

Is the BMI for Californians Increasing?

Trends in Weight and Body Mass Index among Californians

Estimates indicate that almost two-thirds of Americans are overweight or obese and that rates in obesity for the nation have increased from 15 percent in 1980 to 32 percent in 2004^{1, 2}. Being overweight or obese increases a person's risk for serious disease such as: type 2 diabetes, coronary heart disease, stroke, and cancer³. Persons who are obese may also experience social stigma and discrimination. Higher body weight is also associated with increased mortality. Overweight is the second leading cause of preventable death in the United States⁴.

Weight is one measure to examine trends in body weight. However another measure which takes into account the height of a person is the Body Mass Index (BMI).

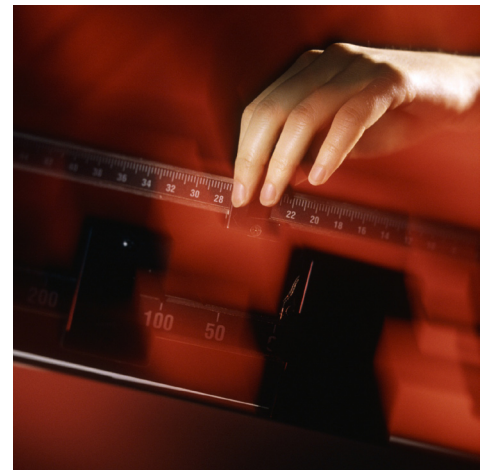
The Body Mass Index (BMI) is a statistical measure of the weight of a person scaled by their height that is used

by many physicians and researchers studying obesity. It is defined as the individual's body weight divided by the square of their height. The mathematical formula for the BMI is as follows:

$$\text{BMI} = \frac{\text{weight (lb)} * 703}{\text{height}^2 (\text{in}^2)}$$

The BRFSS has included questions on height and weight since 1984 which were used to calculate an individual's BMI. Using self reported data from the 2007 California Behavioral Risk Factor Surveillance System (BRFSS) the average BMI was analyzed by socio demographic characteristics such as gender, race, education and poverty. Trends in the average BMI from 1984 to 2007 by socio-demographic characteristics were also analyzed using the BRFSS.

In 2007 the average BMI, which was 26.8 among all adults in California, was higher among males than females (27.3 vs. 26.3 respectively) (see Chart 1).

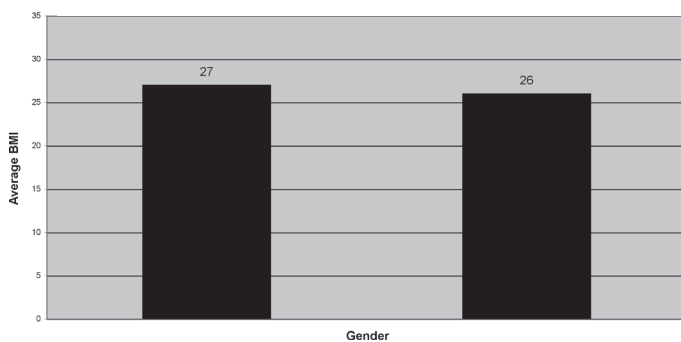


The average BMI was highest among Blacks (28.9) and lowest among Other1 adults (24.3). Among Whites the mean BMI was 26.9 and among Hispanics it was 27.7 (see Chart 2).

The average BMI was correlated with a person's education as well as poverty.

