LIFESTYLE CHARACTERISTICS AMONG PEOPLE WITH DIABETES AND PREDIABETES

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SUMMARY

This chapter describes lifestyle characteristics of the diabetes population in the United States, including information on dietary habits, physical activity, smoking, and health-seeking behaviors. In general, data indicate that many people with diabetes, like the rest of the U.S. population, are not meeting dietary recommendations, especially for fruits and vegetables, where only about one-quarter are consuming the suggested amount. Fruits, vegetables, and percent calories from macronutrients are measured most frequently, while micronutrients are rarely examined in national studies.

Overall, only one-third of people with diabetes meet physical activity recommendations, and people with diabetes engage in less physical activity than those without diabetes.

According to nationally representative data, people who smoke comprise about one-fifth of the diabetes population compared to a slightly higher proportion of smokers among those without diabetes. There has been a decreasing trend in the proportion of smokers among people with and without diabetes, ranging from a high of 35.6% in the 1970s to a low of 19.9% in the 1990s.

The available published national data on health-seeking behaviors among people with diabetes suggest a greater percentage of people with diabetes have reduced their intake of high fat foods, received advice to quit smoking, visited a physician regularly, and changed their physical activity than those without diabetes, although most people reported engaging in these behaviors regardless of diabetes status. Across diabetes status groups, most people report that they are practicing weight control.

This comprehensive review and compilation of data on lifestyle characteristics among people with diabetes demonstrates that healthy lifestyle behaviors are not at optimal rates in America's diabetes population. Although a number of lifestyle education programs have been designed and implemented in the country since *Diabetes in America's* last publication, more creative ideas are still necessary for sustainable, efficient, and cost-effective national programs.

INTRODUCTION

This chapter presents an overview of the prevalence of lifestyle characteristics of people with diabetes in the United States. Information about these characteristics as risk factors for diabetes can be found in Chapters 11 *Risk Factors for Type 1 Diabetes* and 13 *Risk Factors for Type 2 Diabetes*. The chapter describes existing data and presents new findings on various facets of lifestyle characteristics, such as nutrition status, physical activity level, smoking, and health-seeking behaviors. Published studies were selected for inclusion due to their large sample sizes and nationally representative populations. Since the last edition of *Diabetes in America*, several new studies have been published in this area.

DATA SOURCES AND LIMITATIONS

Data sources used in this chapter include both original and published analyses of the National Health and Nutrition Examination Surveys (NHANES), a yearly nationally representative survey that uses interviews and physical examinations to assess health status. New analyses for *Diabetes in America, 3rd edition*, using NHANES data from 2007–2010 used glycosylated hemoglobin (A1c), fasting plasma glucose, and oral glucose tolerance tests to classify undiagnosed (previously undetected) diabetes two ways: one based only on A1c and fasting plasma glucose (defined by A1c ≥6.5% [≥48 mmol/mol] or fasting plasma glucose ≥126 mg/dL [≥6.99 mmol/L]), tests which are more likely to be used in the clinical practice community, and another based on adding a glucose tolerance test (defined by A1c ≥6.5%, fasting plasma glucose ≥126 mg/dL, or 2-hour plasma glucose from an oral glucose tolerance test ≥200 mg/dL [≥11.10 mmol/L]),

tests more likely to be used in a research setting by virtue of the added glucose tolerance test. In the actual clinical practice community, tests would be repeated to confirm diagnoses. Prediabetes was defined by A1c 5.7%–<6.5% (39–<48 mmol/mol), fasting plasma glucose 100–<126 mg/dL (5.55–<6.99 mmol/L), or a 2-hour plasma glucose from an oral glucose tolerance test of 140–<200 mg/dL (7.77–<11.10 mmol/L). Data were also examined for those with self-reported diagnosed diabetes (diagnosed before being examined in the NHANES) and those with normal glucose levels.

Other original and published analyses of nationally representative data include the Behavioral Risk Factor Surveillance System (BRFSS), a yearly telephone survey that assesses risk factors for state-level surveillance, and the National Health Interview Survey (NHIS), a survey using personal interviews to monitor disease trends. Other data sources include published analyses of the SEARCH for Diabetes in Youth Study (SEARCH), a multicenter study of youth age <20 years with physician-diagnosed type 1 or type 2 diabetes; the baseline assessment of Look AHEAD (Action for Health in Diabetes), a multicenter trial of overweight and obese adults age 45–75 years with confirmed type 2 diabetes; the Strong Heart Study (SHS), a study of cardiovascular disease and risk factors in American Indians; and the Diabetes Control and Complications Trial (DCCT), a multicenter trial of people with type 1 diabetes age 13–39 years at baseline.

Despite the richness of the data on lifestyle characteristics among individuals with diabetes in the United States, there are still many limitations. Considering the evidence on nutrition characteristics among people with diabetes, most dietary markers have not been analyzed consistently or with standardized methods, making comparisons among studies difficult to assess. It is also hard to draw general conclusions about the level of physical activity among people with diabetes, because the definitions and assessment methods have changed frequently over time. Most data on physical activity are self-reported, and only the NHANES objectively measures physical activity. Furthermore, data about health-seeking behaviors are frequently collected but rarely analyzed. In all areas, the estimates are subject to reporting bias due to social desirability. Future data collection strategies should focus on consistent, comparable methods of objective measures of lifestyle characteristics among people with diabetes.

NUTRITION

Data on nutrition among people with diabetes span several categories, including total calories, macronutrients, cholesterol, fiber, alcohol, micronutrients, fruits and vegetables, and other foods. Although smaller studies on these topics exist, most were excluded from discussion in this chapter because they are not generalizable to the U.S. population. The population-based studies used a variety of methods to assess nutrition intake, including 24-hour dietary recall (NHANES and SHS), food frequency questionnaires (Look AHEAD and SEARCH), diet history (DCCT), dietary screeners, and self-reported intake (BRFSS). When reading the data, it is important to keep in mind that people with diabetes tend to be older and that older people tend to consume fewer calories overall.

TOTAL CALORIES
Table 10.1 presents published data on total calorie intake among people with diabetes. In the DCCT, participants in the intensive arm at baseline consumed approximately 2,500 kcal per day (1). NHANES 1988–2004 data demonstrated a significant increase in reported consumption of calorie intake only among individuals age 45–64 years with self-reported diabetes from 1,771 kcal in 1988–1990 to 2,100 kcal in 2003–2004 (2). In the SHS, men reported consuming an average of 1,595 kcal per day and women reported consuming 1,422 kcal per day (3). The SEARCH study found that adolescents with type 1 diabetes reported consuming more calories than those with type 2 diabetes (4,5); older adolescents reported consuming more calories than younger ones. During the baseline assessment of Look AHEAD in 2001–2004, men reported consuming an average of 2,000 kcal per day, and women reported consuming 1,774 kcal per day (6).

A new analysis for *Diabetes in America*, using NHANES data from a dietary recall in 2007–2010, indicated that adults with diagnosed diabetes reported consuming an average of 1,837 kcal per day, while those without diabetes reported consuming 2,150 kcal per day (Figure 10.1). This difference is likely because people with diabetes tend to be older, and older people may eat less. People with undiagnosed diabetes consumed an average of 2,002–2,088 kcal per day, those with prediabetes consumed 2,176 kcal per day, and those with normal glucose levels reported consuming 2,214 kcal per day. Across all categories of diabetes status, individuals age ≥65 years reported consuming fewer daily calories than those age <65 years, and men reported consuming more calories than women (Appendix 10.1). Non-Hispanic whites and Hispanics usually consumed more calories per day than non-Hispanic blacks, except among individuals with diagnosed diabetes, where non-Hispanic whites consumed more calories than non-Hispanic blacks and Hispanics. Individuals who completed high school or less usually consumed fewer calories than those with more education.

Overall, the data suggest that men with diabetes consume more calories per day than women with diabetes and that caloric intake among people with diabetes has increased over time. However, in the general population, caloric intake is usually greater in men compared to women due to larger body size. Additionally, all people, not just those with diabetes, have increased their calorie consumption over time.

TABLE 10.1. Published Studies on Caloric Intake Among People With Diabetes

STUDY, YEARS (REF.)	POPULATION AND SAMPLE SIZE	STUDY METHODOLOGY	CALORIES (KCAL/DAY)
DCCT, 1983–1989 (1)	532 adults with type 1 diabetes age 13–39 years at baseline who were enrolled in the intensive treatment group	Diet history	Mean: 2,496 Median: 2,325
NHANES, 1988–1990, 1991–1994, 1999–2004 (2)	1,404 adults age 20–74 years with self-reported diabetes	24-hour recall	1988–1990: 1,941 1991–1994: 1,980 1999–2000: 2,058 2001–2002: 1,948 2003–2004: 2,109
NHANES, 1999–2000; SHS, 1997–1999 (3)	1,381 adults age 51–84 years with self-reported diabetes for ≥1 year, no medical conditions affecting intake	24-hour recall	NHANES Men: 1,852 Women: 1,384 SHS Men: 1,595 Women: 1,422
SEARCH, 2001 (4)	1,697 youth with physician-diagnosed diabetes age 10–19 years	FFQ	Type 1 diabetes Age 10–14 years: 1,925 Age ≥15 years: 2,056 Type 2 diabetes Age 10–14 years: 1,849 Age ≥15 years: 1,964
SEARCH, 2001 (5)	Type 1 diabetes diagnosed by physician: 2,176 Type 2 diabetes diagnosed by physician: 365 All age <20 years	FFQ	Type 1 diabetes 50th percentile: 1,752 Type 2 diabetes 50th percentile: 1,617
Look AHEAD, 2001 (6)	5,145 adults age 45–75 years with type 2 diabetes*	FFQ	Men: 2,000 Women: 1,774

Conversions for glucose values are provided in *Diabetes in America Appendix 1 Conversions*. DCCT, Diabetes Control and Complications Trial; FFQ, food frequency questionnaire; Look AHEAD, Action for Health in Diabetes; NHANES, National Health and Nutrition Examination Survey; SEARCH, SEARCH for Diabetes in Youth Study; SHS, Strong Heart Study.
* Type 2 diabetes was confirmed by medical record, current diabetes treatment, confirmation from a primary health-care provider, fasting glucose of 126 mg/dL or more, symptoms of hyperglycemia with nonfasting plasma glucose of 200 mg/dL or more, or 2-hour plasma glucose of 200 mg/dL or more after ingestion of a 75-g oral glucose solution on at least two tests.
SOURCE: References are listed within the table.

MACRONUTRIENTS

Several published analyses of nationally representative data have explored the amount of fat, carbohydrate, and protein content that people with diabetes reported consuming using percent of calories from these macronutrients (Table 10.2). As of 2013, the American Diabetes Association (ADA) recommends no specific intake of total fat, carbohydrates, and protein for all people with diabetes (7). In 1988–1994, NHANES data indicated that 26% of the population consumed >40% of their daily calories from fat, while in 1999–2002, 40% of the population with self-reported diabetes consumed 30%–40% of calories from fat (8,9). In community-based studies, consumption patterns were similar across age groups and types of diabetes, with 35%–40% of daily calories coming from fat, 44%–49% from carbohydrates, and 15%–18% from protein (1,3,4,6).

In a trend analysis of nationally representative data, carbohydrate consumption was the only macronutrient that increased over time, from 209 g in 1988–1990 to 241 g in 2003–2004 (2).

Total Fat

A new *Diabetes in America* analysis of the NHANES 2007–2010 indicated that people with self-reported diagnosed diabetes obtained 35% of their calories from fat, while people without diabetes obtained 33% of calories from fat (Figure 10.2). Non-Hispanic whites consumed a greater percentage of calories from fat compared to the other racial/ethnic groups, while people with more education usually consumed a greater percentage than people with less education (Appendix 10.2).

Another new analysis of NHANES 2007–2010 data showed that people with self-reported diagnosed diabetes reported consuming an average of 73.6 g of total fat per day, while people without diabetes consumed 80.4 g per day (Table 10.3).

FIGURE 10.1. Energy Intake Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2007–2010
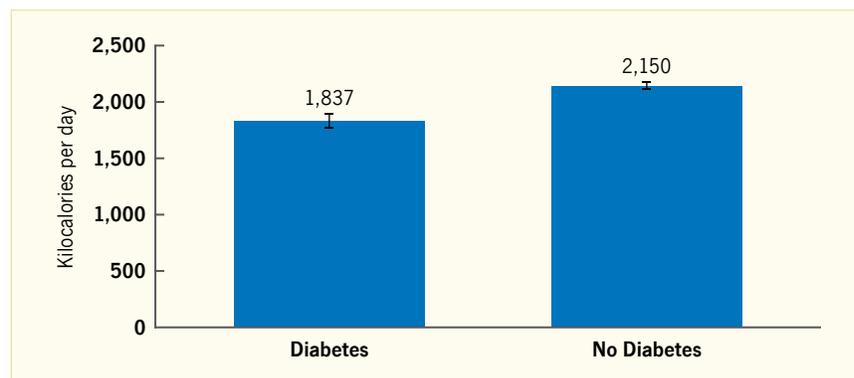
Dietary intake is reported as a 24-hour dietary recall. Diabetes status is based on self-report. Error bars represent 95% confidence intervals.

SOURCE: National Health and Nutrition Examination Surveys 2007–2010

TABLE 10.2. Published Studies on Macronutrient Intake Among People With Diabetes

STUDY, YEARS (REF.)	POPULATION AND SAMPLE SIZE	STUDY METHODOLOGY	TOTAL FAT	CARBOHYDRATES	PROTEIN

DCCT, 1983–1989 (1)	532 adults with type 1 diabetes age 13–39 years at baseline who were enrolled in the intensive treatment group	Diet history	Calories from fat
			  Mean: 38.5%
			  Median: 38.7%
				Calories from carbohydrates
				  Mean: 45.7%
				  Median: 44.7%
					Calories from protein
					  Mean: 17.8%
					  Median: 17.6%

NHANES, 1988–1994 (8)	1,480 adults with self-reported diabetes	24-hour recall	42% got recommended 30%–40% calories from fat; 26% got >40% of daily calories from fat		
NHANES, 1988–1990, 1991–1994, 1999–2004 (2)	1,404 adults age 20–74 years with self-reported diabetes	24-hour recall	1988–1990: 79 g 1991–1994: 83 g 1999–2000: 84 g 2001–2002: 78 g 2003–2004: 85 g	1988–1990: 209 g 1991–1994: 226 g 1999–2000: 240 g 2001–2002: 227 g 2003–2004: 241 g	1988–1990: 90 g 1991–1994: 82 g 1999–2000: 88 g 2001–2002: 82 g 2003–2004: 85 g

NHANES, 1999–2000; SHS, 1997–1999 (3)	1,381 adults age 51–84 years with self-reported diabetes for ≥1 year, no medical conditions affecting intake	24-hour recall	Calories from fat
			NHANES
			  Men: 34.7%
			  Women: 33.8%
			SHS
			  Men: 35.3%
			  Women: 35.9%
				Calories from carbohydrates
				NHANES
				  Men: 48.4%
				  Women: 49.8%
				SHS
				  Men: 48.7%
				  Women: 48.7%
					Calories from protein
					NHANES
					  Men: 17.9%
					  Women: 17.2%
					SHS
					  Men: 16.7%
					  Women: 16.3%

NHANES, 1999–2002 (9)	1,514 adults with self-reported diabetes	24-hour recall	40% reported 30%–40% of calories from fat		64% met recommendation of having 10%–20% of calories from protein

SEARCH, 2001 (4)	1,697 youth with physician-diagnosed diabetes age 10–19 years	FFQ	Calories from fat
			Type 1 diabetes
			  Age 10–14 years: 36.9%
			  Age ≥15 years: 38.2%
			Type 2 diabetes
			  Age 10–14 years: 37.9%
			  Age ≥15 years: 37.0%
				Calories from carbohydrates
				Type 1 diabetes
				  Age 10–14 years: 48.7%
				  Age ≥15 years: 47.7%
				Type 2 diabetes
				  Age 10–14 years: 47.3%
				  Age ≥15 years: 48.8%
					Calories from protein
					Type 1 diabetes
					  Age 10–14 years: 15.7%
					  Age ≥15 years: 15.7%
					Type 2 diabetes
					  Age 10–14 years: 15.7%
					  Age ≥15 years: 15.2%

Look AHEAD, 2001 (6)	5,145 adults age 45–75 years with type 2 diabetes*	FFQ	40% of calories from fat, 7% met recommendation of obtaining ≤30% of calories from fat		

Conversions for glucose values are provided in *Diabetes in America Appendix 1 Conversions.* DCCT, Diabetes Control and Complications Trial; FFQ, food frequency questionnaire; Look AHEAD, Action for Health in Diabetes; NHANES, National Health and Nutrition Examination Survey; SEARCH, SEARCH for Diabetes in Youth Study; SHS, Strong Heart Study.

* Type 2 diabetes was confirmed by medical record, current diabetes treatment, confirmation from a primary health-care provider, fasting glucose of 126 mg/dL or more, symptoms of hyperglycemia with nonfasting plasma glucose of 200 mg/dL or more, or 2-hour plasma glucose of 200 mg/dL or more after ingestion of a 75-g oral glucose solution on at least two tests.

SOURCE: References are listed within the table.

Across diabetes status groups, younger adults tended to eat more grams of total fat per day than older adults, and men consumed more fat than women. Non-Hispanic whites usually consumed more daily total fat than non-Hispanic blacks and Hispanics, while those with more education consumed more fat per day than those with less education (Appendix 10.3).

Carbohydrates

Diabetes in America analysis of NHANES 2007–2010 data showed that people with self-reported diagnosed diabetes consumed 47.5% of their daily calories from carbohydrates compared to 49.5%

FIGURE 10.2. Percent of Calories From Total Fat Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2007–2010
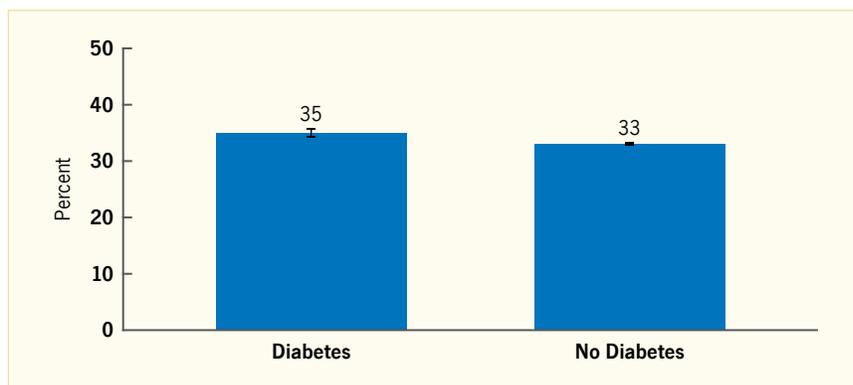
Dietary intake is reported as a 24-hour dietary recall. Diabetes status is based on self-report. Error bars represent 95% confidence intervals.

SOURCE: National Health and Nutrition Examination Surveys 2007–2010

for people without diabetes (Figure 10.3). Across diabetes status groups, women consumed a greater percentage of calories from carbohydrates compared to men, and Hispanics consumed more than non-Hispanic blacks and whites. Persons with less education generally consumed a greater percentage of calories from carbohydrates than those with more education across diabetes status groups, though the differences were small for those with diagnosed diabetes (Appendix 10.4).

A second new analysis found that people with self-reported diagnosed diabetes consumed an average of 212.1 g of carbohydrates per day, while people without diabetes consumed 261.4 g of carbohydrates per day (Table 10.3). People with clinical undiagnosed diabetes consumed an average of 238.5 g per day, people with research undiagnosed diabetes consumed 256.3 g per day, people with prediabetes consumed 264.2 g per day, and people with normal glucose levels consumed 266.3 g per day (Appendix 10.5). Differences by demographic status across diabetes status groups were similar to results for total fat.

Protein

Diabetes in America analysis of NHANES 2007–2010 data indicated that people with self-reported diagnosed diabetes consumed 17.2% of calories from protein, while people without diabetes consumed 15.7% of calories from protein (Figure 10.4). Among those with diagnosed and undiagnosed diabetes, younger adults consumed a higher percentage of calories from protein than older adults, but among adults with prediabetes or normal glucose levels, older adults consumed a higher percentage of calories from protein than younger adults. No consistent patterns were found across diabetes groups by sex, race/ethnicity, and education (Appendix 10.6).

Diabetes in America analysis also found that people with self-reported diagnosed diabetes consumed on average 76.9 g of protein per day, while people without diabetes consumed 82.6 g per day (Table 10.3). Those with clinical undiagnosed diabetes consumed on average 78.5 g per day, those with research

undiagnosed diabetes consumed 80.3 g per day, those with prediabetes consumed 83.3 g per day, and those with normal glucose levels consumed 85.3 g per day (Appendix 10.7). Across all diabetes status groups, consumption of protein was higher in younger adults, men, non-Hispanic whites and Hispanics, and those with more education.

TABLE 10.3. Macronutrient Intake Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2007–2010

	GRAMS (STANDARD ERROR)	
MACRONUTRIENT	**Diabetes N=1,369**	**No Diabetes N=9,803**
Total fat	73.6 (1.73)	80.4 (0.89)
Saturated fat	24.1 (0.63)	26.5 (0.34)
Carbohydrate	212.1 (3.74)	261.4 (3.84)
Protein	76.9 (1.50)	82.6 (0.77)

Dietary intake is reported as a 24-hour dietary recall. Diabetes status is based on self-report.

SOURCE: National Health and Nutrition Examination Surveys 2007–2010

FIGURE 10.3. Percent of Calories From Carbohydrates Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2007–2010
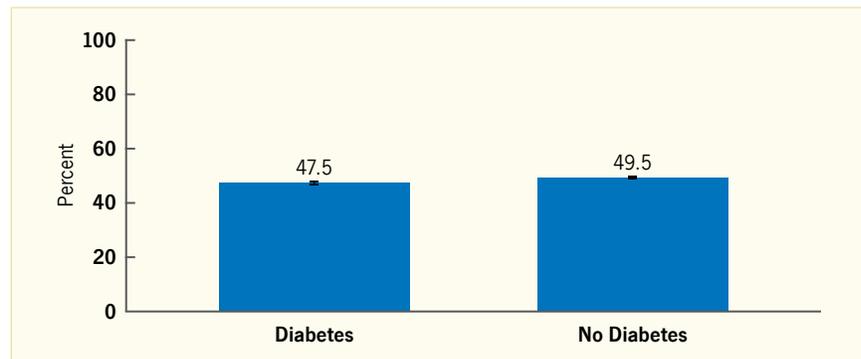
Dietary intake is reported as a 24-hour dietary recall. Diabetes status is based on self-report. Error bars represent 95% confidence intervals.

