The Global Diet Quality Score: Data Collection Options and Tabulation Guidelines

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Introduction

Poor quality diets are associated with adverse health outcomes related to both undernutrition and overnutrition and are a leading cause of disease globally (Global Burden of Disease [GBD] 2016). Yet, until recently, we have lacked a standard, relatively simple, and validated method for routinely measuring diet quality[1] in population-based surveys across contexts (Miller et al. 2020), and therefore have lacked a means by which to assess and track this critical dimension of health and well-being.

In 2018, *Intake* – Center for Dietary Assessment launched a 2-year research initiative[2] to support a consortium of researchers at the Harvard T.H. Chan School of Public Health Department of Nutrition and the National Public Health Institute (INSP), Mexico, to develop and validate metrics of diet quality that would be appropriate for collection through routine population-based surveys and that would be fit for purpose for inclusion in global monitoring frameworks.

The work entailed constructing a set of candidate food group-based metrics that account for the quantity of consumption in the scoring method. Secondary food frequency questionnaire (FFQ) and quantitative 24-hour dietary recall datasets across different regions of the world were analyzed over the course of the 2-year research initiative to examine the association of each candidate metric with a range of diet quality outcomes related to nutrient adequacy and noncommunicable disease (NCD) risk. The inclusion of two cohort datasets in the analyses (one from Mexico and one from the United States) allowed for the evaluation of the responsiveness of outcomes to changes in metric score over time and provided a rigorous design for examining the association of the candidate diet quality metrics developed with NCD risk-related outcomes.

From these analyses, an overall metric of diet quality — the Global Diet Quality Score (GDQS) — was identified. The GDQS was designed to be appropriate for use among non-pregnant, non-lactating women of reproductive age in low- and middle-income countries (LMICs) but has also been shown through secondary data analysis to be valid for use in high-income countries, thereby providing a simple, standardized metric appropriate for population-based measurement of diet quality globally.[3]

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1 For operational purposes, we have defined diet quality as a diet that is both adequate in nutrients and also protective against diet-related non-communicable disease risk outcomes. Miller et al (2020) use the following definition: a metric that is valid to assess both diet-related maternal and child health (MCH) and non-communicable diseases (NCDs) outcomes.

2 The Global Diet Quality Score (GDQS) research initiative was launched by *Intake* – Center for Dietary Assessment. The research was led by the Harvard T.H. Chan School of Public Health, Department of Nutrition, and was carried out in collaboration with researchers at the National Public Health Institute (INSP), Mexico. Funding for the research was provided by FHI Solutions, recipient of a Bill & Melinda Gates Foundation grant to support Intake.

3 A set of manuscripts to report on these results has been submitted to the *Journal of Nutrition* for publication consideration in a GDQS-focused Journal of Nutrition Supplement. The *Journal of Nutrition* Supplement, The Global Diet Quality Score: A New Method to Collect and Analyze Population-Based Data on Diet Quality, is expected to be published in September 2021.

GDQS Metric Design

The GDQS is an entirely food-based metric, consisting of 25 food groups: 16 healthy food groups, 7 unhealthy food groups, and 2 food groups (red meat, high-fat dairy) that are unhealthy when consumed in excessive amounts[4].

For 24 of the GDQS food groups, three ranges of quantity of consumption are defined (in grams/day) and used in scoring the metric: low, medium, and high. For one food group (high-fat dairy), four ranges of quantity of consumption are used: low, medium, high, and very high.

Each respondent receives points for each GDQS food group, according to the quantity of consumption consumed for that food group during the 24-hour reference period. The points associated with the healthy GDQS food groups increase for each higher quantity of consumption category. The points associated with the unhealthy GDQS food groups decrease for each higher quantity of consumption category. For the two food groups that are unhealthy in excessive consumption (red meat, high-fat dairy), the points associated with the GDQS food group increase up to a certain threshold of quantity of consumption, after which the points decrease.

The overall GDQS is a sum of the points across all 25 GDQS food groups. The GDQS has a possible range of 0 to 49. Population-based cutoffs of 15 and 23 have been identified for the GDQS, to allow for reporting the percent of the population at high risk for poor diet quality outcomes (GDQS <15) and the percent of the population at low risk for poor diet quality outcomes (GDQS ≥23), based on the information collected for the 24-hour reference period.

Table 1 provides the list of GDQS food groups, the quantity of consumption categories per GDQS food group, and the points assigned to each GDQS food group category of consumption, to tabulate the GDQS.

GDQS Sub-Metrics and Other Sub-Analyses

Collecting data on the GDQS also allows for tabulation of two GDQS sub-metrics: the GDQS positive (GDQS+) sub-metric and the GDQS negative (GDQS–) sub-metric. The GDQS+ is the total score across the 16 healthy GDQS food groups, with a possible range of 0 to 32. The GDQS− is the total score across the 7 unhealthy GDQS food groups and the 2 GDQS food groups that are unhealthy when consumed in excessive amounts, with a possible range of 0 to 17.

The GDQS+ and GDQS− offer value by providing more targeted information about the relative contribution of healthy and unhealthy food group consumption to overall diet quality in a particular setting.

GDQS data can also be analyzed to report the percent of the population consuming each GDQS food group in the reference 24-hour period and the percent of the population consuming low, middle, and high (or very high, in the case of high-fat dairy) quantities of consumption of each food group in the reference 24-hour period.

How the GDQS Is Different from Other Diet Metrics

The GDQS has several novel features in comparison to other simple diet-related metrics. Unlike most existing diet quality-related metrics, the GDQS is designed to be sensitive to diet-related outcomes associated with both undernutrition and overnutrition. The metric is entirely food-based and therefore does not require the use of a food composition table for analysis. The GDQS includes an expanded set of food groups in comparison to most existing simple food-based metrics and incorporates a measure of quantity of consumption in the metric scoring, to allow for a more sensitive assessment of healthy diets.

[4] The naming of these food group categories as “healthy”, “unhealthy”, and “unhealthy when consumed in excessive amounts” provides a simple method for communicating how the foods in each food group contribute to an overall healthy diet, as reflected in the epidemiological literature and operationalized by the GDQS.

How to Collect Data on the GDQS

Various data collection methods can be used to derive data for the GDQS. The choice of method depends on the availability of existing dietary data and the resources available to collect new data. Quantitative 24-hour dietary recall data are an ideal data source for the GDQS. FFQ data can also be used to derive the GDQS, but for these data to be a robust data source for the GDQS, the FFQ instrument must comprehensively list the foods commonly consumed by the target population and allow for the quantity of intake of each food to be derived for a 24-hour reference period. To facilitate routine data collection for the GDQS, *Intake* developed an electronic data collection tool to provide a simple method to collect population-based GDQS data at relatively low cost and with low respondent burden. More information about the GDQS app is provided in Annex 1.

