WELL V2:

EVIDENCE BEHIND THE **NOURISHMENT** CONCEPT

FEATURE N01: FRUITS AND VEGETABLES

OVERVIEW

Part 1: Provide an adequate variety of fruits and vegetables if food is sold or provided on a daily basis within the project boundary.
Part 2: Increase the visibility of fruits and vegetables through choice architecture strategies if food is sold or provided on a daily basis within the project boundary.

SCIENTIFIC BACKGROUND

- Fruits and vegetables refer to a diverse group of plant foods widely recommended in a healthy diet. They are high in vitamins, minerals, electrolytes, antioxidants and are an excellent source of dietary fiber, which is required for a healthy digestive system.[1]
- The many types of fruits and vegetables vary widely in nutrient content, which can be further affected by food processing, cooking or peeling. Specific fruits and vegetables also have different psychological effects, which is why it's important to consume a variety every day.[1]
- The World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations recommend consuming a minimum of 400 grams (equivalent to about five servings) of fruits and vegetables a day.[2]
- Choice architecture refers to the process of influencing and guiding behavior without eliminating options or significantly changing economic incentives.[3] To promote healthy behaviors, behavioral nudges in the form of environmental design can be used to cue and encourage, or hinder and deter, certain actions.[3,4]
- Choice architecture has been used to nudge behaviors in the direction of healthier choices through the alteration of the environment within which decisions are made.[5] This includes nudging individuals towards selecting healthier foods, including fruits and vegetables.
- Several aspects of a menu can influence consumer choices and a well-designed menu can direct attention to specific items.[6-8]
    - Menu design can be leveraged to promote healthier choices. Several studies indicate that explicitly labeling food items as "healthy" is not recommended as consumers associate the word with less flavorful or less indulgent options.[9,10]
    - Visual elements (e.g., graphics, imagery, background, text colors, bolding) can be used to make specific menu items stand out in order to draw customer attention and increase consumption of those items.[11-13]
- Menu item descriptions can also influence sales. Studies indicate that evocative labels/names or descriptions can positively affect taste and value perceptions as can increased complexity in item description (i.e., more detailed descriptions using appealing language).[14-17]

KEY HEALTH AND WELL-BEING EFFECTS

- The WHO reports that low intake of fruits and vegetables is one of the top 10 risk factors contributing to global mortality, responsible for approximately 3.9 million annual deaths worldwide in 2017.[18,19]
- Robust population-based studies suggest diets rich in fruits and vegetables are associated with a lower risk of developing cancers (e.g., gastrointestinal, breast, lung), reduction in systolic blood pressure, and lower chances of developing cardiovascular disease, including stroke and coronary heart disease.[20-25]
    - The WHO estimates that 31% of ischemic heart disease deaths and 11% of strokes are attributed to low fruit and vegetable consumption globally.[26]
    - An analysis across several studies that included close to 500,000 participants found an average 4% reduction in risk of death from cardiovascular disease for every additional serving of fruits and vegetables per day.[27]
- Some studies have found that higher fruit and vegetable intake, especially green, leafy vegetables, root vegetables and fruit, has been associated with a lower risk of type II diabetes.[28,29]

HEALTH PROMOTION BENEFITS AND STRATEGIES

- Several studies provide evidence to support environmental modifications, especially at workplaces, in promoting healthier dietary behaviors.[30,31] Potentially effective strategies for increasing fruit and vegetable consumption

(especially in combination) include color-coded food labeling to help identify healthier food options, point-of-purchase prompts, promotional materials and expanding the availability or number of healthy food options.[32-35]
    - Restaurants and other dining spaces can utilize these strategies on menus and menu boards.
- Studies in cafeterias show that both children and adults are more likely to choose healthier food items when they are at eye-level or conveniently located (e.g., at point-of-purchase or seen first out of available options) and that these effects may be sustained in the long-term.[36,37]
- Altering the placement of fruits and vegetables (e.g., proximity and availability) and combined nudges (altering placement and presentation) appear to be the most effective strategies for nudging increased consumption of fruits and vegetables.[38]
    - One study showed that making a certain food item slightly more difficult to reach (25 cm [10 in] further away) can reduce food intake by up to 16%, suggesting that minor food placement changes in settings such as cafeterias can influence greater consumption of foods like fruits and vegetables and discourage the consumption of less healthy alternatives.[39]
    - The majority of studies that provide support for choice architecture strategies in promoting healthy behavior change are based in worksite or school settings, but the placement of fruits and vegetables may be important in other settings as well. One study based in a retail setting focused on low-income families in the United States found an increase in the use of food vouchers for fruits and vegetables when fruits and vegetables were placed prominently near the front of the store.[40]
- Overall, studies indicate that quantity of intake appears to be the most important factor in the health benefits of fruit and vegetable consumption but variety is also an important consideration in dietary intake.[41,42] Studies suggest that one way to potentially lower the risks of cancer, coronary heart disease and type II diabetes and improve cognitive performance can be through consuming a greater variety of fruits and vegetables.[43-46] Higher dietary diversity is also generally associated with healthier metabolic outcomes.[47]
    - Dietary diversity is important because different fruits and vegetables have different nutrients, micronutrients and antioxidants. Eating a variety can help provide a more comprehensive consumption of nutrient content.
    - Fruits and vegetables have different effects on glycemic load, a measure of how a food impacts blood sugar levels. Non-starchy vegetables such as cauliflower and broccoli and fruits such as berries and pears have a low glycemic load (i.e., a relatively small impact on blood sugar) and may be associated with weight loss. Starchy vegetables such as corn and potatoes have a high glycemic load and may be associated with weight gain.[48]

ADDITIONAL NOTES

- Studies on dietary interventions often rely on self-report. More studies are needed that include objective measures of dietary behaviors and environmental factors such as body weight or other metabolic metrics, or data on actual canteen/vending machine sales.[31]
- Studies show that financial barriers are an important consideration in promoting increased fruit and vegetable intake.[49] Economic incentives have been demonstrated to be effective in specifically promoting fruit and vegetable consumption.[50]

FEATURE N02: NUTRITIONAL TRANSPARENCY

OVERVIEW

Part 1: Provide nutritional information for all packaged foods and beverages sold or provided on a daily basis within the project boundary and provide calorie labeling for all standard menu items.
Part 2: Provide point-of-decision signage that prompts individuals to report food allergies to staff and ensure that all food service staff have access to annual food allergy training.
Part 3: Label high sugar content for standard menu items.