SOURCE: National Health and Nutrition Examination Surveys 2007–2010

FIGURE 10.4. Percent of Calories From Protein Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2007–2010

Dietary intake is reported as a 24-hour dietary recall. Diabetes status is based on self-report. Error bars represent 95% confidence intervals.

SOURCE: National Health and Nutrition Examination Surveys 2007–2010

Saturated Fat

The most frequently reported fat measurement was percentage of calories from saturated fat (Table 10.4). NHANES data showed that 61% of people with self-reported diabetes reported that they consumed >10% of their daily calories from saturated fat in 1988–1994, while in 1999–2002, 48.3% consumed <10% of calories from saturated fat (8,9).

TABLE 10.4. Published Studies on Saturated and Unsaturated Fat Intake Among People With Diabetes

STUDY, YEARS (REF.)	POPULATION AND SAMPLE SIZE	STUDY METHODOLOGY	SATURATED FAT	MONOUNSATURATED FAT	POLYUNSATURATED FAT
DCCT, 1983–1989 (1)	532 adults with type 1 diabetes age 13–39 years at baseline who were enrolled in the intensive treatment group	Diet history	Calories from saturated fat Mean: 13.5% Median: 13.4%	Calories from monounsaturated fat Mean: 14.5% Median: 14.5%	Calories from polyunsaturated fat Mean: 7.6% Median: 7.3%
NHANES, 1988–1994 (8)	1,480 adults with self-reported diabetes	24-hour recall	61% consumed >10% of their daily calories from saturated fat		
NHANES, 1988–1990, 1991–1994, 1999–2004 (2)	1,404 adults age 20–74 years with self-reported diabetes	24-hour recall	1988–1990: 26 g 1991–1994: 26 g 1999–2000: 26 g 2001–2002: 23 g 2003–2004: 27 g	1988–1990: 32 g 1991–1994: 32 g 1999–2000: 32 g 2001–2002: 29 g 2003–2004: 32 g	1988–1990: 15 g 1991–1994: 19 g 1999–2000: 19 g 2001–2002: 17 g 2003–2004: 18 g

NHANES, 1999–2000; SHS, 1997–1999 (3)	SHS: 1,186 adults age 45–79 years with self-reported diabetes for <1 year, no medical conditions affecting intake	24-hour recall	Calories from saturated fat
			NHANES
			  Men: 11.1%
			  Women: 10.7%
			SHS
			  Men: 11.7%
			  Women: 11.8%
				Calories from monounsaturated fat
				NHANES
				  Men: 13.2%
				  Women: 12.6%
				SHS
				  Men: 14.2%
				  Women: 14.4%
					Calories from polyunsaturated fat
					NHANES
					  Men: 7.6%
					  Women: 7.7%
					SHS
					  Men: 5.9%
					  Women: 6.4%

NHANES, 1999–2002 (9)	1,514 adults with self-reported diabetes	24-hour recall	48.3% met recommendation of having <10% of calories from saturated fat; 28.3% met recommendation of having <10% of calories from unsaturated fat		

SEARCH, 2001 (4)	1,697 youth with physician-diagnosed diabetes age 10–19 years	FFQ	Calories from saturated fat
			Type 1 diabetes
			  Age 10–14 years: 13.5%
			  Age ≥15 years: 13.7%
			Type 2 diabetes
			  Age 10–14 years: 13.8%
			  Age ≥15 years: 13.2%
				Calories from monounsaturated fat
				Type 1 diabetes
				  Age 10–14 years: 14.8%
				  Age ≥15 years: 15.2%
				Type 2 diabetes
				  Age 10–14 years: 15.3%
				  Age ≥15 years: 15.0%
					Calories from polyunsaturated fat
					Type 1 diabetes
					  Age 10–14 years: 5.7%
					  Age ≥15 years: 5.9%
					Type 2 diabetes
					  Age 10–14 years: 5.9%
					  Age ≥15 years: 5.6%

Look AHEAD, 2001 (6)	5,145 adults age 45–75 years with type 2 diabetes*	FFQ	Median percentage calories from saturated fat: 13% Met recommendation of ≤10% of calories from saturated fat: 15%		

Conversions for glucose values are provided in *Diabetes in America Appendix 1 Conversions*. DCCT, Diabetes Control and Complications Trial; FFQ, food frequency questionnaire; Look AHEAD, Action for Health in Diabetes; NHANES, National Health and Nutrition Examination Survey; SEARCH, SEARCH for Diabetes in Youth Study; SHS, Strong Heart Study.
* Type 2 diabetes was confirmed by medical record, current diabetes treatment, confirmation from a primary health-care provider, fasting glucose of 126 mg/dL or more, symptoms of hyperglycemia with nonfasting plasma glucose of 200 mg/dL or more, or 2-hour plasma glucose of 200 mg/dL or more after ingestion of a 75-g oral glucose solution on at least two tests.
SOURCE: References are listed within the table.

Community-based studies showed that the percentage of calories from saturated fat in people with both types of diabetes ranged between 11.7% and 14% (1,3,4,6). The ADA recommends that people with diabetes and normal glucose levels consume less than 10% of their daily calories from saturated fat; thus, many people with diabetes are not meeting current guidelines (7).

Diabetes in America analysis of NHANES 2007–2010 data indicated that people with self-reported diagnosed diabetes consumed 11.4% of their daily calories from saturated fat compared to 10.8% for people without diabetes (Figure 10.5). Across diabetes status groups, non-Hispanic whites consumed a greater percentage of calories from saturated fat compared to non-Hispanic blacks and Hispanics (Appendix 10.8).

New analysis of the data from the NHANES 2007–2010 for *Diabetes in America* found that people with self-reported diagnosed diabetes consumed a mean of 24.1 g of saturated fat per day, while people without diabetes consumed 26.5 g per day (Table 10.3). Across diabetes status groups, younger adults consumed more saturated fat than older adults, men consumed more saturated fat than women, non-Hispanic whites consumed more saturated fat than non-Hispanic blacks and Hispanics, and those with more education usually consumed more saturated fat than those with less education (Appendix 10.9).

Unsaturated and Trans Fats

Studies investigating the percentage of daily calories consumed from other fats did not find significant differences across age groups and types of diabetes. In these studies, the percentages of daily calories from other types of fat among people with type 1 and type 2 diabetes were in the range of 14.2%–15% for monounsaturated fat, 5.5%–7.6% for polyunsaturated fat, and 2.3%–2.8% for trans fat (Table 10.4, trans fat data not shown) (3,4). An analysis of NHANES data reported trends in saturated, monounsaturated, and polyunsaturated fat intake among people with self-reported diagnosed diabetes and found no significant changes from 1988 to 2004 (Table 10.4) (2).

Overall, these data suggest that people with diabetes consume less fat than people without diabetes, but because they eat fewer calories, people with diabetes obtain a higher percentage of their calories from fat than people without diabetes. For carbohydrates, people with diabetes consume fewer grams and a smaller percentage of calories from carbohydrates than people without diabetes, but the amount has been increasing over time. Like fat, people with diabetes consume less protein than people without diabetes, but they consume a larger percentage of calories from protein. People with diabetes also consume less saturated fat than people without diabetes, but they obtain a larger percentage of their calories from saturated fat. Regardless of diabetes status, most Americans on average consume too much saturated fat.

CHOLESTEROL

The ADA recommends people with diabetes follow the cholesterol recommendation for the general population, which is <300 mg per day (10). The median amount of cholesterol consumed in people with diabetes was 297 mg per day in the Look AHEAD population (6) and 228 mg per day in the SHS. In these two studies, more than half of people with diabetes did not meet the recommended guidelines for daily cholesterol consumption. NHANES data indicated no significant change in cholesterol intake

FIGURE 10.5. Percent of Calories From Saturated Fat Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2007–2010
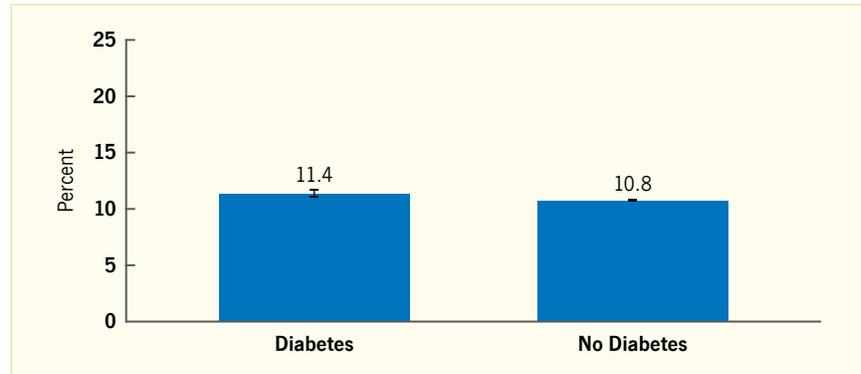
Dietary intake is reported as a 24-hour dietary recall. Diabetes status is based on self-report. Error bars represent 95% confidence intervals.

SOURCE: National Health and Nutrition Examination Surveys 2007–2010

from 1988 to 2004 among people with diabetes, with intake ranging from 301 mg to 352 mg per day, respectively (2).

Diabetes in America analysis of NHANES 2007–2010 data indicated that people with diagnosed diabetes consumed an average 256 mg of cholesterol per day, people with clinical undiagnosed diabetes consumed 286 mg per day, people with research undiagnosed diabetes consumed 282 mg per day, people with prediabetes consumed 303 mg per day, and people with normal glucose levels consumed 292 mg per day (Appendix 10.10). Across the diabetes status groups, younger adults consumed more cholesterol per day than older adults, and men consumed more cholesterol than women; no consistent patterns across diabetes status groups were found by race/ethnicity or education.

FIBER

People with diabetes are encouraged to follow the fiber recommendations for the general public, which suggest consuming 14 g per 1,000 kcal of fiber each day (7,10). In 1999–2002, only 18.3% of people with self-reported diagnosed diabetes consumed the recommended amount of fiber each day (9). In 2000–2003, the Look AHEAD study showed that only 20% of people with confirmed diabetes met the age- and sex-specific recommendations for daily fiber intake (6). Patterns of fiber intake were similar for type 1 and type 2 physician-diagnosed diabetes in

adolescents, according to SEARCH (4,5), while in Look AHEAD, younger adults with confirmed diabetes consumed more fiber than older ones (6). Based on these data, only a small proportion of the American diabetes population is getting the recommended amount of fiber in their diets. In the DCCT, the average intake of fiber was 10.7 g per 1,000 kcal, while daily fiber intake among people with diabetes showed no significant change over the period 1988–2004, with daily intake ranging from 16 g to 19 g (1,2).

Diabetes in America analysis of NHANES 2007–2010 data indicated that people with diagnosed diabetes consumed an average of 9.1 g of dietary fiber per 1,000 calories, people with undiagnosed diabetes consumed 8.4 g per 1,000 calories, and people with prediabetes and normal glucose levels consumed 8.0 g per 1,000 calories (Appendix 10.11). Older adults consumed more fiber per 1,000 calories than younger adults, and Hispanics consumed more fiber per 1,000 calories than non-Hispanics. Among adults with undiagnosed diabetes, prediabetes, and normal glucose levels, women consumed more fiber per 1,000 calories than men, but there was no large sex difference among people with diabetes.

Diabetes in America analysis using the same dataset found that people with self-reported diagnosed diabetes reported consuming slightly less dietary

fiber (15.7 g/day) than people with no diabetes (16.6 g/day) (Figure 10.6). People with clinical undiagnosed diabetes consumed an average of 15.9 g of dietary fiber per day, people with research undiagnosed diabetes consumed 16.7 g per day, people with prediabetes consumed 16.3 g per day, and those with normal glucose levels consumed 16.7 g per day (Appendix 10.12). This is likely because people with diabetes tend to be older, and older people may consume less food. Individuals age 45–64 years usually consumed more fiber than the older and younger groups, while men consumed more fiber than women. Non-Hispanic whites and Hispanics consumed more fiber than non-Hispanic blacks, and college graduates usually consumed more fiber than those with less education.

Overall, the data suggest that people with diabetes consume similar amounts of fiber as people without diabetes, but on average, most people in the United States are not meeting the recommendations for fiber intake.

FIGURE 10.6. Fiber Intake Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2007–2010
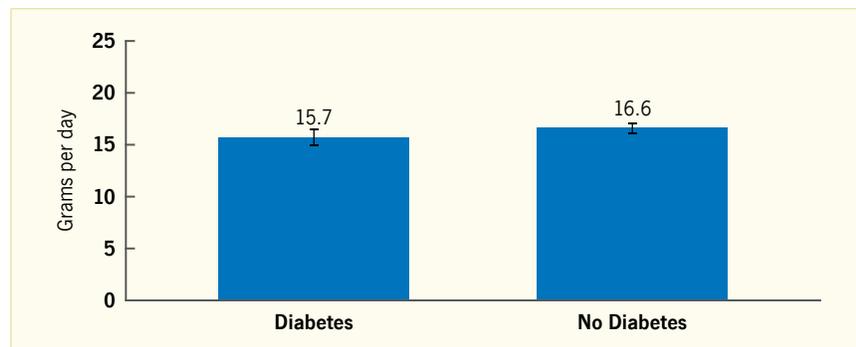
Dietary intake is reported as a 24-hour dietary recall. Diabetes status is based on self-report. Error bars represent 95% confidence intervals.

SOURCE: National Health and Nutrition Examination Surveys 2007–2010

TABLE 10.5. Published Studies on Alcohol Consumption Among People With Diabetes

STUDY, YEARS (REF.)	POPULATION AND SAMPLE SIZE	STUDY METHODOLOGY	STATISTICS
NHANES, 1988–1990, 1991–1994, 1999–2004 (2)	1,404 adults age 20–74 years with self-reported diabetes	24-hour recall	1988–1990: 8 g 1991–1994: 4 g 1999–2000: 3 g 2001–2002: 8 g 2003–2004: 10 g
NHANES, 1988–1994 (13)	218 women with self-reported diabetes, 85 with self-reported gestational diabetes, and 4,325 with no diabetes	Self-report	Drinks per day Diabetes: 0.03 Gestational diabetes: 0.12 No diabetes: 0.44

NHANES, 1988–1994 (14)	1,024 adults with diabetes	Self-report	Mean drinks per month
			Diabetes
			  Beer: 2.1
			  Wine: 0.8
			  Hard alcohol: 1.1
			  Total: 4.8
			No diabetes
			  Beer: 5.3
			  Wine: 1.6
			  Hard alcohol: 2.0
			  Total: 8.9

NHANES, 1999–2000; SHS, 1997–1999 (3)	1,381 adults age 51–84 years with self-reported diabetes for ≥1 year, no medical conditions affecting intake	24-hour recall	Current drinkers
			NHANES
			  Men: 49.8%
			  Women: 29.1%
			SHS
			  Men: 27.6%
			  Women: 10.5%

BRFSS, 2001 (11)	10,980 adults with self-reported diabetes	Self-report	Non-drinkers: 70% Moderate drinkers: 28% Heavy drinkers: 2%
Look AHEAD, 2001 (12)	5,145 adults age 45–74 years with type 2 diabetes*	Self-report	Reported drinking alcohol in the last year All: 59.7% Men: 70.6% Women: 52.2%

Conversions for glucose values are provided in *Diabetes in America Appendix 1 Conversions*. BRFSS, Behavioral Risk Factor Surveillance System; Look AHEAD, Action for Health in Diabetes; NHANES, National Health and Nutrition Examination Survey; SHS, Strong Heart Study.

* Type 2 diabetes was confirmed by medical record, current diabetes treatment, confirmation from a primary health-care provider, fasting glucose of 126 mg/dL or more, symptoms of hyperglycemia with nonfasting plasma glucose of 200 mg/dL or more, or 2-hour plasma glucose of 200 mg/dL or more after ingestion of a 75-g oral glucose solution on at least two tests.

SOURCE: References are listed within the table.

ALCOHOL

The ADA advises moderate, if any, alcohol intake for people with diabetes, which means one drink or less per day for women and two drinks or less per day for men (7). Based on BRFSS 2001 data, 70% of the self-reported diagnosed diabetes population reported being non-drinkers (drank no alcoholic beverages in past 30 days), 28% reported being moderate drinkers (men consuming on average two or less drinks per day, women one), and only 2% reported being heavy drinkers (men more than two per day, women more than one) (Table 10.5) (11). In a questionnaire from the Look AHEAD trial, 59.7% of participants reported drinking any alcohol in the past year (Table 10.5). There was a notable disparity by sex, with 70.6% of males reporting alcohol consumption in the past year compared to 52.2% of females (12). The SHS also found that men with diabetes consumed much more alcohol than women with diabetes (Table 10.5) (3).

Diabetes in America analysis of NHIS 2009–2010 data showed that 45.9% of people with self-reported diagnosed diabetes were current drinkers compared to 66.9% of those without diabetes (Table 10.6).

Across diabetes status groups, a greater percentage of younger adults were current drinkers compared to older adults, and more men were current drinkers than women. A larger percentage of non-Hispanic whites were current drinkers than non-Hispanic blacks, Hispanics, and Asians, and a greater percentage of persons with more education generally were current drinkers than those with less education (Appendix 10.13). A greater percentage of people without diabetes than with diabetes had engaged in binge drinking in the past year (Table 10.6, Appendix 10.14). Additionally, more people with diagnosed diabetes than without diabetes did not drink at all (Figure 10.7). When those without diagnosed diabetes were further subdivided, 65.5% of those with prediabetes and 66.9% of the population with normal glucose levels were current drinkers (Appendix 10.14).

TABLE 10.6. Alcohol Consumption Among Adults Age ≥18 Years, by Diabetes Status, U.S., 2009–2010

ALCOHOL CONSUMPTION	PERCENT (STANDARD ERROR)	
	Diabetes N=5,399	No Diabetes N=48,575
Current drinker	45.9 (0.85)	66.9 (0.35)
Binge drinker*	23.4 (1.14)	36.6 (0.44)
Mean drinks, per day [mean (SE)]	2.3 (0.08)	2.6 (0.02)

A drink is defined as 12 oz. of beer, a 5 oz. glass of wine, or 1.5 oz. of liquor. Diabetes status is based on self-report.
* Binge drinking is defined as reporting five or more drinks on at least one day in the past year.
SOURCE: National Health Interview Surveys 2009–2010

FIGURE 10.7. Alcohol Consumption Among Adults Age ≥18 Years, by Diabetes Status, U.S., 2009–2010
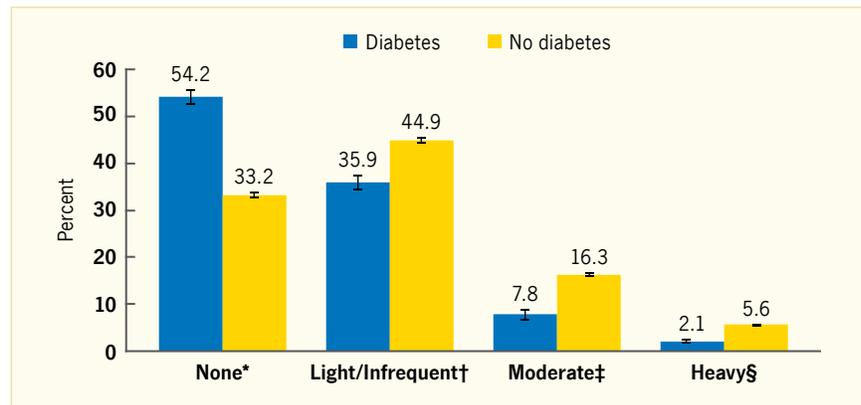
A drink is defined as 12 oz. of beer, a 5 oz. glass of wine, or 1.5 oz. of liquor. Diabetes status is based on self-report. Error bars represent 95% confidence intervals.
* No drinks in past year
† Light: ≥12 drinks in lifetime and ≤3 drinks per week in past year; Infrequent: ≥12 drinks in lifetime and 1–11 drinks in past year
‡ ≥12 drinks in lifetime, and (male) >3 drinks per week up to 14 drinks per week OR (female) >3 drinks per week up to 7 drinks per week
§ ≥12 drinks in lifetime, and (male) >14 drinks per week in past year OR (female) >7 drinks per week in past year
SOURCE: National Health Interview Surveys 2009–2010

Other studies examined the amount of alcohol that people with diabetes reported they consumed, mostly in units of drinks or grams. *Diabetes in America* analysis of NHANES 2007–2010 data demonstrated that people with diabetes reported consuming smaller amounts of alcohol than individuals without diabetes. In this sample, the quantity of alcohol consumed per day was on average 6.1 g in people with diagnosed diabetes, 9.3 g in people with clinical undiagnosed diabetes, 6.8 g in those with undiagnosed diabetes by the research definition, 8.9 g in prediabetes, and 12.8 g in those with normal glucose levels, where 14 g of alcohol is equal to one drink (Appendix 10.15). Across diabetes status groups, those age <65 years drank more than those ≥65 years, and men drank more than women; no consistent patterns were observed by race/ethnicity or education. However, *Diabetes in America* analysis of NHIS 2009–2010 data found that mean drinks per day was similar in these populations, with people with diabetes and prediabetes consuming 2.3 drinks per day and people with normal glucose levels consuming 2.6 drinks per day (Table 10.6 and Appendix 10.14). In an analysis of NHANES 1988–1994 data, the number of alcoholic drinks reported to be consumed per day was 0.03 in people with self-reported diabetes, 0.12 in those with gestational diabetes, and 0.44 in those without diabetes (Table 10.5) (13). Another NHANES analysis from the same years found that people with diabetes consumed significantly fewer mean drinks per month of beer, wine, hard liquor, and total alcohol compared to those without diabetes (Table 10.5) (14). However, a later NHANES analysis found no significant change in the

amount of alcohol use among people with self-reported diabetes from 1988 to 2004, though values ranged from 3 g to 10 g per day over this period (Table 10.5) (2). In general, the data suggest that people with diabetes consume less alcohol than those without diabetes.

MICRONUTRIENTS
Sodium
An analysis of NHANES data found no significant changes in sodium intake in individuals with self-reported diabetes, with average daily intake ranging from 3,717 mg in 1999–2000 to 3,359 mg in 2001–2002 (2). An age-stratified analysis of Look AHEAD data again found that younger participants consumed more sodium than the older members of the population (6), while in the SHS diabetes population, the mean level of sodium intake was 2,744 mg per day (3).

A *Diabetes in America* analysis of NHANES 2007–2010 data indicated that people with diagnosed diabetes consumed on average 3,328 mg of sodium per day, people with clinical undiagnosed diabetes consumed 3,372 mg per day, people with research undiagnosed diabetes consumed 3,281 mg per day, people with prediabetes consumed 3,564 mg per day, and people with normal glucose levels consumed 3,680 mg per day (Appendix 10.16). Across diabetes status groups, higher sodium consumption was found among younger adults, men, non-Hispanic whites, and those with more education compared to older adults, women, non-Hispanic blacks and Hispanics, and those with less education, respectively. Since the recommended amount of sodium is <2,300 mg per day, most people with diabetes are not meeting this goal (7).

