CHAPTER 12

Methods of Assessment of the Impact of COVID-19 on Community Dietary Patterns

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Introduction

Food provides the nutrients and energy that are essential for human health. Poor diet is associated with major chronic diseases such as obesity, diabetes, cancer, and respiratory and cardiovascular diseases that persist in both developing and developed nations (Popkin, Adair, and Ng 2012). These diseases contribute to high mortality rates worldwide. A public health challenge is how to reduce exposure to chronic diseases through reinforcement of healthy lifestyles and dietary patterns within populations (Gil et al. 2014). Associations between diet and health outcomes have been observed through longitudinal or retrospective case-control studies, and cross-sectional research studies. Dietary patterns involving healthy food consumption habits among individuals are beneficial in the prevention of diet-related health risks. In dietary patterns studies, it was observed that intake of distinct food combinations is more essential than single nutritive substance or foodstuff consumption (Newby and Tucker 2004). Diet quality assessments that consider overall diet and categorize populations by healthy consumption behavior are crucial tools in monitoring changes within a given population. Broadly, there are two methods—namely, a priori and a posteriori—that have been employed in assessing dietary patterns. The a priori approach assesses consumers' adherence to and application of specific dietary recommendations, whereas the a posteriori approach is data-driven and uses multivariate statistical approaches.

The COVID-19 pandemic has significantly altered the dynamics of nutrition, health, and general dietary patterns for many people around the world. This has accentuated the need to tackle malnutrition in all its forms, including micronutrient deficiencies and obesity. The pandemic has inadvertently highlighted the importance of diet in determining several health outcomes. Although there are minimal data on the impact of early nutritional support in pre-ICU COVID-19 patients, it appears that nutritional status is a significant factor that determines the outcome of COVID-19 infections (Coker et al. 2021). It is known that people who are malnourished have weakened immune systems and may be more susceptible to severe sickness from viruses such as COVID-19 (Global Nutrition Report 2020). The pandemic has disrupted food supply access and hence exposed children to starvation, poor nutrition, and the resulting significant effects on their cognitive development. All of these COVID-19-related hardships come at a time when many families face unemployment and income loss (Coker et al. 2021; World Food Programme and UNICEF 2020). According to the World Food Programme and UNICEF (2020), 368 million children from preschool to secondary school are currently missing school meals, and 148 million (approximately 40 percent) of these children are girls. Global agencies including the World Food Programme have warned that COVID-19 may force an additional 130 million people to the verge of hunger by the end of 2020 (World Food Programme and UNICEF, 2020). In addition, infrastructure flaws in the food supply chain may inadvertently promote the spread and proliferation of the virus (Coker et al. 2021). Therefore, it is crucial to have robust and efficient strategies for monitoring and tracking changes in dietary patterns, particularly during a pandemic.

Dietary surveys are essential policy instruments that can serve several purposes, including identifying hot spots that require interventions, providing better management strategies, and developing improved design of food systems for better availability and accessibility of nutritious foods. This chapter examines the methods of assessment of community dietary patterns and highlights essential elements that may improve measurement to effectively capture the impact of COVID-19.

Dietary Guidelines

Dietary guidelines are typically used to establish public food, nutrition, health, and nutrition educational programs that promote healthy food intake patterns and lifestyles. They give the public advice on nutrition and dietary patterns to help them avoid chronic diseases (WHO 1990). Dietary guidelines must not restrict food intake but must encourage healthy food choices. These guidelines encompass four broad science areas—namely, nutrition, food science, and the agricultural and environmental sciences—as well as educational, social, and behavioral sciences. Since the establishment of food-based dietary guidelines by the Food and Agriculture Organization of the United Nations and the World Health Organization (FAO and WHO 1996), several countries in partnership with international bodies and agencies have adopted their own national nutritional guidelines, often considering each country's ecological and cultural settings, food and nutrients consumption, nutrition outcomes, food supplies, and incidences of diet-related diseases (Herforth et al. 2019). These dietary guidelines can be applied to adjust food consumption patterns and thereby manage populations' health indexes.

Individuals' nutritional status has been a potential protective barrier during the COVID-19 pandemic. Considering that optimal nutrition and dietary nutrient intake have an impact on the immune system, strengthening the immune system is the only long-term approach to survival in the present pandemic circumstances. Dietary guidelines inform people about the foods they should eat to boost their immune system's defenses against viruses like COVID-19.