SCIENTIFIC BACKGROUND

- Improving upon a person's knowledge base can make attention, comprehension, memory and decision-making more efficient.[51] General nutrition knowledge, coupled with nutritional information, can help individuals pay more attention to food labels, remember and understand relevant takeaways from the label and support healthier consumption decisions based on label information.[52]
    - Nutritional transparency is especially important for the millions of individuals with food allergies and food intolerances who must navigate many issues when dining away from home.
- A food allergy is a medical condition in which exposure to a food allergen triggers an allergic reaction, an immune response triggered by proteins in the food.
    - While most symptoms of an allergic reaction are moderate (itchy mouth, hives, difficulty breathing), anaphylaxis is a serious allergic reaction that can cause death.[53]
- Both natural and added sugars have no nutritional value or benefit beyond being a source of calories (energy). Nutrition facts labels and ingredient lists are useful tools for monitoring consumption of sugars.
    - Some studies suggest that sugar consumption, especially through sugar-sweetened beverages (SSBs), provides energy that takes the place of other, more nutritious energy sources. This contributes to weight gain as well as an increased risk of several diseases, including cardiovascular disease, diabetes, obesity and colorectal cancer.[54-57]

KEY HEALTH AND WELL-BEING EFFECTS

- Excessive consumption of unhealthy foods (e.g., sugar or calorie-dense foods) is an important contributing factor to weight gain and obesity, which further increases risks of other chronic conditions such as diabetes, coronary artery disease, heart failure, psychiatric disorders and several cancers.[58-61]
    - Ultra-processed foods are often ready-to-eat, highly processed and packaged food products such as SSBs, ready-made meals and processed meats. In a cohort study of more than 40,000 French adults, a 10% increase in the proportion of ultra-processed food consumption was associated with a 14% higher risk of mortality.[62]
- The consumption of added sugars is associated with weight gain, obesity, hypertension, heart disease, diabetes, cavities and metabolic syndrome (several conditions that collectively increase the risk of stroke, heart disease and diabetes).[63-65]
    - In an analysis from the Nurses' Health Study II, women who reported consuming one or more SSBs per day had an 83% greater risk of developing type II diabetes compared to women who consumed less than one SSB per month.[66]
    - In another study assessing metabolic syndrome in adolescents, those who reported average daily sugar intake of 81.8-186.0 (3rd-5th quintiles) grams/day were five times more likely to have metabolic syndrome compared to adolescents who consumed an average of 30.2 (1st quintile) grams/day.[67]

HEALTH PROMOTION BENEFITS AND STRATEGIES

- A review of data from countries around the world indicates that nutrition labeling on prepackaged foods is a primary vehicle for delivering nutrition information that consumers desire and perceive as credible but the extent to which labels are used by consumers varies by subgroups.[68,69] Children, adolescents, and older, obese adults appear to consult nutrition labels less frequently than other subgroups.[69]
- Consumers often consult the ingredient list on food labels, indicating that the provision of this information may influence purchasing decisions. Studies show that between 52% of consumers in one study based in the United States and to up to 78% of consumers in one study based in Malaysia review ingredient lists.[70,71]

    - Most ingredient lists indicate the presence of common food allergens. Although there is no global food allergen labeling framework, most developed countries require mandatory labeling of common food allergens, though which allergens are required to be disclosed significantly varies between countries.[72]
    - A study in the United Kingdom with young adults in a university setting found that using nutrition fact labels was associated with higher fruit and vegetable consumption and lower fat intake.[73] Another U.S.-based study, similarly with young adults in a university setting, found that those who regularly used nutrition facts information had higher diet quality, assessed in terms of greater consumption of fruits and vegetables.[74]
- A review of data collected across several European countries showed that the majority of people reported seeking out calorie information for food and beverage items.[75] Consumers typically appear to underestimate the number of calories in the foods consumed and the greater the number of calories in a meal, the more significant the underestimation.[76-78]
- As there is no cure for food allergies, avoidance of food allergens is a recommended strategy for helping prevent serious allergic reactions, such as anaphylaxis.[53]
    - Food allergy training is a best practice to help ensure that all food service staff better understand how to address potential food allergens and intolerances. Trainings should provide evidence-based information on food allergies and best practices for allergy management, which include reducing the risk for cross-contact, an emergency response plan, communications protocols and ingredient disclosure.[79]

ADDITIONAL NOTES

- Some studies report that nutritional information affects dietary intake to some degree, other studies have reported mixed findings.[80-82] However, more methodologically sound research is needed that uses consistent, validated tools to operationalize and measure both nutritional information (and specific types of information such as calorie content versus macronutrient content versus ingredient lists) and dietary intake.[83-85]
- Findings are mixed on whether or not nutritional information is associated with improvements in some objective measures such as changes in body mass index.[86]
- Emphasis should be placed on sodium intake as well, as it closely links with hypertension and cardiovascular disease and is a major health concern in countries such as China, compared to sugar intake.[87,88]
    - High sodium consumption is defined as >2 grams per day, and main dietary sources are from salt or from sodium glutamate as a condiment in many regions of the world.[89]
- The presentation of nutritional information is only as useful as consumers are able to understand that information and use it to inform decision-making.[90] Beyond nutritional information, nutrition education is necessary for that consumers to better understand the information provided and how it may affect their health and well-being.[75,84,91,92]
- Studies indicate that consumers often do not read or else misinterpret labels, suggesting that care must be taken to make labeling is clearer and more prominent.[93,94]
    - Although consumers seek out caloric information, about 88% of survey respondents in a European sample incorrectly estimated daily caloric needs, suggesting that nutritional information of this kind should be coupled with nutrition education.[75]
- Beyond comprehensive nutrition education, there may be opportunities to improve nutrition labeling through the design of labels by reducing label complexity, conveying numeric information in a more intuitive way, visually highlighting key information through larger font or placement on the label and any efforts that can clarify or contextualize any technical terms or concepts (e.g., defining percent daily value, explaining the relationship between total calories and calories from fat).[75,95,96]
    - In 2015, France was the first country to implement a stoplight color-coded (green, yellow, red) front-of-pack labelling (FOPL) recommendation for all processed food products, as recommended by the European Food and Nutrition Action Plan 2015-2020.[97,98]
    - In a large cohort study of more than 13,000 adults assessing five types of food labels, the stoplight FOPL option ranked highest as easiest to identify and understand while accurately portraying nutritional information to consumers.[98]

FEATURE N03: REFINED INGREDIENTS

OVERVIEW

Part 1: Limit the amount of sugar per serving in foods and beverages provided daily by the project.
Part 2: Provide whole grain food offerings priced equal to or less than non-whole grain foods.

SCIENTIFIC BACKGROUND

- Foods and ingredients that have been processed or altered in some way are considered "refined." Refined foods typically are stripped of several nutrients and have additional artificial ingredients added.
- Nutritionally speaking, sugar (including natural and added or free sugars) has no nutritional value or benefit beyond calories (energy).
- Sugar-sweetened beverages (SSBs) are liquids that are sweetened with various forms of added sugars. These beverages may include sodas, sports drinks, energy drinks, sweetened waters and coffee and tea beverages.[65] Most SSBs provide few or no nutrients and are the primary source of added sugar consumption among children, while accounting for a third of the added sugar consumption in adults.[99,100]
    - Some studies suggest that sugar consumption, especially through SSBs, provides energy that takes the place of other, more nutritious energy sources and thereby contributes to weight gain as well as increased risk of several chronic diseases, including cardiovascular disease, diabetes and obesity.[54-57]
- Whole grain foods contain at least 50% whole grains and are better sources of dietary fiber than refined grains.[101-104]
    - Dietary fiber helps maintain blood sugar levels and a healthy weight, promote normal bowel movements and bowel health, and lower cholesterol levels and reduces the risk of cardiovascular disease.[105]