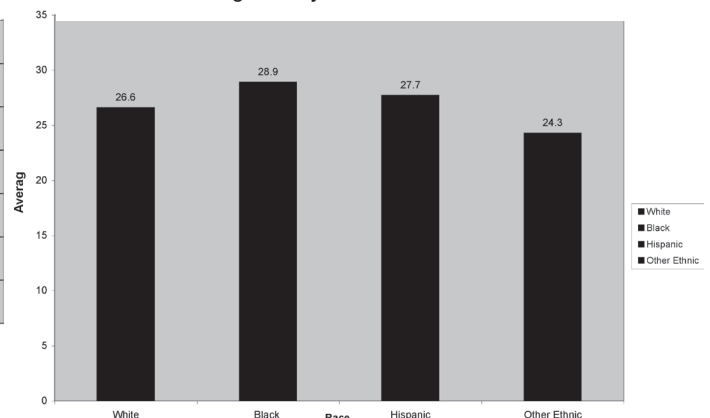
1 Other 83.4% Asian Pacific Islander; 12.6% Aleutian, Eskimo or American Indian; and 4.0% multiracial/other

Chart 1: Average BMI by Gender California BRFSS 2007



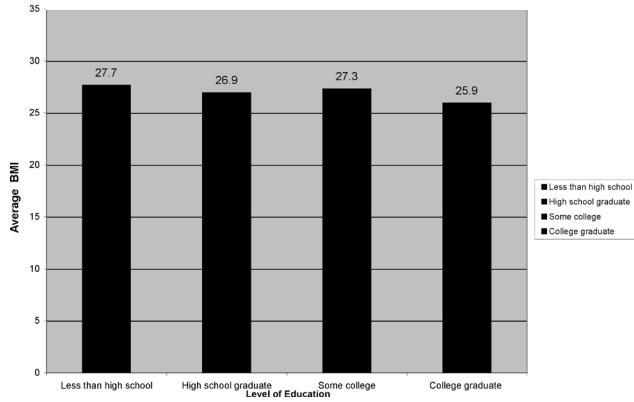
Source: 2007 CA Behavioral Risk Factor Survey weighted to the 2000 CA population

Chart 2: Average BMI by Race California BRFSS 2007



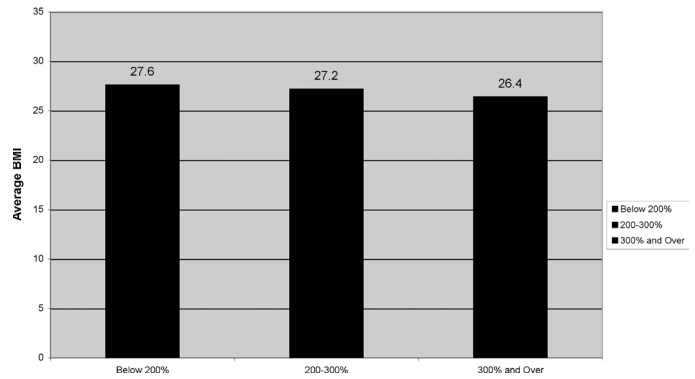
Source: 2007 CA Behavioral Risk Factor Survey weighted to the 2000 CA population

Chart 3: Average BMI by Education California BRFSS 2007



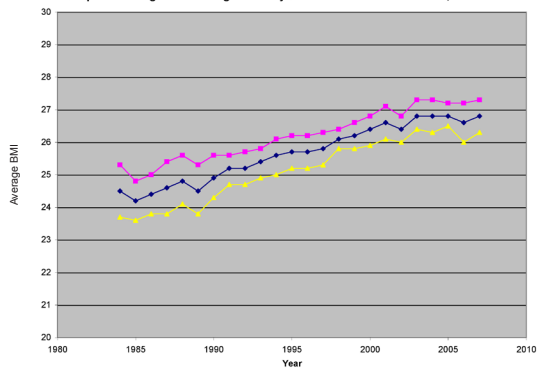
Source: 2007 CA Behavioral Risk Factor Survey weighted to the 2000 CA population

