

Section 15

LINKS TO SYSTEMIC HEALTH/ MANIFESTATIONS OF SYSTEMIC DISEASE

During the past decade there has been increasing evidence documenting the relationships between oral health and systemic disease. Systemic conditions that have been reported to be associated with oral health include diabetes, HIV/AIDS, osteoporosis, respiratory and vascular diseases, osteoarthritis and rheumatoid arthritis, oral cancers, and preterm low-birth weight pregnancy outcomes.

HIV/AIDS, diabetes, and osteoporosis have been reported to be risk factors for periodontal disease (US DHHS, 2000; Chen, 2000). Periodontal disease has also been suggested to have an effect on the control of diabetes. There are a number of oral manifestations associated with these diseases. Oral manifestations of HIV infection include oral candidiasis (most common), hairy leukoplakia, Kaposi's sarcoma, oral erythema, labial herpetic infection, herpes simplex virus, varicella-zoster virus, cytomegalovirus, aphthous ulceration, gangrenous stomatitis, xerostomia, and periodontal disease (Gillespie & Marino, 1993; Scully & McCarthy, 1992; Itin et al., 1993; McKaig et al., 2000). Oral soft tissue abnormalities associated with diabetes include hyperplastic gingivitis (Van Dis et al., 1988) and lichen planus (Bagan-Sebastian, 1992).

Joint diseases also can have oral manifestations. Osteoarthritis and rheumatoid arthritis may affect the temporomandibular joints (TMD, temporomandibular joint disorder), leading to chronic deterioration of the joint. Patients may present with pain and diminished function (Chen, 2000). Some cases of TMD can be attributed to these types of arthritis. Respiratory diseases that may be affected by poor oral health include bacterial pneumonia and chronic obstructive pulmonary disease (Taylor et al., 2000; Chen, 2000).

Medications and treatments associated with a variety of systemic diseases have consequences for oral health. Mucositis caused by cancer therapies can often be a limiting factor in therapy. Xerostomia is associated with a large number of medications.

This section examines the prevalence of type 1 and type 2 diabetes, dental visits in the past year by diabetics, the prevalence of oral manifestations of HIV/AIDS, and the prevalence of osteoporosis.

REFERENCES

- Bagan-Sebastian JV, Milian-Masanet MA, Penarrocha-Diago M, Jimenez Y. A clinical study of 205 patients with oral lichen planus. *J Oral Maxillofac Surg* 1992;50:116-8.
- Chen I. The surgeon general's report on oral health: implications for research and education. *NY State Dent J* 2000;66:38-42.
- Gillespie GM, Marino R. Oral manifestations of HIV infection: a Panamerican perspective. *J Oral Pathol Med* 1993;22:2-7.
- Itin PH, Lautenschlager S, Fluckiger R, Rufli T. Oral manifestations in HIV-infected patients: diagnosis and management. *J Am Acad Dermatol* 1993;29:749-60.
- McKaig RG, Patton LL, Thomas JC, et al. Factors associated with periodontitis in an HIV-infected southeast USA study. *Oral Dis* 2000;6:158-65.
- Scully C, McCarthy G. Management of oral health in persons with HIV infection. *Oral Surg Oral Med Oral Pathol* 1992;73:215-25.
- Taylor GW, Loesche WJ, Terpenning MS. Impact of oral diseases on systemic health in the elderly: diabetes mellitus and aspiration pneumonia. *J Public Health Dent* 2000;60:313-20.
- U.S. Department of Health and Human Services. *Oral Health in America: A Report of the Surgeon General*. Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000.
- Van Dis ML, Allen CM, Neville BW. Erythematous gingival enlargement in diabetic patients: a report four cases. *J Oral Maxillofac Surg* 1988;46:794-8.