KEY HEALTH AND WELL-BEING EFFECTS

- Avoiding the consumption of added sugars can prevent associated health risks, which include weight gain, obesity, hypertension, heart disease, diabetes, cavities and metabolic syndrome (several conditions that collectively increase the risk of stroke, heart disease and diabetes).[63-65]
    - A large cohort study including more than 100,000 adult women and men found that consumption of SSBs and artificially sweetened beverages was associated with early mortality. One extra 350 ml [12 oz] serving of a sugary drink daily was linked to a 7% increased risk of death overall and a 10% increased risk of death from cardiovascular disease.[106]
- A high-fiber diet, such as one that includes more whole grains, can reduce the risk of cardiovascular disease, diabetes, heart disease, stroke, hypertension, obesity and some gastrointestinal diseases, including cancer.[63,103,104,107,108]
    - Studies indicate that the relative risk of coronary heart disease, cardiovascular disease, total cancer and all-cause mortality (i.e., deaths from any cause in a given population or subset of a population across a certain length of time) is reduced by 19%, 22%, 15% and 17%, respectively, when individuals consume three servings of whole grains a day.[109]

HEALTH PROMOTION BENEFITS AND STRATEGIES

- Reducing sugar intake to less than 10% of total energy intake is linked to fewer dental cavities in both adults and children and a lower sugar intake is associated with a healthier, lower body weight. Evidence also suggests reducing sugar intake to less than 5% of total energy intake may further prevent cavities.[110-112]
    - For 2,000 calories a day, 10% of total energy intake and 5% of total energy intake translate to 50 grams and 25 grams, respectively, of sugar.
    - Sugar consumption levels vary by a number of factors worldwide, including age, regional setting and country. In some communities, sugar can account for 7% of total energy intake, while in other communities it can make up 25% of total energy intake.[113]
- Limiting the availability of SSBs while increasing the availability of healthier alternatives (e.g., water) is an effective strategy to reduce SSB consumption and increase consumption of the healthier alternatives.[65,114]
- Consuming whole grains instead of refined grains can help individuals meet recommended daily fiber intakes.
- Lowering prices for whole grains and other healthy options may reduce deaths associated with heart disease, stroke and diabetes.[115]

- Promoting a variety of whole grains, such as kernels of rye, oat, wheat, barley, millet, maize and rice, provides options to consumers to diversify their macro and micronutrient intake.[116]
    - The Whole Grains Council has created a whole grains stamp to demarcate products that contain 100% whole grains and 50% whole grains to help consumers easily identify products that offer at least a half serving of whole grains.[117]

FEATURE N04: FOOD ADVERTISING

OVERVIEW

Part 1: Prohibit advertising of sugar-sweetened beverages (SSBs) and deep-fried foods and promote the consumption of fruits, vegetables and drinking water.

SCIENTIFIC BACKGROUND

- A healthy eating or dietary pattern is a critical component of good health and reduces risks of chronic disease and premature death.[2,27] Sufficient consumption of a variety of fruits and vegetables is an essential component of a healthy eating pattern that can help individuals achieve adequate intakes of necessary micronutrients and dietary fiber.[19] Generally, a healthy eating pattern also includes whole grains and protein-rich foods, such as nuts or beans, while limiting consumption of red meat, saturated and trans fats, high-sodium foods and energy-dense nutrient-poor foods such as those with added sugars.[65]
- Fruits and vegetables refer to a diverse group of plant foods widely recommended in a healthy diet. They are high in vitamins, minerals, electrolytes and antioxidants and are an excellent source of dietary fiber, which is required for a healthy digestive system.[1]
- The World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations recommend a minimum of 400 grams (equivalent to about five servings) of fruits and vegetables a day.[2]
- In addition to consuming healthy foods, adequate hydration is part of a healthy eating pattern. The daily recommended total water intake is about 2.7 L [91 oz] for women and 3.7 L [125 oz] for men which can come from drinking water and other beverages as well as consuming high-moisture foods, such as fruits, vegetables and soups.[118]

KEY HEALTH AND WELL-BEING EFFECTS

- Liquid calories, such as those from SSBs, are less satiating and thereby may lead to overconsumption.[113] Reduced consumption of SSBs is strongly associated with reduced risks of obesity and type II diabetes[119] and properly managing diet-related chronic conditions is associated with reduced risk of cancer. [120]
- A review of several studies indicates that the consumption of fried foods — which are typically energy-dense and associated with higher intake of saturated and trans fats — has been linked to higher risks of type II diabetes, heart failure, high blood pressure and obesity.[121]
    - The potential risks posed by fried foods vary depending on a number of factors, such as the type of oil used, the foods being fried, frying temperature and frying duration.[122,123] For example, deep frying typically requires high temperatures, around 176.7-187.8 °C (350-370 °F) and the use of polyunsaturated oils like canola, corn and soybean that are easily oxidized, generating potentially carcinogenic (i.e., cancer-causing) compounds like aldehydes and polycyclic aromatic hydrocarbons.[124-127] Olive oil, on the other hand, is resistant to oxidation and may present a slightly healthier alternative for use in high temperature cooking.[128] For example, a study in Spain — where a Mediterranean diet is more common and oils used for frying are more often olive oil or sunflower oil — found that the consumption of fried foods was not associated with increased risk of cardiovascular disease or all-cause mortality (i.e., deaths from any cause in a given population or subset of a population across a certain length of time).[129]
- The WHO recommends a minimum daily intake of 400 g (five servings) of fruits and vegetables to prevent diet-related chronic diseases, including cancer, diabetes, cardiovascular disease and obesity. Particularly if fruits and vegetables replace the consumption of energy-dense nutrient-poor foods, such a diet also may help with weight loss and weight stability.[130]
- Water consumption is associated with improvements in subjective mood, including improved feelings of alertness and calmness and a reduced sense of fatigue.[131-134]
    - In a study conducted with primary school children, students who received a physical and educational intervention (newly installed water fountains and educational lessons) saw a 31% risk reduction in becoming overweight and an increase in average daily water consumption by 200 mL [6.7 oz], compared to students who received no intervention.[135]
    - A systematic review of several studies reports that adults who drink SSBs may consume 7.8% more energy (i.e., calories) at meals compared to adults who drink water at meals.[136]

HEALTH PROMOTION BENEFITS AND STRATEGIES

- The WHO recommends limiting heavy marketing of energy-dense nutrient-poor foods, especially to children, as a strategy to limit the consumption of such foods and mitigate the associated risks of weight gain and obesity.[2]
    - Advertising of unhealthy food options is ubiquitous. In an examination of fast food, beverage and snack brands advertisements in 2,000 brand posts, 67.9% of foods advertised were unhealthy and 61.2% of beverages were SSBs.[137] Policies prohibiting these types of food and beverage advertisements can support healthy eating practices.
- While evidence suggests that food advertising is especially influential on children, it is also impactful on influencing food intake of adults.[138]
    - In one study, children who were exposed to food advertising during a television advertisement saw a 45% increase in food consumed, compared to the group that was shown a non-food product advertisement.[139] Adults who were shown food-related advertisements consumed more healthy and unhealthy-related food snacks post-exposure to advertisements compared to the groups who did not see food-related advertisements.[139]
- The provision of free drinking water has been shown to be an effective strategy for re-directing caloric consumption away from SSBs, while also increasing water consumption rates for both children and adults.[136,140-143] Substituting SSBs with non-caloric beverages like water is associated with decreased weight gain in both children and adults.[144,145]

FEATURE N05: ARTIFICIAL INGREDIENTS

OVERVIEW

Part 1: Artificial ingredients in all foods and beverages are completely restricted, or foods and beverages containing artificial ingredients are clearly labeled and a policy is in place to phase out their use.