Chart 4: Average BMI by Poverty Level California 2007 BRFSS



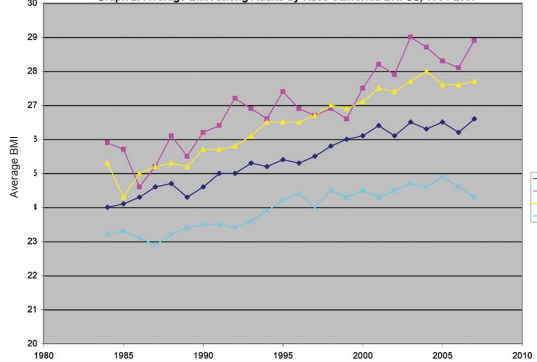
Source: 2007 CA Behavioral Risk Factor Survey weighted to the 2000 CA population

Graph 1: Average BMI Among Adults by Gender for California BRFSS, 1984-2007

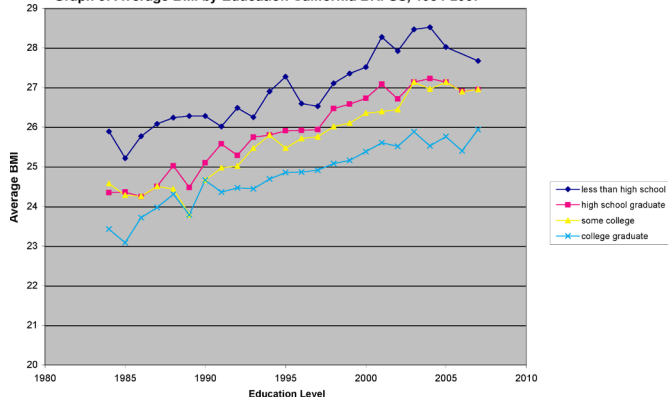


Source: 1984-2007 CA Behavioral Risk Factor Survey Weighted to the 2000 CA population

Graph 2: Average BMI Among Adults by Race California BRFSS, 1984-2007



Graph 3: Average BMI by Education California BRFSS, 1984-2007



Persons in California with less than a high school education had the highest average BMI (27.7). Among high school graduates the mean BMI was 26.9 and among persons with some college the average BMI was 27.3 (see Chart 3). Those with a college education had the lowest BMI (25.9). The average BMI was also correlated with poverty (see Chart 4). The mean BMI was highest among persons less than 200% of the poverty level (27.6). The next highest mean BMI was among persons 200-300% of the poverty level (27.2) and the lowest mean BMI was among adults 300% and above the poverty level.

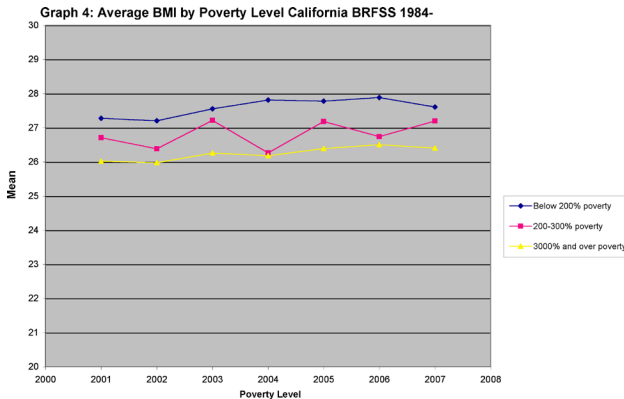
The results of the analysis by year indicate an upward trend in the average BMI between 1984 and 2007 in California (see Graph 4). The average BMI was lowest in 1985 at 24.5 and highest in 2007 at 26.8. Between 2003 and 2007 the average BMI remained fairly constant. In 2003, 2004, and 2005 it was the same as in 2007 (26.8) and in 2006 it was 26.6. Trends by gender indicate a similar pattern for males and females however, the average BMI was consistently lower for females than for males (see Graph 2). The average BMI was lowest in 1985 for both females and males (23.6 and 24.8 respectively). It was highest in 2005 for females (26.5) and in 2007 for males (27.3).