15.1 Prevalence of type 1 and type 2 diabetes

Diabetes mellitus is a chronic disease of metabolism. It poses a significant public health challenge for the United States. More than 16 million people in the United States have diabetes and there are about 800,000 new cases diagnosed each year. In diabetics the pancreas either does not produce enough insulin or other cells in the body do not properly respond to it. This results in an increased level of glucose in the blood and can lead to a number of serious complications. Diabetes is one of the leading causes of death and disability in the United States. The complications of diabetes include blindness, heart and blood vessel disease, strokes, kidney failure, amputations, and nerve damage. Diabetics are at increased risk for destructive periodontitis and subsequent tooth loss (Loe, 1993; Papapanou, 1996). In addition, untreated periodontitis in persons with diabetes may complicate glycemic control (Taylor, 1999). There are three types of diabetes: gestational, type 1, and type 2.

Gestational diabetes

Gestational diabetes only occurs during pregnancy. It occurs more often in African Americans, American Indians, Hispanic Americans, and in women with a family history of diabetes. It usually disappears after delivery.

Type 1 diabetes

Type 1 diabetes is an autoimmune disease. The immune system attacks the insulin-producing beta cells in the pancreas and destroys them. Little or no insulin is produced and people with type 1 diabetes have to take insulin. The causes for this disease are unknown. Type 1 diabetes accounts for about 5% to 10% of diagnosed diabetes in the United States. It usually develops in children and young adults. It is equally common in males and females, and is more common in whites than in nonwhites. Type 1 diabetics are at higher risk for a variety of oral soft tissue lesions (Guggenheimer et al., 2000) including hyperplastic gingivitis (Van Dis et al., 1988) and lichen planus (Bagan-Sebastian, 1992).

Type 2 diabetes

Type 2 diabetes is the most common form. About 90% to 95% of people with diabetes have type 2, and one-third of them have not been diagnosed. Type 2 diabetes usually develops in adults aged 40 and older and is most common in adults over age 55. African Americans, American Indians, Asian and Pacific Islander Americans, and Hispanic Americans are at higher risk than non-Hispanic whites of the same age. American Indians have the highest rates of diabetes in the world. About 80% of people with type 2 diabetes are overweight. The prevalence of diabetes in the United States will probably continue to increase for several reasons. The population is aging. Hispanic Americans and other high-risk minority groups make up the fastest-growing segment of the population. Finally, Americans are increasingly overweight and sedentary. The prevalence of diabetes in the United States is predicted to reach 8.9% of the population by 2025.

SOURCE OF DATA

The analyses reported here are based the Third National Health and Nutrition Examination Survey (NHANES III) 1988-1994, National Center for Health Statistics, Centers for Disease Control and Prevention.

■ **Diabetes prevalence (Figure 15.1.1)**

- Among adults aged 30 and older higher percentages of persons with diabetes were observed in association with older age groups through age 79.
- The prevalence of diabetes was greater for non-Hispanic blacks and Mexican Americans compared to non-Hispanic whites.

Bullets reference data that can be found in Table 15.1.1.

REFERENCES

Bagan-Sebastian JV, Milián-Masanet MA, Penarrocha-Diago M, Jiménez Y. A clinical study of 205 patients with oral lichen planus. *J Oral Maxillofac Surg* 1992;50:116-8.

Guggenheimer J, Moore PA, Rossie K, et al. Insulin-dependent diabetes mellitus and oral soft tissue pathologies. Part I: Prevalence and characteristics of noncandidal lesions. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2000;89:563-9.

Loe H. Periodontal disease: the sixth complication of diabetes mellitus. *Diabetes Care* 1993;16(S1):329-34.