How to Tabulate the GDQS

Detailed guidance on how to tabulate the GDQS is provided in Annexes 2, 3, and 4. Annex 2 provides guidance on how to use quantitative 24-hour dietary recall data to tabulate the GDQS. Annex 3 provides guidance on how to tabulate the GDQS using food frequency data. Annex 4 provides guidance on how to tabulate the GDQS data that have been collected using the GDQS app.

Details about the operational definition of each GDQS food group are provided in Table 2. This table should be referred to when using quantitative 24-hour dietary recall data or FFQ data to tabulate the GDQS, to ensure the correct classification of foods into GDQS food groups. When using the GDQS app for data collection, foods are already pre-classified into the correct GDQS food group, using a master database that is pre-installed in the GDQS app.

The GDQS app was designed to provide comparable data on the GDQS to data tabulated using quantitative 24-hour dietary recall data. We note, however, that primary validation studies would still be useful to evaluate if the method used by the GDQS app for estimating the quantity of consumption allows for the amount of food consumed per GDQS food group to be estimated with sufficient precision.

Although the GDQS can also be tabulated with FFQ data, we expect that FFQ data sources would not necessarily result in GDQS results that are directly comparable to those collected using a 24-hour reference period. The use of a pre-determined food list along with the use of a longer than 24-hour recall period in a FFQ instrument is likely to result in differences in the number of foods/food groups reported as consumed, and in the quantities derived as consumed for a 24-hour period, when compared to GDQS data tabulated using quantitative 24-hour dietary recall data or data collected using the GDQS app.

How to Use GDQS Data

The GDQS is a population-based metric of diet quality. GDQS data are intended to be reported and used at the population or sub-group level, not at the individual level. GDQS data can be used for population-based assessment, target-setting, program/policy design, and cross- or within-country comparison. The GDQS is also appropriate for assessing population-level changes in diet quality and can therefore also be used for monitoring and evaluation of programs and policies that aim to improve diet quality.

To Learn More

To learn more about the GDQS, refer to the resources described below.

- The GDQS Launch Event, February 23, 2021. A recording of the event is available at this link. This recording includes a series of presentations to share final results of GDQS performance across datasets.
- The GDQS Global Stakeholder Meeting. A recording of the meeting is available at this link. This recording includes a series of presentations to provide detailed information on the research methods and to share preliminary results of GDQS performance across datasets.

- A set of manuscripts has been submitted to the *Journal of Nutrition* for peer review for consideration for inclusion in a GDQS-focused Journal Supplement to be published in the fourth quarter of 2021.
- A detailed technical report of the GDQS report will also be published on the *Intake* website in the fourth quarter of 2021.

Table 1. GDQS and GDQS Sub-Metric Food Groups and Scoring

Inclusion in Metrics	Scoring Classification	Food Group	Categories of Consumed Amounts (g/day)				Points Assigned			
			Low	Middle	High	Very High	Low	Middle	High	Very High
GDQS and GDQS+	Healthy	Citrus fruits	<24	24–69	>69		0	1	2	
		Deep orange fruits	<25	25–123	>123		0	1	2	
		Other fruits	<27	27–107	>107		0	1	2	
		Dark green leafy vegetables	<13	13–37	>37		0	2	4	
		Cruciferous vegetables	<13	13–36	>36		0	0.25	0.5	
		Deep orange vegetables	<9	9–45	>45		0	0.25	0.5	
		Other vegetables	<23	23–114	>114		0	0.25	0.5	
		Legumes	<9	9–42	>42		0	2	4	
		Deep orange tubers	<12	12–63	>63		0	0.25	0.5	
		Nuts and seeds	<7	7–13	>13		0	2	4	
		Whole grains	<8	8–13	>13		0	1	2	
		Liquid oils	<2	2–7.5	>7.5		0	1	2	
		Fish and shellfish	<14	14–71	>71		0	1	2	
		Poultry and game meat	<16	16–44	>44		0	1	2	
		Low-fat dairy	<33	33–132	>132		0	1	2	
		Eggs	<6	6–32	>32		0	1	2	
GDQS and GDQS–	Unhealthy in excessive amounts	High-fat dairy* (in milk equivalents)	<35	35–142	>142–734	>734	0	1	2	0
		Red meat	<9	9–46	>46		0	1	0	
	Unhealthy	Processed meat	<9	9–30	>30		2	1	0	
		Refined grains and baked goods	<7	7–33	>33		2	1	0	
		Sweets and ice cream	<13	13–37	>37		2	1	0	
		Sugar-sweetened beverages	<57	57–180	>180		2	1	0	
		Juice	<36	36–144	>144		2	1	0	
		White roots and tubers	<27	27–107	>107		2	1	0	
		Purchased deep fried foods	<9	9–45	>45		2	1	0	

* Hard cheese should be converted to milk equivalents using a conversion factor of 6.1 when calculating total consumption of high-fat dairy for the purpose of assigning a GDQS consumption category. Refer to Annexes 2, 3, and 4, respectively, for details on how to apply this conversion factor appropriately, according to whether a quantitative 24-hour dietary recall survey, a FFQ, or the GDQS app was used to collect the data.

Reference: Table adapted from Table 3 in Bromage S, Batis C, Bhupathiraju SN, Fawzi WW, Fung TT, Li Y, Deitchler M, Angulo E, Birk N, Castellanos-Gutiérrez A, Fang T, He Y, Matsuzaki M, Zhang Y, Moursi M, Gicevic S, Holmes MD, Isanaka S, Kinra S, Sachs SE, Stampfer MJ, Stern D, Willett WC. Development and validation of a novel food-based Global Diet Quality Score. Manuscript submitted in February 2021 for publication consideration in a *Journal of Nutrition* Supplement: "The Global Diet Quality Score (GDQS): A New Method to Collect and Analyze Population-Based Data on Diet Quality".