Calcium
Depending on age, the recommended amount of daily calcium intake for adults ranges from 1,000 to 1,200 mg (10). SEARCH and Look AHEAD examined calcium intake among populations with physician-diagnosed and confirmed diabetes. In two analyses of SEARCH data, adolescents with type 1 diabetes reported consuming more calcium than those with type 2 diabetes (4,5). In Look AHEAD, younger participants consumed more calcium than older ones, but only 20% of the total population met the age-specific recommendations for daily calcium intake (6).

Diabetes in America analysis of NHANES 2007–2010 data indicated that people with diagnosed diabetes consumed on average 876 mg of calcium per day, people with clinical undiagnosed diabetes consumed 987 mg, people with research undiagnosed diabetes consumed 915 mg, people with prediabetes consumed 958 mg, and people with normal glucose levels consumed 1,011 mg (Appendix 10.17). Across all diabetes status groups, younger adults, men, non-Hispanic whites, and persons with a college education consumed more calcium than older adults, women, non-Hispanic blacks and Hispanics, and those with less education, respectively.

Vitamin D
The recommended amount of vitamin D is 15 µg per day (10). *Diabetes in America* analysis of NHANES 2007–2010 data found that people with self-reported diagnosed diabetes consumed 4.4 µg of vitamin D per day, people with undiagnosed diabetes consumed 5.0 µg, and people with prediabetes and normal glucose levels consumed 4.7 µg (Appendix 10.18). Men consumed greater amounts of vitamin D than women, non-Hispanic whites consumed more vitamin D than non-Hispanic blacks and Hispanics, and those with more education usually consumed more vitamin D than those with less education. Across diabetes status groups, no consistent patterns were observed by age.

Other Micronutrients
In the SEARCH population, 69.3% met vitamin C recommendations, 15.6% met vitamin E recommendations, and 91.1% met iron recommendations, according to ADA guidelines (4).

FRUITS AND VEGETABLES
Table 10.7 presents data on fruit and vegetable consumption among people with diabetes. NHANES data indicated that 38% of people with diabetes met the recommendation of eating five or more servings of fruits and vegetables per day in 1988–1994 (9). Among those with gestational diabetes in the BRFSS 2001–2003, 26% consumed the recommended daily servings of fruits and vegetables (15). BRFSS 2005 data found that 26%–28% of people with diabetes consumed five or more servings of fruits and vegetables (16,17).

In SEARCH, the median servings of fruit per week was 6.5 per 1,000 kcal in people with type 1 diabetes and 4.5 per 1,000 kcal in those with type 2 diabetes. For vegetables, the median servings per week consumed by adolescents with type 1 diabetes was 5.5 per 1,000 kcal, while it was 6.5 per 1,000 kcal among those with type 2 diabetes (5). In Look AHEAD, 36% of people with type 2 diabetes met the recommendation of two servings of fruit per day, and the median number of servings per day was two. For vegetables, 38% met the recommendation of three servings per day, which was also the median number of daily servings in this population (6).

Diabetes in America analysis using BRFSS 2007 and 2009 data based on self-report indicated that 24.2% of people with diabetes, 22.1% of people with prediabetes, and 24.3% of people with normal glucose levels were consuming at least five servings of fruits and vegetables per day (Table 10.8). In the same years, the mean servings of fruits and vegetables per day were similar in adults in the three diabetes status groups, ranging from 1.41 to 1.52 for fruits and 2.27 to 2.37 for vegetables (Figure 10.8). In people with and without diabetes, women consumed more fruits and vegetables than men, non-Hispanic Asians consumed more than the other racial groups, and those with some college education and college graduates consumed more than those with less education (Appendix 10.19). Among people without diabetes, a greater percentage of adults age ≥65 years met the fruit and vegetable recommendations compared to younger adults.

TABLE 10.7. Published Studies on Consumption of Fruits and Vegetables Among People With Diabetes

STUDY, YEARS (REF.)	POPULATION AND SAMPLE SIZE	STUDY METHODOLOGY	FRUITS AND VEGETABLES
NHANES, 1988–1994 (8)	1,480 adults with self-reported diabetes	FFQ	Ate ≥5 servings of daily fruits and vegetables: 38%

SEARCH, 2001 (5)	Type 1 diabetes diagnosed by physician: 2,176
	Type 2 diabetes diagnosed by physician: 365
	All age <20 years
		FFQ	Median weekly servings of fruit per 1,000 kcal
			    Type 1 diabetes: 6.5
			    Type 2 diabetes: 4.5
			Median weekly servings of vegetables per 1,000 kcal
			    Type 1 diabetes: 5.5
			    Type 2 diabetes: 6.5

Look AHEAD, 2001 (6)	5,145 adults age 45–75 years with type 2 diabetes*	FFQ	Median daily fruit servings: 2 Met recommendation: 36% Median daily vegetable servings: 3 Met recommendation: 38%
BRFSS, 2001–2003 (15)	4,718 women age 18–44 years with self-reported gestational diabetes	Self-report	Ate ≥5 daily servings of fruits and vegetables: 25.6%
BRFSS, 2005 (16)	33,320 adults with self-reported diabetes	Self-report	Ate ≥5 daily servings of fruits and vegetables: 26%
BRFSS, 2005 (17)	16,428 adults with self-reported diabetes	Self-report	Ate ≥5 servings of daily fruits and vegetables: 27.9%

Conversions for glucose values are provided in *Diabetes in America Appendix 1 Conversions*. BRFSS, Behavioral Risk Factor Surveillance System; FFQ, food frequency questionnaire; Look AHEAD, Action for Health in Diabetes; NHANES, National Health and Nutrition Examination Survey; SEARCH, SEARCH for Diabetes in Youth Study; SHS, Strong Heart Study.
* Type 2 diabetes was confirmed by medical record, current diabetes treatment, confirmation from a primary health-care provider, fasting glucose of 126 mg/dL or more, symptoms of hyperglycemia with nonfasting plasma glucose of 200 mg/dL or more, or 2-hour plasma glucose of 200 mg/dL or more after ingestion of a 75-g oral glucose solution on at least two tests.
SOURCE: References are listed within the table.

In contrast, data from the NHANES 2009–2010 dietary screener showed that only 6.0% of people with self-reported diagnosed diabetes and 7.1% of people without diabetes reported consuming at least five servings of fruits and vegetables each day (Appendix 10.20). All diabetes status groups reported consuming similar mean servings of fruits and vegetables. The percentage meeting the recommendation ranged from 5.0% to 9.5%, and on average, all groups consumed similar amounts of fruits and vegetables every day (Appendix 10.21).

Overall, a small proportion of people with diabetes are meeting the recommendations for fruit and vegetable intake, just like in the general population.

OTHER FOODS

Several studies looked at specific foods and food groups consumed in people with diabetes. In the SEARCH study, those with type 1 diabetes reported consuming a median of 6.5 servings of dairy and no weekly servings of soda; for those with type 2 diabetes, 4.5 servings of dairy and 1.5 servings of soda per 1,000 kcal were consumed (5). In the Look AHEAD population, individuals with diabetes reported eating a median of three servings of grains per day, two servings of dairy, three servings of meat, and two servings

TABLE 10.8. Fruit and Vegetable Servings Per Day Among Adults Age ≥18 Years, by Diabetes Status, U.S., 2007 and 2009

SERVINGS PER DAY	PERCENT (STANDARD ERROR)		
	Diabetes N=96,508	Prediabetes N=12,260	Normal Glucose N=711,910
No daily servings	0.2 (0.02)	0.3 (0.07)	0.1 (0.01)
1–<3	39.7 (0.33)	41.1 (0.94)	39.9 (0.13)
3–<5	35.9 (0.32)	36.5 (0.91)	35.7 (0.12)
≥5	24.2 (0.29)	22.1 (0.81)	24.3 (0.11)

Diabetes status and fruit and vegetable consumption are based on self-report.
SOURCE: Behavioral Risk Factor Surveillance System 2007 and 2009

FIGURE 10.8. Mean Fruit and Vegetable Consumption Among Adults Age ≥18 Years, by Diabetes Status, U.S., 2007 and 2009
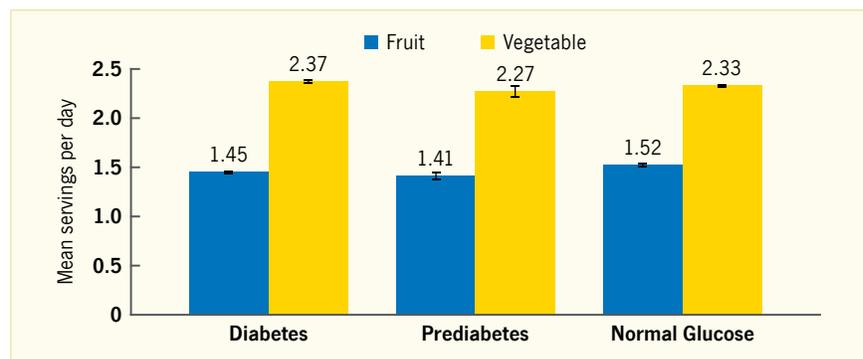
Diabetes status and fruit and vegetable consumption are based on self-report. Error bars represent 95% confidence intervals.
SOURCE: Behavioral Risk Factor Surveillance System 2007 and 2009

of fats, oils, and sweets (6). An analysis of NHANES 1988–1994 data found that people with diabetes consumed more diet soda but less regular soda than people without diabetes. The same study found that people with and without diabetes consumed similar amounts of caffeinated coffee, caffeinated tea, and juice, but people with diabetes consumed more milk than those without diabetes (14).

One community-based study used a telephone survey to examine fast food habits and unplanned eating in adolescents with diabetes. In this population, 48% reported eating fast food four or more times a month, 32% had fast food two or three times a month, and 20% consumed fast food zero or one time in the past month. In the same sample, 76% reported overeating at least once a week, and 69% consumed unplanned snacks at least once per week. Only 38% reported no daily soda consumption, while 42% reported less than a serving per day versus 20% having more than a serving per day (18).

Diabetes in America analysis of the NHANES 2009–2010 dietary screener showed that on average, all diabetes status groups reported consuming less than one serving of regular soda per day (Appendix 10.22). Across diabetes status groups, younger adults reported consuming more soda than older adults. Women with self-reported diabetes consumed more soda than men with diabetes, but women with normal glucose levels consumed less soda than men without diabetes. Although there were no consistent patterns by race/ethnicity, those with a college education consumed less soda than those with less education across diabetes groups.

PHYSICAL ACTIVITY

Several nationally representative studies examined self-reported physical activity among people with diabetes (Table 10.9). Although these published studies were based on U.S. representative data, it was difficult to interpret and compare their results because the studies came from different time periods and considered different recommendation guidelines on physical activity. Sources of physical activity data include previously described studies, such as the BRFSS, NHANES, and NHIS. Other studies described in Table 10.9 include the Health and Retirement Study, a longitudinal panel study that surveys adults age >50 years on health, social, and financial issues every 2 years; the Regenstrief Physical Activity Questionnaire, a survey of older adults designed to develop physical activity measures to use in a low-income primary care population; the U.S. portion of the Joint Canada/United States Survey of Health, a telephone survey based on the NHIS; the Study to Help Improve Early Evaluation and Management of Risk Factors Leading to Diabetes (SHIELD), a population-based study that measures health behaviors, provider recommendations, and intentions to follow recommendations among people with type 2 diabetes; and the Treatment Options for Type 2 Diabetes in Adolescents and Youth (TODAY) study, a multisite randomized trial that evaluates treatments for type 2 diabetes in youth. 2010 ADA recommendations state that people with diabetes should engage in at least 150 minutes a week of moderate to vigorous aerobic exercise at least three days per week and moderate to vigorous resistance training two to three days per week (19).

A nationally representative study from 1990 found that 34.3% of people with diagnosed diabetes reported regular exercise in the past 2 weeks, while 40.9% of people without diabetes reported regular exercise (20). Three nationally representative studies in the following decade found similar results, with 28.2%–34.5% of people with diagnosed diabetes meeting the current physical activity recommendations (8,9,21). Data from the 2000s showed that 25%–42% of people with diagnosed diabetes met the recommended guidelines for physical activity. Based on ADA and U.S. Department of Health and Human Services guidelines, 21%–36% of people with diabetes met the moderate physical activity guideline, and 9%–14% met the vigorous physical activity guidelines (16,17,22).

Other evidence on physical activity in people with diabetes has come from smaller surveys and community-based studies. These studies are also heterogeneous in the method of assessment, definitions used, time periods, and the populations surveyed. These data showed that 18%–55% of people with type 2 diabetes engaged in no physical activity, 22.0%–53.6% engaged in moderate level activity, and 12.4%–23.0% in high level activity (Table 10.9) (18,23,24). Published studies from the U.S. portion of the Joint Canada/United States Survey of Health also found that people with diabetes engaged in less regular physical activity than those without diabetes (Table 10.9) (25). An analysis of SHIELD 2007 survey data looked at sex and race/ethnicity and breakdowns of physical activity among people with diabetes and found that Hispanic men were the most active, while non-Hispanic white women were the least active (26). In addition, the TODAY study found that boys and girls age 10–18 years with type 2 diabetes got 353.1–375.2 minutes of total activity per day, but only 8.2–35.0 minutes of activity per day included moderate to vigorous activity (27).

Nationally representative data from 2001–2003 indicated that 48.8% of women with gestational diabetes met physical activity guidelines, 34.3% got some physical activity but did not meet the guidelines, and 13.2% were sedentary (15).

Only one study has examined trends over time in physical activity among people with diabetes. An analysis of BRFSS 1996–2005 data found that people with self-reported diagnosed diabetes engaged in less physical activity than people without diabetes, and the percentage did not change over the time period. In contrast, the prevalence of physical activity among people without diabetes increased linearly over the study period (28).

Diabetes in America analysis of the NHIS 2009–2010 indicated that 17.4% of people with self-reported diagnosed diabetes engaged in ≥75 minutes per week of vigorous physical activity compared to 33.5% of people without diabetes (Table 10.10). Although a similar percentage of people with and without

TABLE 10.9. Published Studies on Physical Activity Among People With Diabetes

STUDY, YEARS (REF.)	POPULATION AND SAMPLE SIZE	STUDY METHODOLOGY	STATISTICS
NHANES, 1988–1994 (8)	1,480 adults with self-reported diabetes	Self-report	Inactive: 31% Insufficiently active: 38% Met physical activity recommendations: 31%

NHIS, 1990 (20)	1,632 adults with diabetes; 38,933 adults without diabetes	Self-report	With diabetes:
			    Reported any exercise in the two weeks: 69.0%
			    Reported regular exercise: 34.3%
			    Reported exertion of ≥2,000 kcal/week: 19.7%
			Without diabetes:
			    Reported any exercise in the two weeks: 72.2%
			    Reported regular exercise: 40.9%
			    Reported exertion of ≥2,000 kcal/week: 21.5%

Health and Retirement Study, 1992 and 1996 (23)	733 adults age 50–62 years with type 2 diabetes	Self-report	All baseline participants, 1992
			    No exercise: 34%
			    Moderate exercise: 53.6%
			    High exercise: 12.4%
			Participants with data at both time points
			    1992: 70.5% engaging in exercise
			    1996: 38.3% engaging in exercise

BRFSS, 1996–2005 (28)	Ranged from 4,379 to 13,608 adults with diabetes per year	Self-report	Adults with diabetes did not change physical activity over time; trends increased in people without diabetes.

BRFSS, 1999 (21)	9,496 adults with diabetes; 250,493 adults without diabetes	Self-report	Met physical activity recommendations
			    With diabetes: 34.5%
			    Without diabetes: 43.9%

NHANES, 1999–2002 (9)	1,514 adults with self-reported diabetes	Self-report	Met recommended level of physical activity: 28.2%
BRFSS, 2001–2003 (15)	4,718 women age 18–44 years with gestational diabetes, not current	Self-report	Met physical activity guidelines: 48.8% Some physical activity but below guidelines: 34.3% Sedentary: 13.2%
Community-based study, 2003–2005 (18)	103 adolescents age 12–21 years with type 2 diabetes	Self-report	Did not exercise: 18% Exercised 1–3 times per week: 48% Exercised ≥4 times per week: 34% Participated in physical education class: 37%
NHANES, 2003–2006 (29)	754 adults with self-reported diabetes	Accelerometry	Light physical activity, min/day: 311.30 Moderate-vigorous physical activity, min/day: 12.27

Joint Canada/United States Survey of Health, 2004 (25)	395 adults with diabetes; 4,788 adults without diabetes	Self-report	With diabetes
			    Frequency of physical activity lasting >30 minutes: 11.4 times per month
			    Regular physical activity: 35.3%
			    Occasional physical activity: 19.3%
			    Infrequent physical activity: 45.4%
			    Mean energy expenditure: 1.2 MET-hours/day
			Without diabetes
			    Frequency of physical activity lasting >30 minutes: 16.5 times per month
			    Regular physical activity: 46.3%
			    Occasional physical activity: 22.9%
			    Infrequent physical activity: 30.9%
			    Mean energy expenditure: 1.9 MET-hours/day

BRFSS, 2005 (16)	33,320 adults with self-reported diabetes	Self-report	Met physical activity recommendations: 33%
BRFSS, 2005 (17)	16,428 adults with self-reported diabetes	Self-report	Engaged in leisure time physical activity: 40%

BRFSS, 2007 (22)	18,370 adults age ≥65 years with diabetes	Self-report	ADA 2007 guidelines
			    Met moderate physical activity: 21%
			    Met vigorous physical activity: 9%
			    Met total physical activity: 25%
			DHHS guidelines
			    Met moderate physical activity: 36%
			    Met vigorous physical activity: 14%
			    Met total physical activity: 42%

Table 10.9 continues on the next page.

TABLE 10.9. (continued)

STUDY, YEARS (REF.)	POPULATION AND SAMPLE SIZE	STUDY METHODOLOGY	STATISTICS	

SHIELD, 2007 (26)	3,411 adults with type 2 diabetes	Self-report	Non-Hispanic white men
			  High physical activity: 17.1%
			  Minimally active: 25.7%
			  Inactive: 57.2%
			Non-Hispanic black men
			  High physical activity: 13.6%
			  Minimally active: 24.3%
			  Inactive: 62.1%
			Hispanic men
			  High physical activity: 23.5%
			  Minimally active: 18.5%
			  Inactive: 58.0%
				Non-Hispanic white women
				  High physical activity: 10.2%
				  Minimally active: 19.3%
				  Inactive: 70.5%
				Non-Hispanic black women
				  High physical activity: 12.4%
				  Minimally active: 19.4%
				  Inactive: 68.2%
				Hispanic women
				  High physical activity: 19.4%
				  Minimally active: 17.3%
				  Inactive: 63.3%

TODAY (27)	699 youth age 10–18 years with diagnosed type 2 diabetes	Accelerometry	Total activity, min/day Boys 10–14 years: 373.3 Boys 15–18 years: 356.4 Light physical activity, min/day Boys 10–14 years: 338.3 Boys 15–18 years: 330.1 Moderate-vigorous physical activity, min/day Boys 10–14 years: 35.0 Boys 15–18 years: 26.3	Girls 10–14 years: 375.2 Girls 15–18 years: 353.1 Girls 10–14 years: 348.6 Girls 15–18 years: 344.9 Girls 10–14 years: 26.6 Girls 15–18 years: 8.2
Subset of Regenstrief Physical Activity and Health Survey (24)	260 adults age ≥55 years with medical diagnosis of diabetes	Self-report	Reported 0 minutes of weekly physical activity: 55% Reported 1–60 minutes/week: 22% Reported >60 minutes/week: 23%	

ADA, American Diabetes Association; BRFSS, Behavioral Risk Factor Surveillance System; DHHS, Department of Health and Human Services; MET, Metabolic Equivalent of Task, the ratio of the rate of energy expended during an activity to the rate of energy expended at rest; NHANES, National Health and Nutrition Examination Survey; NHIS, National Health Interview Survey; SHIELD, Study to Help Improve Early Evaluation and Management of Risk Factors Leading to Diabetes; TODAY, Treatment Options for Type 2 Diabetes in Adolescents and Youth study.

SOURCE: References are listed within the table.

diabetes engaged in moderate and insufficient physical activity, 44.9% of people with diabetes were not active, while 30.1% of people without diabetes were not active.

Across diabetes status groups, a greater percentage of younger adults, men, and non-Hispanic whites and Asians met current exercise recommendations compared to older adults, women, and other racial/ethnic groups, respectively; persons with more education were more likely to meet the recommendations than those with less education (Appendix 10.23). Persons with normal glucose levels engaged in more weekly physical activity minutes than those with diabetes or prediabetes (Appendix 10.24).

NHANES 2007–2010 data also demonstrated disparities in physical activity between people with and without diabetes, where 36.0% of those with self-reported diagnosed diabetes met the physical activity standards compared to 56.6% of those without diabetes (Table 10.11). When the category of

TABLE 10.10. Physical Activity Among Adults Age ≥18 Years, by Diabetes Status, U.S., 2009–2010

	PERCENT (STANDARD ERROR)	
PHYSICAL ACTIVITY LEVEL	Diabetes N=5,099	No Diabetes N=47,782
Vigorous*	17.4 (0.76)	33.5 (0.34)
Moderate†	12.0 (0.62)	12.4 (0.19)
Insufficient	25.7 (0.90)	24.0 (0.29)
None/not active	44.9 (0.92)	30.1 (0.39)

Diabetes status is based on self-report.
* ≥75 minutes per week
† ≥150 minutes per week; includes combination of moderate and vigorous activity.
SOURCE: National Health Interview Surveys 2009–2010

TABLE 10.11. Physical Activity Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2007–2010

	PERCENT (STANDARD ERROR)	
	Diabetes N=1,480	No Diabetes N=10,641
Meet physical activity standards	36.0 (1.50)	56.6 (0.95)
Less than recommended amount of physical activity	14.5 (1.21)	15.3 (0.41)
No physical activity	49.5 (1.60)	28.1 (0.99)

Physical activity standards are defined as ≥150 minutes of moderate or ≥75 minutes of vigorous leisure-time or work-related physical activity per week; physical activity is self-reported. Diabetes status is based on self-report.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

those without diabetes was expanded, a smaller percentage of people with clinical and research undiagnosed diabetes (38.0%–38.3%) met the physical activity recommendations compared to individuals with prediabetes (55.9%) and normal glucose levels (60.9%) (Appendix 10.25). Across diabetes status groups, more young adults met the physical activity recommendations than older adults, more men met the standards than women, and persons with more education met the recommendations more often than those with less education; no consistent patterns were observed by race/ethnicity (Appendix 10.26).