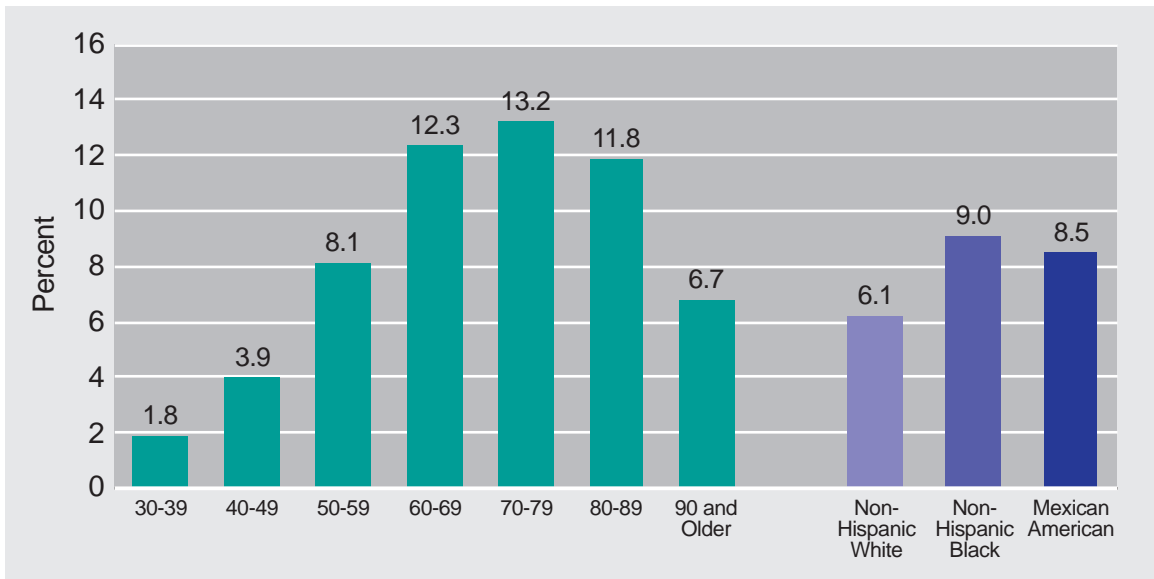
National Diabetes Information Clearinghouse, a service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). The clearinghouse is available at <http://www.niddk.nih.gov/health/diabetes/pubs/dmover/dmover.htm#what>

Papapanou P. Periodontal diseases: epidemiology. *Ann Periodontol* 1996;1:1-36.

Taylor G. Periodontal treatment and its effects on glycemic control. *Oral Surg, Oral Med, Oral Pathol, Oral Radiol, Endod* 1999;87:311-6.

Van Dis ML, Allen CM, Neville BW. Erythematous gingival enlargement in diabetic patients: a report four cases. *J Oral Maxillofac Surg* 1988;46:794-8.

Figure 15.1.1. Percentage of persons with diabetes among adults aged 30 and older by age group and race/ethnicity



Data source: The Third National Health and Nutrition Examination Survey (NHANES III) 1988-1994, National Center for Health Statistics, Centers for Disease Control and Prevention.

15.2 Dental visits in the past year among those diagnosed with diabetes

Regular dental visits provide important opportunities for prevention, early detection, and treatment of periodontal problems and soft tissue lesions in persons with diabetes. Among adult diabetics, data from the 1998 NHIS showed that 49.9% had visited a dentist within the past year while 64.6% of nondiabetic adults visited a dentist within the past year. The percentage of nondiabetics visiting a dentist within the past year was significantly greater than that for diabetics for all race/ethnic groups (except Hispanics), gender, and federal poverty level.