Table 2. Operational Definitions of GDQS Food Groups

Food Group	Description
Citrus fruits	Whole fruits in the genus *Citrus*.
Deep orange fruits	Whole fruits (not including juice or spreads) containing ≥120 retinol equivalents per 100g.
Other fruits	Whole fruits not belonging in the other fruit categories (not including coconuts).
Dark green leafy vegetables	Leafy vegetables containing ≥120 retinol equivalents per 100g.
Cruciferous vegetables	Vegetables in the family *Brassicaceae*.
Deep orange vegetables	Non-tuberous vegetables containing ≥120 retinol equivalents per 100g.
Other vegetables	Vegetables not belonging in the other vegetable categories.
Legumes	Legumes and foods derived from legumes, such as tofu and soymilk. Does not include bean sprouts (classified in "Other vegetables") or groundnuts (classified in "Nuts and seeds").
Deep orange tubers	Tuberous vegetables containing ≥120 retinol equivalents per 100g (includes variants biofortified with vitamin A)
Nuts and seeds	Nuts, seeds, and products derived from nuts and seeds, such as nut-based butters (but not oils). Also includes groundnuts. Seeds that are used as spices are included when used in their whole (not powdered) form.
Whole grains	Whole grains and whole grain products. Does not include products with significant amounts of added sugar (classified as "Sweets and ice cream").
Liquid oils	All types of oils that are liquid at room temperature, regardless of fatty acid profile (this includes palm olein, liquid palm kernel oil, and liquid coconut oil). Does not include oil used to deep fry foods that are purchased. But does include oil used to deep fry foods prepared at home.
Fish and shellfish	Fish (whether processed or unprocessed) based on phylogenetic classifications (including sharks, eels, and rays), and other seafood high in n3 fatty acids (including shellfish, jellyfish, cetaceans, and pinnipeds, but not echinoderms). Includes organs.
Poultry and game meat	Unprocessed poultry and game, including a range of undomesticated animals and bush meat, for example: primates, rodents, canines, felines, marsupials, leporids (rabbits and hares), wild boar, bats, bears, semiaquatic mammals (including otters and beavers), undomesticated ungulates, reptiles (aquatic and terrestrial), and amphibians. Includes organs.
Low-fat dairy	Reduced or naturally low-fat dairy products (≤2% milk fat). Includes flavored milk, and milk or cream added to coffee or tea.
Eggs	All types of eggs. Does not include mayonnaise.
High-fat dairy	High-fat milk and dairy products (>2% milk fat). Includes flavored milk, and milk or cream added to coffee or tea. Does not include butter or clarified butter. This category also does not include ice cream and whipped cream.
Red meat	Unprocessed red meat belonging to domesticated animals (i.e., not game), including organs. "Red" classification is not based on color but on nutritional characteristics, and thus includes pork and lamb.

Processed meat	Processed red meat, poultry, or game, including organs, and excluding fish or seafood. Processing is defined as per International Agency for Research on Cancer: "salting, curing, fermentation, smoking or other processes to enhance flavor or improve preservation."
Refined grains and baked goods	Refined grains and refined grain products. Does not include products with significant amounts of added sugar, which should instead be classified as "Sweets and ice cream".
Sweets and ice cream	Sugar-sweetened foods that are not beverages. This category includes sugar and other caloric sweeteners added to other foods and drinks. Whipped cream is also classified in this category.
Sugar-sweetened beverages	Sweetened drinks that do not contain any fruit juice at all. Includes, for example: sodas, energy drinks, and sports drinks, and beverages made using low-calorie sweeteners, such as diet sodas. Sweetened tea and coffee, and dairy or cereal-based drinks are not included.
Juice	Unsweetened or sweetened drinks that are at least partly composed of fruit juice. This category also includes fruit smoothies made from whole fruit.
White roots and tubers	Tuberous vegetables with <120 retinol equivalents per 100g. Includes flours such as potato or cassava flour.
Purchased deep fried foods	Deep fried foods are foods that are fried in an amount of fat or oil sufficient to cover the food completely. Only deep fried foods that are purchased (i.e., not prepared at home) are classified in this category. Foods that are classified in this category are "double classified." The food should be classified as belonging to the purchased deep fried food category and should also be classified in the food group to which the food normally belongs if not purchased and deep fried (e.g., deep fried white potatoes that are purchased should be classified in both the purchased deep fried foods category and in the white roots and tubers category).

Note: Semisolid and solid fats and insects are not included in the GDQS scoring. In addition, coconuts and coconut byproducts (e.g., coconut milk) are not included in the GDQS scoring. The exception is liquid coconut oil, which is included in the GDQS scoring. The following beverages are also among those not included in the GDQS scoring: alcohol, coffee, and tea. However, if milk is added to coffee or tea, the added milk should be classified in the high- or low-fat dairy GDQS food group, and if a caloric sweetener (e.g., sugar) is added to coffee or tea, then the caloric sweetener should be classified in the sweets and ice cream GDQS food group. Fortified foods should be classified in the food group that corresponds to the unfortified version of that food (e.g., orange juice fortified with calcium should be classified in the juice category; liquid oil fortified with vitamin A should be classified in the liquid oil category). As a simple metric of diet quality, the GDQS does not intend to capture information related to the consumption of fortified foods.

Reference: Table adapted from Table 4 in Bromage S, Batis C, Bhupathiraju SN, Fawzi WW, Fung TT, Li Y, Deitchler M, Angulo E, Birk N, Castellanos-Gutiérrez A, Fang T, He Y, Matsuzaki M, Zhang Y, Moursi M, Gicevic S, Holmes MD, Isanaka S, Kinra S, Sachs SE, Stampfer MJ, Stern D, Willett WC. Development and validation of a novel food-based Global Diet Quality Score. Manuscript submitted in February 2021 for publication consideration in a Journal of Nutrition Supplement: "The Global Diet Quality Score (GDQS): A New Method to Collect and Analyze Population-Based Data on Diet Quality".

Annex 1. The GDQS App for Data Collection

The GDQS app is an electronic data collection tool developed by *Intake* with the aim of providing a standard, easy-to-use method for collecting low-cost, time-relevant data on diet quality to inform and monitor country-specific programs and policies for agriculture and nutrition.

The GDQS app uses an open recall method to capture all foods consumed by a respondent during a 24-hour reference period and eliminates food group classification error by incorporating into the app an extensive database of foods, pre-classified into their corresponding GDQS food group. In this way, when the respondent mentions a food consumed during the open recall, the enumerator records the food in the app, and the app classifies the food in the appropriate food group automatically based on pre-populated information. In the case that a food reported as consumed is missing from the master database of foods, the enumerator records the food using free text and must manually classify the food into the corresponding GDQS food group.

To collect quantity of consumption information for the GDQS, the enumerator reminds the respondent of the foods that the respondent reported consuming for a given GDQS food group and asks the respondent to visualize the total amount of food consumed and compare the amount (volume) to a set of ten 3D cubes, each of which has been predetermined in size to reflect the volume that corresponds to a quantity of consumption cutoff (in grams) that is used for a food group to tabulate the GDQS.