SCIENTIFIC BACKGROUND

- Food additives are substances often used to preserve or enhance the flavor, appearance, shelf life or other cosmetic elements of foods or beverages.[146]
- Food additives can include artificial (synthetic) ingredients as well as natural ingredients that are added to foods for preservation purposes. Artificial ingredients (e.g., colorings, sweeteners) make up a subset of food additives (e.g., salt, herbs) that are not naturally-occurring and lack any nutritional value.[147]
- The use of food additives has been a common practice for centuries and has become increasingly ubiquitous due to increased preservation of foods to support the world's growing population.[148]
    - Over the past century, more than 4,000 novel ingredients have been incorporated into the global food supply, with an average of 1,500 new compounds entering the food market annually.[149,150] The majority of artificial ingredients have not been evaluated for their effects on metabolic regulation.

KEY HEALTH AND WELL-BEING EFFECTS

- Many food additives, both natural and artificial, are considered safe for consumption. However, some food additives, such as artificial sweeteners, can trigger allergic reactions or intolerance symptoms in certain individuals.[151,152]
    - Food allergies are characterized by an immune response. Food intolerances, on the other hand, also trigger adverse reactions, but — with the exception of celiac disease — not immune reactions. Therefore, they cannot trigger things like anaphylaxis, a severe allergic reaction that can be life-threatening.[153]
- While most artificial ingredients used in foods are not known to cause health problems, the overconsumption of certain artificial colorings and preservatives has been associated with increased health risks related to metabolic regulation and weight gain, as well as increased risk for irritable bowel syndrome.[149,154-159]
- Artificial sweeteners may alter the composition and function of the human microbiome (i.e., microorganisms in the body that protect against germs and help break down nutrients).[160] These compositional and functional alterations may increase glucose intolerance and also may increase risks associated with cardiovascular disease, obesity, diabetes and metabolic syndrome.[161-167]

HEALTH PROMOTION BENEFITS AND STRATEGIES

- Consumers tend to have health concerns around foods with additives, particularly artificial ones, which may influence purchasing and consumption decisions.[168-171]
- Studies show that people will choose foods without additives when presented with the option to do so.[172-174] This suggests that providing additive-free foods can be helpful in supporting consumer decisions around food products.

ADDITIONAL NOTES

- Children are especially susceptible to consuming foods with artificial ingredients.[175,176] In the United States, and other places, racial and ethnic differences also have been documented in differential exposure to food additives.[177,178]

FEATURE N06: PORTION SIZES

OVERVIEW

Part 1: Limit standard menu items to 650 kcal or have a smaller portion offering available for at least 50% of standard menu items that contain more than 650 kcal. When food is self-serve, provide dishware in age-appropriate sizes.

SCIENTIFIC BACKGROUND

- Portion sizes have been on a growing trend for several decades in places like the United States across various food and beverage products and throughout various settings (e.g., restaurants, fast food establishments and in the home).[179-181]
- The portion size of food offerings has a strong influence on the amount of food actually consumed.[179,182,183]
- Weight gain is fundamentally a reflection of energy intake (e.g., food consumed) exceeding energy use (e.g., movement and exercise).[184]
    - Energy intake and expenditure rates are tied to behavior and environment however, genetic considerations also strongly drive a person's ability or propensity for weight gain or loss, as well a given person's risk for diseases like obesity.[185-187]

KEY HEALTH AND WELL-BEING EFFECTS

- Around the world, larger-than-appropriate portions have been demonstrated to contribute to overeating and a greater risk of weight gain.[179,182,183]
- Maintaining a healthy weight and avoiding weight gain can significantly reduce the risk of numerous health outcomes, including coronary heart disease, type II diabetes, hypertension and several cancers.[188-190]
- Weight loss of 5% to 10% of total body weight can reduce, and at times resolve, disorders and conditions associated with weight gain and obesity.[191,192]
    - One study notes that there are improvements in cholesterol, blood pressure and blood sugar for every kilogram of weight lost and that avoiding weight gain after secondary school can protect against a 5.7% and 3.1% increased risk of coronary heart disease for women and men, respectively.[190]

HEALTH PROMOTION BENEFITS AND STRATEGIES

- Several studies, including a Cochrane Systematic Review of 72 randomized controlled trial studies, have determined that there is ample and strong evidence that restricting the size, availability and promotion of larger-sized portions and dishware of both foods and beverages can meaningfully reduce the amount of food actually consumed.[193,194]
- Dishware size has been shown to significantly influence self-reported sensations of fullness in both children and adults.[194,195]
- Several studies demonstrate that children given adult-sized portions or adult-sized dishware consistently consume more food (estimated up to 25% more by one study) than when given age-appropriate portions or dishware sizes. A similar relationship is observed when comparing adult consumption between smaller- versus larger- sized portions or dishware sizes.[193,194,196,197]
- Even small decreases in dishware sizes can affect the amount of energy (i.e., calories) available for consumption. Shifting from a 25 cm [10 in] diameter plate to a 20 cm [8 in] diameter plate results in a 67% decrease in the amount of energy presented to the consumer.[198]
    - Among students in a university setting, those using a plate of 25 cm [10 in] diameter compared to a plate of 30 cm [12 in] diameter reported serving themselves smaller portions than those in the larger plate group.[199]
- A quantitative review of evidence from several studies in the United Kingdom found that reducing portion and dishware sizes across the whole diet (i.e., all foods and beverages consumed in a day) could reduce daily energy consumption by up to 228 kcal for children and adults.[193]

ADDITIONAL NOTES

- Portion control efforts tend to address overeating rather than undereating and there are more studies on the negative health effects associated with being overweight or obese than underweight. However, there are also significant health risks associated with being underweight, including a potential increased risk of all-cause mortality

(i.e., deaths from any cause in a given population or subset of a population across a certain length of time) compared to healthy weight individuals.[200,201]

FEATURE N07: NUTRITION EDUCATION

OVERVIEW

Part 1: Offer nutrition education in the form of cooking demonstrations, dietary workshops, nutrition consultations or gardening workshops led by certified professionals.

SCIENTIFIC BACKGROUND

- Reports show that fruit and vegetable consumption around the world is below recommended levels.[202-204]
- Health-related behaviors formed in childhood and adolescence often track to adulthood, making early intervention critical for establishing healthy habits, including good diet and nutrition.[205-208]
- Health literacy refers to an individual's cognitive and social ability to access, correctly interpret and understand basic health information as well as the resources needed to act on those understandings and make decisions that promote and maintain individual and community health.[209-212]
- Nutrition literacy is a subset of broader health literacy. It is an emerging topic that refers to the capacity to obtain and process nutrition-related information necessary to make appropriate food decisions.[213] Food literacy goes a step further and includes the application of nutritional information to make food choices and shape behaviors.[213,214] In some cases, food literacy includes food preparation knowledge and cooking skills obtained through social, cultural and environmental experiences.[215-217]

KEY HEALTH AND WELL-BEING EFFECTS

- Nutrition has a strong impact on an individual's risk of weight gain or obesity as demonstrated by studies in both developing and developed countries.[218-221]
- Inadequate nutrition and unhealthy diets and practices are strongly implicated in several major chronic diseases, such as cardiovascular disease, diabetes and cancer.[222-224] Making healthy modifications to diets and nutritional behaviors is recommended as a preventative measure against the development of such chronic diseases.[221,225]
- Health literacy is a key determinant of health status.[226] Individuals with low health literacy tend to have greater difficulty in managing chronic health conditions.[227]
- Individuals with high food literacy are more likely to make healthy nutritional and dietary choices, including improvements in fruit and vegetable consumption and purchasing healthier foods, even when doing so is inconvenient, and have higher confidence in cooking.[216,228]

