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Urban Food Environments and Diets Tool

DIET ASSESSMENT

Global Diet Quality Score (GDQS)

Overview

The Global Diet Quality Score (GDQS) is a standardized, food-based metric developed to assess overall dietary quality across diverse populations and settings. It captures two key dimensions of diet: nutrient adequacy and risk of non-communicable diseases (NCDs). The GDQS achieves this by scoring both healthy and unhealthy food groups, making it a comprehensive tool for evaluating diet quality in relation to both undernutrition and overnutrition.

The GDQS score is validated for use with populations including children (2-5 years), children (5-9 years), adolescents (10-14 years), adult women and men (15-49 years). For children and adolescents, the portion size thresholds are adapted to the energy requirements of each age group and caregivers report for younger children. The app was designed to be a feasible, less resource-intensive approach to support frequent collection of population-level data on dietary quality. The GDQS score performs comparably to the Minimum Dietary Diversity - Women (MDD-W) indicator in predicting nutrient adequacy, and performs similarly to the Alternative Healthy Eating Index (AHEI) in measuring diet-related NCD risks. The GDQS score has been tested in nationally representative studies as indicator of adequate nutrient intake, dietary quality and ultra-processed food (UPF) consumption (e.g., Brazil).

Tools for deriving the GDQS

The GDQS score can be derived from various dietary assessment methods, including 24-hour recalls and quantitative food frequency questionnaires (FFQs). To support more frequent and resource-efficient data collection, the GDQS app was developed as a free, electronic tool. The GDQS mobile app uses open recall and a global food database of over 6,000 items to estimate the GDQS score, enabling scalable, low-cost monitoring of diet quality—particularly in low-resource settings. The app reflects both nutrient adequacy and NCD risk by scoring consumption of healthy and unhealthy food groups. The app has been validated in multiple settings, showing strong agreement with weighed food records (WFR) and reliable classification of food groups using standardized portion estimation tools. It demonstrated moderate to high accuracy across 22 of 25 food groups and was found to be feasible and effective for dietary monitoring in both high- and low-resource contexts, confirming its accuracy and feasibility for diverse populations and settings.

See GDQS results from 20 countries 17+

Rationale

The Global Diet Quality Score (GDQS) is a validated indicator that assesses overall dietary quality by capturing both nutrient adequacy and risk of non-communicable diseases (NCDs). Importantly, the GDQS is the only indicator that simultaneously predicts both undernutrition and NCD risk by assessing intake of both protective and harmful foods. It scores consumption of healthy and unhealthy food groups and is especially relevant in contexts facing the double burden of malnutrition. The GDQS is validated for use with children, adolescents, and adults aged 15–49 and performs comparably to established indicators like MDD-W and AHEI. It has been applied in nationally representative studies to assess nutrient intake, diet quality, and ultra-processed food consumption. If you want to use the GDQS, the GDQS app is a practical and efficient way to collect the data needed to calculate the score.

Type of data

Building on its strong conceptual foundation, the GDQS relies on specific types of dietary data to generate meaningful insights into diet quality across populations. The GDQS indicator is based on the collection of information on information on individual food items, mixed dishes, and beverages consumed, as well as categorical information on food group consumption over a 24-hour reference period. Measured at the population or subgroup level, the GDQS can compare within or across countries, to track population-level changes in diet quality, as well as in the design, monitoring and evaluation of programs and policies to improve diet quality. Data is uploaded to a server to integrate with other survey modules.

Understanding the nature of the data collected helps clarify the strengths and limitations of the GDQS as a dietary assessment tool.

Indicators

Despite certain limitations, the GDQS provides a range of indicators and sub-metrics that offer valuable insights into dietary patterns and health risks.

GDQS score

The GDQS score is a comprehensive, food-based metric with simple quantity-based scoring that serves as a validated proxy for nutrient adequacy and diet-related NCD risk (see Toolkit), and can be easily calculated using the GDQS app.

