Measuring Adult Obesity

Obesity is a major contributor to chronic disease and leads to increased health care costs [2-5]. Obesity is the result of complex interactions between behavior, epigenetics, structural environments (availability of opportunities for healthy choices) and social context (e.g., housing insecurity, food insecurity). For example, the opportunity to eat nutritious food may depend on the availability and affordability of food. In many communities, there is nowhere to buy fresh fruits and vegetables, and no safe or comfortable places be physically active [6].

The Centers for Disease Control and Prevention (CDC) monitors adult obesity rates annually and provides estimates of modifiable risk behaviors for each state using data from the Behavioral Risk Factor Surveillance System (BRFSS). Data from BRFSS are used to monitor health behavior trends over time and inform public health programs at the state and national level. The Minnesota Department of Health (MDH) uses these data to inform the public about the prevalence of obesity in the state, track changes over time, and support planning of public health interventions designed to reduce obesity.

This data brief presents findings from the most recent national BRFSS data on trends in obesity prevalence and the relationship between obesity, physical activity, fruit and vegetable consumption and housing and food insecurity in Minnesota.
BRFSS includes questions designed to assess food and housing insecurity as indicators of social context that could influence health behaviors and obesity. Fifteen states piloted the use of these questions, including Minnesota [7]. Minnesota included this set of questions, as well as questions on physical activity and fruit and vegetable consumption, in their 2015 BRFSS questionnaire [8]. The only questions also included in the 2016 BRFSS questionnaire were the obesity rate and the physical activity measure.

### BRFSS Social Context Questions

#### Housing Insecurity
How often in the past 12 months would you say you were worried or stressed about having enough money to pay your rent/mortgage?
(Always, Usually, Sometimes, Rarely, Never)

#### Food Insecurity
How often in the past 12 months would you say you were worried or stressed about having enough money to buy nutritious meals?
(Always, Usually, Sometimes, Rarely, Never)

### BRFSS Key Findings

#### State and National Prevalence

Since the 1980s, obesity has been recognized as a national problem [9-11]. Following national trends, Minnesota’s obesity rate increased during this period, rising to 26.0 percent in 2007. Since then, Minnesota’s obesity rate has ranged between 25.2 percent and 27.6 percent.

**Minnesota has a lower obesity rate than the U.S. as a whole.**

In 2016, the Minnesota adult rate of obesity was 27.8 percent, lower than the median U.S. obesity rate of 29.9 percent [Figure 1] [12]. From 2011 to 2016, Minnesota’s obesity rate was consistently lower than the U.S. median rate [12]. In 2016, Minnesota’s obesity rate was significantly lower than the neighboring states of Iowa, North Dakota, South Dakota and Wisconsin.
Minnesota’s obesity rate has remained stable since 2007.

The Minnesota obesity rate has shown a stable trend starting in 2007, despite some fluctuations beginning in 2013 [Figure 2] [12]. Estimates are affected by sample size and changes in demographic make-up of survey respondents from year to year. More years of data will help determine if this trend line is increasing, decreasing or reflects random fluctuation [8].

Data source: CDC Behavioral Risk Factor Surveillance System
Modifiable Risk Behaviors: Physical Activity & Fruit and Vegetable Consumption

Two important components of obesity prevention are a healthy diet and regular physical activity. Balancing the calories consumed with the number of calories the body uses for activity plays an important role in preventing excess weight gain [1, 13, 14].

Physically active Minnesotans are less likely to be obese.

For Minnesotans who reported being physically active at least one day in the past 30 days, the obesity rate was 12.3 percentage points lower than for those who did not report this behavior [Figure 3]. This relationship is present in BRFSS data for each of the years 2011 through 2016 [12].

Figure 3. Obesity Rate by Physical Activity, Minnesota, BRFSS, 2016

Minnesotans who consume fruits and vegetables are less likely to be obese.

The same positive relationship exists for people who reported they ate fruits and vegetables at least one time per day compared to those who did not [Figure 4]. For Minnesotans who reported consuming fruit one or more times a day, the obesity rate was 5.2 percentage points lower than those who did not. For Minnesotans who reported consuming vegetables one or more times per day, the obesity rate was 2.7 percentage points lower than those who did not. BRFSS collected these data in 2011, 2013 and 2015. The positive relationship between lower obesity rate and fruit and vegetable consumption is present for each of these years [12].
Social Context: Housing and Food Insecurity

Research indicates that people with higher incomes generally experience better health and live longer than people with lower incomes [15]. Oftentimes, those who experience economic hardships face conditions that lead to poor health including unsafe housing, lack of access to nutritious foods, less leisure time for physical activity, poorer education and higher stress levels [15]. The effects of two social context measures, housing and food insecurity, are evident in the Minnesota 2015 BRFSS data.

**Minnesotans facing housing and food insecurity are more likely to be obese.**

Based on 2015 BRFSS data, 25.4 percent of Minnesotans faced housing insecurity and 17.1 percent faced food insecurity.

Minnesota BRFSS data indicate that adults who reported sometimes, usually, or always being worried or stressed about having enough money to pay rent/mortgage were 7.8 percentage points more likely to be obese compared to those who were rarely or never worried or stressed about this [Figure 5]. Similarly, Minnesotans who were sometimes, usually, or always worried or stressed about having enough money to buy nutritious meals were 9 percentage points more likely to be obese compared to those who rarely or never felt this way.
Minnesotans experiencing housing insecurity are less likely to be physically active.

Minnesotans who reported being housing insecure were 10.2 percentage points less likely to report being physically active in the last 30 days [Figure 6]. Minnesotans who reported being food insecure were 1.0 percentage point less likely to report being physically active in the last 30 days, though this result was not statistically significant.
Minnesotans experiencing housing and food insecurity were less likely to eat fruits and vegetables.