HEALTH PROMOTION BENEFITS AND STRATEGIES

- Nutrition education should aim to increase awareness and motivation by addressing beliefs and attitudes, facilitating an ability to take actions to meet goals for healthier eating and self-regulation and involving an environmental component to ensure that the environment supports the action.[229]
    - A review of evidence from more than 300 studies indicates that nutrition education is most effective when there is a focus on behavior and action as opposed to solely on improving knowledge.[229]
- Education (information and skills) that facilitates more meals at home represents a promising strategy for healthier changes in eating patterns in both children and adults. Cooking classes that demonstrate cooking skills and integrate hands-on learning have been shown to positively affect attitudes and enjoyment related to cooking and improve food preparation knowledge and abilities.[230,231] Further, cooking demonstrations led by professionals have been shown to be effective in teaching food-related skills, broadening diets (e.g., enjoying new foods and a variety of foods) and increasing fruit and vegetable consumption.[232-234]
    - The importance of learning cooking skills at an early age has been well demonstrated.[235,236] One longitudinal study found that adolescents who assisted in food preparation were more likely to sustain that behavior five years later.[208] Other studies similarly show that engaging children and adolescents in meal preparation can lead to healthier diets, but it should be noted that these studies largely assume that participants have regular access to food and live in a conventional family-style environment.[237-241]
- Studies consistently show that the effectiveness of health interventions that aim to change dietary behaviors and outcomes are greatly enhanced with multimodal programming.[242,243] This means that although there are benefits to providing education alone, interventions that combine education with other strategies, such as policy or environmental changes, are much more effective.[5,244,245]

- There is a substantial body of support for the effectiveness of nutrition education interventions in schools.[246,247] Such education has been found to change attitudes about healthy foods, improve self-efficacy, influence food preferences and, in some cases, increase consumption of fruits and vegetables and reduce rates of weight gain and obesity.[246-248]
    - The most effective intervention programs typically last longer than a year, involve parents, are integrated into existing curriculum and are further supported by on-site provision of fruits and vegetables.[246]
    - Successful nutrition education expands beyond basic nutrition information to include consideration of food preferences as well as barriers to adopting preventive behaviors and strategies that are age- and culturally-appropriate.[249-251]
- Hands-on nutrition education experiences, such as gardening of edible plants, also may help encourage healthy dietary choices.[252] In a study that assessed the impact of a school garden on dietary choices, students who were in the intervention group that received nutrition education paired with gardening time were significantly more likely to consume vegetables during lunch than the other two comparison groups (those who only received nutrition education and a control group).[252]

FEATURE N08: MINDFUL EATING

OVERVIEW

Part 1: Provide dedicated eating space that contains tables and chairs to support the provision of daily meal breaks.

SCIENTIFIC BACKGROUND

- Mindfulness – the practice of cultivating awareness of internal thoughts, emotions and bodily sensations – has been linked to improved physical and psychological well-being, including the reduction of anxiety and mood problems and depression.[253-255]
- Research has shown that eating often is carried out absent-mindedly or 'mindlessly' and is accompanied by habitualized consumption patterns.[255-257]
- Therefore, eating often is initiated according to external versus internal cues, which influence how we eat and perceive food.[255,258]
    - Environmental cues can trigger physiological reactions in the body. Discrete, contextual and temporal cues associated with meals have been shown to influence the release of gut hormones, such as ghrelin and insulin, which play a role in hunger and satiety.[259,260]
- A large meta-analysis confirmed that eating habits are also strongly influenced by social norms and the eating habits of those nearby through a phenomenon called modelling.[261,262]
- A clinical review found that good social relationships are vital for good mental and physical health, while a meta review of systematic reviews found that social isolation and loneliness have been linked to worse cardiovascular and health outcomes and are significantly associated with an increase in all-cause mortality.[263,264]

KEY HEALTH AND WELL-BEING EFFECTS

- Eating behaviors are influenced by a host of factors that extend beyond hunger, including economic, social, psychological and environmental design determinants.[265,266]
- Eating alone and distracted eating have become emerging concerns and are associated with a variety of social and health outcomes.[267]
- One study found that people who tend to eat alone may be more likely to choose unhealthier foods, eat fewer fruits and vegetables and eat at irregular times.[265]
    - Both men and women who live alone experience lower intake of a variety of vegetables, with an increased effect observed in those who experience infrequent friend interaction.[265]
- Eating alone more than two times a day is associated with an increased risk of metabolic syndrome, heart disease, stroke and diabetes in both men and women.[267]
    - Metabolic syndrome is a cluster of factors, including abdominal obesity, elevated blood pressure, high triglycerides (TG) and low HDL cholesterol levels and insulin resistance.[268]
- There is some evidence to indicate that distracted eating while working, reading, watching television or listening to music is associated with higher food intake and a disconnection between desire to eat and actual consumption.[269-271]
    - A meta-analysis of ten studies that examined the effect of distracted eating and caloric intake found a statistically significant increase in immediate caloric intake.[270]
    - A meta-analysis of four studies that examined the effect of distracted eating and delayed caloric intake found a statistically significant intake in calories.[270]
- Distracted eating is associated with a reduction in memory of calorie and meal intake, both in the moment of intake and afterwards.[270]
- Studies have also found that eating while performing higher-cognitive tasks led those on diets to overeat and resulted in a decrease in taste perception and intensity for all participants.[272]
    - Conversely, those who were not on diets were found to eat less when under stress.[273,274]
    - So-called 'stress-eating' has been found to lead to less taste perception and is influenced by a variety of individual characteristics, particularly gender, as it is more common among women.[275-278]

HEALTH PROMOTION BENEFITS AND STRATEGIES

- Research has shown a positive relationship between mindful eating and mental well-being.[270]

- Providing opportunities for more mindful and attentive eating during meals may lead to better control of one's food intake.[279]
- There is strong evidence that mindfulness, even in the absence of specific instruction on mindful eating, may encourage healthier weight and eating habits. Results across four studies found a positive relationship between mindfulness and healthier eating, including less impulsive eating, reduced caloric consumption and healthier snack choices.[280]
    - Mindfulness has been shown to be an effective practice for individuals with eating disorders, as it helps cultivate conscious and healthy eating behaviors, including the reduction of compulsive overeating, as well as emotional and disinhibited eating, which is associated with smaller serving sizes.[257,281]
- The provision of dedicated eating spaces can encourage individuals to enjoy meals together, prevent distracted eating at workstations and lead to better eating habits.
    - As well, lunch breaks and snack breaks throughout the day provide essential recovery periods to disengage from daily work tasks and recharge.[279]
- Designated meal periods can provide individuals the time to eat meals mindfully.

ADDITIONAL NOTES

- Time pressure while eating has been found to have negative impacts on eating habits, emphasizing the importance of having both the time and space to eat. School aged children who had less than 20 minutes to eat, drank 10% less milk, ate 12% fewer vegetables and consumed 13% less of their entrée.[282,283]
- Special consideration should be given to vulnerable populations who may be at a higher risk for loneliness, such as seniors or individuals with chronic illness. A cross-sectional study found that individuals in the lowest income bracket who are also regularly ill are twice as likely to report severe loneliness.[284]

FEATURE N09: SPECIAL DIETS

OVERVIEW

Part 1: Provide main dish options that do not contain the most common food allergens.
Part 2: Label food allergens for all foods and beverages at point-of-decision.