- The indicator uses a food-based scoring system across 25 groups—classified as healthy, unhealthy, or neutral—making it scalable, adaptable, and suitable for global dietary surveillance.
- Healthy foods (e.g., vegetables, legumes, and whole grains) add up to 3 points per group based on consumption level, while unhealthy foods (e.g., processed meats, sugary drinks, and sweets) subtract up to 2 points, and neutral foods (e.g., starchy staples) have minimal or context-dependent impact, typically scored as 0 or 1. This scoring system reflects both positive and negative dietary behaviors, enabling the GDQS to assess overall diet quality in a single, interpretable metric.
- The score (ranging from 0 – 49) has no universal cutoff, but one can generate categorical risk levels (scores <15 (high risk), ≥15 to <23 (moderate risk, and ≥23 (low risk) respectively).
- The score can be used to characterize population-level dietary patterns.
- The score can also be calculated from quantitative dietary data gathered through other methods, such as 24-hour recall or by Food Frequency questionnaires (FFQs).
- A recent study indicates that GDQS scores collected using the GDQS app predicted metabolic risk outcomes as well as or better than the same metric calculated using a 24HR or FFQ (Bromage 2023).

GDQS sub-metrics

- **GDQS (+)**: The GDQS positive (+) is the total score as a sum of 16 healthy GDQS food groups (score ranges from 0-32). A higher score indicates a higher relative contribution of healthy foods to the diet.
- **GDQS (-)**: The GDQS negative (-) is the total score as a sum of 7 unhealthy food groups and 2 food groups considered unhealthy when consumed in excessive quantities (high fat dairy, red meat) (score from 0-17). A higher score shows a lower relative contribution of unhealthy foods to the diet.
- A recent study suggests these composite metrics may have limited equivalence across contexts, and that use of sub-metrics may be more informative (Hanley-Cook 2024).

GDQS – Meal

The GDQS-Meal is a simplified metric for assessing the quality of meals served in institutional settings (e.g., school feeding). This metric does not use a 24-hour recall of all foods consumed but rather collects data at meal-level based on the number of food groups included and their quantity cutoffs, like the full GDQS scoring system. It categorizes food groups as healthy, unhealthy, or unhealthy in large quantities, and accounts for the inclusion of fortified foods, with higher scores reflecting more diverse and nutritious meals.

Quantity of [food group] consumed

The GDQS app covers 25 food groups, including 16 healthy groups, 7 unhealthy groups, and 2 groups that are unhealthy in excess amounts. Consumption of each group is measured as "low," "medium," or "high" (or "very high" for the high fat dairy group), using 3D cubes as a visual aid to help respondents estimate their level. While GDQS and its sub-indicators are the main outputs from the GDQS tool, researchers with interest in specific food groups may also gain insight from individual food group variables, including the percentage of the population that consumed low, medium, and high amounts of a given food group. However, the GDQS food groups cannot be combined when calculating this indicator - it is only available for the pre-defined 25 food groups.

Proportion of [population group] that consumed [food group]

Similarly, a binary indicator can be generated to measure the presence of food groups (yes/no) in an individual's diet, in any amount. At the population-level, this can estimate the proportion of the population that consumes the food group. These indicators can be created for each of the 25 food groups pre-defined by GDQS.

Caution: Does not show full picture of diet (limited scope), individual dietary patterns or diet assessment, dietary energy, or diversity of consumption within food groups. Does not indicate the frequency or quantity of food group of interest, or changes in quantities consumed.

Additional notes on indicators

GDQS can be used to calculate other commonly used indicators of diet quality such as the Minimum Dietary Diversity for Women (MDD-W), Diet Diversity Scores (DDS), among others.

GDQS cannot be used to calculate the intake of specific nutrients that are over- or under-consumed in the population. Quantitative intake data on macro- and micronutrients is needed for this type of analysis as is the use of a food composition table and conversion factors.

Pros

- GDQS captures a full picture of the diet: it includes both unhealthy and healthy foods, unlike many diversity-only focused indicators.
- Dual predictive power assesses both undernutrition (e.g., micronutrient deficiencies) and NCD risk, making it ideal for double burden contexts.
- As noted earlier, GDQS has been validated against MDD-W and AHEI across diverse populations
- Adaptation to local contexts: food items reported during the data collection that are not in the global food database can be added by enumerators during interviews; missing foods are manually classified into GDQS food groups.
- Efficient data collection with the GDQS app: the app streamlines fieldwork (10-20 minutes per respondent), use of open recall, eliminates food group classification errors (pre-programmed into app) and score calculation and no need for national food composition tables. The app and database are available in eight languages and allows for translation into other languages. Data collected with the app can be used for other food group classifications or to derive other indicators (e.g., MDD-W).