Dietary Pattern Analysis

Dietary patterns are best in distinguishing the connection between diet and chronic illnesses (Schwerin et al. 1982). They refer to quantities, proportions, varieties, or combinations of different foods and beverages in diets, as well as the frequency with which they are habitually consumed. Improved diet quality and healthier dietary patterns result in better health outcomes (Livingstone and McNaughton 2018). Analysis of dietary patterns normally focuses on the relationship between dietary intake and chronic disease outcomes (Hu 2002). A priori and a posteriori approaches can both be used for dietary pattern analysis. The a priori approach to dietary pattern analysis is created from dietary recommendations or guidelines such as the Diet Quality Index (DQI), Mediterranean Diet Scale (MDS), Healthy Diet Indicator (HDI), and others. The a priori approach describes the extent of consumers' adherence to and usage of set guidelines, whereas the a posteriori approach is data driven and uses multivariate statistical methods (Hu 2002; Panagiotakos 2008; Ramezankhani et al. 2021). The a posteriori approach enables the food intake among population subgroups to be investigated and measured scientifically using statistical tools such as factor and cluster analysis. Several studies have used factor analyses of dietary patterns to reveal population food intake behavior and chronic disease associations (Judd et al. 2015).

Dietary Pattern Analysis—A Posteriori

The a posteriori method of dietary pattern analysis is a data-driven approach that applies mathematics to extract dietary (that is, food consumption) patterns empirically. Food frequency questionnaires, diet records, and 24-hour recalls are commonly used to collect the dietary data. A larger collection of dietary variables is aggregated and reduced to form a smaller set of variables when factor or cluster analysis is used. Each dietary pattern is given a descriptive name based on the most common food groups (Kant 2004).

Factor Analysis

Factor analysis is a technique for reducing the number of dietary variables by identifying factors made up of associated variables (Kant 2004). Principal component analysis (PCA) is a form of exploratory factor analysis that uses matrix algebra to classify the principal components in the data based on a correlation or covariance matrix of the input variables, rather than assuming an underlying model of the factors. The patterns are created using the relationships between the input variables (that is, the foods or food groups) as a starting point. The elements, or factors, that result are linear combinations of the observed variables that explain the data variance. Factor loadings (or scoring coefficients) for each variable are incorporated in the principal components analysis output, which can be interpreted as correlation coefficients (Venkaiah et al. 2011). Food, for example, is divided into groups based on the associations between food products or food groups, and each of the derived factors is assigned a factor score. The best way to represent a person's dietary pattern is to look at his or her factor scores for each derived factor. Confirmatory factor analysis enables the investigator to use previous information about the subject matter by determining both the number of factors and the types of variables that will load in each factor. After that, the researcher constructs the factor model and confirms the factor structure and inputs for every variable.

Cluster Analysis

Cluster analysis creates dietary patterns by grouping people together based on their food consumption variations. Individuals are divided into non-overlapping groups based on their typical dietary intake in this method (Kant 2004). In nutritional epidemiology, clustering approaches divide people into equally exclusive, non-overlapping classes. Individuals can only belong to one cluster, and clusters can then be used in the assessment as categorical (nominal) variables. Many of the methods are vulnerable to outliers, so researchers usually standardize their data before using them in the study. Cluster analysis divides people into classes based on how similar their diets are. The two commonly used cluster analysis approaches are k-means and Ward's method (Newby and Tucker 2004).

Reduced Rank Regression

Reduced rank regression (RRR) is a statistical method for determining dietary patterns (food intake combinations) that explains as much variance among a collection of response variables as possible. Since it incorporates both existing data and exploratory statistics, it is an a posteriori process. To classify response variables, the approach relies on prior information gleaned from established research on nutrient-disease relationships (Vermeulen et al. 2017). These response variables may be nutrients or biomarkers that have been linked to the progression of the health outcome under investigation. Dietary patterns that clarify variance in response variables are detected. Following that, only certain patterns that explain the differences in the response variables are used in subsequent analysis. After this step, each study subject's dietary pattern score is determined for each pattern. These ratings are used in analyses to determine whether any of the dietary patterns are linked to the health outcomes of concern.

Treelet Transform

The treelet transform (TT) is a new method of finding patterns in data from the machine learning discipline. TT is a dimension reduction approach that incorporates features of PCA and cluster analysis to generate a cluster tree that allows a visual examination of how the various variables group. TT reduces multilevel datasets for predictions on a small number of elements that account for the original data's variation. Although very similar to PCA, TT generates sparse components that make it easier to understand (Assi et al. 2016).