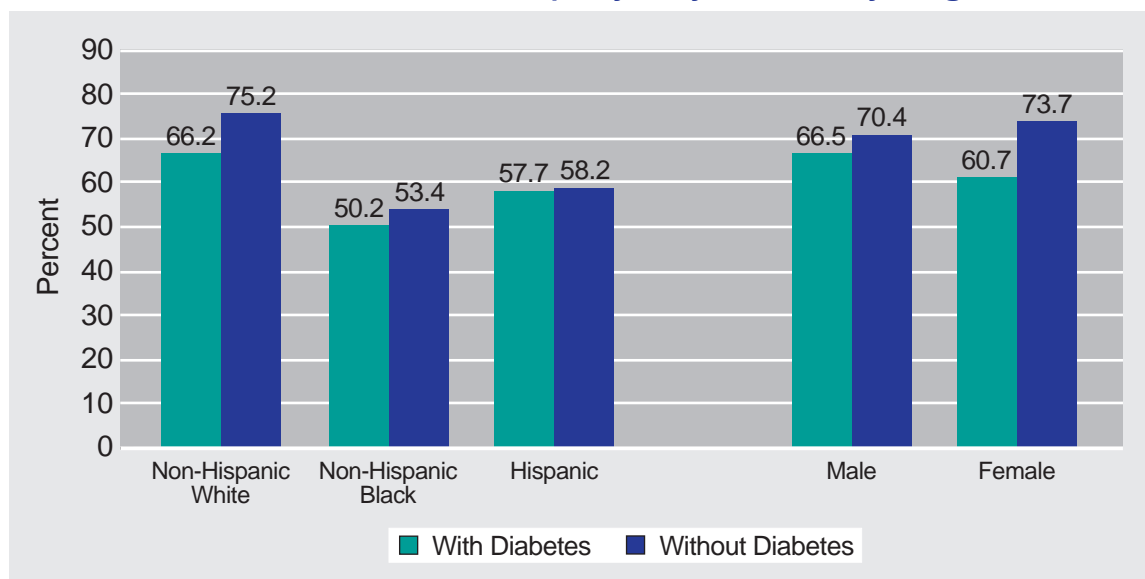
SOURCE OF DATA

The analyses reported here are based on the 1998 National Health Interview Survey, National Center for Health Statistics, Centers for Disease Control and Prevention. Diabetics are defined as those who reported being told by a doctor that they had diabetes. Analyses were performed separately for total, dentate and edentulous adults.

Demographic differences

- Dental visits in the past year are much less common among edentulous compared with dentate adults in all groups.
- A lower percentage of diabetics visited a dentist during the past year compared to non-diabetics. This difference was significant for dentate (63.2% vs. 72.3%) but not for edentulous adults (16.2% vs. 18.4%).
- Among dentate adults, a lower percentage of non-Hispanic white diabetics compared to non-Hispanic white non-diabetics visited a dentist during the past year. The percentages for diabetics and non-diabetics are similar among non-Hispanic blacks and Hispanics (Figure 15.2.1).
- Among dentate adults, a lower percentage of female diabetics compared to female non-diabetics visited a dentist during the past year (Figure 15.2.1).

Figure 15.2.1. Percentage of dentate adults aged 50 and older with and without diabetes who visited a dentist* within the past year by race/ethnicity and gender



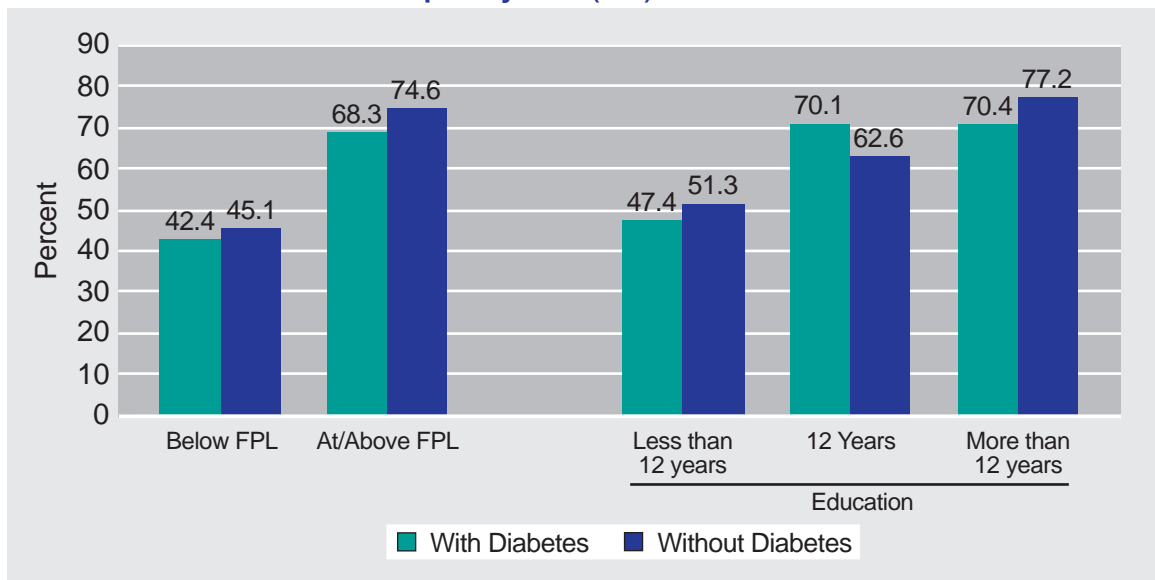
*Types of dentists include dental hygienists, orthodontists, oral surgeons, and all other dental specialists.