Cons

- Not suitable for all populations: it is validated for ages 15-49 years, may not be suitable for young children or older adults without further validation. It may not capture dietary nuances in populations with diverse or non-standard diets, such as Indigenous communities or those with highly seasonal food patterns.
- Requires detailed food group data: the GDQS may be more demanding than other indicators that are simpler in terms of data collection and training.
- No exact intake data (e.g., in grams): provides categorical information (not exact intake in grams) of food groups (not of individual foods) and therefore, does not measure exact quantity consumed of individual food items.
- Does not capture day-to-day variation of within-person diets and therefore cannot be used to assess individual diets or usual intake. For this reason, GDQS data cannot be used to assess the probability of adequate intake of specific nutrients or micronutrients or estimate the proportion of a population with inadequate intake.
- Challenges with standardization across contexts: Food group definitions and cube sizes may not translate well across countries or regions, requiring adaptation and validation.
- However, population-level data can still be used to track changes over time in a population, compare differences among population sub-groups, and assess how the population is performing relative to food-based dietary guidelines. Because it does not track individual foods or nutrient intake, it may be less useful for monitoring the impact of specific nutrition interventions or food-based programs.
- Limited awareness: less established as an indicator so fewer policymakers and practitioners are aware of it.
- The GDQS (and Diet Quality Questionnaire - DQQ) are not the best tools to use if you are interested in infrequently consumed foods.
- Time-intensive: Accurate administration depends on well-trained staff who understand food group classification and portion estimation, which can be resource-intensive. The GDQS app requires in-person interviews because it uses 3D cubes or playdough to help estimate how much of each food group was eaten—something that can't be done over the phone. Also, since it tracks food groups rather than individual foods (except for a few like milk), it does not provide actual intake data, which means you cannot assess whether someone's diet is adequate.

Tool and indicator validation

To ensure these indicators are reliable and meaningful, validation studies have been conducted across diverse settings and populations.

Validation is essential in determining the suitability of a dietary assessment instrument, focusing on its validity, misreporting and measurement errors. Validity assesses how accurately the instrument reflects actual intake, usually in comparison with other methods. Misreporting, influenced by factors like social desirability or memory limitations, can impact accuracy. Measurement errors, either systematic (bias) or random, affect the reliability of findings. Every dietary assessment method has its own set of potential biases and errors – no method is perfect.

A collection of GDQS validation studies is available in the Journal of Nutrition. Notably, Bromage et al. (2021) evaluated GDQS indicators in relation to nutrient adequacy and noncommunicable disease (NCD) outcomes, demonstrating strong predictive capacity.

Additionally, Hanley-Cook 2024 found that standardized sub-metrics for healthy (GDQS+) and unhealthy (GDQS−) food group consumption showed strong agreement and correlation with quantitative 24-hour dietary intake data, reinforcing the tool's validity across diverse dietary contexts.

Lower-resource adaptations

In settings with limited resources, adaptations to the GDQS tool and data collection methods can help maintain data quality while reducing costs and logistical burdens.

- Integrate GDQS into existing surveys to reduce fieldwork costs and streamline implementation. As a ready-to-use tool—with app-based modules and automated indicator calculators—it minimizes misclassification and lowers respondent and enumerator burden.
- Use purposive sampling by selecting a limited number of communities or areas to draw a sample of individuals with contrasting characteristics (e.g., urbanicity, market access) instead of full population-based sampling.
- Consider the Diet Quality Questionnaire (DQQ) for quicker, lower-preparation deployment. Unlike the GDQS, which typically requires a month of preparation and in-person data collection, the DQQ can be administered by phone and has already been used in over 85 countries via the Gallup poll (see DQQ for more details). However, the DQQ has its own limitations (it does not capture portion sizes, cannot estimate nutrient intake, and may be less sensitive to dietary diversity within food groups) and does not provide the same depth or specificity of dietary quality information as the GDQS. These constraints mean it provides a more general picture of diet quality and may not be suitable for all research or policy objectives.