The volume for each of the ten 3D cubes was determined by using the gram cutoff for each food group in the GDQS metric, along with data on the physical density of the foods belonging to each food group (weight in grams ÷ physical density = volume) (Moursi et al. unpublished 2021). In the case that the respondent selects a cube that corresponds exactly to a quantity of consumption cutoff for the GDQS food group that is being asked about, a probing question follows, to ask the respondent if the respondent consumed as much as or more than indicated by the cube size or slightly less than the volume indicated by the cube size[5].

There are seven main steps involved in collecting data for the GDQS with the GDQS app:

Step 1 – Respondent ID and demographic information

Step 2 – Foods and drinks consumed in the past 24 hours using open recall

Step 3 – Ingredients of mixed dishes (recipes)

Step 4 – Additional information on certain foods to classify them into the GDQS food groups

Step 5 – Deep fried foods

Step 6 – Caloric sweeteners

Step 7 – Quantity consumed at the food group level

Data collection is currently estimated to require an average of approximately 10 minutes per respondent, with the amount of time required for data collection highly dependent on the complexity of the diet consumed[6].

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[5] In addition to this method of using 3D cubes for estimating the category of quantity of consumption for each GDQS food group, *Intake* is also currently exploring use of a second potential method that could also be used for a simple estimation of the quantity of consumption of the foods consumed. We intend to update this document once this second method is further developed and documented, to provide a second option for how to derive the quantity of consumption data for tabulation of the GDQS when using the GDQS app for data collection.

[6] The average time required for data collection with the GDQS app will be updated once we have initial pre-test data from a sufficient number of respondents in a LMIC context.

The GDQS app is programmed to send data to a CSWeb server, to easily integrate with other survey module data collected with CSPro. The GDQS app and the supporting database will be made available in English, French, Portuguese, and Spanish at the time of public release. The structure of the GDQS app and supporting database accommodates translation into additional languages as well, according to user needs. The GDQS app is currently envisaged to be ready for public release at the end of 2021, along with a user guide to provide guidance for collecting GDQS data with the GDQS app.

Annex 2. Guidance for Tabulating the GDQS with Quantitative 24-Hour Dietary Recall Data

When using quantitative 24-hour dietary recall data to tabulate the GDQS, only dietary data collected from respondents for the first day of the 24-hour dietary recall is used.

There are six main steps required to process and tabulate the GDQS when using quantitative 24-hour dietary recall data. These steps are described briefly below.

Step 1. Process the dietary data to reflect gram consumption of each single food/ingredient

Before tabulating the GDQS, the data must first be processed so that the total consumption amount (in grams) for each food reported as consumed during the 24-hour recall period is available, by respondent. Mixed dishes reported as consumed should be disaggregated into their component ingredients using recipe information. Each individual ingredient in a mixed dish should be treated as a single food, with a gram consumption amount provided, based on the weight of the ingredient in the form in which it was consumed (e.g., raw, cooked). Some composite foods like breads and cakes are exceptions and should be treated as "single foods" for the purpose of data processing and analysis. For the purpose of tabulating the GDQS, it is generally not necessary to disaggregate the ingredients of a mixed dish into levels finer than that of a GDQS food group. The only exception to this is the high-fat dairy food group, for which hard cheese should be separated from other high-fat dairy products.

Step 2. Assign each single food/ingredient reported as consumed to its correct GDQS food group

Once the data are organized to provide total consumption amount (in grams) by single food or ingredient of mixed dish, each food or ingredient listed in the dataset needs to be classified into the corresponding GDQS food group. Refer to Table 2 for detailed information to guide how to classify each food and mixed dish ingredient into the correct GDQS food group.

Note that there are some foods that will not be classified in any GDQS food group. Some key examples include: alcohol, semi-solid and solid fats, insects, coconuts, and coconut products (e.g., coconut milk). Liquid coconut oil is an exception and is scored under the liquid oil category.

There are a few GDQS food groups that require special attention when assigning foods and ingredients of mixed dishes to the corresponding GDQS food group. The classification instructions for these GDQS food groups are described below.

A. High-fat dairy

The GDQS high-fat dairy food group includes all high-fat dairy products except ice cream and whipped cream.

Because there are significant differences in the nutrient density across the foods included in the high-fat dairy group (e.g., hard cheese has a higher nutrient density than milk) and dairy products are widely consumed globally, for the purpose of scoring the GDQS, hard cheese and other dairy products in the high-fat dairy group are treated differently.

During data processing, the high-fat dairy group should be subdivided into a high-fat "hard cheese" and a high-fat "other dairy" sub-category. Hard cheeses should be classified in the high-fat "hard cheese" sub-category and all other high-fat dairy products in the high-fat "other dairy" sub-category.

B. Liquid oil

Depending on the level of detail collected and the methods used to collect the 24-hour dietary recall data, information may not be available on whether and how much liquid oil was consumed by each respondent. When this is the case, an algorithm can be used to classify liquid oil consumption for each respondent. This algorithm is described in Step 4 below.

C. Purchased deep fried food

The purchased deep fried food category includes only deep fried foods that were purchased. Deep fried foods that were prepared at home are not classified in this GDQS food group. To make the classification for this food group reliably, when possible, data collection instruments should be designed to collect information on whether a deep fried food was prepared at home or purchased, as there is evidence that the oils used in the preparation of deep fried foods by vendors, restaurants, and other commercial entities are more deleterious than oils that are used in preparation of deep fried foods made at home (Cahill et al. 2014).

If the data collection instrument did not provide information on whether the deep fried food consumed was purchased or prepared at home, data analysts will need to use their knowledge of the local cuisine and customary eating behaviors of the surveyed population to guide the classification of foods into this food group.

Note that foods that are classified in the purchased deep fried food category are "double-classified": The food should be classified both in the purchased deep fried food category and in the food category to which the food normally belongs. For example, deep fried white potatoes that are purchased should be classified both in the purchased deep fried food category and in the white roots and tubers category. If a food that is deep fried and purchased is deep fried using liquid oil, the oil is not classified in the liquid oil food group (by virtue of the comparatively deleterious fatty acid profile of these oils), while if the food is deep fried at home using liquid oil, the oil is classified in the liquid oil group (see Box 1).