Data source: 1998 National Health Interview Survey, National Center for Health Statistics, Centers for Disease Control and Prevention.

- Among both dentate and edentulous adults, a lower percentage of diabetics living at or above the federal poverty level visited a dentist within the past year compared to non-diabetics living at or above the federal poverty level (Figure 15.2.2).
- A lower percentage of diabetics with more than 12 years of education had visited the dentist in the past year compared to non-diabetics with more than 12 years of education (Figure 15.2.2). Similar results held for edentulous adults.

Bullets reference data that can be found in Tables 15.2.1 and 15.2.2.

Figure 15.2.2. Percentage of dentate adults aged 50 and older with and without diabetes who visited a dentist* within the past year by federal poverty level (FPL) and education



*Types of dentists include dental hygienists, orthodontists, oral surgeons, and all other dental specialists.
 Data source: 1998 National Health Interview Survey, National Center for Health Statistics, Centers for Disease Control and Prevention.

15.3 Prevalence of HIV/AIDS-related oral manifestations

The human immunodeficiency virus (HIV) is a viral infection that gradually destroys the immune system. Primary or acute HIV infection may be associated with symptoms resembling mononucleosis or influenza. HIV seroconversion usually occurs within 3 months of exposure. Acute HIV infection can, but does not always, progress to symptomatic HIV infection and advanced HIV diseases or acquired immunodeficiency syndrome (AIDS). It cannot be assumed that all people infected with HIV will inevitably progress to AIDS. It is estimated that 1 out of every 200 people in the United States carries the HIV virus, but not all of them are symptomatic (http://webmd.lycos.com/content/asset/adam_disease_hiv_infection).

The prevalence of AIDS in the United States has been increasing, although the rate of increase has slowed (CDC, 2000). This increase is in part due to increased survival time resulting from new drug therapies and better medical management. It extends across all groups, inclusive of race, gender, age, and geographic location. Approximately 320,000 persons were living with AIDS at the end of 1999.

Rates of HIV transmission and disease among African Americans are disproportionately high and not declining as rapidly in response to effective interventions as they are among whites (Smith et al., 2000). A number of factors have been suggested for this disparity, including increased rates of participation in high-risk sexual and drug use behaviors (Aral et al., 1996; Rothenberg, 1996; Shiboski & Padian, 1996; Smith et al., 2000).

The oral manifestations of HIV/AIDS include oral candidiasis, which is frequently observed in the earliest stages of HIV infection. It affects more than 30% of HIV-positive individuals and is seen in more than 90% of AIDS patients (US DHHS, 2000; Patton et al., 1999). Other oral lesions seen among AIDS patients include linear gingival erythema, necrotizing ulcerative periodontitis, stomatitis, gingivitis, oral hairy leukoplakia, herpes simplex virus infection, cytomegalovirus ulceration, human papillomavirus infection, recurrent aphthous ulcers, and HIV salivary gland disease (US DHHS, 2000; Patton et al., 1999; Phelan et al., 1997).

SOURCE OF DATA

The analyses reported here are derived from Shiboski CH, Hilton JF, Neuhaus JM, et al. Human immunodeficiency virus-related oral manifestations and gender. A longitudinal analysis. The University of California, San Francisco Oral AIDS Center Epidemiology Collaborative Group. Arch Intern Med 1996;156(19):2249-54. Nationally representative data are not available. The study population included HIV-positive men and women in California. The results are part of a 4-year prospective study between 1987 and 1991. A standardized oral examination was administered at baseline and every 6 months thereafter.

■ Oral manifestations of HIV/AIDS

- Men had a higher prevalence of oral lesions than women.
- The most common type of oral lesion was oral candidiasis.

