text{cups_veg_no_fries} = \text{muintercept} + (\text{kidgrp} * \text{mukidb}) + (\text{teengrp} * \text{muteenb}) + (\text{vsalad} * \text{musaladb}) + (\text{vothpot} * \text{muothptb}) + (\text{vbean} * \text{mubeanb}) + (\text{vpizza} * \text{mupizzab}) + (\text{vothveg} * \text{muothvgb}) + (\text{vtomsc} * \text{mutomscb}) + (\text{vsalsa} * \text{musalsab})$
 - Fruits and vegetables with fries
 - $\text{cups_fv_fries} = \text{mpintercept} + (\text{kidgrp} * \text{mpkidb}) + (\text{teengrp} * \text{mpteenb}) + (\text{pfrtjc} * \text{mpfjcb}) + (\text{pfruit} * \text{mpfruitb}) + (\text{psalad} * \text{mpsaladb}) + (\text{pothpot} * \text{mpothptb}) + (\text{pbean} * \text{mpbeanb}) + (\text{pothveg} * \text{mpothvgb}) + (\text{pfrfry} * \text{mpfrfrb}) + (\text{ptomsc} * \text{mptomscb}) + (\text{psalsa} * \text{mpsalsab}) + (\text{ppizza} * \text{mppizzab})$
 - Fruits and vegetables without fries
 - $\text{cups_fv_no_fries} = \text{mnintercept} + (\text{kidgrp} * \text{mnkidb}) + (\text{teengrp} * \text{mnteenb}) + (\text{pfrtjc} * \text{mnfjcb}) + (\text{pfruit} * \text{mnfruitb}) + (\text{psalad} * \text{mnsaladb}) + (\text{pothpot} * \text{mnothptb}) + (\text{pbean} * \text{mnbeanb}) + (\text{pothveg} * \text{mnothvgb}) + (\text{ptomsc} * \text{mntomscb}) + (\text{psalsa} * \text{mnsalsab}) + (\text{ppizza} * \text{mnpizzab})$

11. All results are produced in predicted intake in cup equivalents per day.

Questions?

Your Program Advisor is here to support you with any questions related to the DSQ and can also recommend additional quantitative and qualitative measures of interest for your evaluation.

Resources

1. National Institute of Health, National Cancer Institute. *Dietary Screener Questionnaire (DSQ) in the NHANES 2009-10: Dietary Factors, Food Items Asked, and Testing Status for DSQ*. Division of Cancer Control and Population Science.
<https://epi.grants.cancer.gov/nhanes/dietscreen/evaluation.html#pub>.
2. Thompson, F. E., Midthune, D., Kahle, L., & Dodd, K. W. (2017). Development and evaluation of the National Cancer Institute's Dietary Screener Questionnaire scoring algorithms. *The Journal of Nutrition*, 147(6), 1226-1233. <https://doi.org/10.3945/jn.116.246058>
3. United States Department of Agriculture and United States Department of Health and Human Services. (2020). *Dietary Guidelines for Americans, 2020- 2025*. 9th Edition.
[DietaryGuidelines.gov](https://www.dietaryguidelines.gov)

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