Box 1. Approach for classifying foods deep fried at home or purchased

GDQS food group classification	Example: Potatoes deep fried at home	Example: Purchased deep fried potatoes
Purchased deep fried food	No	Yes
White roots and tubers	Yes	Yes
Liquid oil	Yes (if deep fried with liquid oil)	No

Step 3. Sum the quantity of consumption (in grams) of all foods/ingredients reported as consumed for each GDQS food group, by respondent

Once the foods/ingredients reported as consumed have been classified into the correct GDQS food group, the total amount (in grams) of all foods/ingredients reported as consumed per GDQS food group are summed, by respondent. For any GDQS food group that was not reported by a respondent as consumed (information known after carrying out Step 2), the respondent should be given a value of 0 grams for quantity of consumption for that food group. The only exception is if information on liquid oil consumption was not directly collected with the data collection instrument.

At the end of Step 3, each respondent should have a total consumption value in grams for each GDQS food group (except potentially for the liquid oil GDQS food group). Some food groups require special instructions for carrying out this step; these are described below.

A. High-fat dairy

To account for the difference in nutrient density between high-fat "hard cheese" and high-fat "other dairy," multiple the quantity (in grams) reported as consumed for the foods/ingredients classified in the high-fat "hard cheese" sub-category by a factor of 6.1. Multiplying the quantity of high-fat "hard cheese" consumed (in grams) by a factor of 6.1 allows the quantity of high-fat "hard cheese" consumed to be converted into a consumption quantity that is more reflective of/equivalent to the nutrient density of high-fat "other dairy" (Willett et al. 2020).

Once the conversion factor of 6.1 is applied to the quantities of consumption reported for the foods/ingredients classified in the high-fat "hard cheese" sub-category, the total consumption amount in the high-fat "hard cheese" and the high-fat "other dairy" sub-categories can be summed together for each respondent to create a total quantity of consumption amount (in grams) for a newly created "high-fat dairy in milk equivalents" category.

B. Liquid oil

If the data collection instrument did not collect detailed information about the quantity of liquid oil consumed, then it will not be possible to derive a total consumption value (in grams) for this GDQS food group (i.e., quantity of consumption information will be missing). In this case, each respondent can be classified into a quantity of consumption category for the liquid oil food group based on an algorithm (refer to Step 4, Box 2 and Box 3, below).

Step 4. Assign each respondent to a quantity of consumption category per GDQS food group

In Step 4, the quantity of consumption values (in grams) per GDQS food group are used to assign each respondent to a category of quantity of consumption for each GDQS food group. Refer to Table 1 (columns for categories of consumed amounts) for the consumption thresholds in grams to use to assign individuals to the correct category of consumption per GDQS food group.

If information about liquid oil was not specifically collected in the data collection instrument, the following algorithm (Box 2) can be used to classify individuals into a quantity of consumption category for the liquid oil GDQS food group. This algorithm uses information about the use of liquid oil in the preparation of the foods consumed, the pouring of liquid oils on the foods consumed, and the consumption of mixed dishes.

Box 2. Detailed algorithm for classifying individuals in consumption categories for liquid oil GDQS food group

If the individual reported:	Quantity of consumption category for liquid oil GDQS food group:
Consuming two or more mixed dishes	High
Pouring liquid oil on any food or consuming any food prepared with liquid oil (including deep fried foods prepared at home)	High
Consuming one mixed dish and not pouring liquid oil on any food and not consuming any food prepared with liquid oil (including deep fried foods prepared at home)	Middle
Did not report consuming any mixed dish and did not pour liquid oil on any food and did not consume any food prepared with liquid oil (including deep fried food prepared at home)	Low

In cases where the data collection instrument did not collect detailed information about the pouring of liquid oil on the foods consumed, or about the use of liquid oil in the preparation of the food consumed, the algorithm below can be used instead to classify individuals into a quantity of consumption category for the liquid oil GDQS food group. This algorithm is based solely on mixed dish consumption.

Box 3. Simplified algorithm for classifying individuals in consumption categories for liquid oil GDQS food group

If the individual reported:	Quantity of consumption category for liquid oil GDQS food group:
Consuming two or more mixed dishes	High
Consuming one mixed dish	Middle
Did not report consuming any mixed dish	Low

After completing Step 4, each individual in the dataset should be classified into one of three categories of quantity of consumption for 24 of the GDQS food groups and into one of four categories of quantity of consumption for the high-fat dairy GDQS food group (i.e., the "high-fat dairy [in milk equivalents]" food group).

Step 5. Assign points to each GDQS quantity of consumption category and sum, by respondent

In Step 5, each respondent is assigned points for each GDQS food group, according to that respondent's category of consumption for a given GDQS food group. The points assigned to each quantity of consumption category for each respective GDQS food group are shown in the last four columns of Table 1.

The GDQS variable is tabulated by summing points across all 25 GDQS food groups, by respondent. The GDQS+ variable is tabulated by summing points across the 16 healthy GDQS food groups, by respondent. The GDQS– variable is tabulated by summing points across the 7 unhealthy GDQS food groups and the 2 GDQS food groups that are unhealthy when consumed in excessive amounts, by respondent.

Step 6. Calculate the population-based value of the GDQS

Because the GDQS is a population-based metric, the GDQS data for each individual must be analyzed to report a population-based metric. There are several ways to use the data available from Step 5 to produce population-based metrics.

The mean GDQS, the mean GDQS+, and the mean GDQS– can be reported for the population. In addition, a cutoff value of <15 and ≥23 can be applied to the GDQS variable to create a population-level categorical indicator. A GDQS ≥23 is associated with a low risk of nutrient inadequacy and NCD-related outcomes, scores ≥15 and <23 indicate moderate risk, and scores <15 indicate high risk, based on the 24-hour reference period for which data were collected. The percent consuming low, middle, and high (and very high, in the case of high-fat dairy) categories of quantity of consumption in the reference 24-hour period can also be reported for each GDQS food group.

For all population-based metrics reported, survey weights should be applied in the analysis, and all necessary survey design variables should be accounted for in the analysis, as is the case when reporting any population-based survey data.

Annex 3. Guidance for Tabulating the GDQS with Food Frequency Data

To tabulate the GDQS using food frequency data, certain prerequisites must be met by the food frequency data collection instrument that was used:

1. The food frequency instrument must enumerate the foods that are consumed reasonably often by an appreciable number of individuals in the target population and must adequately capture the diversity of dietary patterns across the target population (Willett 2013). Ideally, the food frequency instrument will have been validated to be a robust tool for assessing food and nutrient intake among the population.
2. The data collected with the food frequency instrument must be able to be converted into quantities consumed (in grams) for the reference period used for data collection.

