Socioeconomic Status of Women With Diabetes—United States, 2000

persons1,2 and are less likely to have ade-
quity clinical and prevention care ser-
vices.3 In the United States, diabetes is a
potentially debilitating disease that is in-
creasing in prevalence4; however, little is
known about the socioeconomic sta-
tus of persons with diabetes.5 6 Women
account for approximately 52% of all
persons aged ≥20 years with diabetes.4
To assess the socioeconomic status of
women with diabetes, CDC analyzed
data from the Behavioral Risk Factor Sur-
veillance System (BRFSS), which indi-
cated that the socioeconomic status of
women with diabetes in 2000 was mark-
edly lower than that of women without
diabetes. Efforts should be focused to un-
derstand the impact of socioeconomic
conditions on the health and quality of
care of women with diabetes.

BRFSS is a state-based, random-digit-
dialed telephone survey of the nonin-
nstitutionalized U.S. population aged ≥18 years. In 2000, the median state-
specific response rate was 48.9% (range:
28.8%-71.8%) (CDC, unpublished data, 2001). Persons with diabetes were iden-
tified if they answered “yes” to the ques-
tion, “Have you ever been told by a do-
ctor that you have diabetes?” Women
who answered “no” and those who had
been told they had diabetes only dur-
ing pregnancy were considered not to
have diabetes. Data on level of educa-
tion and annual household income were
used to assess socioeconomic status;
marital status, size of household, and
employment status were used as indi-
cators of living arrangements; and
household size was derived by adding
the number of adults and number of
children aged ≤17 years. A woman was
classified as having low socioeco-
nomic status if she did not complete
high school or resided in a household
with an annual income of <$25,000.

State-specific data were aggregated
and weighted to reflect age, sex, and
racial/ethnic distribution, and chi-
square tests were used to test all uni-
variate associations. Because many
persons aged 18-24 years have not com-
pleted their education, socioeconomic
status was evaluated only for women
aged ≥25 years. Multivariate logistic
regression analysis was used to exam-
ine the relation between having dia-
betes and not completing high school or
living in a low-income household, with
control made for age, race/ethnicity, and
living arrangements. The models then
were used to calculate adjusted per-
centages using the distributions of
female respondents aged ≥25 years in
the total population. All analyses were
conducted using SASv8 software with
SUDAAN to estimate standard errors.

Of the 109,680 women who partici-
pated in the 2000 BRFSS survey, 6,835
(6.3%) had been told by a doctor that they
had diabetes (mean age at diagnosis: 48.8
years). Women with diabetes were more
likely than women without diabetes to
be aged ≥45 years; nonwhite; divorced,
separated, or widowed; living alone;
retired; or unable to work.

Among women aged ≥25 years, the
percentage with diabetes who had not
completed high school (27.7%; 95%
confidence interval [CI] = 25.7%-29.7%)
was more than twice that of
women without diabetes who had not
completed high school (12.2%; 95%
CI = 11.8%-12.6%). Among women with
diabetes, 20.5% (95% CI = 18.0%-25.3%)
of those aged 25-44 years had
not completed high school, compared
with 34.3% (95% CI = 31.4%-37.2%) of
those aged ≥65 years. Among women
without diabetes, 9.8% (95% CI = 9.2%
-10.3%) of those aged 25-44 years had
not completed high school, compared
with 20.5% (95% CI = 19.5%-21.5%) of
those aged ≥65 years. After multivar-
iate adjustment, a low level of formal
education remained significantly more
common among women with diabetes
than among those without diabetes.

Overall, women with diabetes (40.4%
[95% CI = 38.1%-42.6%]) were approxi-
mately twice as likely as women with-
out diabetes (22% [95% CI = 21.5%
-22.5%]) to have an annual household
income <$25,000. Among women with
diabetes, the percentages with incomes
<$25,000 were highest for women aged
≥65 years (47.8% [95% CI = 44.4%
-51.1%]) and those aged 44 years
(41.3% [95% CI = 35.4%-47.2%]) and
lowest (33% [95% CI = 29.5%-36.6%]
for women aged 45-64 years. In each
age group, percentages were lower for
women without diabetes (32.9%, 19.7%,
and 18.6%, respectively). After multi-
variate adjustment, the difference
between women with and without dia-
betes remained significant.

Reported by: GLA Beckles, MD, PE Thompson-Reid,
MPH, Div of Diabetes Translation, National Center for
Chronic Disease and Health Promotion, CDC.

CDC Editorial Note: The findings in this
report indicate that the socioeco-
nomic status of women with diabetes
is lower than that of women without dia-
betes and confirm the findings of the
1989 National Health Interview Sur-
vey (NHIS).3 In 2000, at least one in four
women with diabetes aged ≥25 years
had a low level of formal education, and
40% lived in low-income households.
Women with diabetes were more likely
to have a low socioeconomic status
independent of living arrangements
(i.e., marital status, size of household,
and employment status). Attaining a
higher educational level might influ-
ence decision-making, and persons with
a higher income might have better

5 tables, 1 figure omitted
access to health care, higher living standards, and other material benefits that have a positive impact on health. Although socioeconomic status might be influenced adversely by factors related to having diabetes (e.g., being unemployed or retiring early), most women with diabetes in this survey were diagnosed long after they had completed their education. BRFSS estimates suggest that the low socioeconomic status of many women with diabetes might compromise their ability to benefit from treatments that might reduce their risks for complications and premature death. Programs designed to meet the needs of women with diabetes should take socioeconomic status into account to assure that women benefit from the interventions. Performance should be carefully evaluated to assess program effectiveness and identify areas for improvement.