Although most data on physical activity are self-reported, the NHANES 2003–2006 used a physical activity monitor to obtain objective data. A published study found that people with diabetes on average engaged in 311.3 minutes of physical activity per day, but only 12.27 minutes of moderate-vigorous activity per day (29). New data analysis for *Diabetes in America* showed that individuals with diagnosed diabetes engaged in fewer daily minutes of moderate-vigorous physical activity compared to those with undiagnosed diabetes, prediabetes, and normal glucose levels (Appendix 10.27). People with diagnosed diabetes also spent more minutes per day being sedentary than the other diabetes groups. Across diabetes status groups, younger people engaged in more minutes of total and moderate-vigorous physical activity than older adults (Appendix 10.28). Men participated in more minutes of moderate-vigorous physical activity but fewer total minutes than women (latter data not shown). Persons with less education engaged in more total activity (data not shown) than the more educated but usually less moderate-vigorous physical activity (latter data in Appendix 10.28).

Data from 2001–2006 were analyzed to determine the number of Metabolic Equivalent of Task (MET) hours that the different diabetes status groups expended each week. A MET is the ratio of the metabolic rate during physical activity to the resting metabolic

FIGURE 10.9. Mean MET-Hours Per Week of Physical Activity Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2001–2006
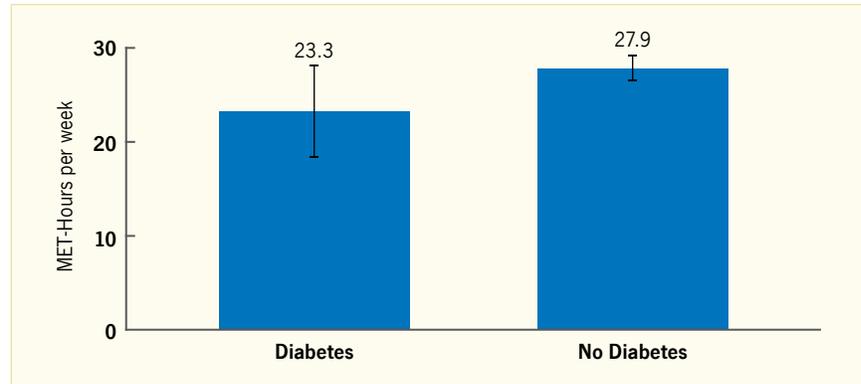
Metabolic Equivalent of Task (MET) is the ratio of the rate of energy expended during an activity to the rate of energy expended at rest; self-reported based on the type of leisure-time activity and duration. Diabetes status is based on self-report. Error bars represent 95% confidence intervals.
SOURCE: National Health and Nutrition Examination Surveys 2001–2006

TABLE 10.12. Percent Distribution of MET-Hours Per Week of Physical Activity Among Adults, by Diabetes Status, U.S., 2001–2006

MET-HOURS PER WEEK	PERCENT (STANDARD ERROR)			
	Diagnosed Diabetes* N=680	Undiagnosed Diabetes (Clinical Definition)† N=188	Prediabetes† N=1,130	Normal Glucose† N=2,101
>0–<10	43.4 (2.43)	42.9 (5.48)	40.0 (1.62)	36.4 (1.42)
10–<50	46.3 (2.23)	48.4 (5.64)	47.8 (1.54)	48.0 (1.43)
≥50	10.3 (1.57)	8.7 (3.59)[1]	12.2 (1.14)	15.6 (1.01)

Metabolic Equivalent of Task (MET) is the ratio of the rate of energy expended during an activity to the rate of energy expended at rest; self-reported based on type of leisure-time activity, intensity, and duration. Conversions for glucose and A1c values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
*   Diagnosed diabetes is based on self-report.
†   Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL. 2-hour plasma glucose from an oral glucose tolerance test was not available in all years of physical activity measurement.
[1] Relative standard error >40%–50%
SOURCE: National Health and Nutrition Examination Surveys 2001–2006

rate. Regardless of the way the group with no diabetes was divided, people with diagnosed diabetes, undiagnosed diabetes, and prediabetes engaged in fewer weekly MET-hours of physical activity than individuals with normal glucose levels (Figure 10.9, Appendix 10.29). Across diabetes status groups, men participated in more weekly MET-hours of physical activity than women. Younger people with prediabetes and normal glucose levels engaged in more weekly MET-hours than older adults, but that pattern did not hold for individuals with diagnosed and undiagnosed diabetes. No consistent relationships were observed by race/ethnicity or education (Appendix 10.30). A larger percentage of people with

normal glucose levels engaged in ≥50 weekly MET-hours of physical activity compared to the other diabetes groups (Table 10.12).

Taken together, these nationally representative studies, cohorts, and new analyses demonstrate a suboptimal level of physical activity among people with diabetes. Additionally, people with diabetes engage in less physical activity than their peers without diabetes, and their levels of physical activity have not changed significantly over the past 20 years.

SMOKING

Research on smoking prevalence in people with diabetes is extensive and spans several decades (Table 10.13). Data sources include original and published analyses of the BRFSS, NHANES, and NHIS, as well as SEARCH, Look AHEAD, and Translating Research Into Action for Diabetes (TRIAD), a multisite study of quality of care and self-care in people with diabetes. Data on trends over time in smoking among people with diabetes are also available.

A national study conducted in 1988 found that 26.0% of people with self-reported diagnosed diabetes were current smokers, 25.9% were former smokers, and 48.1% were never smokers (Table 10.13) (30). The highest prevalence of smoking was found among people with diabetes who did not graduate from high school and individuals between the ages of 18 and 34 years (30). Data from another national survey

in 1989 found similar results, with 20.2% of people with diabetes being current smokers. In this population, the highest prevalence of smoking was found among those between the ages of 18 and 44 years, men, non-Hispanic blacks, and the least educated (31). Similar percentages were found in other national data in 1988–1994, when a study found that 27% of people with diabetes and 36% of people with gestational diabetes were current smokers compared to 31% in people without diabetes (13). An analysis of NHANES 1999–2002 data found that 18.8% of the self-reported diagnosed diabetes population were current smokers (9), while analysis of the BRFSS 1999 found that 15.2% of people with self-reported diagnosed diabetes and 22.9% of those without diabetes were current smokers (21). Data from the BRFSS 2001–2003 showed similar rates of smoking in people with and without self-reported gestational diabetes (15).

In 2001, 17% of people with self-reported diabetes reported current smoking (11), while in 2005, 21.6% of people with self-reported diabetes were current smokers (17).

Diabetes in America analysis using NHIS 2009–2010 and NHANES 2007–2010 data indicated that the percentage of current smokers is lower among people with diagnosed diabetes or undiagnosed diabetes compared to those with prediabetes or normal glucose levels (Figure 10.10, Table 10.14, Appendices 10.31–10.34). However, in both data sets, former smoking was observed more frequently in people with diabetes compared to those without diabetes, while the prevalence of never having smoked was lower in those with diabetes than those without diabetes. Prevalence of smoking was higher in younger age groups and men and lower in college graduates in people with and without diabetes.

TABLE 10.13. Published Studies on Smoking Among People With Diabetes

STUDY, YEARS (REF.)	POPULATION AND SAMPLE SIZE	STUDY METHODOLOGY	STATISTICS
BRFSS, 1988 (30)	3,006 adults with diabetes	Self-report	Current smokers: 26.0% Former smokers: 25.9% Never smokers: 48.1%
NHANES, 1988–1994 (13)	218 adults with diabetes; 85 with gestational diabetes; 4,325 with no diabetes	Self-report	Current smokers Diabetes: 27% Gestational diabetes: 36% No diabetes: 31%
NHIS, 1989 (31)	2,405 adults with diabetes	Self-report	Current smokers With diabetes: 20.2% Without diabetes: 26.1%
BRFSS, 1999 (21)	9,496 adults with diabetes; 250,493 without diabetes	Self-report	Current smokers With diabetes: 15.2% Without diabetes: 22.9%
NHANES, 1999–2002 (9)	1,514 adults with self-reported diabetes	Self-report	18.8% smokers
BRFSS, 2001 (11)	10,980 adults with diabetes	Self-report	Current smokers: 17%
Look AHEAD, 2001 (12)	5,145 adults age 45–74 years with type 2 diabetes	Self-report	Current smokers: 4.4% Former smokers: 45.4% Never smoker 50.2%
SEARCH, 2001 (32)	3,466 youth age <20 years with physician-diagnosed diabetes Type 1 diabetes: 2,887 Type 2 diabetes: 579	Self-report	Reported current use of tobacco products Type 1 diabetes: 9.9% Type 2 diabetes: 15.7%
BRFSS, 2001–2003 (15)	4,718 women age 18–44 years with gestational diabetes	Self-report	Current smokers Gestational diabetes: 23.3% No diabetes: 24.0%
TRIAD, 2002–2003 (33)	6,538 adults age ≥25 years with physician-diagnosed diabetes	Self-report	Current smokers: 15%
BRFSS, 2005 (17)	16,428 adults with diabetes	Self-report	21.6% smokers

BRFSS, Behavioral Risk Factor Surveillance System; NHANES, National Health and Nutrition Examination Survey; NHIS, National Health Interview Survey; SEARCH, the Search for Diabetes in Youth Study; TRIAD, Translating Research Into Action for Diabetes.

SOURCE: References are listed within the table.

The prevalence of smoking has been examined in multicenter trials and community-based studies (Table 10.13). SEARCH found differences in smoking status between adolescents with type 1 and type 2 diabetes, with 9.9% of those with type 1 diabetes using tobacco products and 8.1% smoking cigarettes compared to 15.7% of those with type 2 diabetes using tobacco products and 13.1% smoking cigarettes (32). Look AHEAD found that 4.4% of people with confirmed diabetes were current smokers, 45.4% were former smokers, and 50.2% had never smoked (12). TRIAD found that 15% of their sample reported that they were current smokers, and smoking was more common in younger adults, non-Hispanic African Americans, and those with less education (33).

Several studies examined trends in smoking among people with diabetes using nationally representative data (Table 10.15). One analysis examined

FIGURE 10.10. Percent Smoking Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2007–2010
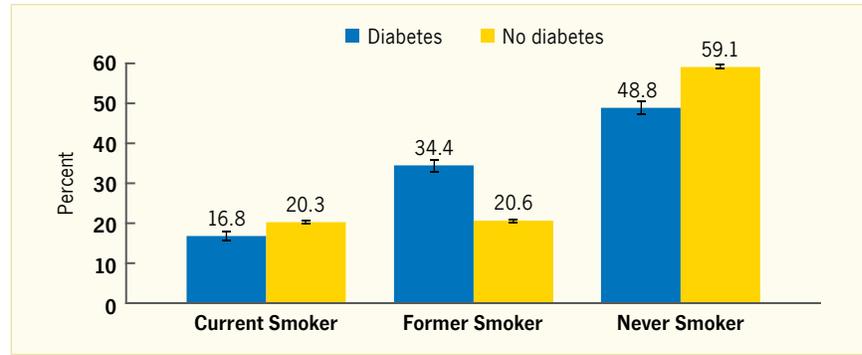
Diabetes status is based on self-report. Error bars represent 95% confidence intervals.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

TABLE 10.14. Smoking Among Adults Age ≥18 Years, by Diabetes Status, U.S., 2009–2010

	PERCENT (STANDARD ERROR)	
SMOKING	Diabetes N=5,428	No Diabetes N=49,115
Current smoker	16.8 (0.69)	20.3 (0.28)
Former smoker	34.4 (0.86)	20.6 (0.25)
Never smoker	48.8 (0.92)	59.1 (0.32)

Diabetes status is based on self-report.
SOURCE: National Health Interview Surveys 2009–2010

TABLE 10.15. Published Studies on Smoking Trends Among People With Diabetes

STUDY, YEAR (REF.)	POPULATION AND SAMPLE SIZE	STUDY METHODOLOGY	STATISTICS
NHANES, 1971–1974, 1976–1980, 1988–1994, 1999–2000 (34)	Adults age 20–74 years with diabetes 1971–1974: 570 1976–1980: 557 1988–1994: 999 1999–2000: 357	Self-report	Age-adjusted prevalence of smoking dropped 15% over the time period; median annual change of -0.5 percentage points per year.
NHIS, 1974, 1985, 1990 (35)	Adults with diabetes 1974: 487 1985: 569 1990: 763	Self-report	Current smokers With diabetes: 1974: 35.6% 1985: 31.0% 1990: 25.8% Without diabetes: 1974: 37.3% 1985: 30.2% 1990: 25.6%
NHANES, 1988–1994, 1999–2008 (36)	1988–1994: 1,065 adults with diabetes 1999–2008: 1,872 adults with diabetes	Self-report	Current smokers 1988–1994: 17.5% 1999–2008: 18.1%
BRFSS, 1990–2001 (37)	4,183–14,447 adults per year with diabetes	Self-report	Current smokers 1990: 23.6% 1991: 23.0% 1992: 24.7% 1993: 22.8% 1994: 21.8% 1995: 24.1% 1996: 24.6% 1997: 21.8% 1998: 23.4% 1999: 22.4% 2000: 24.1% 2001: 23.2%

Table 10.15 continues on the next page.

TABLE 10.15. (continued)

STUDY, YEAR (REF.)	POPULATION AND SAMPLE SIZE	STUDY METHODOLOGY	STATISTICS
BRFSS, 1991–1999 odd years (38)	Adults with diabetes	Self-report	Current smokers 1991: 23% 1993: 20.1% 1995: 24.7% 1997: 21.6% 1999: 19.9%
NHANES, 1999–2008 (39)	Adults with diabetes: 3,111 Adults with impaired fasting glucose*: 3,557 Adults without diabetes: 17,981	Self-report	Current smokers Diabetes: 25.7% Impaired fasting glucose: 24.2% No diabetes: 24.1%

Conversions for glucose values are provided in *Diabetes in America Appendix 1 Conversions*. BRFSS, Behavioral Risk Factor Surveillance System; NHANES, National Health and Nutrition Examination Survey; NHIS, National Health Interview Survey.

* Impaired fasting glucose is defined as individuals who had been told by a health professional that they were "borderline" for diabetes but did not take insulin or diabetes pills, or who had a fasting blood glucose ≥100 mg/dL and <126 mg/dL.

SOURCE: References are listed within the table.

trends in smoking from 1971 to 2000 and found that age-adjusted prevalence of smoking dropped 15% over the time period, with a median decrease of 0.5 percentage points per year (34). Another analysis of NHIS data tracked the prevalence of current smoking in people with self-reported diagnosed diabetes in 1974, 1985, and 1990. The prevalence of smoking decreased from 35.6% to 25.8% over this time period, although different diagnostic criteria were used in the medical community to define diabetes at these time points. A similar decrease in prevalence of smoking was also found in people without diabetes (35). A third study found no change in smoking from 1988–1994 to 1999–2008, when the prevalences were 17.5% and 18.1%, respectively (36). Another analysis of trends based on nationally representative data from 1990 to 2001 found no significant decreases over time in either the diabetic or nondiabetic populations, with the prevalence of smoking ranging from 21.8% to 24.7% among those with diabetes (37). Another study examined the prevalence of smoking in odd years from 1991 to 1999 and found a 13% decrease during this time frame, with yearly percentages ranging from 24.7% to 19.9% over the period (38). The most recent analysis of smoking trends from the NHANES 1999–2008 showed no significant differences in smoking prevalence between those with diabetes, impaired fasting glucose, and normal glucose levels, and found no significant trends over time (39).

HEALTH-SEEKING BEHAVIORS

Data on health-seeking behaviors include information on changing dietary intake, pursuing smoking cessation, changing physical activity behavior, practicing weight control, and visiting physicians regularly. Data sources include new analyses for *Diabetes in America* and published analyses of NHANES, NHIS, and BRFSS data, as well as SHIELD and the Health and Retirement Study.

CHANGING DIETARY INTAKE
Research from the NHANES 2005–2006 indicated that 54.7% of people with prediabetes based on a fasting plasma glucose or an oral glucose tolerance test tried to reduce fat or calories intake in the last year, and 31.9% were advised to do so by their physician (40). In addition, a community-based study of adolescents in 2003–2005 reported that 58% of the population decreased their carbohydrate intake, 19% decreased fats, 30% decreased calories, and 18% added healthier foods (18).

Analyses for *Diabetes in America* using data from the NHANES 2007–2010 indicated that when instructed by a doctor, 88.2% of people with diagnosed diabetes and 81.5% of those without diagnosed diabetes reported eating fewer high fat foods (Figure 10.11). The percentage of people with undiagnosed diabetes, prediabetes, and normal glucose levels who were eating fewer high fat foods ranged from 79.6% to 84.2% (Appendix 10.35). No consistent demographic patterns across any of the groups by diabetes status were observed (Appendix 10.36).

PURSUING SMOKING CESSATION
Diabetes in America analysis using NHIS 2009–2010 data indicated that 51.5% of individuals with self-reported diagnosed diabetes, 50.2% of individuals with prediabetes, and 46.2% of individuals with normal glucose levels who smoke were attempting to quit smoking (Figure 10.12). Among people with and without diabetes, a greater percentage of younger adults reported pursuing smoking cessation compared to older adults, and a greater percentage of non-Hispanic blacks and Hispanics tried to quit smoking than non-Hispanic whites and Asians (Appendix 10.37).

Published studies have examined trends over time in attempting to quit smoking. One nationally representative study that examined data from 1990–2001 found that the prevalence increased from 55.5% to 60.1% in people with diabetes and from 44.3% to 54.4% in those without diabetes (37). Another study found that the percentage of individuals receiving physician advice to quit smoking was higher in people with diabetes, where it

increased from 35.1% in 1974 to 60.8% in 1985, compared to those without diabetes (35).

CHANGING PHYSICAL ACTIVITY BEHAVIOR

Several studies have examined levels of increased physical activity in people with diabetes. In the SHIELD study, 47% of people with diagnosed diabetes were advised by a health care professional to increase their exercise. Of those who received this recommendation, 33%–46% intended to follow it all or most of the time (26). In a population of people with diagnosed prediabetes, 48.5% had increased their physical activity in the past 12 months, and 34.2% had been advised to do so by a physician (40). In both populations, minorities were more likely to follow the recommendation than non-Hispanic whites.

A new analysis for *Diabetes in America* using NHANES 2007–2010 data showed that a higher percentage of people with normal glucose levels reported increasing their physical activity compared to those with diagnosed diabetes, undiagnosed diabetes, or prediabetes (Figure 10.11, Appendices 10.35 and 10.38). No consistent patterns were found by age, sex, race/ethnicity, or education level.

Other studies examined sedentary behaviors. One community-based study examined sedentary behaviors in adolescents with type 2 diabetes and found that 32% of their population watched less than 1 hour of television per day, 39% watched 2–3 hours, and 29% watched more than 4 hours (18). In the TODAY study, adolescents with type 2 diabetes engaged in 479.0–546.5 minutes of sedentary time per day (27).

PRACTICING WEIGHT CONTROL

In the 1992 wave of the Health and Retirement Study, 78%–80% of the population with diagnosed diabetes were on a special diet, and 58%–59% were trying to lose weight. However, in the 1996 wave, only 61.7% were on a special diet, and 53.6% were trying to lose weight (23). In 2005–2006, a nationally representative study on people with prediabetes found that 52.2% of this population had tried

FIGURE 10.11. Prevalence of Health Behaviors Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2007–2010
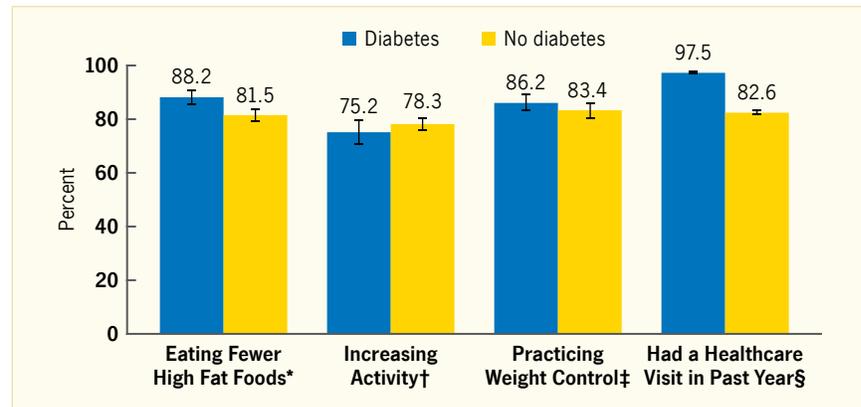
Diabetes status is based on self-report. Error bars represent 95% confidence intervals.
* Question asked among persons told by a doctor to eat less fat and cholesterol in order to lower cholesterol level.
† Question asked among persons told by a doctor to exercise to reduce cholesterol level.
‡ Question asked among persons told by a doctor to control weight in order to improve cholesterol level.
§ At least one health care visit in past year to see a doctor or health care professional at a doctor's office, clinic, hospital, emergency room, at home, or some other place.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

FIGURE 10.12. Prevalence of Pursuing Smoking Cessation Among Adults Age ≥18 Years, by Diabetes Status, U.S., 2009–2010
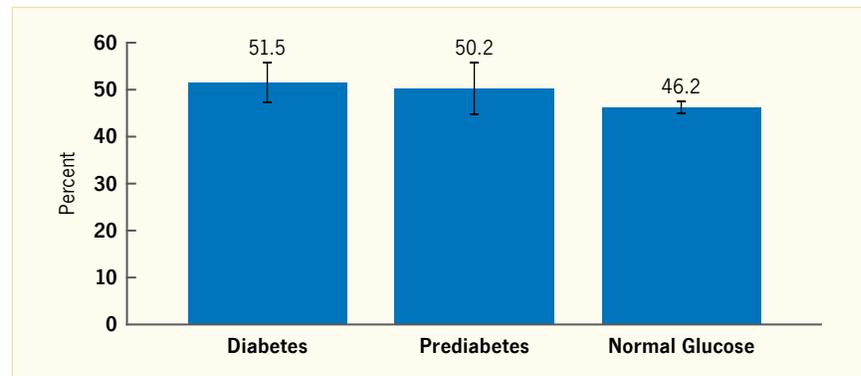
Diabetes status is based on self-report. Error bars represent 95% confidence intervals.
SOURCE: National Health Interview Surveys 2009–2010

to control or lose weight in the past year, while 29.7% received physician advice to lose weight (40). An analysis of SHIELD 2007 data showed that 40%–57% of the population with diagnosed diabetes had a health professional instruct them to change what they eat. Among those who received this advice, 48%–72% indicated that they would follow it most or all of the time. Additionally, higher percentages of Caucasian and Hispanic diabetic women reported trying to lose weight compared to other sex and race/ethnicity groups (26).