Provided these two prerequisites are met, the GDQS can be tabulated using the food frequency data. There are seven main steps required. These steps are described briefly below.

Step 1. Process the dietary data to reflect gram consumption of each single food/ingredient

Before tabulating the GDQS, the food frequency data must first be processed so that the total consumption amount (in grams) for each food reported as consumed is available, by respondent, for the reference period of data collection used in the FFQ. Mixed dishes should be disaggregated into their component ingredients using recipe information. Each individual ingredient in a mixed dish should be treated as a single food, with a gram consumption amount provided, based on the weight of the ingredient in the form in which it was consumed (e.g., raw, cooked). Some composite foods like breads and cakes are exceptions and should be treated as "single foods" for the purpose of data processing and analysis. For the purpose of tabulating the GDQS, it is generally not necessary to disaggregate the ingredients of a mixed dish into levels finer than that of a GDQS food group. The only exception to this is the high-fat dairy food group, for which hard cheese should be separated from other high-fat dairy products.

Step 2. Process the food frequency data to reflect gram consumption for a 24-hour reference period

Once the data have been converted into quantities consumed (in grams) for the reference period used in the data collection instrument, the data need to be further converted to reflect a gram-per-day consumption amount for each respondent. To convert the quantities reported as consumed by each respondent for the reference period into a gram-per-day consumption amount, divide the consumption amounts reported for each food/ingredient by the number of days that constitute the reference, by respondent. For example, if the FFQ used a 7-day reference period, the consumption amount reported for each respondent should be divided by 7 to derive an approximated average gram consumption amount for a 24-hour period. When converting a reference period of 1 month into a 24-hour period, a conversion factor of 30.4 days should be used (i.e., 365 ÷ 12 = 30.4). If frequency information was collected with the use of a range (e.g., 2–3/month), the mid-point of the range should be used (i.e., 2.5/month), and if the frequency information was collected using an unspecified amount greater than n/reference period (e.g., ≥2/month), n should be used (i.e., 2/month).

Step 3. Assign each single food/ingredient as consumed to its correct GDQS food group

Once the data have been processed to provide total consumption amount (in grams) by single food, or ingredient of mixed dish, each food or ingredient listed in the dataset needs to be classified into the

corresponding GDQS food group. Refer to Table 2 for detailed information on how to classify each food and mixed dish ingredient into the correct GDQS food group.

Note that there are some foods that will not be classified in any GDQS food group. Some key examples include: alcohol, semi-solid and solid fats, insects, coconuts, and coconut products (e.g., coconut milk). Liquid coconut oil is an exception and is scored under the liquid oil category.

There are a few GDQS food groups that require special attention when assigning foods and ingredients of mixed dishes to the corresponding GDQS food group. The classification instructions for these GDQS food groups are described below.

A. High-fat dairy

The GDQS high-fat dairy food group includes all high-fat dairy products, except ice cream and whipped cream.

Because there are significant differences in the nutrient density across the foods included in the high-fat dairy group (e.g., hard cheese has a higher nutrient density than milk) and dairy products are widely consumed globally, for the purpose of scoring the GDQS, hard cheese and other dairy products in the high-fat dairy group are treated differently.

During data processing, the high-fat dairy group should be subdivided into a high-fat "hard cheese" and a high-fat "other dairy" sub-category. Hard cheeses should be classified in the high-fat "hard cheese" sub-category and all other high-fat dairy products in the high-fat "other dairy" sub-category.

B. Liquid oil

Depending on the level of detail collected and the methods used to collect the food frequency data, information may not be available on whether and how much liquid oil was consumed by each respondent. When this is the case, an algorithm can be used to classify liquid oil consumption for each respondent. This algorithm is described in Step 5 below.

C. Purchased deep fried food

The purchased deep fried foods category includes only deep fried foods that were purchased. Deep fried foods that were prepared at home are not classified in this GDQS food group. To make the classification for this food group reliably, when possible, data collection instruments should be designed to collect information on whether a deep fried food was prepared at home or purchased, as there is evidence that the oils used in the preparation of deep fried foods by vendors, restaurants, and other commercial entities are more deleterious than oils that are used in preparation of deep fried foods made at home (Cahill et al. 2014).

If the data collection instrument did not collect information on whether the deep fried food consumed was purchased or prepared at home, data analysts will need to use their knowledge of the local cuisine and customary eating behaviors of the surveyed population to guide the classification of foods into this food group.

Note that foods that are classified in the purchased deep fried food category are "double-classified": The food should be classified both in the purchased deep fried food category and in the food category to which the food normally belongs. For example, deep fried white potatoes that are purchased should be classified both in the purchased deep fried food category and in the white roots and tubers category. If a food that is deep fried and purchased is deep fried using liquid oil, the oil is not classified in the liquid oil food group (by virtue of the comparatively deleterious fatty acid profile of these oils), while if the food is deep fried at home using liquid oil, the oil is classified in the liquid oil group (see Box 1).

Box 1. Approach for classifying foods deep fried at home or purchased

GDQS food group classification	Example: Potatoes deep fried at home	Example: Purchased deep fried potatoes
Purchased deep fried foods	No	Yes
White roots and tubers	Yes	Yes
Liquid oil	Yes (if deep fried in liquid oil)	No

Step 4. Sum the quantity of consumption (in grams) of all foods/ingredients reported as consumed for each GDQS food group, by respondent

Once the foods/ingredients reported as consumed have been classified into the correct GDQS food group, the total amount (in grams) of all foods/ingredients reported as consumed per GDQS food group are summed, by respondent. For any GDQS food group that was not reported by a respondent as consumed (information known after carrying out Step 3), the respondent should be given a value of 0 grams for quantity of consumption for that food group. The only exception is if information on liquid oil consumption was not directly collected with the data collection instrument.

At the end of Step 4, each respondent should have a total consumption value in grams for each GDQS food group (except potentially for the liquid oil GDQS food group). Some food groups require special instructions for carrying out this step; these are described below.

A. High-fat dairy

To account for the difference in nutrient density between high fat "hard cheese" and high fat "other dairy," multiple the quantity (in grams) reported as consumed for the foods/ingredients classified in the high-fat "hard cheese" sub-category by a factor of 6.1. Multiplying the quantity of high-fat "hard cheese" consumed (in grams) by a factor of 6.1 allows the quantity of high-fat "hard cheese" consumed to be converted into a consumption quantity that is more reflective of/equivalent to the nutrient density of high-fat "other dairy" (Willett et al. 2020).

