Disease Control Bulletin
EPIDEMIOLOGY & DISEASE PREVENTION VERMONT DEPARTMENT OF HEALTH

Special Report: Cardiovascular Disease in Vermont

February 2003

Occurrence of Cardiovascular Disease in Vermont

Mortality

Despite the substantial decline in mortality during the past several decades, coronary heart disease and stroke are the first and third leading causes of death, respectively, among men and women in Vermont and in the United States. Since 1990, an average of 1,159 Vermonters have died annually from coronary heart disease and an average of 337 have died annually from stroke. In 2000, the age-adjusted death rate for coronary heart disease was 174.5 per 100,000 population (95% confidence interval [CI]: 164.0-184.9) and the age-adjusted death rate for stroke was 55.1 per 100,000 population (95% [CI]: 49.2-61.0) in Vermont.[1]

The 10-year age-adjusted coronary heart disease mortality rate was statistically higher for men than for women from 1991 to 2000 ($p<0.05$), while there was no significant difference in the 10-year age-adjusted stroke mortality rate between men and women. In 2000, the coronary heart disease death rate in men was 225 per 100,000 population compared to 137 per 100,000 population in women, and the stroke death rate in men was 56 per 100,000 population versus 54 per 100,000 population in women.

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Table 1: Prevalence of Cardiovascular Disease* In Vermont
Source: Behavioral Risk Factor Surveillance Survey(BRFSS)**

	Coronary Heart Disease Percent (95%CI)***		Myocardial Infarction Percent (95%CI)		Stroke Percent (95%CI)	
Vermont	3.9	(3.2-4.6)	4.1	(3.3-4.9)	2.0	(1.5-2.5)
Male	4.4	(3.2-5.6)	5.3	(4.0-6.7)	1.8	(1.0-2.6)
Female	3.4	(2.6-4.2)	2.9	(2.0-3.8)	2.2	(1.5-2.9)
18- 64 yrs	1.7	(1.1-2.2)	2.0	(1.3-2.6)	0.8	(0.4-1.2)
65+	15.0	(11.9-18.1)	14.8	(11.5-18.0)	7.6	(5.3-9.8)

* Has a doctor ever told you that you had any of the following: heart attack or myocardial infarction, angina, coronary heart disease or stroke?

** BRFSS rates are self-reported, they do not include people who have not been diagnosed or those who have died from their conditions.

*** 95% Confidence Interval (CI)–A confidence interval is a range of values within which the true rate is expected to fall. A 95% CI indicates that there is a 95% chance that the true value will be in between the upper and lower limits.

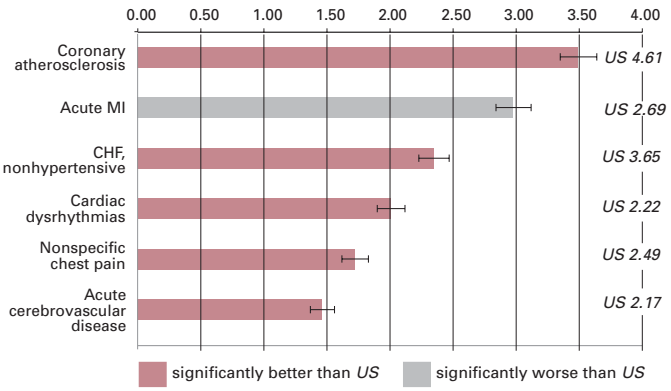
Prevalence

In 1999, weighted estimates from the Behavioral Risk Factor Surveillance Survey (BRFSS) showed that the prevalence of myocardial infarction was higher in adult men than women. As expected, the prevalence of cardiovascular disease increased with age, with a higher prevalence shown in adults aged 65 and older compared to those adults aged 18 to 64 years (see Table 1).