Diabetes in America analysis of NHANES 2007–2010 data demonstrated that similar percentages of people with self-reported diagnosed diabetes and no

diagnosed diabetes reported practicing weight control (Figure 10.11). The vast majority of people with diagnosed diabetes (86.2%), clinical undiagnosed diabetes (83.2%), research undiagnosed diabetes (84.0%), prediabetes (84.0%), and normal glucose levels (82.7%) reported practicing weight control in the past year (Appendix 10.35). Among those with undiagnosed diabetes, prediabetes, or normal glucose levels, a greater percentage of non-Hispanic blacks and Other/Multiracial individuals reported practicing weight control than non-Hispanic whites and Hispanics, but no consistent patterns by any other type of demographic characteristic were found (Appendix 10.39).

REGULAR PHYSICIAN VISITS

An analysis of BRFSS 1999 data found that 88.3% of people with self-reported diabetes had regularly visited their physician in the past year compared to only 68.5% of people without diabetes (21). NHIS 2009–2010 data supported these findings, as 87.1% of people with self-reported diabetes, 82.3% of people with self-reported prediabetes, and 64.6% of people without diabetes/prediabetes regularly visited their physician (Figure 10.13). A greater percentage of older adults were more likely to visit their physician regularly than younger adults, and the percentage of Hispanics doing so was smaller than the other racial/ethnic groups (Appendix 10.40). There were greater differences by demographics in the population without diabetes than with diabetes.

FIGURE 10.13. Prevalence of Visiting a Physician Regularly Among Adults Age ≥18 Years, by Diabetes Status, U.S., 2009–2010
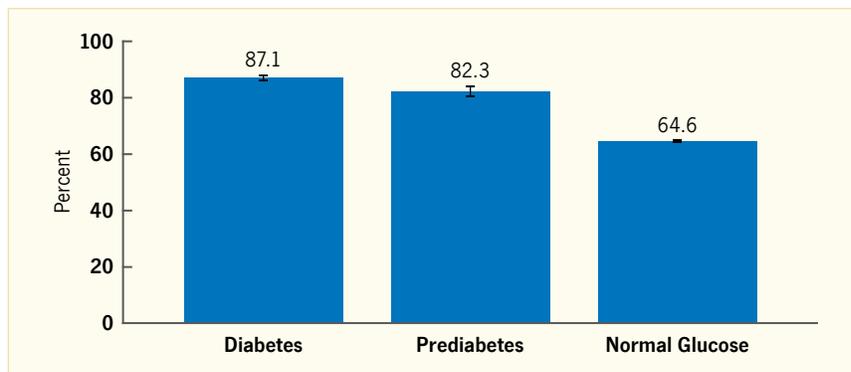
Diabetes status is based on self-report. Error bars represent 95% confidence intervals.

SOURCE: National Health Interview Surveys 2009–2010

Diabetes in America analysis using NHANES 2007–2010 data showed that a greater percentage of people with diabetes had a yearly health care visit compared to people with undiagnosed diabetes, prediabetes, and normal glucose levels (Appendix 10.35). There was little variance by demographics for people with diabetes, but greater differences were found for people in the other diabetes status groups (Appendix 10.41).

IMPLICATIONS FOR HEALTH PROFESSIONALS

These new analyses of national data sets plus the review of published literature on lifestyle characteristics of people with diabetes should capture the attention of academics, students, health care providers, and policymakers. It is imperative to have reliable health information at the national level to accurately monitor lifestyle characteristics among the diabetes population and to encourage the development of strategies to improve these risk factors. Health professionals and policy makers can then translate these strategies into clinical and public health settings, respectively.

LIST OF ABBREVIATIONS

A1c . . . . glycosylated hemoglobin
ADA . . . . American Diabetes Association
BRFSS . . . . Behavioral Risk Factor Surveillance System
DCCT . . . . Diabetes Control and Complications Trial
Look AHEAD . . Action for Health in Diabetes
MET . . . . metabolic equivalent of task
NHANES . . . . . National Health and Nutrition Examination Survey
NHIS . . . . National Health Interview Survey
SEARCH . . . . . SEARCH for Diabetes in Youth Study
SHIELD . . . . . . Study to Help Improve Early Evaluation and Management of Risk Factors Leading to Diabetes
SHS . . . . Strong Heart Study
TODAY . . . . Treatment Options for Type 2 Diabetes in Adolescents and Youth Study
TRIAD . . . . Translating Research Into Action for Diabetes study

CONVERSIONS

Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.*

DUALITY OF INTEREST

Ms. Ogilvie and Drs. Zabetian, Mokdad, and Narayan reported no conflicts of interest.

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APPENDICES

APPENDIX 10.1. Mean Energy Intake, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	MEAN (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	1,837 (34.1)	2,088 (59.1)	2,002 (46.2)	2,176 (31.8)	2,214 (31.1)
Age (years)					
20–44	2,199 (97.8)	2,396 (147.8)	2,264 (113.9)	2,424 (68.2)	2,294 (37.4)
45–64	1,935 (63.5)	2,307 (113.0)	2,209 (109.6)	2,181 (41.2)	2,126 (64.2)
≥65	1,625 (28.0)	1,725 (59.5)	1,702 (50.9)	1,751 (42.9)	1,785 (76.0)
Sex					
Men	2,117 (53.7)	2,387 (72.9)	2,331 (92.8)	2,524 (44.1)	2,682 (51.4)
Women	1,568 (27.4)	1,614 (63.1)	1,662 (52.5)	1,780 (27.3)	1,851 (27.1)
Race/ethnicity					
Non-Hispanic white	1,908 (45.3)	2,147 (81.3)	2,034 (60.8)	2,184 (45.0)	2,264 (34.5)
Non-Hispanic black	1,766 (77.6)	1,821 (115.2)	1,849 (102.3)	2,150 (72.8)	2,127 (44.4)
Hispanic	1,737 (50.9)	2,221 (121.3)	2,038 (82.6)	2,182 (51.7)	2,176 (63.1)
Mexican American	1,793 (70.6)	2,281 (171.3)	2,109 (110.9)	2,321 (60.6)	2,244 (90.2)
Other Hispanic	1,632 (63.5)	2,121 (217.4)	1,922 (137.0)	1,911 (72.4)	2,072 (64.2)
Education					
<9th grade	1,565 (77.0)	1,907 (171.0)	1,770 (101.1)	1,947 (75.3)	1,981 (85.2)
Some high school	1,772 (82.0)	1,825 (103.5)	1,751 (87.9)	2,270 (108.7)	2,355 (84.7)
High school graduate	1,796 (60.4)	2,082 (91.5)	2,018 (66.0)	2,204 (52.5)	2,161 (56.1)
Some college	1,957 (55.3)	2,204 (101.0)	2,129 (117.0)	2,167 (56.8)	2,224 (47.6)
College graduate	2,008 (68.2)	2,269 (174.1)	2,164 (133.7)	2,174 (52.4)	2,222 (51.4)

Energy intake (kcal) is based on 24-hour dietary recall. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.2. Percent of Calories From Total Fat, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	PERCENT (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	35.0 (0.40)	34.4 (0.53)	34.5 (0.46)	33.9 (0.21)	33.2 (0.31)
Age (years)					
20–44	35.3 (0.83)	32.8 (1.47)	32.9 (2.10)	32.8 (0.38)	32.8 (0.30)
45–64	35.3 (0.58)	34.4 (0.99)	34.9 (0.64)	35.0 (0.27)	34.3 (0.63)
≥65	34.5 (0.50)	35.0 (0.75)	34.8 (0.68)	33.4 (0.51)	32.8 (0.64)
Sex					
Men	35.5 (0.48)	35.0 (0.71)	35.0 (0.81)	33.7 (0.28)	33.1 (0.48)
Women	34.4 (0.55)	33.5 (0.81)	34.0 (0.57)	34.0 (0.33)	33.2 (0.32)
Race/ethnicity					
Non-Hispanic white	36.2 (0.44)	35.7 (0.69)	35.9 (0.60)	34.8 (0.24)	33.7 (0.38)
Non-Hispanic black	34.4 (0.57)	33.0 (1.07)	33.0 (1.12)	33.4 (0.53)	33.0 (0.49)
Hispanic	32.8 (0.39)	31.4 (1.17)	29.9 (0.87)	31.1 (0.48)	31.1 (0.53)
Mexican American	33.8 (0.63)	31.1 (1.22)	29.5 (0.99)	31.9 (0.63)	31.6 (0.70)
Other Hispanic	30.8 (0.73)	31.9 (2.15)	30.4 (1.72)	29.4 (0.91)	30.3 (0.83)
Education					
<9th grade	33.7 (0.81)	32.1 (1.26)	30.8 (1.24)	29.2 (0.68)	30.6 (1.81)
Some high school	34.8 (0.89)	33.2 (1.34)	33.5 (1.01)	34.2 (0.74)	31.7 (0.68)
High school graduate	35.2 (0.55)	34.7 (0.67)	34.7 (0.66)	34.2 (0.66)	32.9 (0.36)
Some college	35.6 (0.65)	34.5 (1.06)	34.5 (0.75)	33.8 (0.44)	33.9 (0.55)
College graduate	34.8 (0.87)	36.4 (1.51)	37.6 (1.51)	34.7 (0.58)	33.4 (0.55)

Total fat intake is based on 24-hour dietary recall. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.3. Mean Total Fat Intake, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	MEAN (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	73.6 (1.73)	77.4 (2.19)	80.5 (3.11)	83.4 (1.56)	82.8 (1.63)
Age (years)					
20–44	89.0 (5.07)	88.4 (7.52)	84.4 (8.07)	89.8 (3.23)	84.2 (1.74)
45–64	78.3 (3.27)	89.4 (5.49)	86.2 (4.52)	86.5 (1.92)	83.5 (3.26)
≥65	63.9 (1.72)	67.5 (3.50)	66.3 (2.95)	66.1 (2.10)	66.9 (3.29)
Sex					
Men	86.0 (2.58)	93.2 (4.46)	91.2 (4.38)	96.7 (2.25)	100.1 (2.87)
Women	61.6 (1.68)	60.2 (2.46)	63.1 (2.57)	68.4 (1.38)	69.5 (1.38)
Race/ethnicity					
Non-Hispanic white	78.5 (2.16)	85.9 (4.34)	81.8 (2.92)	85.9 (2.22)	85.6 (1.82)
Non-Hispanic black	70.1 (3.64)	67.7 (4.47)	68.3 (3.78)	81.3 (3.22)	79.7 (2.20)
Hispanic	65.4 (2.64)	77.5 (5.71)	67.6 (3.60)	76.5 (2.11)	77.1 (3.23)
Mexican American	69.6 (3.81)	80.5 (8.09)	70.2 (4.86)	82.9 (2.54)	80.7 (4.54)
Other Hispanic	57.7 (2.91)	72.4 (8.67)	63.3 (6.04)	63.8 (3.57)	71.5 (3.48)
Education					
<9th grade	60.0 (3.95)	68.3 (7.79)	60.0 (4.76)	64.8 (3.50)	70.4 (6.85)
Some high school	70.9 (4.09)	66.5 (3.91)	64.8 (3.81)	88.5 (5.96)	83.7 (3.79)
High school graduate	71.7 (2.77)	80.7 (4.63)	77.7 (2.47)	84.8 (3.04)	79.1 (2.40)
Some college	80.0 (3.10)	85.6 (4.76)	82.7 (4.68)	82.7 (2.69)	84.5 (2.39)
College graduate	80.4 (3.40)	92.7 (9.70)	91.7 (7.06)	85.3 (2.90)	84.7 (2.67)

Total fat intake (grams) is based on 24-hour dietary recall. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions*. A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.

SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.4. Percent of Calories From Carbohydrates, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	PERCENT (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	47.5 (0.43)	49.2 (0.77)	47.8 (0.74)	49.3 (0.36)	49.0 (0.50)
Age (years)					
20–44	44.8 (1.12)	50.0 (1.76)	46.9 (2.31)	50.8 (0.53)	49.1 (0.54)
45–64	46.8 (0.72)	49.3 (1.15)	47.9 (1.17)	47.3 (0.46)	48.5 (0.86)
≥65	49.1 (0.62)	48.9 (1.00)	48.2 (0.81)	50.9 (0.68)	50.7 (0.88)
Sex					
Men	45.6 (0.56)	47.9 (0.77)	46.5 (0.94)	48.5 (0.49)	47.4 (0.70)
Women	49.3 (0.58)	51.3 (1.14)	49.2 (0.94)	50.2 (0.46)	50.3 (0.52)
Race/ethnicity					
Non-Hispanic white	46.6 (0.51)	48.5 (0.95)	46.5 (0.99)	48.4 (0.43)	48.5 (0.58)
Non-Hispanic black	48.0 (0.72)	48.5 (0.83)	48.3 (0.84)	49.7 (0.75)	48.9 (0.65)
Hispanic	48.7 (0.60)	51.7 (1.38)	52.7 (1.05)	51.7 (0.58)	51.9 (0.63)
Mexican American	47.5 (1.08)	52.6 (1.15)	53.8 (0.93)	50.9 (0.73)	51.2 (0.80)
Other Hispanic	51.0 (1.44)	50.2 (2.82)	51.1 (2.08)	53.1 (1.11)	53.0 (0.84)
Education					
<9th grade	48.2 (0.84)	51.0 (1.59)	52.3 (1.34)	54.4 (0.81)	53.2 (1.92)
Some high school	47.0 (1.00)	50.1 (1.44)	48.8 (1.48)	48.7 (0.84)	50.0 (1.05)
High school graduate	47.7 (0.69)	49.3 (1.10)	47.9 (1.32)	50.0 (0.91)	49.5 (0.66)
Some college	47.6 (0.81)	49.7 (1.49)	48.2 (1.32)	49.2 (0.75)	48.7 (0.72)
College graduate	47.0 (1.05)	46.4 (1.54)	43.5 (1.44)	47.6 (0.68)	48.4 (0.84)

Carbohydrate intake is based on 24-hour dietary recall. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions*. A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.

SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.5. Mean Carbohydrate Intake, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	MEAN (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	212.1 (3.74)	238.5 (5.58)	256.3 (7.22)	264.2 (4.05)	266.3 (3.66)
Age (years)					
20–44	239.4 (12.67)	299.8 (17.76)	264.9 (16.85)	303.1 (7.84)	277.4 (5.42)
45–64	219.9 (6.03)	283.7 (13.42)	264.3 (13.38)	254.5 (5.90)	250.7 (6.97)
≥65	195.7 (3.18)	209.3 (7.73)	203.5 (6.30)	219.6 (5.19)	219.9 (9.18)
Sex					
Men	234.0 (5.66)	286.1 (9.05)	270.2 (11.43)	301.9 (5.58)	313.5 (6.92)
Women	191.0 (4.29)	209.1 (11.58)	205.7 (8.49)	221.4 (3.55)	229.6 (3.71)
Race/ethnicity					
Non-Hispanic white	216.4 (5.22)	260.7 (9.93)	236.2 (7.47)	260.7 (5.28)	269.2 (4.26)
Non-Hispanic black	206.2 (8.45)	214.9 (13.09)	219.5 (12.63)	263.5 (8.48)	255.9 (5.14)
Hispanic	204.5 (4.97)	286.6 (17.43)	266.9 (11.43)	277.3 (7.19)	276.7 (7.72)
Mexican American	205.2 (7.66)	295.0 (22.39)	278.3 (14.88)	292.2 (9.43)	282.9 (11.02)
Other Hispanic	203.1 (8.44)	272.5 (33.44)	248.3 (19.63)	248.2 (8.74)	267.2 (7.76)
Education					
<9th grade	184.9 (8.50)	242.9 (21.0)	229.9 (12.69)	255.7 (8.13)	254.2 (8.18)
Some high school	201.1 (8.82)	226.4 (12.91)	211.9 (13.94)	271.7 (11.78)	288.6 (8.67)
High school graduate	209.1 (7.39)	256.6 (12.52)	243.4 (11.44)	271.4 (6.54)	264.0 (7.04)
Some college	226.6 (6.29)	273.1 (14.06)	255.2 (15.93)	263.3 (7.55)	266.4 (6.06)
College graduate	227.7 (8.15)	265.0 (19.50)	235.6 (16.69)	257.0 (6.96)	262.5 (6.59)

Carbohydrate intake (grams) is based on 24-hour dietary recall. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions*. A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.6. Percent of Calories From Protein, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	PERCENT (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	17.2 (0.23)	15.9 (0.34)	16.2 (0.35)	15.6 (0.16)	15.7 (0.15)
Age (years)					
20–44	17.5 (0.76)	16.7 (1.00)	17.1 (0.93)	15.0 (0.17)	15.6 (0.18)
45–64	17.3 (0.33)	15.7 (0.38)	16.1 (0.46)	15.9 (0.24)	15.7 (0.34)
≥65	17.0 (0.24)	15.8 (0.45)	16.0 (0.29)	15.7 (0.26)	16.3 (0.45)
Sex					
Men	17.4 (0.23)	15.8 (0.32)	15.9 (0.36)	15.7 (0.25)	16.2 (0.25)
Women	16.9 (0.36)	16.0 (0.51)	16.5 (0.46)	15.4 (0.21)	15.2 (0.19)
Race/ethnicity					
Non-Hispanic white	17.0 (0.29)	15.5 (0.43)	16.1 (0.45)	15.5 (0.19)	15.6 (0.21)
Non-Hispanic black	17.0 (0.33)	16.8 (0.97)	16.6 (0.92)	15.2 (0.33)	15.1 (0.35)
Hispanic	17.5 (0.39)	16.2 (0.38)	16.3 (0.42)	15.9 (0.28)	15.5 (0.19)
Mexican American	17.2 (0.31)	16.0 (0.59)	15.8 (0.44)	16.2 (0.39)	15.4 (0.28)
Other Hispanic	17.9 (1.01)	16.7 (0.68)	16.9 (0.84)	15.4 (0.31)	15.7 (0.25)
Education					
<9th grade	17.6 (0.45)	16.5 (0.70)	16.1 (0.46)	15.5 (0.34)	15.2 (0.37)
Some high school	17.5 (0.47)	16.5 (0.80)	16.2 (0.69)	15.6 (0.38)	15.1 (0.40)
High school graduate	16.7 (0.47)	15.7 (0.61)	16.7 (0.56)	14.9 (0.22)	15.2 (0.27)
Some college	17.0 (0.35)	15.1 (0.57)	15.3 (0.59)	15.5 (0.27)	15.4 (0.28)
College graduate	17.5 (0.42)	16.4 (0.46)	17.1 (0.54)	16.2 (0.32)	16.4 (0.26)

Protein intake is based on 24-hour dietary recall. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions*. A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.7. Mean Protein Intake, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	MEAN (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	76.9 (1.50)	78.5 (2.26)	80.3 (2.52)	83.3 (1.41)	85.3 (1.60)
Age (years)					
20–44	93.2 (3.68)	95.4 (6.64)	92.2 (6.36)	90.1 (2.92)	88.0 (1.74)
45–64	80.9 (2.74)	87.5 (4.55)	84.9 (3.92)	85.2 (2.02)	82.3 (3.02)
≥65	67.8 (1.42)	66.5 (2.57)	66.8 (2.08)	68.0 (2.19)	71.2 (3.05)
Sex					
Men	90.3 (2.17)	92.2 (3.63)	90.6 (3.24)	97.6 (2.12)	106.4 (2.72)
Women	64.0 (1.52)	61.3 (1.40)	65.9 (2.31)	67.1 (1.33)	68.9 (1.32)
Race/ethnicity					
Non-Hispanic white	79.3 (2.01)	81.0 (3.76)	79.3 (3.08)	83.6 (2.07)	87.1 (1.93)
Non-Hispanic black	73.5 (3.51)	72.4 (3.89)	73.4 (3.65)	79.9 (2.39)	78.1 (2.19)
Hispanic	74.3 (2.02)	88.7 (4.51)	81.0 (3.16)	86.0 (1.71)	83.1 (2.32)
Mexican American	75.9 (2.96)	89.7 (6.73)	82.0 (4.27)	92.8 (1.94)	84.2 (3.73)
Other Hispanic	71.3 (4.16)	87.1 (10.29)	79.3 (6.96)	72.7 (2.98)	81.3 (2.61)
Education					
<9th grade	67.5 (3.72)	78.7 (8.18)	70.5 (4.82)	76.9 (3.14)	74.6 (3.54)
Some high school	76.5 (3.92)	72.2 (5.00)	68.1 (2.71)	89.0 (5.57)	87.8 (4.45)
High school graduate	72.7 (2.89)	79.1 (4.12)	81.1 (3.20)	80.9 (2.58)	80.2 (2.34)
Some college	79.9 (2.39)	81.0 (3.78)	78.6 (3.85)	82.1 (2.02)	84.3 (2.55)
College graduate	87.2 (4.00)	89.1 (6.02)	88.4 (4.43)	85.7 (1.91)	89.7 (2.75)

Protein intake (grams) is based on 24-hour dietary recall. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.

SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.8. Percent of Calories From Saturated Fat, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	PERCENT (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	11.4 (0.17)	11.5 (0.26)	11.3 (0.27)	11.0 (0.10)	10.8 (0.14)
Age (years)					
20–44	11.7 (0.30)	11.1 (0.72)	11.1 (1.01)	10.8 (0.18)	10.8 (0.13)
45–64	11.4 (0.25)	11.5 (0.43)	11.5 (0.29)	11.4 (0.16)	11.0 (0.34)
≥65	11.4 (0.21)	11.5 (0.32)	11.1 (0.28)	10.7 (0.19)	10.6 (0.29)
Sex					
Men	11.5 (0.23)	11.6 (0.34)	11.5 (0.42)	11.0 (0.15)	10.9 (0.19)
Women	11.3 (0.22)	11.2 (0.45)	11.0 (0.31)	11.1 (0.14)	10.7 (0.17)
Race/ethnicity					
Non-Hispanic white	12.1 (0.18)	11.9 (0.35)	11.7 (0.35)	11.5 (0.11)	11.1 (0.17)
Non-Hispanic black	10.5 (0.19)	10.9 (0.48)	11.0 (0.48)	10.5 (0.22)	10.5 (0.23)
Hispanic	10.5 (0.24)	10.4 (0.58)	9.7 (0.41)	9.9 (0.15)	10.0 (0.19)
Mexican American	10.7 (0.37)	10.2 (0.48)	9.6 (0.43)	10.1 (0.24)	10.0 (0.24)
Other Hispanic	10.1 (0.24)	10.6 (1.34)	9.9 (0.85)	9.7 (0.36)	10.0 (0.36)
Education					
<9th grade	10.9 (0.41)	10.6 (0.60)	10.1 (0.57)	9.5 (0.32)	10.0 (0.87)
Some high school	11.6 (0.40)	10.6 (0.49)	10.6 (0.32)	11.4 (0.35)	10.5 (0.30)
High school graduate	11.3 (0.22)	12.0 (0.50)	11.7 (0.44)	11.2 (0.26)	10.8 (0.16)
Some college	11.6 (0.25)	11.0 (0.32)	10.9 (0.35)	11.0 (0.19)	11.1 (0.27)
College graduate	11.5 (0.32)	12.6 (0.94)	12.4 (0.78)	11.2 (0.27)	10.8 (0.22)

Saturated fat intake is based on 24-hour dietary recall. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.

SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.9. Mean Total Saturated Fat Intake, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	MEAN (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	24.1 (0.63)	25.4 (0.91)	26.8 (1.08)	27.4 (0.60)	27.2 (0.62)
Age (years)					
20–44	29.4 (1.61)	30.2 (3.10)	28.7 (3.30)	29.8 (1.25)	27.9 (0.66)
45–64	25.5 (1.25)	29.9 (2.11)	28.7 (1.68)	28.4 (0.75)	26.9 (1.27)
≥65	21.0 (0.58)	21.9 (0.98)	20.9 (0.92)	21.2 (0.74)	21.7 (1.03)
Sex					
Men	27.9 (0.96)	31.1 (1.78)	30.1 (1.70)	31.8 (0.89)	33.2 (1.08)
Women	20.4 (0.54)	20.0 (0.81)	20.5 (1.06)	22.4 (0.50)	22.6 (0.55)
Race/ethnicity					
Non-Hispanic white	26.1 (0.83)	28.8 (1.63)	26.9 (1.25)	28.6 (0.81)	28.4 (0.69)
Non-Hispanic black	21.5 (1.05)	22.4 (1.26)	22.6 (1.07)	25.6 (1.02)	25.8 (0.74)
Hispanic	21.1 (1.20)	25.0 (1.99)	21.7 (1.23)	24.7 (0.79)	24.8 (1.04)
Mexican American	22.3 (1.61)	26.0 (2.70)	22.6 (1.61)	26.6 (1.07)	25.3 (1.44)
Other Hispanic	18.8 (0.83)	23.3 (3.01)	20.2 (2.00)	21.0 (1.35)	23.9 (1.43)
Education					
<9th grade	19.6 (1.44)	22.0 (2.02)	19.2 (1.47)	21.3 (1.27)	23.2 (2.87)
Some high school	23.9 (1.58)	21.3 (1.38)	20.4 (1.11)	29.9 (2.52)	28.3 (1.68)
High school graduate	23.1 (0.98)	28.0 (1.69)	26.6 (1.06)	27.9 (1.08)	26.1 (0.86)
Some college	26.0 (1.06)	27.3 (1.37)	26.2 (1.56)	26.8 (0.89)	28.1 (1.09)
College graduate	26.6 (1.24)	32.0 (4.31)	30.7 (3.06)	27.9 (1.11)	27.2 (0.90)

Saturated fat intake (grams) is based on 24-hour dietary recall. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.10. Mean Total Cholesterol Intake, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	MEAN (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	256 (8.1)	286 (23.4)	282 (29.1)	303 (8.6)	292 (13.8)
Age (years)					
20–44	286 (18.4)	374 (54.5)	438 (99.8)	334 (15.7)	309 (17.9)
45–64	267 (16.0)	296 (45.1)	287 (31.2)	318 (15.9)	273 (14.1)
≥65	233 (11.3)	246 (28.6)	220 (17.1)	221 (21.1)	191 (28.5)
Sex					
Men	296 (15.4)	329 (39.3)	349 (48.1)	362 (15.5)	379 (22.6)
Women	219 (9.0)	223 (14.9)	209 (15.6)	238 (11.4)	222 (11.4)
Race/ethnicity					
Non-Hispanic white	250 (11.7)	300 (32.3)	296 (39.2)	298 (12.5)	280 (16.8)
Non-Hispanic black	275 (11.2)	247 (26.0)	240 (22.5)	325 (21.4)	303 (21.8)
Hispanic	292 (23.8)	301 (42.0)	268 (26.2)	316 (15.8)	315 (35.0)
Mexican American	332 (28.9)	303 (42.6)	284 (31.2)	353 (21.8)	335 (52.7)
Other Hispanic	220 (38.1)	299 (75.2)	247 (48.1)	238 (24.5)	285 (43.6)
Education					
<9th grade	267 (13.1)	303 (54.5)	274 (40.6)	278 (25.8)	339 (77.2)
Some high school	257 (17.3)	244 (24.9)	230 (15.2)	388 (38.5)	288 (21.3)
High school graduate	255 (21.5)	319 (34.5)	285 (23.2)	284 (23.7)	284 (15.1)
Some college	272 (18.2)	319 (36.3)	309 (23.9)	309 (22.5)	290 (31.1)
College graduate	219 (19.7)	169 (39.1)	289 (124.8)[1]	275 (12.7)	294 (34.6)

Cholesterol intake (mg) is based on 24-hour dietary recall. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
[1] Relative standard error >40%–50%
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.11. Grams of Dietary Fiber Per 1,000 Calories Consumed, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	GRAMS (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	9.1 (0.25)	8.4 (0.31)	8.4 (0.32)	8.0 (0.17)	8.0 (0.19)
Age (years)					
20–44	7.2 (0.41)	7.0 (0.62)	6.9 (0.66)	7.0 (0.24)	7.5 (0.22)
45–64	8.9 (0.45)	8.1 (0.49)	8.0 (0.46)	7.9 (0.27)	8.6 (0.23)
≥65	9.9 (0.28)	9.3 (0.51)	9.3 (0.38)	9.8 (0.19)	10.2 (0.47)
Sex					
Men	9.2 (0.46)	7.7 (0.29)	7.6 (0.27)	7.4 (0.18)	7.2 (0.21)
Women	9.0 (0.21)	9.6 (0.56)	9.1 (0.40)	8.6 (0.21)	8.6 (0.25)
Race/ethnicity					
Non-Hispanic white	9.2 (0.40)	8.3 (0.45)	8.2 (0.41)	7.9 (0.22)	8.1 (0.27)
Non-Hispanic black	8.1 (0.16)	7.6 (0.38)	7.2 (0.41)	7.1 (0.33)	6.2 (0.16)
Hispanic	9.5 (0.34)	9.5 (0.47)	9.8 (0.43)	8.8 (0.20)	8.6 (0.22)
Mexican American	10.0 (0.47)	9.7 (0.35)	10.6 (0.49)	9.1 (0.26)	8.8 (0.30)
Other Hispanic	8.6 (0.53)	9.2 (1.15)	8.6 (0.77)	8.1 (0.37)	8.3 (0.37)
Education					
<9th grade	9.4 (0.42)	9.9 (0.73)	10.5 (0.53)	9.1 (0.34)	9.1 (0.40)
Some high school	7.9 (0.31)	9.4 (0.92)	8.8 (0.55)	6.7 (0.22)	7.1 (0.28)
High school graduate	8.7 (0.33)	7.4 (0.49)	7.6 (0.43)	7.4 (0.26)	7.1 (0.30)
Some college	9.1 (0.24)	8.2 (0.43)	8.0 (0.44)	7.8 (0.27)	7.6 (0.23)
College graduate	10.9 (1.15)	8.6 (0.61)	8.4 (0.64)	9.1 (0.36)	9.0 (0.30)

Dietary fiber intake (grams) is based on 24-hour dietary recall. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions*. A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.12. Mean Dietary Fiber Intake, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	MEAN (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	15.7 (0.44)	15.9 (0.55)	16.7 (0.64)	16.3 (0.39)	16.7 (0.48)
Age (years)					
20–44	15.1 (1.13)	16.3 (1.30)	14.9 (1.50)	16.1 (0.54)	16.3 (0.59)
45–64	16.1 (0.80)	18.1 (0.91)	16.9 (0.91)	16.2 (0.58)	17.4 (0.50)
≥65	15.3 (0.27)	15.2 (0.78)	15.3 (0.58)	16.7 (0.59)	17.3 (1.07)
Sex					
Men	17.9 (0.78)	17.9 (0.85)	17.1 (0.77)	17.7 (0.39)	18.4 (0.64)
Women	13.5 (0.29)	14.8 (0.96)	14.6 (0.76)	14.6 (0.48)	15.3 (0.50)
Race/ethnicity					
Non-Hispanic white	16.4 (0.70)	16.6 (0.99)	15.7 (0.69)	16.0 (0.56)	17.2 (0.64)
Non-Hispanic black	13.4 (0.56)	12.6 (0.63)	12.3 (0.74)	14.5 (0.54)	12.5 (0.49)
Hispanic	15.4 (0.52)	20.9 (1.37)	19.6 (1.06)	18.5 (0.59)	17.8 (0.55)
Mexican American	16.6 (0.69)	21.8 (1.75)	21.6 (1.38)	20.5 (0.71)	18.7 (0.62)
Other Hispanic	13.3 (0.66)	19.3 (3.69)	16.3 (2.35)	14.6 (0.69)	16.5 (0.73)
Education					
<9th grade	13.8 (0.53)	18.1 (1.39)	17.9 (1.03)	17.1 (0.86)	17.5 (1.13)
Some high school	13.1 (0.63)	16.2 (1.78)	14.7 (1.00)	13.9 (0.53)	15.9 (0.82)
High school graduate	14.3 (0.46)	14.3 (0.78)	14.4 (0.83)	15.2 (0.59)	14.3 (0.58)
Some college	16.8 (0.60)	17.4 (1.12)	15.9 (0.98)	15.9 (0.47)	15.9 (0.50)
College graduate	20.1 (2.04)	19.0 (1.91)	17.8 (1.72)	18.6 (0.76)	18.9 (0.82)

Dietary fiber intake (grams) is based on 24-hour dietary recall. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions*. A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.13. Prevalence of Current Alcohol Consumption, by Diabetes Status and Demographic Characteristics, U.S., 2009–2010

	PERCENT (STANDARD ERROR)	
CHARACTERISTICS	Diabetes N=5,399	No Diabetes N=48,575
Age (years)		
18–44	60.9 (2.57)	70.6 (0.44)
45–64	50.8 (1.32)	68.5 (0.52)
≥65	33.8 (1.30)	49.9 (0.73)
Sex		
Men	54.8 (1.27)	72.7 (0.43)
Women	36.6 (1.15)	61.5 (0.45)
Race/ethnicity		
Non-Hispanic white	48.0 (1.12)	71.8 (0.41)
Non-Hispanic black	41.5 (1.80)	56.7 (0.81)
All Hispanic	44.2 (2.00)	57.5 (0.65)
Mexican American	43.5 (2.46)	57.3 (0.83)
Other Hispanic	45.5 (3.24)	58.0 (1.07)
Non-Hispanic Asian	34.5 (3.44)	48.9 (1.14)
Education		
Elementary	23.9 (1.95)	38.8 (1.14)
Some high school	34.5 (2.33)	51.1 (0.96)
High school graduate	43.5 (1.56)	61.6 (0.58)
Some college	52.1 (1.78)	70.5 (0.52)
College graduate	63.2 (1.91)	77.9 (0.48)

Diabetes status is based on self-report.
SOURCE: National Health Interview Surveys 2009–2010

APPENDIX 10.14. Alcohol Consumption and Consumption Status Among Adults Age ≥18 Years, by Diabetes Status, U.S., 2009–2010

	DIABETES		PREDIABETES		NORMAL GLUCOSE	
	N	Percent (SE)	N	Percent (SE)	N	Percent (SE)
Drinking*						
Current drinker	5,399	45.9 (0.85)	2,211	65.5 (1.32)	46,366	66.9 (0.36)
Binge drinker†	2,238	23.4 (1.14)	1,362	29.4 (1.62)	29,552	37.0 (0.44)
Mean drinks, per day [mean (SE)]	2,252	2.3 (0.08)	1,372	2.3 (0.06)	29,825	2.6 (0.02)
Drinking Status	5,389		2,207		46,191	
None		54.2 (0.85)		34.5 (1.33)		33.2 (0.36)
Light/infrequent		35.9 (0.82)		46.8 (1.30)		44.8 (0.32)
Moderate		7.8 (0.46)		14.0 (0.87)		16.4 (0.27)
Heavy		2.1 (0.27)		4.7 (0.57)		5.6 (0.16)

Diabetes status is based on self-report. SE, standard error.
*   A drink is defined as 12 oz. of beer, a 5 oz. glass of wine, or 1.5 oz. of liquor.
† Binge drinker is defined as reporting five or more drinks on at least one day in the past year.
SOURCE: National Health Interview Surveys 2009–2010

APPENDIX 10.15. Mean Alcohol Intake, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

	MEAN (STANDARD ERROR)				
CHARACTERISTICS	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	6.1 (0.99)	9.3 (1.64)	6.8 (1.00)	8.9 (0.74)	12.8 (1.01)
Age (years)					
20–44	12.8 (2.93)	6.0 (1.84)[1]	13.9 (3.46)	9.7 (1.21)	14.2 (1.22)
45–64	7.2 (1.65)	7.4 (1.82)	9.5 (2.55)	10.0 (1.03)	10.9 (1.47)
≥65	3.1 (0.60)	6.3 (1.81)	7.3 (1.50)	5.1 (0.73)	7.4 (1.88)
Sex					
Men	10.4 (1.63)	9.3 (1.21)	13.6 (2.35)	12.0 (1.21)	18.3 (2.08)
Women	2.1 (0.61)	2.8 (1.21)[2]	4.8 (1.16)	5.3 (0.68)	8.6 (0.94)
Race/ethnicity					
Non-Hispanic white	6.8 (1.42)	5.9 (1.03)	9.3 (1.80)	8.8 (0.95)	14.0 (1.21)
Non-Hispanic black	4.9 (1.03)	11.7 (4.57)[1]	11.7 (4.39)[1]	9.6 (1.54)	13.3 (1.44)
Hispanic	7.2 (2.10)	7.3 (1.81)	9.2 (3.26)[1]	9.5 (1.57)	9.8 (1.37)
Mexican American	8.9 (2.63)	6.8 (2.18)[1]	9.2 (4.05)[2]	8.9 (2.23)	10.9 (1.98)
Other Hispanic	3.9 (1.62)[2]	8.0 (2.90)[1]	[3]	10.6 (2.31)	8.2 (1.77)

Appendix 10.15 continues on the next page.

APPENDIX 10.15. (continued)

CHARACTERISTICS	MEAN (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Education					
<9th grade	4.4 (1.43)[1]	[3]	7.7 (3.44)[2]	8.2 (2.39)	8.0 (2.14)
Some high school	5.7 (1.57)	8.8 (4.33)[2]	10.4 (3.27)[1]	7.2 (1.38)	17.1 (3.80)
High school graduate	6.5 (1.80)	5.3 (1.54)	6.2 (1.82)	8.4 (1.45)	14.0 (2.25)
Some college	5.7 (1.83)[1]	7.3 (1.95)	11.8 (2.60)	9.5 (1.43)	12.4 (1.42)
College graduate	8.6 (1.85)	7.9 (1.42)	10.5 (3.58)[1]	9.7 (1.08)	11.8 (1.83)

Alcohol intake (grams) is based on dietary screener. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions*. A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
[1] Relative standard error >30%–40%
[2] Relative standard error >40%–50%
[3] Estimate is too unreliable to present; ≤1 case or relative standard error >50%.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.16. Mean Sodium Intake, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	MEAN (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	3,328 (67.9)	3,372 (85.0)	3,281 (79.4)	3,564 (59.0)	3,680 (55.7)
Age (years)					
20–44	3,870 (199.2)	4,026 (354.8)	3,828 (327.7)	3,985 (129.1)	3,821 (65.6)
45–64	3,575 (113.3)	3,546 (150.4)	3,451 (147.4)	3,569 (80.3)	3,512 (113.1)
≥65	2,900 (61.1)	2,931 (99.8)	2,901 (83.9)	2,844 (86.4)	2,977 (129.0)
Sex					
Men	3,960 (110.7)	3,826 (119.3)	3,795 (147.2)	4,120 (79.7)	4,422 (98.9)
Women	2,721 (59.2)	2,651 (80.9)	2,748 (84.4)	2,931 (54.7)	3,105 (56.9)
Race/ethnicity					
Non-Hispanic white	3,492 (100.5)	3,505 (106.2)	3,390 (106.4)	3,570 (82.0)	3,779 (64.6)
Non-Hispanic black	3,099 (123.8)	2,886 (169.3)	2,969 (183.4)	3,389 (138.4)	3,360 (72.7)
Hispanic	3,014 (105.9)	3,399 (258.9)	3,029 (168.5)	3,435 (82.4)	3,432 (118.4)
Mexican American	3,001 (133.1)	3,354 (269.4)	2,994 (171.0)	3,610 (105.9)	3,525 (180.4)
Other Hispanic	3,039 (175.7)	3,475 (582.2)	3,087 (381.2)	3,091 (129.4)	3,289 (105.7)
Education					
<9th grade	2,729 (132.6)	2,930 (234.8)	2,780 (185.9)	3,163 (145.7)	3,163 (229.7)
Some high school	3,305 (172.2)	2,766 (166.6)	2,535 (113.9)	3,641 (190.0)	3,807 (205.2)
High school graduate	3,241 (179.3)	3,448 (130.8)	3,440 (163.1)	3,528 (97.8)	3,529 (117.9)
Some college	3,541 (133.2)	3,701 (215.2)	3,539 (214.7)	3,584 (99.5)	3,606 (112.1)
College graduate	3,654 (212.6)	3,559 (211.9)	3,638 (182.3)	3,649 (78.7)	3,860 (103.5)

Sodium intake (mg) is based on 24-hour dietary recall. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions*. A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.17. Mean Calcium Intake, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	MEAN (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	876 (21.5)	987 (53.2)	915 (34.3)	958 (24.0)	1,011 (22.1)
Age (years)					
20–44	1,053 (69.7)	1,034 (110.8)	939 (71.1)	1,038 (45.6)	1,038 (26.5)
45–64	892 (37.2)	1,112 (99.9)	1,025 (71.6)	958 (31.0)	981 (38.7)
≥65	808 (16.3)	827 (48.8)	800 (41.0)	822 (29.9)	869 (39.6)
Sex					
Men	978 (33.7)	1,093 (80.6)	1,034 (58.9)	1,062 (30.7)	1,175 (34.6)
Women	777 (21.6)	818 (33.6)	791 (26.6)	839 (24.2)	883 (22.5)
Race/ethnicity					
Non-Hispanic white	940 (30.1)	1,060 (82.7)	952 (47.2)	996 (33.8)	1,075 (26.3)
Non-Hispanic black	740 (35.1)	710 (44.4)	738 (44.8)	844 (40.1)	801 (23.3)
Hispanic	808 (36.5)	1,001 (67.4)	893 (42.6)	935 (26.6)	917 (25.1)
Mexican American	841 (46.3)	1,059 (97.4)	943 (65.2)	976 (35.3)	923 (36.1)
Other Hispanic	748 (41.4)	904 (85.1)	812 (58.2)	854 (50.2)	907 (36.6)
Education					
<9th grade	745 (41.1)	863 (67.9)	822 (49.7)	837 (37.7)	798 (71.8)
Some high school	847 (54.9)	792 (63.2)	762 (44.3)	944 (80.5)	945 (69.8)
High school graduate	830 (42.1)	946 (57.5)	926 (48.2)	954 (34.1)	938 (35.7)
Some college	935 (37.1)	1,010 (71.6)	902 (50.5)	941 (32.2)	1,068 (39.0)
College graduate	992 (50.3)	1,273 (181.6)	1,108 (109.6)	1,021 (27.8)	1,046 (35.9)

Calcium intake (mg) is based on 24-hour dietary recall. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.18. Mean Vitamin D Intake, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	MEAN (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,369	Undiagnosed Diabetes (Clinical Definition)† N=441	Undiagnosed Diabetes (Research Definition)‡ N=608	Prediabetes‡ N=1,792	Normal Glucose‡ N=1,701
Total	4.4 (0.19)	5.0 (0.36)	5.0 (0.39)	4.7 (0.18)	4.7 (0.16)
Age (years)					
20–44	4.7 (0.41)	4.6 (0.92)	4.2 (0.57)	4.9 (0.35)	4.6 (0.20)
45–64	4.2 (0.34)	5.2 (0.68)	5.2 (0.82)	4.8 (0.26)	4.7 (0.38)
≥65	4.7 (0.29)	5.0 (0.34)	5.1 (0.47)	4.5 (0.28)	5.9 (0.53)
Sex					
Men	5.0 (0.30)	5.6 (0.51)	5.4 (0.43)	5.2 (0.28)	5.5 (0.32)
Women	3.9 (0.24)	4.1 (0.37)	4.6 (0.53)	4.2 (0.14)	4.1 (0.19)
Race/ethnicity					
Non-Hispanic white	4.6 (0.25)	5.5 (0.53)	5.4 (0.48)	5.0 (0.22)	4.9 (0.22)
Non-Hispanic black	3.7 (0.26)	3.3 (0.26)	3.6 (0.50)	3.8 (0.23)	3.7 (0.39)
Hispanic	4.1 (0.28)	4.7 (0.62)	4.4 (0.48)	4.8 (0.42)	4.5 (0.24)
Mexican American	4.2 (0.33)	5.0 (0.87)	4.5 (0.59)	5.2 (0.60)	4.7 (0.30)
Other Hispanic	3.8 (0.37)	4.2 (0.61)	4.3 (0.89)	4.1 (0.23)	4.2 (0.34)
Education					
<9th grade	3.9 (0.31)	4.4 (0.39)	4.4 (0.35)	4.0 (0.26)	4.2 (0.51)
Some high school	4.2 (0.24)	4.2 (0.56)	4.9 (0.88)	4.8 (0.55)	4.2 (0.50)
High school graduate	4.0 (0.34)	5.4 (0.62)	5.8 (0.71)	4.7 (0.31)	4.2 (0.26)
Some college	5.0 (0.53)	5.0 (0.63)	4.3 (0.37)	5.0 (0.44)	4.8 (0.32)
College graduate	5.0 (0.75)	5.5 (0.90)	5.4 (0.64)	4.7 (0.21)	5.1 (0.30)

Vitamin D intake (µg) is based on 24-hour dietary recall. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.19. Prevalence of Consuming Five or More Fruits and Vegetables Per Day, by Diabetes Status and Demographic Characteristics, U.S., 2007 and 2009