The findings in this report are subject to at least three limitations. First, the low median response rate suggests that the potential for participation bias. Second, all data were self-reported and might be subject to recall bias. Finally, the level of low socioeconomic status (i.e., household income <$25,000) among women with diabetes might be under-estimated because 21% of women with diabetes declined to state their income; these nonrespondents were more likely to be elderly, Hispanic, widowed, retired, or not to have completed high school (i.e., to belong to groups that are frequently low income).

CDC has initiated activities that focus on the needs of women with diabetes. CDC’s Diabetes and Women’s Health Across the Life Stages: A Public Health Perspective analyzes the epidemiologic, social, and environmental dimensions of women and diabetes and discusses public health implications. CDC, the American Diabetes Association, the American Public Health Association, and the Association of State and Territorial Health Officials are developing a National Public Health Action Plan for Diabetes and Women. CDC is sponsoring Translating Research into Action for Diabet es (TRIAD), a 5-year prospective study of the quality of diabetes care, costs, and outcomes in managed-care settings that will examine the effects of socioeconomic status on health and quality of care. Finally, CDC is encouraging increased focus on women with diabetes through the National Diabetes Education Program, a collaborative effort with the National Institutes of Health to promote early diagnosis and improvement of the treatment and outcomes for persons with diabetes (available at http://www.cdc.gov/diabetes/projects/ndeps.htm); Racial and Ethnic Approaches to Community Health (REACH) 2010, a program aimed at eliminating disparities in the health status of ethnic minorities (available at http://www.cdc.gov/reach2010), and state-based diabetes control programs.

The low socioeconomic status of many women with diabetes poses challenges to public health practitioners. As the prevalence of diabetes continues to increase, continued and creative efforts will be needed to gain greater understanding of how socioeconomic status affects the health of women with diabetes.

This report is based on data contributed by state BRFSS coordinators.

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emotional problems) was not good and usual activity (i.e., self-care, work, or recreation) was limited as a result of poor physical or mental health. Unhealthy days were defined as the total number of days for which the respondent reported feeling either physically or mentally unhealthy, up to a maximum of 30 days per respondent. Means and 95% confidence intervals (CIs) were calculated using SUDAAN to account for the complex BRFSS survey design.

During 1996–2000, a total of 13,686 adults in Puerto Rico participated in BRFSS. The average response rate was 91.8% (range: 89.4%-93.2%). An estimated 34% (95% CI = 33.1%-35.0%) of adults in Puerto Rico reported fair or poor health. Levels of self-rated health in adults in Puerto Rico did not differ by sex. On average, adults with fair or poor health reported substantially more days for which they were either physically or mentally unhealthy or limited in activity than those whose health status was good, very good, or excellent. Among persons rating their health status as fair or poor, younger adults were more likely than older adults to report mentally unhealthy days.

Men aged 18–44 years living in the island’s metropolitan or eastern regions reported the fewest (2.9) unhealthy days, and women aged ≥65 years living in the northern region reported the most (9.8) unhealthy days. The number of self-reported unhealthy days peaked in 1998 and 1999 but did not change substantially. Overall, the mean number of activity limitation days was substantially higher during 1996–2000 (2.7 days; 95% CI = 2.5–2.9) than during 1996–1997 (1.7 days; 95% CI = 1.5–1.9). The number of unhealthy days reported was significantly higher for women aged 18–44 years, 45–64 years, and ≥65 years than for men in the same three age groups by 1.4 days, 1.7 days, and 2.2 days, respectively.

Fewer unhealthy days were reported by respondents with higher education, income, and employment levels than less educated, poorer, and unemployed respondents. By educational attainment, mean unhealthy days ranged from 2.7 days for men aged 18–44 years with a high school education to 9.5 days for women aged ≥65 years who did not complete high school. By household income, the lowest mean for unhealthy days was 1.9 days for men aged 18–44 years with household incomes of $35,000–$49,999; the highest mean for unhealthy days was 9.4 days for women aged ≥65 years with incomes <$15,000 per year. By employment status, the lowest mean (1.7 days) was for self-employed men aged ≥65 years, and the highest (16.1 days) was for women aged 45–64 years who were unable to work.

Respondents who exercised during the month preceding the survey or who had never smoked cigarettes reported fewer unhealthy days than those who did not exercise or who had smoked. Those with normal body mass index (BMI) usually had fewer unhealthy days than those who were obese (BMI [kg/m²] ≥30). Persons in all age groups with diabetes had significantly more unhealthy days than those without diabetes. Persons who had been told two or more times by a health-care provider that they had high blood pressure reported significantly more unhealthy days in all age groups than those who not been told they had high blood pressure. Those who could not afford to see a health-care provider reported more unhealthy days than those who could afford to see one, but the 9% without health-care coverage had about the same mean number of unhealthy days as those with health-care coverage.