Dietary Pattern Analysis—A Priori (Diet Quality Indexes)

Indexes are instruments used to assess and calculate a variety of clinical conditions, patterns, attitudes, and values that are difficult to quantify and accurately measure, such as the severity of a disease, dietary patterns, and health-associated life quality. Specific variables representing index items or components are combined in all indexes. Each indexed dietary item or component represents a different index dimension. These elements are usually scored using random weights and then added together to produce a total score that best reflects people's health, food intake habits, and attitudes. Indexes were generated to address several issues with highly correlated records for evaluation. Table 12.1 summarizes the details of commonly used diet quality indexes. Some selected indexes/indicators are discussed below.

The Diet Quality Index

The diet quality index (DQI) was developed by Patterson, Haines, and Popkin (1994) to provide an effective method for evaluating the risk of dietary patterns on chronic diseases based on dietary guidelines. The index was established by a multidisciplinary committee that reviewed epidemiologic, clinical, and laboratory evidence relating to dietary factors and chronic diseases. Diet and health recommendations were weighted, index scoring cut-offs were created, and scores were averaged across all recommendations. The DQI contained an ad hoc weighting scheme in which three of the diet elements (overall fat, saturated fat, and cholesterol) were used to calculate the first and most important diet and health recommendation on dietary lipids, effectively giving this first diet and health recommendation a weight of three. A person who met the first recommendation target (reduce fat to 30 percent or less of total energy) was expected to meet the second goal for saturated fat. The fourth and fifth index elements distinguished the second diet and health carbohydrate guideline (fruits and vegetables, grains, and legumes). The other three elements (protein, calcium, and sodium intake) were given a lower-priority recommendation (one index calculation each) for food and wellness. The last two guidelines (supplement use and fluoride intake) were not considered relevant enough for chronic disease prevention to be included in the index. A score of 0 was granted to people who met their dietary targets. Those who could not attain a target but consumed poorly earned two points. To score the index from 0 to 100, these points were applied together through eight diet variables on a scale from 0 (excellent diet) to 16 (poor diet). It was deduced that this index ranking of total dietary patterns represented the diet's overall efficiency. DQI may not be representative of total diet quality since many micronutrients are not included in the recorded analyses. It may also not be suitable for people with nutrient concerns.

TABLE 12.1—SELECTED COMMONLY USED DIET QUALITY INDEXES (A PRIORI)

Index Name	Index Characteristics	Score Range	Datasets	Target Area
The Diet Quality Index (Patterson et al. 1994)	8 components	0–100	24-hour recall and two-day food records	United States
The Diet Quality Index Revised (Haines, Siega-Riz, and Popkin 1999)	8 components	0–100	24-hour recall	United States
Healthy Eating Index (Kennedy et al. 1995)	10 components	0–100	24-hour recall and two-day food records	United States
Healthy Diet Indicator (Huijbregts et al. 1997)	9 components	0–100	Food groups and nutrients	Europe
Overall Nutritional Quality Index (Katz et al. 2009)	More than 30 components	1–100	Nutrition, food-groups based FFQ	United States
The Baltic Sea Diet Score (Kanerva et al. 2014)	131 components	Three-point scale (never, scarcely, at least six days)	FFQ	Nordic countries
Canadian Healthy Eating Index (Shatenstein et al. 2005)	Canadian Food Guide	0–100	FFQ and recalls	Canada
Alternate Healthy Eating Index (McCullough et al. 2002)	9 components	0–10	FFQ	United States
Diet Quality Index International (Kim et al. 2003)	17 components (adequacy, variety, moderation and overall [total] balance)	0–100	24-hour recall	Global
The Dietary Variety Score (Drewnowski et al. 1997)	10 components	Five-point scale	Food recall and 24-hour recall	United States
The Healthy Food Index (Osler et al. 2001)	24 components	1–4	FFQ	Denmark
Mediterranean Diet Score (Panagiotakos, Pitsavos, and Stefanadis 2006) (Scali, Richard, and Gerber 2001)	11 components	0–5	Food records	Mediterranean and non-Mediterranean regions
Mediterranean Diet Scale (Trichopoulou et al. 2003)	9 components	0–9	FFQ (150 items)	Greece
The Modified Mediterranean Diet Score (Knoops et al. 2004)	8 components	0–8	Food record and FFQ	Europe (Mediterranean and non- Mediterranean)
Mediterranean Score (Martínez-González et al. 2004)	9 components	0–9	FFQ	Mediterranean and non-Mediterranean regions
A Priori Mediterranean Dietary Pattern (Sánchez-Villegas et al. 2002)	6 components	1–5	Eight quintile, FFQ	Mediterranean and non-Mediterranean regions
The Mediterranean Adequacy Index (Fidanza et al. 2004)	10 components	Two-point scale (good, unhealthy)	Diet history method	Europe
Young Healthy Eating Index (Hurley et al. 2009)	At-risk foods for adolescents	Micronutrients and total energy intake	FFQ	United States
KIDMED Index, (Sahingoz and Sanlier 2011)	16 questions for children	1–8	Questionnaire	Turkey
Variety Index for Children (Cox et al. 1997)	Food Guide Pyramid (four food groups)	0–1	Parent interviews (regarding infants)	United States