Hospitalizations

In Vermont, hospitalizations for cardiovascular disease declined by 5.3 percent from 1997 to 1999.[2] Total

Figure 1: Vermont Leading Types of Cardiovascular Disease Hospitalizations, 1999



annual hospital charges for heart disease and stroke were $64.4 million and $15.7 million, respectively, in 1999; these represent an increase of nearly 12.9 percent for coronary heart disease and 4.3 percent for stroke from the previous year. In 1999, Vermont had significantly lower age-adjusted hospitalization rates than the U.S. for five of the six leading types of cardiovascular disease hospitalizations (see Figure 1).[2] Vermont had a significantly higher age-adjusted hospitalization rate than the U.S. for acute myocardial infarction.[2]

Cardiovascular Disease Risk Factors

Most persons with cardiovascular disease share multiple common risk factors and lifestyle behaviors.[3] Established risk factors include cigarette smoking, hypertension (BP ≥ 140/90 mmHg or antihypertensive drug use), high blood cholesterol (total cholesterol ≥ 240 mg/dL), diabetes and overweight (body mass index [BMI] ≥ 25).[4] Figure 2 shows the percentage of Vermonters aged 18 years and older having two or more of the following risk factors for cardiovascular disease: self-reported hypertension, high blood cholesterol, diabetes, obesity or current smoking status. Based on published estimates,[5] the risk of coronary heart disease and stroke for Vermonters reporting two risk factors is approximately twice the risk of Vermonters reporting no risk factors. The risk of death from all causes is increased by 40 percent for those with two risk factors compared to those with no risk factors. Almost one-quarter of Ver-

Figure 2: Vermonters with Two or More Cardiovascular Disease Risk Factors*

Source: BRFSS 1997, 1999

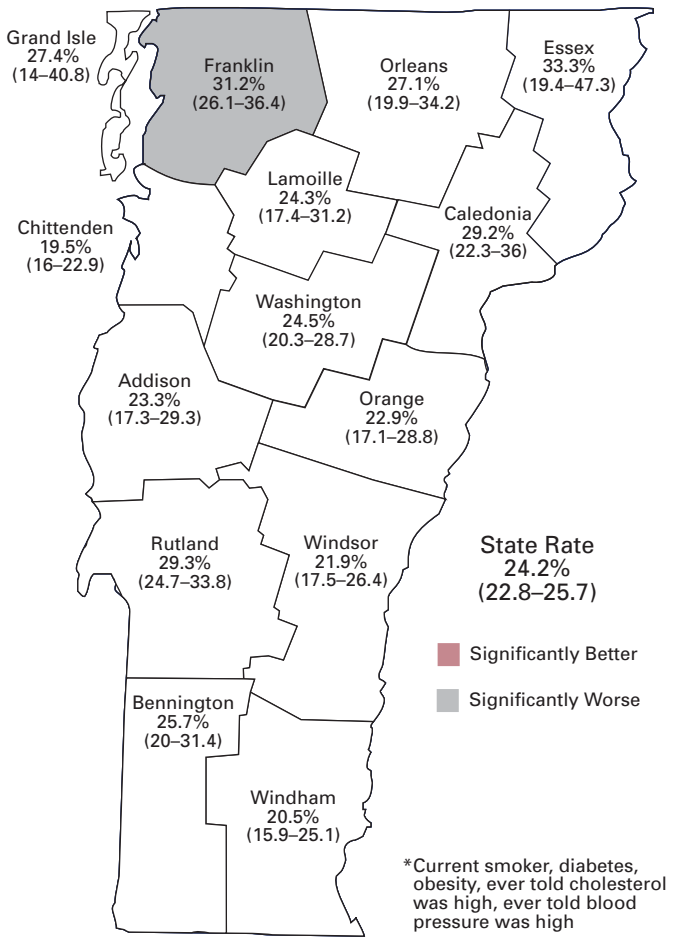
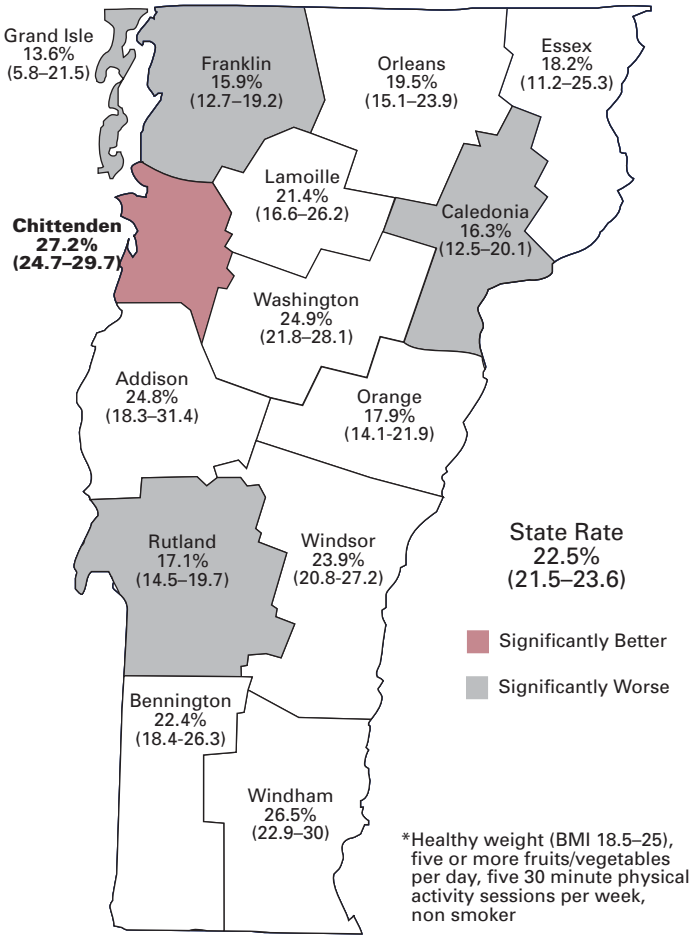