SCIENTIFIC BACKGROUND

- The World Allergy Organization reports that the prevalence of food allergies is increasing in countries around the world.[285]
- A food allergy refers to when the body's immune system responds abnormally to a specific food.[286] Food allergy reactions can vary from mild to severe and are potentially life-threatening.
- There are approximately 160 foods, called food allergens, that can trigger an abnormal immune response (i.e., an allergic reaction) in sensitive people.[287] However, milk, egg, peanut, tree nuts, fish, shellfish, wheat and soy account for the majority of allergic reactions in most countries.
- Food intolerances are a related but distinct phenomenon that can trigger some of the same symptoms as food allergies but do not involve the immune system (with the one exception of celiac disease).[153] Food intolerance symptoms involve the digestive system, with gradually appearing symptoms that flare up when a specific food is consumed in larger quantity or with greater frequency.

KEY HEALTH AND WELL-BEING EFFECTS

- Anaphylaxis is the most serious type of allergic reaction to a food allergen and can be life-threatening.[288] It is characterized by a severe drop in blood pressure, swollen throat, difficulty breathing, rapid pulse and lightheadedness.
- Allergic reactions to food may trigger the development of gastrointestinal disorders, including eosinophilic esophagitis, eosinophilic gastroenteritis, food protein-induced allergic proctocolitis, food protein-induced enterocolitis syndrome, immediate gastrointestinal hypersensitivity and oral allergy syndrome.[289] Some food allergies can cause general gastrointestinal distress, including an itching sensation in the mouth, swollen tongue or lips and digestive issues, such as abdominal cramps and pain, diarrhea and vomiting.[290,291]
- Food allergies can have adverse effects on the skin, including triggering hives and facial swelling, as well as the development of certain skin disorders like atopic dermatitis.[289-291]
- The respiratory system can be affected by food allergies, inducing itching, tightening and swelling of the throat and vocal cords, as well as trouble breathing.[287]

HEALTH PROMOTION BENEFITS AND STRATEGIES

- It is estimated that less than a dozen foods out of the 160 potential food allergens may be responsible for up to 90% of allergic reactions.[287] Therefore, offering meal alternatives that do not contain egg, fish, shellfish, gluten, lactose, peanut, soy, tree nuts and wheat helps provide people in a space with the ability to enjoy a regular, balanced diet without fear of consuming allergens.
- There is no consensus on a minimum level of an allergenic food that can trigger an allergic reaction, and even trace amounts have caused reactions in sensitive individuals.[292,293] Taken together with the lack of available, effective medical preventative or post-exposure treatments means that strict avoidance of allergen-containing foods is currently the most effective way to prevent an allergic reaction.[292,294,295]
- Food allergen labeling regulations vary around the world and typically include a list of mandatory and voluntary food allergens to label.[296] The most commonly labeled food allergens include crustacean shellfish, egg, fish, milk, peanut, soy, tree nuts, wheat, gluten and sulfites.[296]
- Although legislation in many countries requires allergen labeling on pre-packaged foods, labelling is not typically required in restaurants and other food service establishments. However, there is some advocacy for labeling food allergens in foods served in restaurants, noting that proper labelling would allow individuals to more easily avoid the foods to which they are allergic.[297]
    - The minimum amount of protein from an allergenic food that can cause a reaction varies by protein and by a given person's level of sensitivity.[292]

- At a minimum, labeling that identifies when an allergen has been intentionally added to a product is important information for helping consumers avoid foods that can trigger allergic reactions. Precautionary allergen labeling (PAL), which identifies cases where there may be the unintentional presence of allergens in a product, can be additionally helpful information.[93]
    - Studies suggest that consumers often do not read or can misinterpret labels, suggesting that care must be taken to help make labeling clear and prominent.[93,94]
    - PAL is not mandatory nor employed across all countries or consistently within countries. This leads to confusion around how to interpret these labels and whether or not foods that do not contain advisory labels are actually safe to consume for sensitive individuals.[93]

ADDITIONAL NOTES

- There are challenges to collecting accurate data on food allergies on a global scale due to differences in measuring techniques in a population, but trends suggest that the prevalence of food allergies is increasing in the developed world.[298,299] Children, particularly infants and preschool children, are especially vulnerable to food allergies, with an estimated 6-8% of children worldwide affected, according to global surveys.[285,299-301]
- Trends in the developing world, for both adults and children, are understudied and require further investigation to characterize accurately.[298,302]
- Other types of special diets can be based in religious practices, vegetarianism or veganism, and medical conditions (such as diabetes) and can be accommodated within the special diet scope.[303]

FEATURE N10: FOOD PREPARATION

OVERVIEW

Part 1: Provide a food preparation area, storage space and other amenities to support the reassembly or reheating of meals on-site.

SCIENTIFIC BACKGROUND

- The consumption of foods away from home has steadily increased since the 1970s.[304]
    - Foods that are purchased away from home have increasingly become higher in total caloric levels, saturated fat, and total fat, as well as lower in dietary nutrients, such as fiber, calcium, and iron, in comparison to foods that are prepared at home.[304]
- Consuming meals prepared away from the home even once a week is associated with an increased risk of overweight and obesity as well as increased insulin levels and mean percentage body fat.[305]
- Supporting and prioritizing home cooked meals as the main source of a diet can encourage healthful and nutritious eating habits.[306]
- Working adults who have less than one hour a day to cook are more likely to spend money on food away from home.[307]

KEY HEALTH AND WELL-BEING EFFECTS

- Both systematic reviews and population-based studies have found that eating meals cooked at home is associated with a better-quality diet and reduced obesity.[308-310]
    - Eating away from home is linked to higher consumption of energy, fat, saturated fat and sodium and a decreased consumption of fruits, vegetables and whole grains.[310]
    - Young adults who engaged in food preparation had better dietary habits five years later, including a higher rate of consumption of fruits and vegetables.[309]
- Meals consumed away from home are often higher in calories, lower in nutrients and larger in portion size.[311]
    - Food away from home and fast-food establishments typically provide energy-dense options, heavy in total fat and sugar content.[312]
    - Fast food portions have evolved over time. As one study reports, current French fry, hamburger, and soft drink sizes have increased two to five times their original sizing over the past 30 years.[312]
- Americans spend 42% of their overall food budget on food away from home.[311]
    - On average, one meal eaten away from home increases a person's daily calorie intake by 143 kcals. Eating away from home one time a week averages to two additional pounds of weight per year.[311]
- Emerging research has found an association between eating away from home and a higher BMI and lower fruit and vegetable consumption in adults.[312]
    - Mean BMI was higher in women who ate away from home five or more times a week compared to women who rarely ate away from home (zero to one time a week).[312]
    - Among men, eating away from the home either two to four times a week or five or more times a week had a statistically significant increase in BMI compared to eating away from the home zero to one time a week.[312]
- Analysis of dietary intake data also shows that individuals who consume food prepared at home tend to have a better diet quality than individuals who purchase food away from home.[311]

HEALTH PROMOTION BENEFITS AND STRATEGIES

- Research from schools has shown that spaces that allow individuals to reheat or assemble food prepared at home can support healthy eating habits and cooking skills.[313]
- Sufficient cold storage space can accommodate the storage needs of individuals who bring meals from home.
    - Insufficient food storage, in terms of lack of fridge and/or microwave access, has been cited as a workplace barrier to healthy meal choices.[314]
- Other supportive amenities, including eating utensils and devices for reheating food, can make it even easier for individuals to consume homemade meals and encourage healthy eating patterns.
    - By providing amenities to support meal production in the workplace, consumption of minimally processed, nutrient-dense foods is encouraged.[313]

- Cultivating healthful food environments is a component of the national strategy to alleviate childhood obesity. Methods of reduction include minimizing fast food chains surrounding schools, informative food displays, and appropriate time allotment for meals to encourage healthy eating patterns.[313] The same strategy can be utilized in workplace wellness programs to facilitate healthier food choices.