Higher-resource adaptations

Conversely, in high-resource contexts, expanded data collection and broader geographic coverage can enhance the depth and utility of GDQS findings.

- Increase the frequency of data collection (e.g., to capture seasonal and/or temporal changes in diets)
- Expand the geographic scope of the study by adding other population groups (e.g., rural) for purposes of comparison or for conducting cross-country comparisons.

Sampling and data collection considerations

Regardless of resource level, thoughtful sampling and data collection strategies are essential to ensure representativeness and relevance of GDQS data.

The sampling approach depends on the user's question of interest and target population, but it is crucial to ensure a study's sample is representative of the target population. The two primary sampling approaches are probability and non-probability sampling. There are several methods of probability sampling, including simple random sampling, where any member of the target population has an equal chance of being selected into the study, interval sampling, in which people of the targeted group are continually available and selected into a sample (i.e., consumers in a market), and stratified sampling, which divides the target population into groups for sampling, and/or cluster sampling which uses groupings from which the sample population is selected.

In urban settings, administrative boundaries and enumeration areas can help organize sampling. In many countries, lists of enumeration areas can be acquired, after which a sample frame or list of households or targeted individuals from each of those areas are developed, from which households or individuals are sampled. Correcting for over- or under sampling through sample weighting is essential to improve data accuracy. If the question of interest is to assess changes at population-level in dietary quality due to a program or policy, it is critical that the sampling frame include populations that have been exposed to those interventions. Non-probability sampling methods, such as convenience and snowball sampling, can be used when ease of access is prioritized.

Careful conceptualization of the relationship between food environments and diets helps guide geographic focus and sampling strategy, ensuring more meaningful and representative results. For example, if your question of interest is to compare between areas of differing levels of urbanization, the geographic frame could include urban, peri-urban, and rural areas, and a sampling strategy would need to select a representative sample of households and individuals.

As the GDQS app is now validated for use in most target groups, it can be used if there is interest in targeting multiple members of the household that are nutritionally vulnerable.

Other data sources

When primary data collection is not feasible, alternative data sources can complement or substitute GDQS-based assessments, though each comes with its own trade-offs.

While it is ideal to collect primary data, real world limitations to data collection in urban settings may prevent this, including on the implementing side (e.g., budget/resource constraints) and in the field (e.g., difficulty in accessing populations, conflict-affected settings). It may be helpful to examine secondary data sources, either as background to inform primary data collection or in place of it, if data collection is not feasible.