Note: FFQ = food frequency questionnaires

The Healthy Eating Index

The Healthy Eating Index (HEI) is a diet quality index established by the United States Department of Agriculture (Kennedy et al. 1995). It was created to examine dietary consumption and wellness promotion activities in the United States. It uses 10 standards to determine the quality of diet, with HEI scores varying from 0 to 100. The dietary recommendations and guidelines for Americans and the Food Guide Pyramid serve as the basis for the HEI requirements (Kennedy et al. 1995; USDA 1995).

The HEI comprises 10 components that are focused on different aspects of a healthy diet. Respondents are given a minimum score of 0 and a maximum score of 10 for each part, for the complete observance of the dietary recommendations. As a result, the overall index ranges from 0 (worst) to 100 (best). Components 1 through 5 determine how closely a person's diet adheres to the USDA Food Guide Pyramid's serving guidelines for five main food groups: grains, vegetables, fruits, milk, and meat. Component 6 is measured as a percentage of total food energy intake. Component 7 is centered on the quantity of total food energy consumption that is saturated fat. Component 8 is based on the amount of cholesterol ingested. Sodium intake is the basis for component 9. Component 10 measures how varied a person's diet is (Kennedy et al. 1995).

The HEI is a measure that helps people to determine the overall quality of their diets, rather than looking only at separate components. The HEI represents the variety of dietary patterns; it is not guided by a single cause, so a high score is not guaranteed by excelling in only one component (Kennedy et al. 1995). Although created for usage with 24-hour recall, the HEI score is a particular algorithm that represents a summary measure of diet quality, incorporating information on the quantity and diversity of foods and recommendations for consumption of specific food components. HEI's drawbacks are that the index is unable to differentiate between whole and processed grains and does not account for dietary fiber.

The Healthy Diet Indicator

The Healthy Diet Indicator (HDI) was developed based on WHO guidelines for chronic disease prevention (Huijbregts et al. 1997). Saturated and polyunsaturated fatty acids; protein; carbohydrates; dietary fiber; fruits; vegetables; pulses, nuts, and seeds; mono- and disaccharides; and cholesterol are the nine foods or nutrient groups that make up the HDI. For each of these classes, a binary variable is produced. These variables were coded as 1 if a person's intake of the foods was within the suggested boundaries of the WHO dietary guidelines and 0 if the intake was below these limits (Peterkin 1990). The balanced diet score (ranging from 0 to 9) was determined by adding all these dichotomous variables together. Overall fat and total carbohydrates were removed to prevent overlap. Since only details about the preexisting sodium content of foods were available, and it was unclear how much salt was added during meal preparation and at the table, salt was not included. The variables for monosaccharides and disaccharides were used instead of free sugars because the free sugars indicator was not equivalent across countries. Also, because high alcohol consumption in some southern European cities dilutes macronutrient intake as compared with other countries, macronutrient intake was measured as a ratio of overall energy intake excluding alcohol. The HDI tends to disregard differences in food or nutrient levels consumed (for example, someone who consumes 11 percent saturated fatty acids as energy is considered the same as someone who consumes 20 percent), and it should have included other nutrients that contribute to the occurrence of chronic diseases, such as sodium. Even so, it is an excellent method for evaluating diet quality and predicting possible adverse health events.