FEATURE N11: RESPONSIBLE FOOD SOURCING

OVERVIEW

Part 1: Foods and beverages are certified and labelled for organic or humane food production methods and locally sourced foods are promoted through point-of-decision signage.

SCIENTIFIC BACKGROUND

- The high level of demand for animal food products has given rise to farming practices adopted by some industrial farming operations that maximize efficiency and production capacity but often can come at the cost of animal welfare and potentially consumer health.[315-317]
- These practices include intensive confinement (e.g., use of gestation, veal and battery cages), feed contamination (from fecal matter or using other animal products in feed) and non-therapeutic antibiotic use (i.e., preventative/prophylactic medication of animals).[315-317]

KEY HEALTH AND WELL-BEING EFFECTS

- Blood and urine samples from children and adults from studies across the European Union indicate that people commonly are exposed to pesticide residues, especially organophosphates (a chemical class of insecticide) and insecticides.[318-323]
- Pesticide exposure related to conventional crop production processes have been associated with increased risks of type II diabetes, Parkinson's disease and some cancers, including leukemia and brain tumors in children, as well as neurobehavioral impairments.[324-334]
    - Many of these studies, which investigate occupational exposure (e.g., agricultural workers) or the effects of exposure through conventional crop consumption in the general public, remain unclear and require further study.[335]
- The way animals are treated in food production farms (e.g., husbandry practices, feed quality, hygiene and antibiotic use) can have an impact on human health.[336,337] For example, animal husbandry practices adopted by some conventional farms result in a large number of animals kept in close proximity. This creates conditions that more easily transmit diseases across livestock, which can lead to illnesses in humans.[338-341]
    - Outbreaks within the past several years related to Salmonella, severe acute respiratory syndrome (SARS) and Creutzfeldt-Jakob disease ("mad cow disease") have been linked to inhumane and unhygienic farming practices, such as the intensive confinement of a large number of animals into small cages.[338-340]
- The non-therapeutic use of antibiotics in animals for food has been proposed as a potential cause for growing antimicrobial resistance in humans, particularly given that agricultural use represents the largest use of antimicrobial drugs worldwide.[342-344]
    - Certain studies have suggested that prophylactic antibiotics in animals (i.e., use regardless of the presence of disease), common in some conventional farms, does indeed contribute to antibiotic resistance in humans consuming food products derived from those animals, but findings are mixed and additional studies are needed.[344-346]

HEALTH PROMOTION BENEFITS AND STRATEGIES

- While several reviews comparing organic food products (both plant- and animal-based) to conventional food products report that organic practices typically result in food products with lower levels of pesticide residues and antibiotics, long-term data still is lacking, and it remains unclear if the differences in food content translate to actual differences in dietary intake or human health outcomes.[335,343,344,347-349]
    - Studies show that the nutritional content of some organic foods differs from that of conventional foods. Organic crops have been shown to have higher levels of antioxidants and organic milk has been shown to contain higher concentrations of omega-3 fatty acids (fatty acids linked to a variety of health benefits) whereas conventional crops have been found to have higher concentrations of cadmium (a heavy metal with toxic properties) and organophosphates (the main component in herbicides, pesticides and insecticides).[335,343,349]
    - One study in Sweden reported that a diet based on organic food products compared to conventional food products resulted in 70 times lower exposure to pesticide residues, weighted by toxicity.[335,350]

- Switching dietary patterns to a more plant-based focus also can support management of chronic health conditions, as well as reduce one's carbon footprint.[351] By one estimate, modern dietary trends towards refined sugars and fats, oils, and meats, if continued at current rates, will contribute to an 80% increase of global agricultural GHG emissions by 2050.[351]
    - The increase in GHGs – largely due to food production and land clearing – thus can be mitigated by intentional food choices and sourcing.[351]
- A strong and growing body of literature provides support for the benefits of organic farming in terms of improved biodiversity and environmental sustainability, which also ultimately impact human health and well-being, such as through effects on global food security.[352-358]
- Point-of-decision prompts have been demonstrated to be effective in promoting healthier decision-making across a variety of behaviors (e.g., taking the stairs, choosing more nutritious food options).[359-361]
    - Studies report mixed findings on the effectiveness of informational labelling (which, in nutrition research, has been focused almost exclusively on calorie labelling) and suggest that the way information is presented is critical to the effectiveness of this strategy.[85,359]
    - Information that highlights specific, understandable nutritional tradeoffs or that prompts people to consider their health may be more effective than information presented without any additional context or cues on the way decisions affect health.[362-364]
- One of the goals of humane agriculture is to address the conditions under which animals are housed and killed for food production.[365,366] Choosing foods that have been assessed and certified for ethical production practices is one way to verify that consumed animal products have been produced in humane ways.

FEATURE N12: FOOD PRODUCTION

OVERVIEW

Part 1: Provide permanent and accessible space for food production via a garden or greenhouse, edible landscaping or hydroponic or aeroponic farming system.

SCIENTIFIC BACKGROUND

- Growing or otherwise having regular access to locally grown foods has been associated with healthier eating habits, increased variety of fruit and vegetable consumption and a higher consumption of fresh fruits and vegetables.[367,368]
- Currently, both developed and developing nations do not meet the recommended daily nutrient intakes for key food groups, including fruits and vegetables.[369] Adequate fruit and vegetable consumption helps provide daily micronutrient, dietary fiber, vitamin and mineral intake.[1]
- Urban agriculture is one solution-based initiative to combat urban poverty and food shortages, such as limited access to healthy, culturally-appropriate produce.[370]

KEY HEALTH AND WELL-BEING EFFECTS

- Studies indicate that gardeners report better perceived general health, mental health and social cohesion compared to non-gardeners, even when controlling for sociodemographic and lifestyle variables.[371]
- Horticultural therapy is the use of purposefully designed garden spaces for therapeutic and rehabilitative benefits. In a review of 21 studies examining the health effects associated with gardening and horticultural therapy, participants reported a wide range of health benefits, including improvements in depression, anxiety, body mass index, life satisfaction, quality of life and sense of community.[371]
- Consumption of on-site farmed produce may reduce pesticide exposure compared to conventional fruits and vegetables found at the grocery store.[372]