Once the conversion factor of 6.1 is applied to the quantities of consumption reported for the foods/ingredients classified in the high-fat "hard cheese" sub-category, the total consumption amount in the high-fat "hard cheese" and the high-fat "other dairy" sub-categories can be summed together for each respondent to create a total quantity of consumption amount (in grams) for a newly created "high-fat dairy in milk equivalents" category.

B. Liquid oil

If the data collection instrument did not collect detailed information about the quantity of liquid oil consumed, then it will not be possible to derive a total consumption value (in grams) for this GDQS food group (i.e., quantity of consumption information will be missing). In this case, each respondent can be classified into a quantity of consumption category for the liquid oil food group based on an algorithm (refer to Step 5, Box 2 and Box 3, below).

Step 5. Assign each respondent to a quantity of consumption category per GDQS food group

In Step 5, the quantity of consumption values (in grams) per GDQS food group are used to assign each respondent to a category of quantity of consumption for each GDQS food group. Refer to Table 1

(columns for categories of consumed amounts) for the consumption thresholds in grams to use to assign individuals to the correct category of consumption per GDQS food group.

If information about liquid oil was not specifically collected in the data collection instrument, the following algorithm (Box 2) can be used to classify individuals into a quantity of consumption category for the liquid oil GDQS food group. This algorithm uses information about the use of liquid oil in the preparation of the foods consumed, the pouring of liquid oils on the foods consumed, and the consumption of mixed dishes.

Box 2. Detailed algorithm for classifying individuals in consumption categories for liquid oil GDQS food group

If the individual reported:	Quantity of consumption category for liquid oil GDQS food group:
Consuming two or more mixed dishes	High
Pouring liquid oil on any food or consuming any food prepared with liquid oil (including deep fried foods prepared at home)	High
Consuming one mixed dish and not pouring liquid oil on any food and not consuming any food prepared with liquid oil (including deep fried foods prepared at home)	Middle
Did not report consuming any mixed dish and did not pour liquid oil on any food and did not consume any food prepared with liquid oil (including deep fried food prepared at home)	Low

In cases where the data collection instrument did not collect detailed information about the pouring of liquid oil on the foods consumed, or about the use of liquid oil in the preparation of the foods consumed, the algorithm below can be used instead to classify individuals into a quantity of consumption category for the liquid oil GDQS food group. This algorithm is based solely on mixed dish consumption.

Box 3. Simplified algorithm for classifying individuals in consumption categories for liquid oil GDQS food group

If the individual reported:	Quantity of consumption category for liquid oil GDQS food group:
Consuming two or more mixed dishes	High
Consuming one mixed dish	Middle
Did not report consuming any mixed dish	Low

After completing Step 5, each individual in the dataset should be classified into one of three categories of quantity of consumption for 24 of the GDQS food groups and into one of four categories of quantity of consumption for the high-fat dairy GDQS food group (i.e., the "high-fat dairy [in milk equivalents]" food group).

Step 6. Assign points to each GDQS quantity of consumption category and sum, by respondent

In Step 6, each respondent is assigned points for each GDQS food group, according to that respondent's category of consumption for a given GDQS food group. The points assigned to each quantity of consumption category for each respective GDQS food group are shown in the last four columns of Table 1.

The GDQS variable is tabulated by summing points across all 25 GDQS food groups, by respondent. The GDQS+ variable is tabulated by summing points across the 16 healthy GDQS food groups, by respondent. The GDQS– variable is tabulated by summing points across the 7 unhealthy GDQS food groups and the 2 GDQS food groups that are unhealthy when consumed in excessive amounts, by respondent.

Step 7. Calculate the population-based value of the GDQS

Because the GDQS is a population-based metric, the GDQS data for each individual must be analyzed to report a population-based metric. There are several ways to use the data available from Step 6 to produce population-based metrics.

The mean GDQS, the mean GDQS+ , and the mean GDQS– can be reported for the population. In addition, a cutoff value of <15 and ≥23 can be applied to the GDQS variable to create population-level categorical indicator. A GDQS ≥23 is associated with a low risk of nutrient inadequacy and NCD-related outcomes, scores ≥15 and <23 indicate moderate risk, and scores <15 indicate high risk, based on the 24-hour reference period for which data were collected. The percent consuming low, middle, and high (and very high, in the case of high-fat dairy) categories of quantity of consumption in the reference 24-hour period can also be reported for each GDQS food group.

For all population-based metrics reported, survey weights should be applied in the analysis, and all necessary survey design variables should be accounted for in the analysis, as is the case when reporting any population-based survey data.

Annex 4. Guidance for Tabulating the GDQS with Data Collected with the GDQS App

The process of tabulating GDQS data with data collected using the GDQS app requires fewer steps than when tabulating data collected with a quantitative 24-hour dietary recall survey or a FFQ. This is because the GDQS app was specifically designed to collect data on the GDQS.

When data are collected using the GDQS app, there are only two steps required to tabulate the GDQS; these are detailed below. The automated data processing features that occur within the GDQS app are summarized in Annex 5.

Step 1. Assign points to each GDQS quantity of consumption category and sum, by respondent

The GDQS app provides variables for download in which each respondent is assigned to a category of quantity of consumption for each GDQS food group, based on the data reported by the respondent. When these variables produced by the GDQS app are used for data analysis, the first step that is required to tabulate the GDQS is to assign points to each respondent for each GDQS food group, according to the GDQS scoring algorithm. The points assigned to each quantity of consumption category of each respective GDQS food group are shown in the last four columns of Table 1.

The GDQS variable is tabulated by summing points across all 25 GDQS food groups, by respondent. The GDQS+ variable is tabulated by summing points across the 16 healthy GDQS food groups, by respondent. The GDQS– variable is tabulated by summing points across the 7 unhealthy GDQS food groups and the 2 GDQS food groups that are unhealthy when consumed in excessive amounts, by respondent.

Step 2. Calculate the population-based value of the GDQS

Because the GDQS is a population-based metric, the GDQS data for each individual must be analyzed to report a population-based metric. There are several ways to use the data available from Step 1 to produce population-based metrics.

The mean GDQS, the mean GDQS+, and the mean GDQS– can be reported for the population. In addition, a cutoff value of <15 and ≥23 can be applied to the GDQS variable to create a population-level categorical indicator. A GDQS ≥23 is associated with a low risk of nutrient inadequacy and NCD-related outcomes, scores ≥15 and <23 indicate moderate risk, and scores <15 indicate high risk, based on the 24-hour reference period for which data were collected. The percent consuming low, middle, and high (and very high, in the case of high-fat dairy) categories of quantity of consumption in the reference 24-hour period can also be reported for each GDQS food group.