Figure 3: Vermonters with Three or More Healthy Lifestyles Factors*

Source: BRFSS 1996, 1998, 2000



monters have this elevated risk for coronary heart disease, stroke and all-cause mortality based on self-reported risk factors. Vermonters with four or more risk factors have five times the risk of developing coronary heart disease, four times the risk of developing stroke and three times the risk of death from all causes compared to Vermonters with none of these risk factors.

Overall, 24.2 percent (95% [CI]: 22.8–25.7) of adult Vermonters reported having two or more risk factors. County estimates show that, compared to Vermont overall, Franklin County has a significantly higher percentage of adults reporting a multiple cardiovascular disease risk factor profile.

Healthy Lifestyle Behaviors

Prior evidence has shown that people with a favorable cardiovascular disease risk factor profile are at lower age-specific risk for cardiovascular disease deaths and have greater life expectancy than others in the population.[6] Figure 3 shows the percentage of Vermonters aged 18 years and older who engaged in three or more healthy lifestyle behaviors: self-reported non-smoker, regular leisure-time physical activity (at least 30 minutes five or more times per week), healthy weight ([BMI] = 18.5-25) or having adequate fruit and vegetable consumption (five or more servings daily).

Overall, 22.5 percent (95% [CI]: 21.5-23.6) of adult Vermonters were engaged in three or more of these healthy lifestyle behaviors. County estimates show that Franklin, Caledonia, Grand Isle and Rutland counties have a significantly lower prevalence of adults practicing three or more healthy lifestyle behaviors, while Chittenden county had a significantly greater percentage of adults engaging in multiple healthy lifestyle behaviors.

Clinical Guidelines and Recommendations

In recent years, national guidelines have been published describing in detail methods to assess a patient's absolute risk for developing cardiovascular disease based on elevated cholesterol levels, hypertension and overweight status. For more information or for copies of these documents, visit the National Institutes of Health; National Heart, Lung, and Blood Institute website at http://www.nhlbi.nih.gov or call the institute's health information center at 301-592-8573.