The Mediterranean Diet Scale

The Mediterranean Diet Scale (MDS) was developed to determine the degree of observance of the conventional Mediterranean diet (Trichopoulou et al. 2003). High consumption of typical Mediterranean foods such as cereals, legumes, fruit, vegetables, fish, and wine, as well as the ratio of foods rich in monounsaturated fatty acids to saturated fatty acids, are scored 1, whereas high intake of non-Mediterranean foods such as dairy and meat are scored 0. Thus, the score ranges from 0 to 9, where the higher the score the better the compliance with a traditional Mediterranean diet. For alcohol intake, the scale assigns a value of 1 to either men who consume 10 to 50 grams of wine per day or women who consume between 5 and 25 grams per day. Since monounsaturated lipids are used far more in Greece than polyunsaturated lipids, the proportion of monounsaturated to saturated lipids was applied instead of polyunsaturated to saturated lipids for lipid consumption. Trichopoulou and others (2005) reported a two-point rise in the scale that was correlated with a 33 percent reduction in the risk of coronary heart disease in a large, population-based sample of people from Greece. In addition, the proposed scale was associated with all-cause mortality. The cereal category is considered a positive factor in this score. High cereal intake in the Mediterranean diet has long been thought to be safe, but evidence for this has been limited. The intake of refined cereals is rising around the world, including in Mediterranean countries where cereal use is already high. However, this scale is a useful instrument for assessing the risks of different chronic diseases and determining adherence to a healthy dietary pattern.

Population Food Group Diversity Indicators Often in Use

The COVID-19 lockdown resulted in increased food prices, a decline in household dietary diversification, heightened generalized anxiety disorder symptoms, and altered diet and consumption patterns, according to current research evidence (Matsungo and Chopera 2020). Therefore, it is essential to identify and use indicators that effectively measure household-level impact.

Household Dietary Diversity Score

As part of the Food and Nutrition Technical Assistance (FANTA) II Project, the Household Dietary Diversity Score (HDDS) was released in 2006 as a population-level indicator of household food access. Household dietary diversity, defined as the number of food categories consumed by a household over a specific reference period, is an essential measure of food security for a variety of reasons. Caloric and protein adequacy, percentage of protein from animal sources, and household income are all linked to a more diverse household diet. Based on 24-hour history, the HDDS indicator provides an overview of a household's ability to get food as well as its socioeconomic position. The HDDS indicator is calculated using the following 12 food groups: cereals; root and tubers; vegetables; fruits; meat, poultry, and offal; eggs; fish and seafood; pulses, legumes, and nuts; milk and milk products; oil and fats; sugar and honey; and miscellaneous. A score of 1 (if consumed) or 0 (not consumed) is given to each food group. The total number of food categories consumed by the household determines the household score, which ranges from 0 to 12 (Swindale and Bilinsky 2006).

Although there is no standard cutoff or objective level for determining whether a household's diet is sufficiently varied, FANTA recommends two approaches for using this indicator in performance reporting. One approach is to set a target based on the dietary diversification patterns of wealthier households (the top 33 percent in income), on the assumption that poorer households would increase their dietary diversity as their finances rise. An alternative is to set a target based on the average dietary diversity of the 33 percent of households with the most diversity (Swindale and Bilinsky 2006).

Infant and Young Child Feeding—Minimum Dietary Diversity

The WHO developed the minimum dietary diversity (MDD) score for children ages 6 to 23 months to assess dietary diversity as part of infant and young child feeding (IYCF) practices among children in this age group. The WHO established the MDD as one of eight IYCF indicators to provide simple, valid, and reliable metrics for measuring IYCF practices at the population level. The other seven indicators are early breastfeeding initiation; exclusive breastfeeding under six months; continued breastfeeding at one year; introduction of solid, semisolid, or soft meals; minimum acceptable diet; minimum meal frequency; and intake of iron-rich or iron-fortified foods (WHO 2008). The minimum acceptable diet indicator, which is a composite indicator, incorporates the MDD. The information is acquired through a questionnaire given to the child's caregiver, which is normally included in the IYCF module. Respondents are asked whether their child consumed any food from each of these eight food groups in the preceding 24 hours: breast milk; grains, roots and tubers; legumes and nuts; dairy products; flesh foods; eggs; vitamin A–rich fruits and vegetables; and other fruits and vegetables. The total number of food categories from which a child has eaten is summed to calculate the MDD (WHO 2008).