HEALTH PROMOTION BENEFITS AND STRATEGIES

- From Malawi to Jamaica, community and school gardens that incorporate sustainable gardening practices are collaborative learning environments that benefit the community through recreational space and food production.[373,374]
    - In the United States, the Centers for Disease Control and Prevention (CDC) recommends growing vegetables in school gardens as one of the ways to increase the intake of fruits and vegetables for students.[375] The U.S. Department of Agriculture supports farm-to-school programs by providing funding, training, research and technical support.[376]
    - In settings with limited space and capacity for live plants, hydroponic and aeroponic plant-cultivation systems can overcome these challenges. Hydroponics refers to a process where plants are grown in sand, gravel or liquid, with added nutrients instead of traditional soil. In aeroponic systems, plants require very little growing medium and have their roots suspended in the air while nutrients are delivered through a fine mist.[377]
- Advantages of consuming locally grown produce include access to food at peak ripeness, greater plant variety and the prioritization of plant taste over longevity.[378] Further, facilitating access to affordable, local fruits and vegetables can help remove geographic and economic barriers, particularly for vulnerable populations.[379,380]
- Evidence from developing countries using nutrition-sensitive agriculture interventions shows that gardening and food production training programs are associated with greater yields and more diverse produce consumption, reductions in adverse health outcomes and women empowerment.[381]
- Multiple organizations support school gardens to promote students' knowledge and behavior towards healthy foods, agriculture and the environment. The Food and Agriculture Organization of the United Nations (FAO) reports that school farms increase children's preference for fruits and vegetables, result in voluntary diet changes, improve understanding of the natural environment, result in higher student retention and improve relationships and social cohesion[374].
    - In addition, findings from a randomized control trial that provided gardens as an intervention to elementary schools showed a decrease in sedentary activity within children who received outdoor, garden-based lessons compared to children who received indoor, classroom-based lessons.[382]

ADDITIONAL NOTES

- Vulnerable populations, such as children and individuals with chronic conditions, may benefit more from nearby permanent and accessible space for food production compared to healthy adults.[383-385,386]
- Research shows that sensory gardens, therapeutic horticulture, horticultural therapy and other purposeful uses of plants can improve the behavior and well-being of dementia patients. Other benefits include improvements in sleep patterns and energy levels. These findings suggest that the use of existing or planned gardens paired with an educational program for healthcare staff may be a useful non-pharmacological intervention for dementia care.[387]

FEATURE N13: LOCAL FOOD ENVIRONMENT

OVERVIEW

Part 1: Facilitate access to fruits and vegetables through on-site programming or locating the project within 400 m [0.25 mi] of a supermarket, grocery store or farmers' market.

SCIENTIFIC BACKGROUND

- The built environment can have a positive or negative impact on physical activity, body weight and dietary patterns.[388-392] Therefore, it is critical to consider how the planning, design and construction of communities, and the various spaces within them, shape and influence a person's ability to make healthy choices.
- A food desert is a geographic area with limited access to affordable and healthy foods, such as fruits and vegetables. Individuals who reside in food deserts typically have limited resources (e.g., income, transportation) and face environmental barriers to readily obtaining healthy foods.[393]
- The local food environment has a strong impact on individual dietary patterns and on community obesity rates in both developed and developing countries, which can in turn increases the risk of other diet-related diseases, including heart disease, stroke, some cancers and type II diabetes.[394,395]

KEY HEALTH AND WELL-BEING EFFECTS

- Increased access to affordable, healthy foods is associated with higher quality diets and a lower risk of obesity compared to limited access to such foods.[396-398]
- Low intake of fruits and vegetables is one of the top 10 risk factors contributing to global mortality, leading to about 1.7 million annual deaths worldwide.[399] In addition to preventing premature deaths, increased fruit and vegetable intake may lead to a better quality of life by reducing the estimated 16 million disability-adjusted life years (DALYs) that are attributable to low fruit and vegetable intake worldwide.[399]
    - To quantify the burden a disease puts on a population, researchers calculate disability-adjusted life years (DALYs), which represents one lost "healthy" year. DALYs are determined by summing the Years of Life Lost (YLL), which accounts for cases where people die prematurely due to disease, with the Years Lost due to Disability (YLD), which accounts for cases where people live with a condition or its consequences.[400]

HEALTH PROMOTION BENEFITS AND STRATEGIES

- Best practices in urban planning consider 800 m [0.5 mi] a walkable roundtrip distance.[401-403]
- A higher local density of food outlets with healthy food options is associated with metrics that indicate a lower risk of obesity, including a healthier body mass index (BMI) score and a smaller waist circumference.[404-406]
- Compared to other food outlets like convenience stores, supermarkets usually offer a greater variety of high-quality produce at affordable prices.[407] Greater access to supermarkets and decreased access to convenience stores is associated with healthier diets and lower rates of obesity.[407]
- Improved access to farmers' markets is associated with greater consumption of fruits and vegetables, even when there is already access to a supermarket with produce.[408-410] In one survey, 74% of patrons reported consuming more fruits and vegetables because of an on-site farmers' market at the workplace.[411]
    - A study with adult women found that access to supermarkets within an 800 m [0.5 mi] walking distance of work was associated with greater odds of consuming two or more portions of both fruits and vegetables per day.[412] Access within 2 km [1.2 mi] of the workplace was associated with greater odds of consuming two or more portions of fruits, but not vegetables, per day.[412] Similarly, a greater number of supermarkets within 2 km [1.2 mi] of the place of residence was associated with higher odds of consuming two portions of vegetables, but not fruit, per day.[412]
- Community Supported Agriculture (CSA) can likewise promote healthier diets by increasing fruit and vegetable consumption, especially among low-income households.[413-417]
    - CSAs refer to a fresh food delivery model where patrons typically pay at the beginning of the season for a share of fruits and vegetables grown and delivered by farmers throughout the season. In this model, the consumer and the farmer share the seasonal risks associated with farming.

- Mobile markets are an additional, and increasingly popular, way to bring fresh fruits and vegetables to communities with limited access to healthy food sources. They are a good option for underserved communities that cannot support a standing farmers' market or full-service supermarket or grocery store.[418,419]

ADDITIONAL NOTES

- The food environment may contribute to health disparities.[420] Studies in the United States show that minority communities — especially African American and/or low-income communities — have more access to fast food outlets and convenience stores and less access to supermarkets or grocery stores compared to predominantly White or higher-income communities.[421,422] Minority communities also have correspondingly higher rates of poor-diet-related health outcomes like obesity and type II diabetes.[421,422]
- An individual's food environment must be considered as an ecosystem, with many levers that act in tandem to shape behaviors. Simply adding more healthy food outlets to improve access does not necessarily mean improved utilization of new resources nor improved subsequent health outcomes.
    - Several studies highlight this difference between access and utilization and the complexity underlying these issues.[423,424] One such study reported a 6% higher prevalence of obesity (at home) with each mile closer to a supermarket.[424]
    - Other studies report improvements in perceptions of access to healthy foods with improved supermarket or grocery store access but no changes in BMI, diet or weight.[425-427] Therefore, distance may be one of many barriers to accessing healthy foods. Other constraints, such as economic pressures, likely need to be addressed as well, through interventions such as financial incentives and nutrition assistance programs.[428-430]
- There are benefits to an integrated system. One study found that the introduction of a farmers' market in an underserved, urban community reduced grocery prices overall by almost 12% in three years.[431] Another reported that a better predictor of a person's BMI is not their individual choice of grocery store but the grocery store of choice of the average resident in the community.[432] These studies suggest that individual components of the food environment function within a larger system and can be leveraged to the benefit of the community as a whole.

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