Conclusion: Healthy Vermonters 2010

Reducing heart disease and stroke is a priority in Healthy Vermonters 2010, the states blueprint for improving public health. The Healthy Vermonter 2010 goals to reduce cardiovascular disease morbidity and mortality are:

- Reduce coronary heart disease deaths to no more than 166 per 100,000 people. (VT 2000: 174.5 per 100,000)
- Reduce stroke deaths to no more than 48 per 100,000 people. (VT 2000: 55.1 per 100,000)
- Reduce the percentage of adults with high blood pressure to less than 16 percent. (VT 1999: 22%)
- Reduce the percentage of adults who smoke cigarettes to no more than 12 percent. (VT 2000: 21%)

There are also goals relating to obesity, physical activity, nutrition and diabetes. For more information about programs at the Department of Health or a full copy of Healthy Vermonter's 2010, please visit the department's website at www.HealthyVermonters.info or contact the Division of Health Improvement at 802-863-7270.

To calculate individual risk of cardiovascular disease based on risk factors,[7] go to http://www.riskscore.org.uk/

References for Cardiovascular Disease in Vermont

[1] Vermont 1999 Vital Statistics Dataset. Age-adjustment standard United States 2000 population.

[2] Vermont 1997-1999 Hospital Discharge Datasets.

[3] Brownson RC, Remington PL, Davis JR. Chronic disease epidemiology and control. 2nd ed. Washington, DC: American Public Health Association, 1998.

[4] Kannel WB. An overview of the risk factors for cardiovascular disease. In: Kaplan NM, Stamler J, eds. Prevention of coronary heart disease: practical management of the risk factors. Philadelphia: Saunders, 1983:1-19.

[5] Yusuf HR, Giles WH, Croft JB, Anda RF, Casper ML. Impact of multiple risk factor profiles on determining cardiovascular disease risk. Preventive Medicine 27, 1-9 (1998).

[6] Stamler J. Established major coronary risk factors. In: Marmot M, Elliott P, eds. Coronary heart disease epidemiology: from aetiology to public health. Oxford, England: Oxford University Press, 1992:35-66.

[7] Pocock SJ, McCormack V, Gueyffier F, Boutitie F, Fagard RH, Boissel J-P. A score for predicting risk of death from cardiovascular disease in adults with raised blood pressure, based on individual patient data from randomized controlled trials. British Medical Journal 323, 75-81 (2001).

Obesity: A Major Risk Factor for Cardiovascular Disease

Obesity is a major cause of morbidity and mortality in both men and women in the United States and Vermont. Over the last several decades obesity has been increasing in prevalence according to self-reported data from the Behavioral Risk Factor Surveillance System (BRFSS)[1] and the National Health and Nutrition Examination Survey III.[2]

Data in this report reflect the characteristics and percentages of adult Vermonters in each body mass index (BMI) category and the relationship between selected chronic conditions and BMI. Body mass index, defined as weight in kilograms divided by squared height in meters, encompasses the range of weight categories including under healthy weight (BMI <19 kg/m^2), healthy weight (BMI 19–24.9 kg/m2), overweight (BMI 25–29.9 kg/m^2), obese (BMI 30–39.9 kg/m^2) and class III obesity[3] (BMI ≥ 40 kg/m^2).

Consequences of Obesity

Men and women with BMIs above the healthy weight range have an increased incidence of Type 2 diabetes, hypertension, coronary heart disease and gallbladder disease.[4] Post-menopausal breast, endometrial, colon and kidney cancer, osteoarthritis and infertility are also related to excess body fat.[4]

The lowest rates of all causes of mortality are found among individuals with BMIs between 23.5 and 24.9 in men and 22.0 and 23.4 in women. Rates are highest among individuals with class III or extreme obesity (BMI ≥ 40).[5] Individuals with class III obesity have twice the risk for all causes of mortality compared to obese individuals.[6]

Vermont data substantiate the relationship between obesity and chronic disease. The percentages of adult Vermonters in each BMI category who reported ever being diagnosed with cardiovascular disease (including coronary heart disease, angina, stroke or myocardial infarction) are shown in Figure 1.

In 2000, more Vermonters reported having a disability[7] if they were in the overweight (19%), obese (26%) or class III obesity (37%) categories than if they were in the healthy weight category (12%) (p<0.001).