CHARACTERISTICS	DIABETES		NO DIABETES	
	N	Percent (SE)	N	Percent (SE)
Age (years)				
20–44	7,372	26.0 (1.04)	214,972	22.7 (0.18)
45–64	41,826	22.4 (0.41)	306,295	24.6 (0.15)
≥65	47,310	25.7 (0.38)	202,584	28.4 (0.19)
Sex				
Men	38,932	20.4 (0.43)	268,423	19.7 (0.17)
Women	57,576	28.1 (0.38)	455,428	28.4 (0.14)
Race/ethnicity				
Non-Hispanic white	69,528	24.0 (0.29)	579,351	24.4 (0.11)
Non-Hispanic black	11,922	24.7 (0.90)	50,981	22.5 (0.39)
All Hispanic	7,947	23.0 (1.00)	48,868	22.9 (0.41)
Non-Hispanic Asian	1,191	31.4 (2.87)	11,674	28.7 (0.95)
Native Hawaiian/Pacific Islander	282	15.9 (4.42)	1,848	28.1 (2.68)
American Indian/Alaska Native	1,999	24.5 (2.32)	9,249	24.5 (1.10)
Education				
Elementary	6,756	20.9 (1.22)	21,898	20.3 (0.69)
Some high school	9,703	19.8 (0.87)	41,173	19.1 (0.51)
High school graduate	33,574	21.5 (0.47)	211,763	19.9 (0.20)
Some college	25,148	24.8 (0.54)	193,033	23.3 (0.21)
College graduate	21,114	30.2 (0.64)	254,833	29.4 (0.18)

Diabetes status is based on self-report. SE, standard error.
SOURCE: Behavioral Risk Factor Surveillance System 2007 and 2009

APPENDIX 10.20. Dietary Intake Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2009–2010

	DIABETES N=435	NO DIABETES N=3,984
Percent (standard error)		
Fruit and vegetable servings per day		
0	[2]	0.3 (0.06)
>0–<3	69.1 (3.43)	70.8 (1.20)
3–<5	24.6 (3.21)	21.8 (0.98)
≥5	6.0 (1.93)[1]	7.1 (0.56)
Mean (standard error)		
Servings per day		
Fruit	1.1 (0.06)	1.1 (0.03)
Vegetables	1.3 (0.08)	1.3 (0.03)
Regular soda	0.25 (0.03)	0.61 (0.03)

Dietary intake is reported using a dietary screener; fruit includes whole fruit and fruit juice; vegetables include salad, non-fried potatoes, and other vegetables, not including salad, potatoes, or beans. Diabetes status is based on self-report.
[1] Relative standard error >30%–40%
[2] Estimate is too unreliable to present; ≤1 case or relative standard error >50%.
SOURCE: National Health and Nutrition Examination Surveys 2009–2010

APPENDIX 10.21. Dietary Intake Among Adults ≥20 Years, by Diabetes Status, U.S., 2009–2010

	Diagnosed Diabetes* N=435	Undiagnosed Diabetes (Clinical Definition)† N=150	Undiagnosed Diabetes (Research Definition)‡ N=198	Prediabetes‡ N=697	Normal Glucose‡ N=835
	Percent (standard error)				
Fruit and vegetable servings per day					
0	[3]	[3]	[3]	0.4 (0.19)[2]	[3]
>0–<3	69.1 (3.43)	72.7 (3.84)	74.3 (3.34)	77.0 (1.50)	69.1 (2.55)
3–<5	24.6 (3.21)	17.7 (3.55)	20.3 (3.64)	17.6 (1.08)	22.2 (1.60)
≥5	6.0 (1.93)[1]	9.5 (3.13)[1]	5.3 (1.80)[1]	5.0 (1.30)	8.6 (1.31)
	Mean (standard error)				
Servings per day					
Fruit	1.1 (0.06)	1.0 (0.09)	0.9 (0.07)	1.1 (0.10)	1.1 (0.06)
Vegetables	1.3 (0.08)	1.4 (0.14)	1.4 (0.10)	1.2 (0.05)	1.4 (0.05)
Regular soda	0.3 (0.03)	0.6 (0.12)	0.5 (0.08)	0.6 (0.08)	0.6 (0.07)

Dietary intake is reported using a dietary screener; fruit includes whole fruit and fruit juice; vegetables include salad, non-fried potatoes, and other vegetables, not including salad, potatoes, or beans. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
[1] Relative standard error >30%–40%
[2] Relative standard error >40%–50%
[3] Estimate is too unreliable to present; ≤1 case or relative standard error >50%.
SOURCE: National Health and Nutrition Examination Surveys 2009–2010

APPENDIX 10.22. Mean Servings of Regular Soda Per Day, by Diabetes Status and Demographic Characteristics, U.S., 2009–2010

CHARACTERISTICS	MEAN (STANDARD ERROR)				
	Diagnosed Diabetes* N=435	Undiagnosed Diabetes (Clinical Definition)† N=149	Undiagnosed Diabetes (Research Definition)‡ N=197	Prediabetes‡ N=697	Normal Glucose‡ N=835
Total	0.3 (0.03)	0.6 (0.12)	0.5 (0.08)	0.6 (0.08)	0.6 (0.07)
Age (years)					
20–44	0.51 (0.13)	1.08 (0.33)[1]	0.74 (0.23)[1]	0.89 (0.11)	0.74 (0.09)
45–64	0.21 (0.04)	0.58 (0.18)[1]	0.43 (0.11)	0.39 (0.07)	0.42 (0.07)
≥65	0.16 (0.05)[1]	0.27 (0.09)[1]	0.17 (0.06)[1]	[3]	[3]
Sex					
Men	0.17 (0.05)	0.61 (0.17)	0.57 (0.15)	0.64 (0.09)	0.91 (0.10)
Women	0.33 (0.04)	0.68 (0.28)[2]	0.34 (0.10)	0.57 (0.10)	0.39 (0.06)
Race/ethnicity					
Non-Hispanic white	0.16 (0.05)[1]	0.74 (0.19)	0.44 (0.10)	0.57 (0.09)	0.65 (0.08)
Non-Hispanic black	0.50 (0.14)	0.31 (0.05)	0.40 (0.06)	0.78 (0.16)	0.66 (0.14)
Hispanic	0.38 (0.09)	0.64 (0.11)	0.63 (0.10)	0.67 (0.06)	0.59 (0.10)
Mexican American	0.39 (0.13)[1]	0.77 (0.15)	0.77 (0.13)	0.71 (0.08)	0.64 (0.14)
Other Hispanic	0.37 (0.12)[1]	0.36 (0.11)[1]	0.30 (0.11)[1]	0.60 (0.07)	0.51 (0.09)
Other/Multiracial	[3]	0.11 (0.04)[1]	[3]	0.48 (0.19)[1]	0.39 (0.17)[2]
Education					
<9th grade	0.34 (0.15)[2]	0.55 (0.25)[2]	0.66 (0.19)	0.98 (0.21)	0.80 (0.16)
Some high school	0.55 (0.23)[2]	0.95 (0.45)[2]	0.62 (0.29)[2]	1.05 (0.22)	1.13 (0.18)
High school graduate	0.31 (0.06)	0.99 (0.23)	0.71 (0.12)	0.97 (0.10)	1.05 (0.25)
Some college	0.13 (0.03)	0.44 (0.09)	0.31 (0.07)	0.45 (0.07)	0.59 (0.10)
College graduate	0.06 (0.03)[2]	[3]	[3]	0.15 (0.04)	0.25 (0.04)

Soda servings are based on dietary screener. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
[1] Relative standard error >30%–40%
[2] Relative standard error >40%–50%
[3] Estimate is too unreliable to present; ≤1 case or relative standard error >50%.
SOURCE: National Health and Nutrition Examination Surveys 2009–2010

APPENDIX 10.23. Prevalence of Meeting or Exceeding Current Physical Activity Requirements, by Diabetes Status and Demographic Characteristics, U.S., 2009–2010

	DIABETES		NO DIABETES	
CHARACTERISTICS	**N**	**Percent (SE)**	**N**	**Percent (SE)**
Age (years)				
18–44	694	36.9 (2.35)	24,155	50.5 (0.49)
45–64	2,284	31.2 (1.29)	15,587	44.0 (0.55)
≥65	2,121	24.0 (1.25)	8,040	33.1 (0.66)
Sex				
Men	2,339	34.7 (1.28)	21,072	50.7 (0.51)
Women	2,760	23.8 (1.11)	26,710	41.4 (0.47)
Race/ethnicity				
Non-Hispanic white	2,643	30.8 (1.18)	27,955	48.7 (0.46)
Non-Hispanic black	1,146	26.8 (1.89)	7,418	39.6 (0.77)
All Hispanic	1,011	24.9 (2.08)	9,064	38.8 (0.72)
Mexican American	603	24.5 (2.62)	5,453	38.9 (0.99)
Other Hispanic	408	25.6 (3.23)	3,611	38.7 (1.05)
Non-Hispanic Asian	248	32.8 (3.94)	3,004	41.2 (1.32)
Education				
Elementary	676	16.2 (2.03)	2,873	23.0 (1.09)
Some high school	683	20.2 (1.96)	4,638	33.2 (0.90)
High school graduate	1,467	25.4 (1.65)	12,516	37.7 (0.59)
Some college	1,403	32.4 (1.62)	14,369	48.5 (0.60)
College graduate	836	46.4 (2.21)	13,184	58.3 (0.60)

Meets criteria for vigorous (≥75 minutes per week) or moderate or combination of moderate and vigorous activity (≥150 minutes per week). Diabetes status is based on self-report. SE, standard error.

SOURCE: National Health Interview Surveys 2009–2010

APPENDIX 10.24. Prevalence of Physical Activity Among Adults Age ≥18 Years, by Diabetes Status, U.S., 2009–2010

	DIABETES		PREDIABETES		NORMAL GLUCOSE	
PHYSICAL ACTIVITY	**N**	**Percent (SE)**	**N**	**Percent (SE)**	**N**	**Percent (SE)**
Vigorous*	5,099	17.4 (0.76)	2,137	23.7 (1.14)	45,647	33.9 (0.35)
Moderate†		12.0 (0.62)		15.2 (0.97)		12.3 (0.20)
Insufficient		25.7 (0.90)		29.8 (1.28)		23.7 (0.29)
None/Not active		44.9 (0.92)		31.3 (1.26)		30.1 (0.39)
Mean physical activity, minutes per week [mean, (SE)]‡	2,656	282.6 (15.31)	1,406	298.5 (15.79)	30,784	333.2 (3.81)

Diabetes status is based on self-report. SE, standard error.
* ≥75 minutes per week
† ≥150 minutes per week; includes combination of moderate and vigorous activity.
‡ Mean physical activity: average minutes among persons who report moderate or vigorous physical activity.

SOURCE: National Health Interview Surveys 2009–2010

APPENDIX 10.25. Prevalence of Physical Activity Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2007–2010

	PERCENT (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,480	**Undiagnosed Diabetes (Clinical Definition)† N=465**	**Undiagnosed Diabetes (Research Definition)‡ N=634**	**Prediabetes‡ N=1,813**	**Normal Glucose‡ N=1,723**
Meet physical activity standards§	36.0 (1.50)	38.3 (3.85)	38.0 (2.45)	55.9 (1.83)	60.9 (1.57)
Less than recommended amount of physical activity	14.5 (1.21)	16.3 (2.26)	18.9 (2.33)	15.5 (0.89)	17.9 (1.27)
No physical activity	49.5 (1.60)	45.4 (3.91)	43.1 (2.98)	28.6 (1.79)	21.2 (1.16)

Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
§ ≥150 minutes of moderate or ≥75 minutes of vigorous leisure or work-related physical activity per week; physical activity is self-reported.

SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.26. Prevalence of Meeting Physical Activity Standards, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	PERCENT (STANDARD ERROR)				
	Diagnosed Diabetes* N=1,480	Undiagnosed Diabetes (Clinical Definition)† N=465	Undiagnosed Diabetes (Research Definition)‡ N=634	Prediabetes‡ N=1,813	Normal Glucose‡ N=1,723
Age (years)					
20–44	51.7 (5.16)	57.3 (6.97)	55.1 (8.13)	63.7 (2.15)	64.8 (1.65)
45–64	36.7 (2.70)	42.1 (6.66)	39.9 (4.25)	55.0 (3.05)	57.8 (2.93)
≥65	30.2 (2.08)	27.1 (3.56)	29.5 (3.83)	44.9 (2.62)	36.5 (3.93)
Sex					
Men	45.4 (2.26)	42.4 (5.11)	43.7 (4.00)	65.4 (2.32)	69.9 (2.24)
Women	26.7 (1.79)	31.3 (3.86)	31.9 (3.11)	45.2 (2.44)	54.0 (1.92)
Race/ethnicity					
Non-Hispanic white	38.7 (2.12)	35.3 (4.95)	37.6 (3.20)	58.0 (2.53)	62.7 (2.06)
Non-Hispanic black	25.8 (2.68)	41.5 (6.59)	35.2 (6.11)	57.1 (3.01)	51.9 (3.95)
Hispanic	31.3 (3.24)	47.4 (5.42)	42.1 (5.14)	50.6 (2.92)	59.5 (1.96)
Mexican American	34.2 (4.87)	43.7 (7.58)	39.5 (7.01)	53.4 (3.11)	59.3 (2.91)
Other Hispanic	26.2 (3.70)	54.1 (7.33)	46.3 (5.87)	45.2 (5.07)	59.6 (3.30)
Education					
<9th grade	17.8 (3.03)	33.8 (6.36)	26.5 (4.81)	42.9 (5.81)	49.3 (5.67)
Some high school	26.0 (3.21)	32.3 (5.22)	28.3 (3.63)	52.6 (3.59)	53.9 (5.19)
High school graduate	34.2 (2.39)	35.8 (4.50)	40.9 (3.64)	57.4 (2.85)	61.0 (2.30)
Some college	46.9 (3.26)	41.8 (6.95)	37.4 (5.01)	58.9 (3.56)	60.5 (3.24)
College graduate	45.1 (5.08)	45.6 (8.28)	50.4 (6.54)	57.2 (3.37)	64.7 (2.60)

Physical activity standards are defined as ≥150 minutes moderate or ≥75 minutes vigorous of leisure or work-related physical activity per week; physical activity is self-reported. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.27. Mean Minutes Per Day of Physical Activity Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2003–2006

	MEAN (STANDARD ERROR)			
	Diagnosed Diabetes* N=661	Undiagnosed Diabetes (Clinical Definition)† N=183	Prediabetes† N=1,015	Normal Glucose† N=2,239
Minutes of moderate-vigorous activity per day	11.9 (0.97)	14.7 (1.92)	20.8 (0.90)	28.2 (0.84)
Minutes of light activity per day	241.5 (3.10)	259.2 (9.15)	250.4 (2.72)	227.0 (2.95)
Minutes of being sedentary per day	524.8 (5.29)	522.1 (16.87)	489.5 (3.89)	475.5 (3.09)

Physical activity (minutes/day) is measured objectively using a physical activity monitor. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL. 2-hour plasma glucose from an oral glucose tolerance test was not available in all years of physical activity measurement.
SOURCE: National Health and Nutrition Examination Surveys 2003–2006

APPENDIX 10.28. Mean Minutes Per Day of Moderate-Vigorous Physical Activity, by Diabetes Status and Demographic Characteristics, U.S., 2003–2006

CHARACTERISTICS	MEAN (STANDARD ERROR)			
	Diagnosed Diabetes* N=661	Undiagnosed Diabetes (Clinical Definition)† N=183	Prediabetes† N=1,015	Normal Glucose† N=2,239
Age (years)				
20–44	19.4 (2.12)	24.1 (3.33)	27.3 (1.73)	32.7 (1.06)
45–64	13.5 (1.23)	16.3 (3.14)	21.6 (1.40)	24.7 (1.24)
≥65	6.6 (0.99)	7.5 (1.43)	9.6 (1.06)	10.1 (1.40)
Sex				
Men	14.7 (1.39)	18.0 (2.75)	26.6 (1.25)	37.6 (1.53)
Women	9.4 (0.77)	9.3 (1.87)	12.9 (0.81)	20.9 (0.70)

Appendix 10.28 continues on the next page.

APPENDIX 10.28. (continued)

CHARACTERISTICS	MEAN (STANDARD ERROR)			
	Diagnosed Diabetes* N=661	Undiagnosed Diabetes (Clinical Definition)† N=183	Prediabetes† N=1,015	Normal Glucose† N=2,239
Race/ethnicity				
Non-Hispanic white	9.7 (0.96)	14.2 (2.56)	19.4 (1.00)	27.6 (0.84)
Non-Hispanic black	11.7 (1.71)	8.6 (1.73)	21.2 (2.02)	29.5 (1.56)
Hispanic	19.9 (2.76)	24.7 (3.76)	31.8 (2.73)	33.1 (1.73)
Mexican American	16.9 (1.98)	25.3 (4.35)	28.5 (2.58)	33.4 (2.17)
Other Hispanic	25.1 (5.83)	22.5 (6.37)	44.7 (10.35)	32.4 (3.26)
Other/Multiracial	18.5 (4.04)	15.8 (5.14)[1]	18.5 (3.23)	22.9 (3.31)
Education				
<9th grade	11.1 (1.82)	14.7 (5.24)[1]	21.3 (3.60)	26.6 (2.81)
Some high school	9.1 (1.72)	12.5 (2.73)	20.5 (1.70)	27.0 (1.93)
High school graduate	9.0 (1.31)	11.3 (3.19)	18.8 (1.67)	28.4 (1.23)
Some college	14.0 (1.47)	12.8 (2.07)	18.1 (1.34)	26.0 (1.47)
College graduate	14.1 (1.76)	24.0 (4.11)	23.3 (1.55)	30.0 (1.36)

Physical activity (minutes/day) is measured objectively using a physical activity monitor. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions*. A1c, glycosylated hemoglobin.

* Diagnosed diabetes is based on self-report.

† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL. 2-hour plasma glucose from an oral glucose tolerance test was not available in all years of physical activity measurement.

[1] Relative standard error >30%–40%

SOURCE: National Health and Nutrition Examination Surveys 2003–2006

APPENDIX 10.29. Mean MET-Hours Per Week of Physical Activity Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2001–2006

	MEAN (STANDARD ERROR)			
	Diagnosed Diabetes* N=680	Undiagnosed Diabetes (Clinical Definition)† N=188	Prediabetes† N=1,130	Normal Glucose† N=2,100
MET-hours/week‡	23.4 (2.52)	21.4 (3.64)	24.8 (1.26)	30.2 (1.57)

Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions*. A1c, glycosylated hemoglobin.

* Diagnosed diabetes is based on self-report.

† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL. 2-hour plasma glucose from an oral glucose tolerance test was not available in all years of physical activity measurement.

‡ Metabolic Equivalent of Task (MET) is the ratio of the rate of energy expended during an activity to the rate of energy expended at rest; self-reported based on type of leisure-time activity, intensity, and duration.

SOURCE: National Health and Nutrition Examination Surveys 2001–2006

APPENDIX 10.30. Mean MET-Hours Per Week of Physical Activity, by Diabetes Status and Demographic Characteristics, U.S., 2001–2006

CHARACTERISTICS	N	MEAN (STANDARD ERROR)			
		Diagnosed Diabetes* N=1,480	Undiagnosed Diabetes (Clinical Definition)† N=465	Prediabetes† N=1,813	Normal Glucose† N=1,723
Age (years)					
20–44	1,841	23.3 (3.09)	19.0 (4.19)	27.7 (2.01)	33.3 (2.37)
45–64	1,294	25.4 (3.95)	20.5 (3.73)	24.4 (2.34)	24.8 (1.91)
≥65	964	20.3 (2.48)	23.5 (6.66)	20.4 (1.58)	22.9 (4.22)
Sex					
Men	2,063	25.2 (2.84)	24.1 (5.16)	28.0 (1.65)	37.4 (2.69)
Women	2,036	21.4 (3.61)	16.4 (3.56)	19.8 (1.72)	24.6 (1.59)
Race/ethnicity					
Non-Hispanic white	2,296	20.4 (1.74)	23.2 (4.95)	23.9 (1.27)	30.3 (1.87)
Non-Hispanic black	784	23.4 (3.88)	15.8 (5.44)[1]	29.6 (4.50)	36.4 (3.72)
Hispanic	845	30.7 (12.12)[2]	14.5 (2.70)	29.7 (4.95)	23.6 (2.59)
Mexican American	705	16.0 (2.27)	13.2 (1.97)	28.5 (4.63)	21.8 (1.98)
Other Hispanic	140	[3]	18.4 (7.78)[2]	32.2 (10.48)[1]	26.3 (6.06)
Other/Multiracial	174	28.6 (6.28)	21.1 (9.85)[2]	20.8 (4.90)	29.0 (6.84)

Appendix 10.30 continues on the next page.