Minimum Dietary Diversity for Women

Minimum Dietary Diversity for Women (MDD-W) is a population-level indicator of dietary diversity that has been validated for women between the ages of 15 and 49. The MDD-W is a 10-food-group, dichotomous indicator that is widely used to assess dietary variety in women of reproductive age at the population level. The Women's Dietary Diversity Score, a validated continuous indicator based on reported intake of 9 food groups, had been used prior to the MDD-W. After more testing with different datasets, the MDD-W was created with the goal of providing a dichotomous, easily understood indicator rather than a continuous one. Women with minimally appropriate diet variety, according to the MDD-W, have ingested at least 5 of the 10 potential food groups over a 24-hour recall period. When a categorical indicator of individual dietary diversity for women is needed, both the FAO and the United States Agency for International Development (USAID) propose using the MDD-W. If a continuous variable is necessary, these organizations also advocate using the 10-food-group dietary variety indicator. The information is acquired by a questionnaire given to female respondents ages 15 to 49 (FAO and USAID 2016).

Respondents are asked to recollect the food groups from which they ate in the previous 24 hours, using either a list-based method (with questions about intake of each of the 10 food groups in sequence) or an open-recall technique (with questions about intake of each of the 10 food groups in any order). Even though the MDD-W guidelines include both recall methods, the open-recall technique is recommended. The 10 food groups required for the MDD-W are as follows: grains, roots, and tubers; pulses; nuts and seeds; dairy; meat, poultry, and fish; eggs; dark leafy greens and vegetables; vitamin A–rich fruits and vegetables; other vegetables; and other fruits. Enumerators keep count of whether or not the respondent ate foods from each dietary group. The total number of food groups consumed is added together, with each food given an equal weight (FAO and USAID 2016).

Dietary Pattern and Diet Quality Assessment in COVID-19-Related Population Dietary Behavior Studies

Population studies evaluating dietary patterns from a quality perspective have focused on various aspects of diet quality measurements and their corresponding indexes. However, COVID-19 has made it necessary to look beyond the status quo and measure other factors that are essential to augment our understanding of the impacts. In this section, we highlight four elements that may improve dietary pattern measurement and capture the potential impact of COVID-19.

Food Diversity

Eating a balanced diet improves health and reduces risk of preventable chronic diseases such as obesity and associated complications. While some of the current dietary assessments measure food diversity, nutrient-based dietary assessments such as the Nutrient Improvement Score, Nutrient Adequacy Ratio, and Mean Adequacy Ratio may not capture the level of diversity in the diet. Except for the food and behavioral models such as the Preschoolers Diet-Lifestyle Index, Foods E-KINDEX, and the Chinese Children Dietary Index, most dietary pattern assessments were not designed to account for factors such as lifestyle that would reflect the impact of COVID-19, indicating a need for further research efforts (Matsungo and Chopera 2020).

Anxiety

COVID-19-related anxiety issues have been reported globally and have significant effects on what people consume during the pandemic. It is essential to capture anxiety while measuring changes in dietary patterns. Population dietary studies could therefore employ the Generalized Anxiety Disorder scale (GAD-7) to access these changes. This will require measuring anxiety symptoms over a stated period (14–21 days). Matsungo and Chopera (2020) used a four-point Likert scale for a similar measurement. The total GAD-7 score ranged from 0 to 21, with increasing scores indicating more severe functional impairments because of anxiety. Augmenting dietary results with such measurement will provide a more holistic outlook on consumers' dietary patterns during pandemics (Matsungo and Chopera, 2020).

Body Image Perception

COVID-19 has changed how people perceive their body size, since frequent snacking between meals, combined with less activity, has often resulted in body weight gain. Pulvers and colleagues (2004) and Yepes and others (2015) have measured body image perception using a silhouette test. This test allows participants to select matching body sizes that reflect their perceptions of how they look before and after the COVID-19 lockdown (Matsungo and Chopera 2020).

Physical Activity and Lifestyle Changes

There is evidence that COVID-19 has resulted in reduced physical activity and lifestyle changes. Ruiz-Roso and others (2020) observed that walking and moderate physical activity have decreased by more than 50 percent during the lockdown, which could have both mental and physical health implications, considering that insufficient physical activity is seen as a primary risk factor for obesity and cardiovascular disease. There are few dietary assessment tools that measure physical activity levels. It would be important for food- and nutrient-based dietary pattern models to include physical activity and lifestyle changes to account for the impact of COVID-19.