Prevalence of Obesity

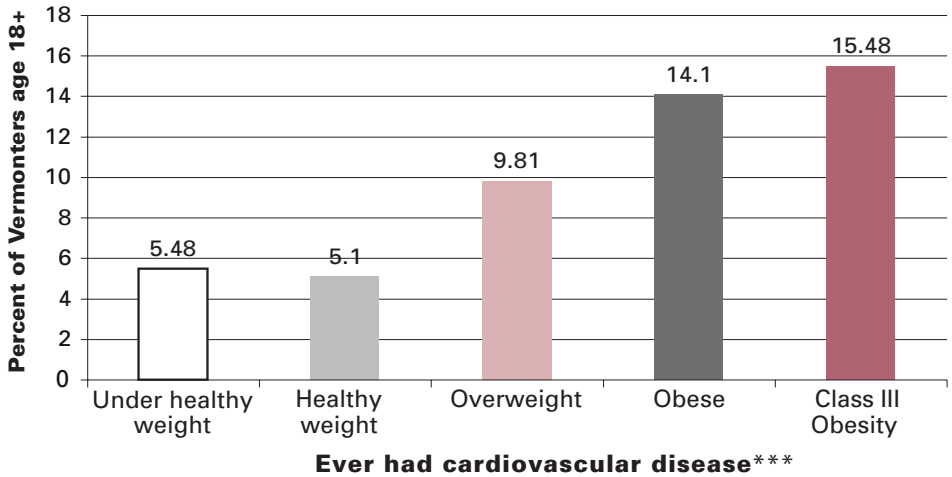
Six Healthy Vermonter 2010 goals relate to physical activity, nutrition and obesity. The goals directly related to obesity include 1) reducing the percentage of adults age 20 and older who are obese from 17.6 percent in 2001 to 15 percent by 2010, and 2) reducing the percentage of youth who are obese or overweight from 10 percent of children in grades 8–12 in 2001 to 5 percent by 2010.

Trends over time: From 1990 to 2001, the percentage of Vermonters in the under healthy weight category declined by 33 percent, from 4.3 percent to 2.9 percent, and in the healthy weight category by 19 percent, from 55.1 percent to 44.7 percent. The percentage of overweight adult Vermonters increased 16 percent, from 29.9 percent to 34.7 percent, while the percentage of obese Vermont men and women increased 55 percent, from 10.3 percent to 16.0 percent, during this period. A dramatic rise in the percentage of adult Vermonters with class III obesity was also seen with a 600 percent increase, from 0.3 percent in 1990 to 2.1 percent in 2000. The corresponding U.S. prevalence was 0.78 percent in 1990 to 2.2 percent in 2000.[3]

Characteristics of Vermonters over healthy weight: In grades 8–12, more Vermont boys [14.1%; 95% confidence interval (CI) =11.9–16.2] than girls [5.4%; 95% CI =4.0–6.9] were overweight.[8] For adult Vermonters,

Figure 1. Vermont Adults Reporting Cardiovascular Disease by Body Mass Index Category*

Source: Vermont Behavioral Risk Factor Surveillance System (BRFSS)** 2001



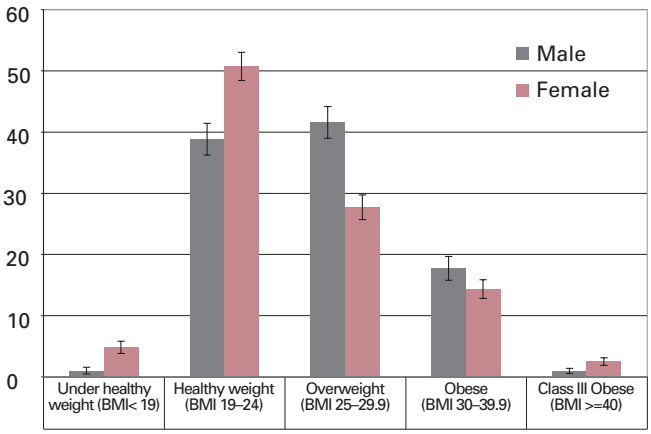
* Categories of body mass index (BMI) defined as: Under healthy weight BMI< 19, Healthy weight BMI 19–24, Overweight BMI 25–29.9, Obese BMI 30–39.9, Class III obese BMI >=40.