APPENDIX 10.30. (continued)

		MEAN (STANDARD ERROR)			
CHARACTERISTICS	N	Diagnosed Diabetes* N=1,480	Undiagnosed Diabetes (Clinical Definition)† N=465	Prediabetes† N=1,813	Normal Glucose† N=1,723
Education					
<9th grade	381	12.9 (1.76)	29.0 (11.32)[1]	27.4 (6.81)	20.1 (3.37)
Some high school	467	40.9 (13.13)[1]	13.9 (3.35)	29.8 (5.83)	26.8 (3.05)
High school graduate	942	20.9 (3.66)	15.5 (3.16)	24.2 (2.32)	32.1 (4.09)
Some college	1,276	23.9 (3.08)	31.1 (9.79)[1]	22.1 (1.60)	32.3 (2.47)
College graduate	1,029	22.4 (2.35)	18.1 (2.98)	26.4 (2.03)	28.3 (1.69)

Metabolic Equivalent of Task (MET) is the ratio of the rate of energy expended during an activity to the rate of energy expended at rest; self-reported based on type of leisure-time activity, intensity, and duration. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions*. A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL; normal glucose is defined as A1c<5.7% and fasting plasma glucose <100 mg/dL. 2-hour plasma glucose from an oral glucose tolerance test was not available in all years of physical activity measurement.
[1] Relative standard error >30%–40%
[2] Relative standard error >40%–50%
[3] Estimate is too unreliable to present; ≤1 case or relative standard error >50%.
SOURCE: National Health and Nutrition Examination Surveys 2001–2006

APPENDIX 10.31. Smoking Among Adults Age ≥18 Years, by Diabetes Status, U.S., 2009–2010

	PERCENT (STANDARD ERROR)		
SMOKING	Diabetes N=5,428	Prediabetes N=2,226	Normal Glucose N=46,891
Current smoker	16.8 (0.69)	20.8 (1.03)	20.2 (0.28)
Former smoker	34.4 (0.86)	30.2 (1.22)	20.2 (0.25)
Never smoker	48.8 (0.92)	49.0 (1.32)	59.6 (0.32)

Diabetes status is based on self-report.
SOURCE: National Health Interview Surveys 2009–2010

APPENDIX 10.32. Prevalence of Current Smoking, by Diabetes Status and Demographic Characteristics, U.S., 2009–2010

	DIABETES		NO DIABETES	
CHARACTERISTICS	N	Percent (SE)	N	Percent (SE)
Age (years)				
18–44	714	23.9 (2.09)	24,520	22.4 (0.39)
45–64	2,421	21.4 (1.17)	16,036	21.5 (0.45)
≥65	2,293	8.2 (0.67)	8,559	9.8 (0.39)
Sex				
Men	2,461	17.8 (1.06)	21,622	23.0 (0.39)
Women	2,967	15.8 (0.83)	27,493	17.8 (0.32)
Race/ethnicity				
Non-Hispanic white	2,841	18.0 (0.95)	28,819	22.0 (0.36)
Non-Hispanic black	1,235	17.4 (1.44)	7,661	21.5 (0.56)
All Hispanic	1,040	12.3 (1.27)	9,216	13.6 (0.48)
Mexican American	617	11.0 (1.38)	5,513	13.5 (0.58)
Other Hispanic	423	14.3 (2.41)	3,703	13.9 (0.79)
Non-Hispanic Asian	258	8.0 (1.76)	3,060	11.0 (0.72)
Education				
Elementary	739	14.3 (2.15)	3,019	17.9 (0.92)
Some high school	743	20.7 (1.88)	4,832	33.8 (0.92)
High school graduate	1,582	18.6 (1.18)	12,951	27.8 (0.56)
Some college	1,466	18.9 (1.48)	14,714	20.7 (0.46)
College graduate	862	9.5 (1.16)	13,379	8.8 (0.30)

Diabetes status is based on self-report. SE, standard error.
SOURCE: National Health Interview Surveys 2009–2010

APPENDIX 10.33. Prevalence of Smoking Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2007–2010

	PERCENT (STANDARD ERROR)				
SMOKING	Diagnosed Diabetes* N=1,481	Undiagnosed Diabetes (Clinical Definition)† N=466	Undiagnosed Diabetes (Research Definition)‡ N=635	Prediabetes‡ N=1,815	Normal Glucose‡ N=1,723
Current smoker	17.4 (1.08)	17.9 (2.46)	16.8 (1.66)	21.4 (1.21)	21.2 (1.05)
Former smoker	34.1 (1.24)	37.2 (3.45)	32.2 (2.97)	27.0 (1.91)	20.2 (1.33)
Never smoker	48.5 (1.29)	44.9 (2.80)	51.0 (2.55)	51.6 (2.16)	58.6 (1.60)

Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.34. Prevalence of Current Smoking, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

	PERCENT (STANDARD ERROR)				
CHARACTERISTICS	Diagnosed Diabetes* N=1,481	Undiagnosed Diabetes (Clinical Definition)† N=507	Undiagnosed Diabetes (Research Definition)‡ N=674	Prediabetes‡ N=2,040	Normal Glucose‡ N=1,462
Age (years)					
20–44	27.2 (4.97)	27.4 (6.23)	29.4 (6.18)	28.1 (2.25)	24.7 (1.49)
45–64	22.6 (1.84)	22.3 (5.06)	16.9 (3.23)	22.8 (2.19)	16.9 (2.20)
≥65	8.3 (0.80)	9.4 (2.05)	11.7 (2.68)	7.1 (1.06)	4.5 (1.67)[2]
Sex					
Men	20.4 (1.76)	20.7 (3.67)	22.5 (3.23)	22.4 (1.98)	26.0 (1.75)
Women	14.5 (1.83)	13.2 (2.64)	10.7 (1.88)	20.2 (2.09)	17.5 (1.34)
Race/ethnicity					
Non-Hispanic white	18.2 (1.63)	12.9 (3.36)	14.6 (2.20)	20.9 (1.61)	21.6 (1.47)
Non-Hispanic black	19.5 (2.25)	26.7 (4.97)	25.0 (4.35)	28.4 (3.15)	24.7 (2.00)
Hispanic	13.3 (1.18)	24.1 (4.52)	18.5 (3.65)	17.8 (2.40)	17.9 (2.63)
Mexican American	14.0 (1.48)	20.9 (3.96)	18.7 (4.16)	17.1 (2.87)	15.8 (2.30)
Other Hispanic	12.1 (2.07)	30.0 (9.77)[1]	18.2 (7.19)[1]	19.1 (4.06)	21.1 (4.37)
Other/Multiracial	12.6 (5.61)[2]	38.2 (16.62)[2]	32.0 (14.78)[2]	22.2 (4.24)	18.7 (5.86)
Education					
<9th grade	18.9 (2.71)	16.5 (5.65)[1]	20.1 (4.92)	26.2 (3.67)	30.0 (4.80)
Some high school	24.5 (4.24)	34.1 (6.72)	32.0 (7.02)	36.2 (3.19)	41.9 (5.22)
High school graduate/GED	17.7 (2.45)	21.2 (4.22)	17.8 (3.17)	27.8 (2.68)	32.6 (2.51)
Some college	15.0 (2.24)	16.2 (5.66)[1]	11.3 (3.03)	18.7 (1.80)	18.9 (1.75)
College graduate	12.3 (3.38)	[3]	[3]	8.7 (1.37)	9.4 (1.43)

Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
[1] Relative standard error >30%–40%
[2] Relative standard error >40%–50%
[3] Estimate is too unreliable to present; ≤1 case or relative standard error >50%.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.35. Prevalence of Health Behaviors Among Adults Age ≥20 Years, by Diabetes Status, U.S., 2007–2010

HEALTH BEHAVIORS	PERCENT (STANDARD ERROR)				
	Diagnosed Diabetes* N=753	Undiagnosed Diabetes (Clinical Definition)† N=168	Undiagnosed Diabetes (Research Definition)‡ N=221	Prediabetes‡ N=538	Normal Glucose‡ N=219
Eating fewer high fat foods§	88.2 (1.38)	79.6 (3.81)	84.2 (2.79)	83.0 (2.53)	83.4 (2.95)
Increasing activity‖	75.2 (2.44)	80.6 (5.30)	75.5 (5.50)	77.0 (2.84)	81.9 (2.84)
Practicing weight control¶	86.2 (1.63)	83.2 (3.08)	84.0 (4.28)	84.0 (2.68)	82.7 (3.97)
Had a health care visit in past year#	97.5 (0.43)	85.9 (2.12)	88.6 (1.66)	83.5 (1.13)	81.8 (0.93)

Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
§ Question asked among persons told by a doctor to eat less fat and cholesterol in order to lower cholesterol level.
‖ Question asked among persons told by a doctor to exercise to reduce cholesterol level.
¶ Question asked among persons told by a doctor to control weight in order to improve cholesterol level.
\# At least one health care visit in past year to see a doctor or health care professional at a doctor's office, clinic, hospital, emergency room, at home, or some other place.
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.36. Prevalence of Eating Fewer High Fat Foods, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	PERCENT (STANDARD ERROR)				
	Diagnosed Diabetes* N=753	Undiagnosed Diabetes (Clinical Definition)† N=168	Undiagnosed Diabetes (Research Definition)‡ N=221	Prediabetes‡ N=538	Normal Glucose‡ N=219
Total	88.2 (1.38)	79.6 (3.81)	84.2 (2.79)	83.0 (2.53)	83.4 (2.95)
Age (years)					
20–44	87.1 (3.88)	77.4 (15.09)	48.2 (23.4)[1]	75.4 (5.87)	82.4 (6.00)
45–64	87.1 (1.94)	82.1 (6.27)	89.2 (4.25)	83.1 (3.11)	80.6 (4.03)
≥65	89.9 (1.89)	77.2 (6.60)	83.1 (4.38)	87.0 (3.51)	94.0 (3.32)
Sex					
Men	88.5 (1.76)	72.3 (5.39)	73.2 (5.53)	84.7 (2.77)	76.5 (5.88)
Women	87.8 (2.31)	91.1 (2.50)	94.4 (1.68)	81.3 (3.38)	88.6 (3.30)
Race/ethnicity					
Non-Hispanic white	89.4 (1.74)	74.8 (5.30)	81.9 (3.52)	83.7 (2.95)	82.8 (3.68)
Non-Hispanic black	87.5 (1.78)	97.3 (2.73)	97.8 (2.21)	85.1 (4.84)	83.0 (6.09)
Hispanic	85.6 (2.28)	90.5 (5.14)	91.8 (4.00)	78.7 (4.17)	83.2 (5.38)
Mexican American	87.0 (2.86)	92.2 (4.75)	89.4 (5.17)	72.1 (4.44)	74.8 (6.36)
Other Hispanic	83.2 (4.08)	86.3 (12.61)	94.9 (5.41)	89.2 (5.88)	90.6 (5.17)
Other/Multiracial	83.0 (8.92)	83.8 (11.71)	86.5 (8.59)	77.3 (11.41)	100.0
Education					
<9th grade	87.0 (3.05)	81.1 (16.03)	79.4 (11.37)	83.5 (6.54)	79.1 (11.50)
Some high school	93.2 (1.95)	96.4 (2.70)	85.3 (7.64)	82.4 (6.03)	77.9 (11.49)
High school graduate	86.7 (4.07)	71.4 (11.52)	84.8 (6.63)	78.0 (5.48)	76.0 (5.87)
Some college	86.4 (3.96)	76.5 (12.15)	79.6 (9.79)	89.2 (3.09)	86.2 (4.03)
College graduate	89.3 (3.63)	79.8 (10.88)	90.6 (4.92)	81.2 (4.94)	85.8 (5.05)

Question asked among persons told by a doctor to eat less fat and cholesterol in order to lower cholesterol level. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diagnosed diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.
[1] Relative standard error >40%–50%
SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.37. Prevalence of Pursuing Smoking Cessation, by Diabetes Status and Demographic Characteristics, U.S., 2009–2010

	DIABETES		NO DIABETES	
CHARACTERISTICS	**N**	**Percent (SE)**	**N**	**Percent (SE)**
Total	883	51.5 (2.27)	9,823	46.4 (0.70)
Age (years)				
18–44	164	55.7 (5.13)	5,337	50.9 (0.88)
45–64	518	52.4 (2.88)	3,638	40.9 (1.08)
≥65	201	43.7 (4.65)	848	38.0 (2.21)
Sex				
Men	434	50.7 (3.56)	4,997	45.2 (0.92)
Women	499	52.4 (2.81)	4,826	47.8 (0.96)
Race/ethnicity				
Non-Hispanic white	499	50.1 (2.89)	6,344	44.6 (0.82)
Non-Hispanic black	213	57.9 (4.27)	1,695	53.5 (1.69)
All Hispanic	130	51.1 (5.50)	1,310	50.3 (2.06)
Mexican American	69	38.8 (6.47)	767	48.8 (2.49)
Other Hispanic	61	67.2 (7.39)	543	52.7 (3.26)
Non-Hispanic Asian	26	42.7 (11.20)	355	50.9 (3.52)
Education				
Elementary	89	53.0 (8.47)	491	42.6 (2.86)
Some high school	150	46.8 (5.90)	1,481	43.7 (1.72)
High school graduate	289	46.1 (3.47)	3,428	44.8 (1.15)
Some college	257	60.0 (3.81)	3,132	49.6 (1.12)
College graduate	93	48.5 (6.55)	1,251	47.0 (1.70)

Diabetes status is based on self-report. SE, standard error.

SOURCE: National Health Interview Surveys 2009–2010

APPENDIX 10.38. Prevalence of Increasing Exercise, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

	PERCENT (STANDARD ERROR)				
CHARACTERISTICS	**Diagnosed Diabetes* N=753**	**Undiagnosed Diabetes (Clinical Definition)† N=168**	**Undiagnosed Diabetes (Research Definition)‡ N=221**	**Prediabetes‡ N=538**	**Normal Glucose‡ N=219**
Total	75.2 (2.44)	80.6 (5.30)	75.5 (5.50)	77.0 (2.84)	81.9 (2.84)
Age (years)					
20–44	91.2 (3.67)	48.8 (14.86)[1]	62.1 (19.84)	62.0 (7.76)	86.9 (3.80)
45–64	73.5 (3.24)	87.5 (5.96)	76.8 (7.35)	79.1 (3.65)	83.1 (4.01)
≥65	73.5 (3.61)	76.0 (6.79)	75.6 (6.48)	84.2 (3.50)	64.1 (7.98)
Sex					
Men	80.8 (2.55)	84.4 (6.82)	78.0 (6.69)	78.2 (4.05)	81.0 (4.49)
Women	69.6 (3.33)	75.1 (6.23)	73.4 (6.94)	75.5 (3.06)	82.6 (3.27)
Race/ethnicity					
Non-Hispanic white	74.2 (3.68)	79.7 (7.29)	74.2 (7.10)	76.4 (3.31)	81.6 (3.46)
Non-Hispanic black	77.7 (2.68)	89.6 (4.84)	91.6 (4.05)	89.3 (4.48)	82.7 (6.70)
Hispanic	75.5 (2.67)	72.8 (8.18)	68.8 (8.48)	59.2 (5.14)	78.2 (7.20)
Mexican American	76.3 (4.07)	75.7 (8.23)	73.6 (7.28)	58.2 (7.72)	81.8 (12.01)
Other Hispanic	74.2 (3.54)	65.4 (16.34)	62.0 (16.56)	60.7 (5.86)	75.6 (8.39)
Other/Multiracial	76.4 (10.49)	88.9 (10.93)	80.9 (17.01)	92.9 (6.95)	88.6 (12.30)
Education					
<9th grade	65.5 (5.44)	94.2 (4.45)	92.9 (4.40)	73.1 (10.52)	69.1 (18.61)
Some high school	77.6 (4.32)	77.4 (7.22)	72.6 (8.64)	84.3 (4.10)	60.7 (14.77)
High school graduate	74.6 (6.35)	66.8 (11.20)	63.5 (10.20)	72.0 (5.67)	86.8 (5.21)
Some college	75.4 (4.39)	95.0 (3.84)	88.2 (6.13)	79.3 (4.90)	84.5 (4.70)
College graduate	80.7 (5.19)	79.3 (12.00)	76.2 (10.88)	76.5 (4.38)	82.8 (4.14)

Question asked among persons told by a doctor to exercise to reduce cholesterol level. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions*. A1c, glycosylated hemoglobin.

* Diagnosed diabetes is based on self-report.

† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.

‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.

[1] Relative standard error >30%–40%

SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.39. Prevalence of Practicing Weight Control, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	PERCENT (STANDARD ERROR)				
	Diagnosed Diabetes* N=753	Undiagnosed Diabetes (Clinical Definition)† N=168	Undiagnosed Diabetes (Research Definition)‡ N=221	Prediabetes‡ N=538	Normal Glucose‡ N=219
Total	86.2 (1.63)	83.2 (3.08)	84.0 (4.28)	84.0 (2.68)	82.7 (3.97)
Age (years)					
20–44	90.7 (3.51)	81.2 (12.92)	85.3 (10.13)	72.6 (8.21)	83.1 (5.92)
45–64	85.3 (2.28)	82.8 (5.37)	84.5 (6.21)	84.0 (3.10)	82.4 (5.04)
≥65	86.4 (2.56)	83.8 (6.49)	83.1 (6.01)	92.1 (2.69)	82.4 (6.59)
Sex					
Men	87.8 (1.86)	78.2 (3.97)	73.8 (5.44)	85.6 (3.66)	73.6 (7.07)
Women	84.7 (2.83)	91.5 (4.02)	93.0 (4.90)	82.0 (3.29)	89.8 (2.69)
Race/ethnicity					
Non-Hispanic white	87.5 (2.48)	79.8 (4.43)	81.7 (5.36)	84.8 (3.39)	82.0 (4.94)
Non-Hispanic black	85.5 (1.96)	94.2 (4.41)	94.8 (3.94)	88.4 (4.80)	85.3 (7.45)
Hispanic	80.7 (2.52)	83.6 (7.46)	85.9 (5.74)	71.6 (4.61)	72.7 (7.59)
Mexican American	81.8 (3.23)	89.1 (6.65)	91.9 (4.61)	65.6 (7.74)	62.1 (10.11)
Other Hispanic	79.0 (4.39)	70.9 (17.07)	77.6 (10.51)	78.6 (5.37)	81.2 (8.82)
Other/Multiracial	88.2 (7.36)	100.0	100.0	85.8 (11.14)	100.0
Education					
<9th grade	82.4 (3.39)	92.6 (5.84)	75.7 (17.92)	82.2 (6.85)	83.5 (11.39)
Some high school	88.7 (3.04)	89.6 (4.76)	82.7 (8.45)	85.4 (6.61)	74.6 (12.51)
High school graduate	89.6 (2.92)	74.4 (13.30)	85.7 (8.22)	75.5 (6.12)	81.1 (6.28)
Some college	84.4 (3.75)	83.0 (13.32)	88.3 (9.55)	91.6 (2.78)	79.8 (7.13)
College graduate	84.6 (4.90)	89.3 (9.95)	80.3 (12.00)	84.0 (5.51)	86.7 (6.26)

Question asked among persons told by a doctor to control weight in order to improve cholesterol level. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.
* Diabetes is based on self-report.
† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.
‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.

SOURCE: National Health and Nutrition Examination Surveys 2007–2010

APPENDIX 10.40. Prevalence of Visiting a Doctor in the Past Year, by Diabetes Status and Demographic Characteristics, U.S., 2009–2010

CHARACTERISTICS	DIABETES		NO DIABETES	
	N	Percent (SE)	N	Percent (SE)
Total	5,409	87.1 (0.58)	48,799	65.3 (0.32)
Age (years)				
18–44	714	79.7 (1.84)	24,349	56.6 (0.41)
45–64	2,409	87.1 (0.83)	15,944	70.0 (0.50)
≥65	2,286	90.1 (0.77)	8,506	85.6 (0.48)
Sex				
Men	2,449	87.0 (0.83)	21,485	60.0 (0.46)
Women	2,960	87.2 (0.74)	27,314	70.0 (0.38)
Race/ethnicity				
Non-Hispanic white	2,826	88.8 (0.75)	28,646	69.3 (0.39)
Non-Hispanic black	1,232	87.5 (1.14)	7,601	61.6 (0.77)
All Hispanic	1,039	79.9 (1.76)	9,160	51.0 (0.66)
Mexican American	618	76.2 (2.50)	5,490	47.9 (0.82)
Other Hispanic	421	86.3 (1.92)	3,670	56.0 (1.13)
Non-Hispanic Asian	258	86.8 (2.48)	3,035	60.1 (1.05)
Education				
Elementary	734	86.1 (1.51)	2,997	55.8 (1.20)
Some high school	742	86.2 (1.52)	4,804	56.8 (0.87)
High school graduate	1,576	87.2 (1.04)	12,860	62.5 (0.54)
Some college	1,460	87.8 (1.18)	14,625	66.3 (0.53)
College graduate	860	87.2 (1.43)	13,298	71.3 (0.54)

Diabetes status is based on self-report. SE, standard error.
SOURCE: National Health Interview Surveys 2009–2010

APPENDIX 10.41. Prevalence of Having a Health Care Visit in the Past Year, by Diabetes Status and Demographic Characteristics, U.S., 2007–2010

CHARACTERISTICS	PERCENT (STANDARD ERROR)				
	Diagnosed Diabetes* N=753	Undiagnosed Diabetes (Clinical Definition)† N=168	Undiagnosed Diabetes (Research Definition)‡ N=221	Prediabetes‡ N=538	Normal Glucose‡ N=219
Total	97.5 (0.43)	85.9 (2.12)	88.6 (1.66)	83.5 (1.13)	81.8 (0.93)
Age (years)					
20–44	93.9 (2.06)	60.1 (6.39)	68.7 (7.10)	75.1 (2.15)	79.4 (1.34)
45–64	97.0 (0.79)	84.8 (3.49)	87.8 (2.77)	84.0 (1.58)	85.1 (1.84)
≥65	99.3 (0.27)	96.6 (1.50)	97.3 (1.12)	96.4 (0.94)	91.7 (2.43)
Sex					
Men	97.0 (0.69)	82.5 (2.92)	84.5 (2.52)	79.7 (1.18)	73.1 (1.54)
Women	98.0 (0.71)	91.7 (1.80)	93.1 (1.43)	87.8 (1.72)	88.5 (1.11)
Race/ethnicity					
Non-Hispanic white	98.5 (0.59)	91.9 (2.21)	94.3 (1.60)	88.3 (1.52)	84.2 (1.21)
Non-Hispanic black	98.0 (0.94)	84.8 (5.56)	81.8 (7.10)	79.5 (1.60)	78.0 (3.77)
Hispanic	92.6 (1.29)	68.6 (3.40)	69.4 (3.61)	64.2 (2.70)	71.9 (2.20)
Mexican American	91.8 (1.39)	67.1 (5.23)	64.9 (5.48)	60.5 (3.65)	70.0 (2.96)
Other Hispanic	93.9 (2.74)	71.3 (5.12)	76.9 (5.53)	71.2 (4.98)	74.8 (3.21)
Other/Multiracial	97.1 (2.85)	68.2 (15.46)	73.3 (13.37)	77.7 (6.07)	81.6 (4.04)
Education					
<9th grade	97.1 (0.87)	84.5 (4.56)	85.8 (3.76)	75.1 (2.63)	65.9 (6.19)
Some high school	97.9 (0.75)	75.3 (5.30)	82.0 (4.71)	75.7 (3.28)	75.0 (2.61)
High school graduate	98.2 (0.56)	88.1 (2.43)	88.6 (2.91)	82.1 (2.38)	81.3 (2.50)
Some college	95.9 (1.53)	84.4 (3.76)	88.2 (2.56)	85.0 (1.60)	80.4 (1.87)
College graduate	99.1 (0.67)	94.3 (3.75)	97.1 (1.78)	89.8 (1.65)	87.0 (1.85)

At least one health care visit in past year to see a doctor or health care professional at a doctor's office, clinic, hospital, emergency room, at home, or some other place. Conversions for A1c and glucose values are provided in *Diabetes in America Appendix 1 Conversions.* A1c, glycosylated hemoglobin.

* Diagnosed diabetes is based on self-report.

† Undiagnosed diabetes (clinical definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL.

‡ Undiagnosed diabetes (research definition) is defined as A1c ≥6.5% or fasting plasma glucose ≥126 mg/dL or 2-hour plasma glucose ≥200 mg/dL; prediabetes is defined as A1c 5.7%–<6.5% or fasting plasma glucose 100–<126 mg/dL or 2-hour plasma glucose 140–<200 mg/dL; normal glucose is defined as A1c <5.7% and fasting plasma glucose <100 mg/dL and 2-hour plasma glucose <140 mg/dL.

SOURCE: National Health and Nutrition Examination Surveys 2007–2010