For all population-based metrics reported, survey weights should be applied in the analysis, and all necessary survey design variables should be accounted for in the analysis, as is the case when reporting any population-based survey data.

Annex 5. Automated Classification and Data Processing Features Embedded in the GDQS App

Some aspects of GDQS tabulation are embedded in the GDQS app data collection method. These are detailed below.

A. Classification of foods/ingredients of mixed dishes into GDQS food groups

The detailed master database that is included in the GDQS app includes an extensive list of foods/ingredients, all of which are pre-classified into their correct GDQS food group. When foods reported as consumed require additional detail to make a correct classification of the food into a GDQS food group, the necessary probes are specified in the master database and become part of the automated questionnaire included in the GDQS app, to allow the required information to be collected from the respondent for the correct GDQS classification to be made for each food reported as consumed. In the rare case that a food reported as consumed is not included in the master database, the enumerator must determine the correct GDQS food group classification during data collection.

B. Classification into category of quantity of consumption per GDQS food group

Information about the quantity of consumption the respondent consumed of each food group is also directly included in the GDQS app data collection method. This information is collected when the respondent is asked to compare the amount (i.e., volume) of food consumed for each GDQS food group to a set of ten 3D cubes of specified sizes. The set of ten 3D cubes has been created to correspond to the quantity of consumption cutoffs used to define the quantity of consumption categories across the different GDQS food groups. Which cube is selected by the respondent for each GDQS food group determines which category of consumption the individual is classified in for that GDQS food group. When a respondent selects a cube that corresponds to the exact quantity of consumption cutoff for a given GDQS food group, a follow-up question is asked of the respondent to probe if the amount (i.e., volume) consumed was at least as much as the cube size the respondent selected or if it was a little less than the cube size selected.

Some food groups require special treatment to determine a respondent's quantity of consumption category; these are described below.

High-fat dairy

To account for the difference in nutrient density between hard cheese and other dairy products, for the high-fat dairy category, respondents are asked to consider the amount of high-fat hard cheese consumed separately from the amount of high-fat other dairy consumed. Assuming the respondent reports consuming at least one food belonging to the high-fat dairy GDQS food group, one of three scenarios is possible; these are discussed below.

Scenario 1: The respondent consumed high-fat dairy products but no hard cheese

In Scenario 1, the respondent reports the quantity consumed for the high-fat dairy products consumed by selecting the 3D cube that best approximates the volume consumed. In this case, the cutoffs shown for the high-fat dairy group in Table 1 are used to determine the quantity of consumption category.

Scenario 2: The respondent consumed only hard cheese but no other high-fat dairy products

In Scenario 2, the respondent reports the quantity consumed of hard cheese by selecting the 3D cube that best approximates the amount (i.e., volume) of hard cheese consumed. Among the set of ten 3D cubes that are presented to respondents during data collection are three cubes that correspond to the

cutoffs (in grams) for the high-fat hard cheese sub-category. These cutoffs were derived by dividing the cutoffs for the high-fat dairy (in milk equivalents) group by the 6.1 conversion factor needed to account for the difference in nutrient density between high-fat hard cheese and high-fat other dairy products, and deriving the volume of the three cubes according to the average physical density of high-fat hard cheese (where volume = grams ÷ physical density). Based on the 3D cube that the respondent selects, the respondent is then classified in the corresponding quantity of consumption category (in grams) for the hard cheese sub-category, which corresponds to the same categories for the high-fat milk equivalents category when multiplied by 6.1.

Scenario 3: The respondent consumed both hard cheese and other high-fat dairy products

In Scenario 3, the respondent reports the quantity consumed of hard cheese by selecting the 3D cube that best approximates the amount (i.e., volume) of hard cheese consumed. Separately, the respondent must also report the quantity consumed for the high-fat other dairy products consumed by selecting the 3D cube that best approximates the volume consumed. The size of the selected cube that best reflects the quantity of hard cheese consumed (in grams) is then multiplied by 6.1 to convert the gram amount into high-fat milk equivalents. This value is then summed with the value corresponding to the size (in grams) of the 3D cube selected for other high-fat dairy products to provide a total gram amount of high-fat milk equivalents consumed. The respondent is then classified into the corresponding quantity of consumption category for the high-fat milk equivalents category.

The GDQS app automatically performs these calculations in the background without the need for the enumerator to intervene.

Liquid oil

For the liquid oil category, the GDQS app uses the algorithm below to classify the quantity of consumption category (Box 1).

Box 1. Detailed algorithm for classifying individuals in consumption categories for liquid oil GDQS food group

If the individual reported:	Quantity of consumption category of liquid oil GDQS food group:
Consuming two or more mixed dishes	High
Pouring liquid oil on any food or consuming any food prepared with liquid oil (including deep fried foods prepared at home)	High
Consuming one mixed dish and not pouring liquid oil on any food and not consuming any food prepared with liquid oil (including deep fried foods prepared at home)	Middle
Did not report consuming any mixed dish and did not pour liquid oil on any food and did not consume any food prepared with liquid oil (including deep fried food prepared at home)	Low

The GDQS app automatically makes the classifications above, according to each respondent's answers to questions asked as part of data collection using the GDQS app.

C. Initial data processing

To simplify the steps required to process GDQS data collected with the GDQS app, the app provides data for download in a format that already assigns all respondents to the correct quantity of consumption category for each GDQS food group, according to the responses provided by each respondent.

The data processing steps that are incorporated into the GDQS app include the following:

1. The processed GDQS variables available for download will have already assigned the lowest category of consumption to all respondents for any GDQS food group that a respondent did not report consuming.
2. In the case that the respondent selected a 3D cube that aligned with the exact cutoff (in grams) for a quantity of consumption category for a GDQS food group and the respondent indicated — upon probing by the enumerator — that the amount consumed for that food group was actually slightly less than the 3D cube selected, the processed GDQS variables available for download will include a variable that has recoded the smaller 3D cube as the quantity of consumption response for that respondent for that food group.
3. The GDQS app assigns each respondent to the correct quantity of consumption category for each GDQS food group based on the data reported by the respondents and on the data processing steps performed in Steps 1 and 2, above.

Although the GDQS app provides the convenience of these initial data processing steps to take place automatically and to be reflected in a set of GDQS variables ready to use for analysis, all original, unprocessed data collected by use of the GDQS app (including all individual foods and beverages reported as consumed) are retained, sent to the server, and available for download by data analysts.

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