** BRFSS rates are self-reported, they do not include people who have not been diagnosed or those who have died from their conditions.

*** Has a doctor ever told you that you had any of the following: heart attack, myocardial infarction, angina, coronary heart disease or stroke?

**** Cardiovascular disease has a statistically significant relationship with BMI category.

Figure 2. Adult Vermont Men and Women by Body Mass Index (BMI) Category



Source: Vermont Behavioral Risk Factor Surveillance System, 2001

more men than women were obese, but more women than men reported extreme or class III obesity (see Figure 2).

For the period 1999–2000, the prevalence of obesity (BMI ≥ 30) was highest among adult Vermonters with education at the level of"some high school or less" (7.7%), adults age 55–64 (22.5%), and lowest among those with incomes over $75,000 (10.9%).[1]

Physical Activity: the key to a healthy weight: The National Institutes of Health states, "Physical activity should be an integral part of weight loss and weight maintenance. Initially, moderate levels of physical activity for 30–45 minutes, three to five days per week should be encouraged. All adults should set a long-term goal to accumulate at least 30 minutes or more of moderate-intensity physical activity on most, and preferably all, days of the week."[4] In 2000, the percentage of adult Vermonters reporting 30 minutes of physical activity at least five times per week declined with increasing body mass index (healthy weight = 29% [95%CI =26–31], overweight = 24% [95%CI =22–27], obese = 16% [95%CI =13–19], and class III obesity = 15% [95%CI =7–23]).[1]

A combination of increased physical activity and reduced caloric intake produces greater weight loss than either alone.[4] Individuals who engaged in physical activity expending 1,500–2,000 calories per week maintained 76–85 percent of the weight loss at the end of two years.[9] This level of physical activity is equivalent to approximately five hours per week or 45 minutes a day, seven days a week.

Physician's advice: In 2000, of adult Vermonters advised to lose weight by a physician, 76 percent were trying to lose weight. Twelve percent of overweight Vermonters, 33 percent of obese Vermonters and 52 percent of individuals in the class III obese category reported they were advised by their physicians to lose weight.[1]

Conclusion

According to the 2001 Vermont BRFSS, an estimated 151,490 adult Vermonters were overweight, 45,090 were obese, and 2,502 were in the class III obesity category. Nearly three-quarters of individuals who reported a physician's recommendation to lose weight were attempt-

Body Mass Index (BMI) Table for Adult Men & Women

	Healthy Weight						Over Healthy Weight					Obese	
BMI	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**35**
4'10"	91	96	100	105	110	115	119	124	129	134	138	143	167
4'11"	94	99	104	109	114	119	124	128	133	138	143	148	173
5'	97	102	107	112	118	123	128	133	138	143	148	153	179
5'1"	100	106	111	116	122	127	132	137	143	148	153	158	185
5'2"	104	109	115	120	126	131	136	142	147	153	158	164	191
5'3"	107	113	118	124	130	135	141	146	152	158	163	169	197
5'4"	110	116	122	128	134	140	145	151	157	163	169	174	204
5'5"	114	120	126	132	138	144	150	156	162	168	174	180	210
5'6"	118	124	130	136	142	148	155	161	167	173	179	186	216
5'7"	121	127	134	140	146	153	159	166	172	178	185	191	223
5'8"	125	131	138	144	151	158	164	171	177	184	190	197	230
5'9"	128	135	142	149	155	162	169	176	182	189	196	203	236
5'10'	132	139	146	153	160	167	174	181	188	195	202	207	243
5'11"	136	143	150	157	165	172	179	186	193	200	208	215	250
6'	140	147	154	162	169	177	184	191	199	206	213	221	258
6'1"	144	151	159	166	174	182	189	197	204	212	219	227	265
6'2"	148	155	163	171	179	186	194	202	210	218	225	233	272
6'3"	152	160	168	176	184	192	200	208	216	224	232	240	279
6'4"	156	164	172	180	189	197	205	213	221	230	238	246	287

Height (in feet and inches)

Weight (in pounds)

ing to do so. More emphasis is needed in educating overweight and obese patients about the importance of physical activity and healthy eating in managing their weight long term. For more information on the identification, evaluation, and treatment of overweight and obesity, go to http://www.nhlbi.nih.gov/guidelines/obesity/ob_home.htm.