Data Sources	Pros	Cons	Indicators
Global Dietary Database [Individual-level]	-Most are nationally representative -Urban/rural residence included in half of surveys -Harmonized data (variables, units, food definitions) for individual-level dietary data from nutrition surveys for 188 countries	-Requires nutrition and data analysis expertise -Surveys use different designs and tools -Certain food categories are excluded (e.g., poultry, dairy-based desserts, highly processed or packaged foods, mixed dishes and recipes, condiments and spice, supplements)	-Includes 51 dietary factors based on public health and chronic disease risk (e.g., foods, beverages, nutrients, dietary patterns, or qualities)
GIFT Database (FAO) [Individual-level]	-Data are disaggregated by sex and age but inconsistent urban/rural disaggregation -Individual quantitative food consumption data coded with the FoodEx2 European standardized food classification system to code foods for dietary and exposure assessments, data are screened and formatted using R -Dashboards presenting indicators and summary statistics on foods and diets -Can link food groupings to own dietary data (dataset available upon request)	-Need nutrition and data analysis expertise, particularly as outliers and missing data have not been removed from original datasets and energy and nutrient values are provided directly from surveys (does not link food consumption datasets to food composition data)\ -Many datasets are old, most not nationally representative and there are no data on statistical weights -Data covers only 36 countries (Africa: Benin, Burkina Faso, Cameroon, Ghana, Kenya, Malawi, Mali, Mozambique, Nigeria, Senegal, South Africa, Tanzania, Uganda; Asia: Bangladesh, Cambodia, China, India, Indonesia, Lao PDR, Nepal, Philippines, Thailand, Vietnam; Latin America: Brazil, Guatemala, Haiti, Mexico, Saint Kitts and Nevis; Europe: Albania, Armenia, Georgia, Moldova, Ukraine; Middle East/North Africa: Egypt, Lebanon, Morocco, Tunisia; Oceania: Fiji)	-Estimated usual intakes of selected nutrients (with SPADE tool) -MDD-W (and Food group diversity score, individual food group consumption) -Food consumption (daily diet g/per person per day, proportion of food groups consumed (%), calories per person per day) -Other indicators for food safety (dietary exposure to chemicals) and environmental impacts of food consumption (emission, water, and land use) -Statistics on food consumption can be calculated for individual food items or using food groups (e.g., sources of micro- and macronutrients in the diet, macronutrient contribution to total intake)
Demographic and Health Surveys [Individual-level]	-Nationally representative data on dietary diversity -Urban/rural disaggregation	-Need nutrition and data analysis expertise -Alternatively, the DHS StatCompiler and mobile app allows for automatic indicator calculation and disaggregation	-MDD-W -IYCF practices (MAD, MDD, MMF) -Percentage consuming ten food groups1 (PLW, WRA)
Gallup World Poll (GWP) (Global Diet Quality Project)	-Global coverage and standardization (140 countries, including those that lack nutrition surveillance data) -Integration with economic, social and health indicators -Frequent updates (every 5 years) -Samples adults aged 15+ (not just women)	-Other national surveys tend to align more closely with DHS than GWP. -GWP often collects data in lean seasons, potentially underestimating MDD-W compared to DHS. -Validating MDD-W for males aged 15–49 could expand GWP's utility. -Greater variability in GWP estimates than DHS.	-MDD-W, DDS -All-5, protective, and unhealthy food consumption -Healthy diet pattern for NCD prevention -Zero fruit or vegetable consumption -Food groups

[1] The food groups used in the DHS include grains, white roots and tubers, and plantains; pulses such as beans, peas, and lentils; nuts and seeds; dairy products; meat, poultry, and fish; eggs; dark green leafy vegetables; other vitamin A-rich fruits and vegetables; other vegetables; and other fruits.

Data Sources	Pros	Cons	Indicators
Household consumption and expenditure surveys (HCES) [Household-level food consumption]	-Implemented at scale often with national representativeness, but made financially viable through public and donor subsidies -Conducted some countries (every 3-5 years) with a large sample -Urban/rural disaggregation -Contains other variables such as data on socioeconomic status, education, and other determinants relevant to nutrition -Often also includes acquisition data (food acquired from purchases, production, in-kind)	-Household level food consumption, does not address intra-household allocation issues that may affect household members – not ideal source of dietary data. -Modules are heterogenous across countries, making comparisons challenging -Does not differentiate between subgroups to estimate differences in probability of deficiencies in high-risk groups -Often lacks information on types of foods consumed away from home (FAFH); the information on cost of meal consumed outside the home may be available, but not the type of foods/meals. This is a problem especially in urban settings where working HH members or school-age children often eat one or more meals outside the home.	-Food variety (Household diet diversity score) -Food consumption (Food consumption score) -Nutrient availability: macronutrient and micronutrient availability per capita per day (micronutrient availability requires use of FCT), per capita energy intake. -Consumption patterns (frequency or shares of animal-sourced foods, staple foods, ultra-processed foods), however, recall periods are variable (some foods reported over a week, others a month)

Illustrative research using these tools and indicators in urban settings

- The Global Diet Quality Score is associated with nutrient adequacy and depression among Vietnamese youths (Nguyen 2023)
- Application of the Global Diet Quality Score in Chinese Adults to evaluate the Double Burden of Nutrient Inadequacy and Metabolic Syndrome (Yuna 2021)
- Influence of home and away-from-home food environments on diets in urban and peri-urban Kenya: Insights from the Global Diet Quality Score (Maredia 2024)

GDQS and Dietary Assessment-Related Resources

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