Adults who reported being housing insecure were 9.2 percentage points less likely to consume fruit one or more times per day and 6.1 percentage points less likely to consume vegetables one or more times per day [Figure 7]. Adults who reported being food insecure were 10.6 percentage points less likely to consume fruit one or more times per day and 7.4 percentage points less likely to consume vegetables one or more times per day [Figure 8].

**Figure 7. Fruit Consumption by Housing and Food Insecurity, Minnesota, BRFSS, 2015**

**Figure 8. Vegetable Consumption by Housing and Food Insecurity, Minnesota, BRFSS, 2015**

* Differences between yes and no estimates are statistically significant.
Data Implications

Obesity is a major public health problem that contributes to chronic disease, disability, mortality, and high health care costs. Research demonstrates that overweight and obesity are significant causes of chronic diseases including type II diabetes, cardiovascular diseases, certain cancers and other health problems. These conditions can lead to further morbidity and mortality [16, 17]. The associated health care costs are substantial. In Minnesota, medical expenses due to obesity were estimated to be $2.8 billion in 2009 [18].

Root causes of obesity are multifactorial, including complex interactions between epigenetics, behavior and a variety of social and environmental factors [19]. Among these environmental factors are major changes in the American food system and American diet over the past half century. The food system has shifted production to encourage consumption of cheap, nutrient-poor foods that are high in added sugars and saturated fat, and discourage consumption of complex carbohydrates, dietary fiber, and fruits and vegetables [20-25]. These dietary changes are compounded by lifestyle changes that reflect reduced physical activity at work and during leisure time [20, 26], which contributes to energy imbalance [27-30]. Social inequality is also considered a probable cause of obesity. A review by Drewnowski found that inequitable access to healthy foods as determined by socioeconomic factors and social context could influence the diet and health of a population [31, 32]. Energy-dense and nutrient-poor foods can be the only way to provide daily calories at an affordable cost for lower socioeconomic groups as a result of the high costs and inaccessibility of nutrient-rich foods and high-quality diets. BRFSS data on social context measures indicate that in Minnesota those who experience housing and food insecurity are more likely to be obese [12].

Nationwide, public health agencies have mobilized to address the obesity epidemic. National experts agree that program and policy actions should (1) target the food environments, the physical activity environments and the broader socioeconomic environments that contribute to obesity; (2) directly influence behavior, aiming at improving eating and physical activity behaviors; and (3) support health services and clinical interventions [33-38].

Minnesota Department of Health Efforts to Address Obesity

MDH leads multiple initiatives focused on addressing obesity in our state. Among these, the Statewide Health Improvement Partnership (SHIP) is an effort that engages local stakeholders in decisions about how to improve access to and the availability of healthy foods and physical activity in their communities based on the guidance of national experts [33]. Focused on all of Minnesota’s 87 counties and 10 tribal nations, SHIP aims to build more vital and healthier communities by investing in strategies that improve health by reducing chronic disease risk factors related to obesity, commercial tobacco use and secondhand smoke exposure.

Learn more at www.health.state.mn.us/ship.
Technical Notes

Data Source and Methods

Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System

The Behavioral Risk Factor Surveillance System (BRFSS) is an annual statewide random telephone and cellular surveillance survey designed by the Centers of Disease Control and Prevention (CDC). The survey is conducted in all 50 states and US territories. BRFSS monitors modifiable risk behaviors and other factors contributing to the leading causes of morbidity and mortality in the population. Data from the BRFSS are useful for planning, initiating, and supporting health promotion and disease prevention programs at the state and federal level [39]. The survey has three sections:

- Standard Core Questions – Asked every year and are required by all states.
- Rotating Core Questions – Asked every other year and are required by all states.
- Optional Modules – Sets of standardized questions on various topics that each state may select and include in its questionnaire. Once selected, a module must be used in its entirety and asked of all eligible respondents.

Given the random selection of survey participants each year, the data collected each year is cross-sectional and does not follow a single group of individuals over time. This means that changes in estimates from year to year are affected by sample size and changes in demographics of survey respondents from year to year, and that determinations regarding changes in estimates must be made by examination of data trends over time.

Definitions

Obesity

Obesity is defined as an abnormal or excessive fat accumulation that may impair health [10]. Although there are a number of ways to measure fat accumulation, the most common population-level measure is a calculation based on weight and height called Body Mass Index (BMI) [11]. Using this system a person with a BMI of 30 kg/m² or greater is defined as obese [10].

Physical Activity

For this brief, physical activity is defined based on the BRFSS survey question: “During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?” For purposes of reporting in this brief, the data from this question appears in tables and the text as “Had Physical Activity in the last 30 Days.”

Nutrition

For this brief, nutrition is defined based on the BRFSS survey question about fruit and vegetable consumption [40] that are part of the rotating survey core questions and are asked in odd-numbered years [39]. The responses to these questions are used to produce calculated variables intended to emphasize the lack of fruit and vegetable consumption by using 1 or more servings and less than 1 serving as cut points. Comparisons using fruit and vegetable consumption are based on the measure 1 or more servings a day with the knowledge that comparisons using higher consumption levels could attenuate relationships presented.

Housing and Food Insecure

CDC defined the state housing insecure and food insecure based on responses to BRFSS Social Context module administered in 15 states during 2013 [7]. The states were Arkansas, California, Connecticut, District of Columbia, Georgia, Iowa, Kansas, Louisiana, Maine, Minnesota, Nebraska, Nevada, New Jersey, New Mexico, and Virginia. It was determined that – if respondents answered that they were uncertain about the ability to pay for housing or nutrition food sometimes, usually or always – they were defined as insecure. The comparisons in this brief are based on this definition and 2015 Minnesota data from the Social Context module.
References