References for Obesity: A Major Risk Factor

[1] *Behavioral Risk Factor Surveillance System is an annual telephone survey of a random sample of non-institutionalized adult Vermonters (age 18+). For more details, visit: http://www.cdc.gov/brfss/*

[2] *Flegal KM, Carroll MD, Ogden CL, Johnson CL. Prevalence and trends in obesity among U.S. adults, 1999-2000.* JAMA. *2002;288:1723-1727.*

[3] *Freedman DS, Khan LK, Serdula MK, Galuska DA, Dietz WH. Trends and correlates of class 3 obesity in the United States from 1990-2000.* JAMA *2002;288:1758-1761.*

[4] *NHLBI. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: The evidence report. NIH Pub. No. 98-4083, September 1998, 228 pgs.*

[5] *NHLBI. The practical guide to the identification, evaluation, and treatment of overweight and obesity in adults. NIH Pub. No. 00-4084, October 2000, 56 pgs.*

[6] *Calle EE, Thun MJ, Petrelli JM et al. Body-mass index and mortality in a prospective cohort of US adults.* N Engl J Med. *1999;341:1097-1105.*

[7] *The survey question reads: "Are you limited in any way in any activities because of physical, mental or emotional problems?"*

[8] *For children, overweight was defined as BMI > 95th percentile for age and gender, Youth Risk Behavior Survey 2001.*

[9] *Rippe JM, Hess Stacey. The role of physical activity in the prevention and management of obesity. J Am Diet Assoc 1998;98(suppl2):S31-S38.*

Conclusions

- Common risk factors for cardiovascular disease in Vermont include current smoking, diabetes, obesity, high cholesterol and high blood pressure.
- The risk of death from all causes is increased by 40 percent for those with two risk factors (listed above) compared to those with no risk factors. Almost one-quarter of adult Vermonters have this elevated risk for coronary heart disease, stroke and all-cause mortality based on self-reported risk factors. A significantly higher percentage of the residents of Franklin county reported having two or more risk factors compared to the State.
- Healthy lifestyle factors include maintaining a healthy weight (BMI 18.5–25), consuming five or more fruits and vegetables per day, having five 30-minute physical activity sessions per week, and not smoking.
- Only slightly more than one-fifth of Vermonters reported three or more healthy lifestyle factors. For three counties (Franklin, Caledonia, Rutland), a significantly lower percentage of residents reported three or more healthy lifestyle factors.
- Overweight, obesity and extreme obesity continue to increase dramatically among adult Vermonters.
- Reducing heart disease and stroke is a priority in Healthy Vermonters 2010, the states blueprint for improving public health. The Healthy Vermonter 2010 goals to reduce cardiovascular disease morbidity, mortality and obesity are:
  - Reduce coronary heart disease deaths to no more than 166 per 100,000 people. (VT 2000: 174.5 per 100,000)
  - Reduce stroke deaths to no more than 48 per 100,000 people. (VT 2000: 55.1 per 100,000)
  - Reduce the percentage of adults with high blood pressure to less than 16 percent. (VT 1999: 22%)
  - Reduce the percentage of adults who smoke cigarettes to no more than 12 percent. (VT 2000: 21%)
  - Reduce the percentage of adults age 20+ who are obese. (VT 2000: 18%)
  - Reduce the percentage of youth who are obese or overweight. (VT 2001: 10% (grades 8-12)

  There are also goals relating to physical activity, nutrition and diabetes.

For more information about programs at the Department of Health or a full copy of Healthy Vermonter's 2010, please visit the department's website at www.HealthyVermonters.info or contact the Division of Health Improvement at 802-863-7270.

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