The analysis for each race also shows an upward trend in the average BMI over time that remained fairly constant between 2003 and 2007. The trend line for Blacks was highest followed by Hispanics who had the next highest trend line and then Whites. Other adults had the lowest trend line (see Graph 2).

Trends for each level of education indicated that the average BMI was increasing over time but consistently higher for persons with lower education (see Graph 3). Adults with less than a high school education had the highest trend line followed by those with a high school education. Adults with some college had the lowest trend line.

Information on the three levels of poverty was available from 2001 to 2007. The results indicate an upward trend in the average BMI by poverty level. The average BMI was consistently higher for those below 200% of the federal poverty level than for those above 200% of the federal poverty level (see Graph 4).

In summary the results show an upward trend in average BMI from 1984 to 2007. This upward trend was consistent by gender, race, education and poverty level.



References:

1. Health United States 2003 (Atlanta Georgia: Centers for Disease Control and Prevention, National Center for Vital Statistics, 2003): Table 68: Data according to the National Health and Nutrition Examination Survey (NHANES), which uses measured height and weight to assess BMI.
2. Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999-2004. *Journal of the American Medical Association.* 295(13):1549-55, 2006 Apr 5.
3. "Do You Know the Health Risks of Being Overweight?" Weight-Control Information Network, National Institutes of Diabetes and Digestive Kidney Diseases (NIDDK) <http://win.niddk.nih.gov/publications/health_risks.htm>6 June 2005; "Overweight and Obesity consequences", Centers for Disease Control and Prevention <<http://www.cdc.gov/nccdphp/dnpa.obesity/consequences.html>>. 7 June 2005.
4. National Institutes of Health. Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report. June 1998

BRFSS is an ongoing effort by the California Department of Public Health (CDPH), in conjunction with the U.S. Centers for Disease Control and Prevention (CDC), and the Public Health Institute, to assess the prevalence of and trends in health-related behaviors in the California population aged 18 years and older. It is supported in part by funds from the Cooperative Agreement No. U58/DP922811-05W1 from CDC, and in part by funds from the CDPH and other programs and state departments. Data are collected monthly from a random sample of California adults living in households with telephones. The BRFSS database contains information on Californians from 1984 through the present.

The BRFSS questionnaire is developed each year by CDC in collaboration with participating state agencies. Wherever possible, questions have been selected from previously conducted national surveys for comparability. The questionnaire has three components. The first component consists of a core set of questions that is administered by all states participating in the BRFSS collection effort.

The second component of the questionnaire consists of a series of topical modules developed by CDC. States have the option of adding as many modules as they wish to the core questionnaire each year. California has used several of the CDC modules, although the same modules have not been used consistently across all years of the survey.

The final component of the questionnaire consists of questions designed and administered by individual states to address issues of local concern. These have been revised annually in California to address the needs of as many programs as possible. Participants in the California BRFSS are asked about a wide variety of behaviors such as seat belt use, exercise, weight control, diet, tobacco and alcohol consumption, utilization of cancer screening procedures, and other preventive measures. They also are asked for basic demographic information such as age, race/ethnicity, marital and employment status, household income, and education. Participation in the BRFSS is completely voluntary and anonymous.

The administration and protocol of this survey is reviewed and approved annually by the Committee for the Protection of Human Subjects (CPHS). CPHS serves as the institutional review board (IRB) for the California Health and Human Services Agency (CHHSA). The role of the CPHS and other IRBs is to assure that research involving human subjects is conducted ethically and with minimum risk to participants.

The age, race/ethnicity, and sex characteristics of the BRFSS sample differ to some extent from the age, race/ ethnicity, and sex characteristics of the California population. Weighting adjustments are used to compensate for these differences. Prior to analyzing the BRFSS data, the sample is weighted so that age, race/ethnicity, and gender composition match that of the California population. This allows the findings to be generalized to the California population.

For more information on the BRFSS, please contact Survey Research Group, Cancer Surveillance and Research Branch, (916) 779-0338.