REFERENCES

Aral SO, Holmes KK, Padian, NS, Cates W. Overview: individual and population approaches to the epidemiology and prevention of sexually transmitted diseases and human immunodeficiency virus infection. J Infect Dis 1996;174 (Suppl 2): S127-S133.

Centers for Disease Control and Prevention. HIV/AIDS Surveillance Report 2000;12(1):3-4.

Patton LL, van der Host C. Oral infections and other manifestations of HIV disease. Oral Infection 1999;13:879-900.

Phelan JA. Dental lesions: diagnosis and treatment. Oral Dis 1997;3:5235-7.

Rothenberg RB. Personal risk taking and the spread of disease: beyond core groups. J Infect Dis 1996;174(Suppl 2): S144-S149.

Shiboski CH, Hilton JF, Neuhaus JM, et al. Human immunodeficiency virus-related oral manifestations and gender. A longitudinal analysis. The University of California, San Francisco Oral AIDS Center Epidemiology Collaborative Group. Arch Intern Med 1996;156(19):2249-54.

Shiboski S, Padian N. Population- and individual-based approaches to the design and analysis of epidemiologic studies of sexually transmitted disease transmission. J Infect Dis 1996;174(Suppl 2):S188-S200.

Smith DK, Gwinn M, Selik RM, et al. HIV/AIDS among African-Americans: progress or progression? *AIDS* 2000;14:1237-48.

U.S. Department of Health and Human Services. *Oral Health in America: A Report of the Surgeon General*. Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000.

Table 15.3.1. Frequency of oral lesions by gender

Lesion	Men (N=200)	Women (N=218)
	No. (%)	
Baseline visit		
Hairy leukoplakia	18 (9)	11 (5)
Candidiasis	28 (14)	9 (4)
Ulcer	0	4 (2)
All visits*		
Hairy leukoplakia	43 (22)	20 (9)
Candidiasis	47 (24)	28 (13)
Ulcer	3 (2)	11 (5)

*These percentages represent the total number of first lesions diagnosed divided by the total number of participants.
 Source: Shiboski CH, Hilton JF, Neuhaus JM, et al. Human immunodeficiency virus-related oral manifestations and gender. A longitudinal analysis. The University of California, San Francisco Oral AIDS Center Epidemiology Collaborative Group. *Arch Intern Med* 1996;156(19):2249-54. Copyrighted 1996, American Medical Association.

15.4 Prevalence of osteoporosis

Osteoporosis poses a major public health problem for the United States. Results from the NHANES III indicate that 13% to 18% (4-6 million) of American women over 50 have osteoporosis and 37% to 50% (13-17 million) have osteopenia (low bone mass, a major risk factor for osteoporosis) (Looker et al., 1997). Osteoporosis is more prevalent among white and Asian American women than among black women (US DHHS, 2000).

Osteoporosis is suspected of being a risk factor for oral bone loss (Wactawski-Wende et al., 1996). The alveolar processes of the maxilla and mandible provide the bony framework for tooth support and osteoporotic changes to these bones may directly affect tooth stability and retention (Birkenfeld et al., 1999). Kribbs et al. (1989) showed that the height of the edentulous ridge is correlated with body calcium and the mandibular bone mineral density. Greater periodontal loss of attachment was found in women with osteoporosis than in women without it (von Wowern et al., 1994). Estrogen replacement therapy affects oral bone in a manner similar to the way it affects other sites. Better tooth retention is a potential additional benefit for those using hormone replacement therapy after menopause (Grodstein et al., 1997; Krall et al., 1997; Birkenfeld et al., 1999).

SOURCE OF DATA

The analyses reported here are from the Third National Health and Nutrition Examination Survey (NHANES III) 1988-1994, National Center for Health Statistics, Centers for Disease Control and Prevention.

■ Differences in osteoporosis prevalence

- A higher percentage of persons with osteoporosis were observed in older age groups between ages 45 and 84.
- A greater percentage of non-Hispanic whites had osteoporosis compared to non-Hispanic blacks or Mexican Americans (Figure 15.4.1).
- Women were about 10 times more likely than men to have osteoporosis.

Bullets reference data that can be found in Table 15.4.1.