Strategies for Large-Scale Improvements of Populations' Dietary Behaviors

Large-scale behavioral change communication (BCC) techniques have been identified and used as the primary strategy for improving populations' dietary behavior. These strategies may either be education-oriented or community activity–focused, and this section discusses these strategies used in population studies.

Education-Based Large-Scale BCC Strategies

The education-based approach is usually implemented through interpersonal counseling, community-based mass media, community mobilization, or a combination of these techniques (Menon et al. 2016). Education-based BCC strategies are usually delivered through home and local clinic visits, mass media such as radio programs, or community education in the form of community conversations and cooking demonstrations.

As reported by Kim and colleagues (2016), an education-based large-scale BCC strategy was implemented through an Alive & Thrive project aimed to enhance IYCF patterns in four regions in Ethiopia. In the two regions of the study—the Southern Nations, Nationalities, and Peoples Region and Tigray—the effects of the interventions on IYCF practices and anthropometry were evaluated over time. Repeated cross-sectional surveys of households with children ages 0–23.9 months (n = 1,481 and n = 1,494) and children ages 24–59.9 months (n = 1,481 and n = 1,475) were performed at baseline (2010) and end line (2014), using a pre- and post-intervention adequacy assessment design. Regression models were used to quantify the differences in the outcomes over time while accounting for clustering and covariates. Tracing recall of main messages and marketed foods, as well as dose-response tests, were used to determine plausibility. The authors observed changes in the majority of the WHO-recommended IYCF measures. Although the interventions were linked to plausible changes in IYCF practices, there are still significant gaps in Ethiopian children's diets, especially during complementary feeding.

A similar application of the education-based BCC technique employing counseling was reported by Kushwaha and others (2014). The study's main goal was to see how effective peer counseling by mother support groups was at enhancing neighborhood IYCF practices. Between 2006 and 2011, the researchers performed this repeated measure before and after analysis in the Lalitpur district of Uttar Pradesh, India. The following IYCF activities in the group showed substantial improvement: initiation of breastfeeding within one hour of birth, use of prelacteal feeds, rates of exclusive breastfeeding for six months, initiation of complementary feeding, and complementary feeding with continued breastfeeding. Ultimately, peer counseling by mother support groups effected a sustained change in the district's IYCF procedures (Kushwaha et al. 2014).

Community Activity–Based Large-Scale BCC

Besides nutrition education, specific community-based interventions have also been used to improve population dietary and diet-related health behavior. The activities are usually physical activity interventions that enhance community participation. For instance, Xu and colleagues (2017) explored ways to reduce obesity in their research on a community-based nutrition and physical activity intervention for children who are overweight or obese and their caregivers. They emphasized the importance of successful approaches to reduce childhood obesity, and a limited amount of evidence indicates that collaborative community-based services for children and their caregivers could be effective in lowering obesity rates. The study presented the findings of the South County Food, Fitness, and Fun (SCFFF) program, which was established in response to community concerns. Families were referred to the program by their doctors and were able to enroll for free. Daily group diet and physical activity sessions were part of the 16-week intervention. According to the findings, 65 of the 97 children who completed the SCFFF program and provided two-year follow-up data had lower body mass index z-scores two years after the intervention. From baseline to the end of the intervention, these participants reduced their energy, fat, carbohydrate, saturated fat, and sodium intake while increasing core body strength and endurance (Xu et al. 2017).

Conclusion

The literature shows that there are two primary pathways to evaluate population dietary patterns and diet quality: statistics-based multivariate methods (a posteriori) such as cluster or factor analysis, RRR, TT, and PCA; and indexes (a priori) created from dietary guidelines to evaluate diet quality and associated chronic disease risk. Statistical methods are used less frequently because they rely on the existence of previously collected data. The field-based diet quality approach, which is employed in most studies, uses indicators that assess how well the population's diet agrees with an idealized meal. Recent dichotomous, population-level indicators based on food group diversity—including HDDS, IYCF-MDD, and MDD-W—are also becoming widely used. While these models have been successful in measuring population dietary patterns, the impact of COVID-19 has made it necessary to include other factors such as food access, physical activity, dietary diversity, anxiety, and body image perception to account for the impact of COVID-19. Large-scale social and behavioral change communications such as interpersonal counseling, community-based mass media, community mobilization, or a combination of these techniques must be deployed to maintain appropriate dietary patterns in communities.