REFERENCES

Birkenfeld L, Yemini M, Kase NG, Birkenfeld A. Menopause-related oral alveolar bone resorption: a review of relatively unexplored consequences of estrogen deficiency. *Menopause: The Journal of the American Menopause Society* 1999;6:129-33.

Grodstein F, Colditz GA, Stampfer MJ. Postmenopausal hormone use and tooth loss: a prospective study. *J Am Dent Assoc* 1996;127:370-7.

Krall EA, Dawson-Hughes B, Hannan MT, et al. Postmenopausal estrogen replacement therapy and tooth retention. *Am J Med* 1997;102:536-42.

Kribbs PJ, Chesnut CH 3rd, Ott SM, Kilcoyne RF. Relationships between mandibular and skeletal bone in an osteoporotic population. *J Prosthet Dent* 1989;62(6):703-7.

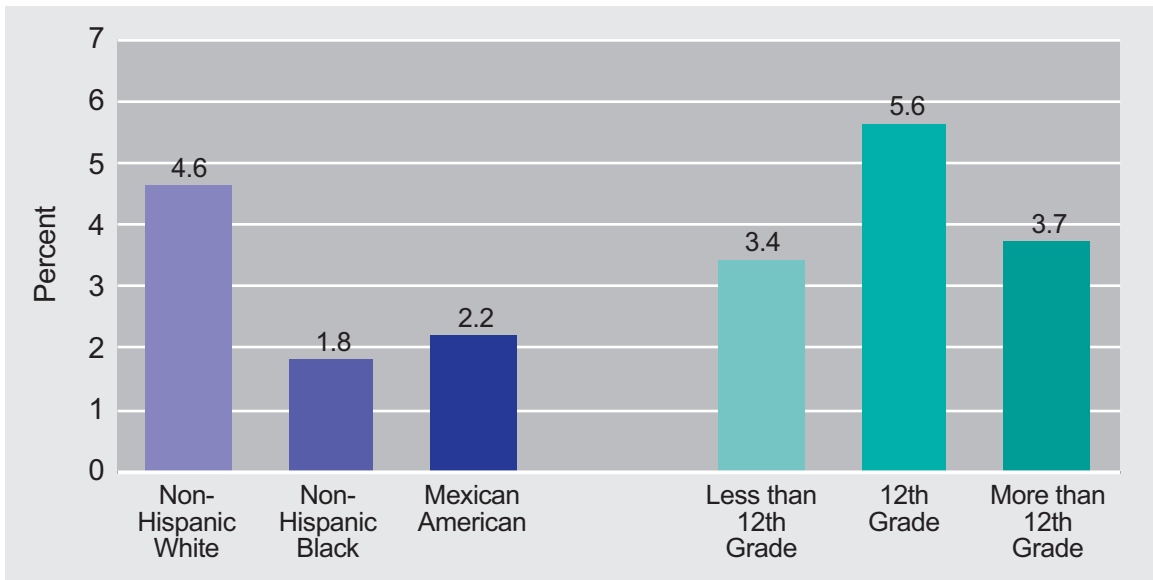
Looker AC, Orwoll ES, Johnston CC Jr, et al. Prevalence of low femoral bone density in older U.S. adults from NHANES III. *J Bone and Miner Res* 1997;12:1761-8.

U.S. Department of Health and Human Services. *Oral Health in America: A Report of the Surgeon General*. Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000.

von Wowern N, Klausen B, Kollerup G. Osteoporosis: a risk factor in periodontal disease. *J Periodontol* 1994;65:1134-8.

Wactawski-Wende J, Grossi SG, Trevisan M, et al. The role of osteopenia in oral bone loss and periodontal disease. *J Periodontol* 1996;67(10 Suppl):1076-84.

Figure 15.4.1. Prevalence of osteoporosis per 100 persons aged 45 and older by race/ethnicity and education



Note: Age standardized to the year 2000 U.S. population.

Data source: The Third National Health and Nutrition Examination Survey (NHANES III) 1988-1994, National Center for Health Statistics, Centers for Disease Control and Prevention.