Reported by: Y Cintron, Department of Health, Office of the Assistant Secretary for Health Promotion, San Juan, Puerto Rico. R Kobau, MPH, Div of Adult and Community Health, National Center for Chronic Disease Prevention and Health Promotion, CDC.

CDC Editorial Note: The findings in this report indicate that there are substantial differences in HRQOL among subgroups in Puerto Rico. Socioeconomic and health indicators for Puerto Rico have improved substantially since 1970 as economic development has transformed a primarily agricultural economy to one based on manufacturing and services. Since 1993, Puerto Rico also has privatized public health facilities and instituted managed competition to extend health insurance coverage to the uninsured. However, the continued low per capita income in Puerto Rico adversely affects Puerto Ricans’ mental and physical health and their overall quality of life. The findings in this report reflect the impact of lower socioeconomic status on HRQOL. In some cases, low HRQOL might affect socioeconomic status (e.g., by reducing one’s productivity and associated earnings).

Puerto Rican adults reported having fewer unhealthy days but substantially worse self-rated health than U.S. adults. Lower self-reported health status among Puerto Ricans, both those living in Puerto Rico and those living on the U.S. mainland, has in part been attributed to somatization (i.e., reported physical symptoms in the absence of physical pathology as a method of expressing psychosocial problems), the stresses of acculturation (6), or ataque de nervios (a culturally meaningful expression addressing the experience of suffering either personal or social loss). Persons with fair or poor health status reported more days for which they were physically and/or mentally unhealthy or limited in activity than did persons whose health status was good, very good, or excellent. This supports the construct validity of the HRQOL measures in the Puerto Rican population: the two constructs—self-rated health and reported unhealthy days—were associated in a consistent and expected manner.

The findings in this report are subject to at least four limitations. First, households without telephones and those with only cellular phones were excluded from the sampling frame. Second, BRFSS excludes an unknown number of persons in institutions and all persons aged <18 years. Third, BRFSS might underrepresent those with a severe impairment because time and functional capacity are required to participate in BRFSS. Finally, the reasons why persons reported worse health status are unclear because BRFSS does not
assess the effects of cultural expressions of distress, acculturative stress, or other sociocultural and environmental factors that influence health.

The results of this analysis indicate that the Spanish-language HRQOL questions might be useful for other Spanish-speaking groups in the U.S. and in other Spanish-speaking countries. Differences in HRQOL in demographic, socioeconomic, and behavioral risk subgroups in Puerto Rico reflect the influence of individual biology and behavior, as well as social and environmental factors, on HRQOL.9

Policy makers can track HRQOL to identify groups with unmet health needs.10 Public health interventions designed to reach vulnerable demographic, socioeconomic, and behavioral risk groups with poor HRQOL might help adults in Puerto Rico to increase their quality and years of healthy life and eliminate health disparities.9

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*This rate is the upper bound response rate, which includes completed interviews, refusals, and terminations. The resulting estimate reflects the cooperation of respondents contacted and is not affected by different in telephone sampling efficiency. The response rates for 1996 and 2000 are unavailable. Council of American Survey Research Organizations response rates were 89.9% in 1997, 76.7% in 1998, and 69.5% in 1999 (Source: BRFSS 1998 and 1999, Summary Quality Control Report).

**Fatal Yellow Fever in a Traveler Returning From Amazonas, Brazil, 2002**

**MMWR. 2002;51:324-325**

**YELLOW FEVER (YF) is a mosquito-borne viral disease that has caused deaths in U.S. and European travelers to sub-Saharan Africa and tropical South America.1-3 Although no specific treatment exists for YF and the case-fatality rate for severe YF is approximately 20%, an effective vaccine is available.6 This report describes a case of fatal YF in an unvaccinated traveler who had returned from a 6-day fishing trip on the Rio Negro west of Manaus in the state of Amazonas, Brazil. Because information from some commercial outfitters and travel agents might underestimate health risks, health-care providers and travelers should review vaccination and other traveler’s health recommendations from public health agencies.

On return from Brazil on March 10, 2002, a previously healthy man aged 47 years from Texas presented to an emergency department (ED) with a 4-day history of crampy abdominal pain and a 1-day history of fever of 102.8 °F (39.3 °C) and severe headache. At the ED, he received symptomatic treatment and doxycycline for a possible rickettsial disease and was discharged. His fever and headache worsened, and on March 12 he was hospitalized for intractable vomiting.

On admission, physical examination revealed an ill-appearing, febrile man. Laboratory tests documented leukopenia (2,300/mm³ [normal: 4,800-10,800/mm³]), anemia (hemoglobin 10.5 g/dL [normal: 14-18 g/dL]), thrombocytopenia (36,000/mm³ [normal: 150,000-450,000/mm³]), abnormal coagulation (prothrombin time: 29 seconds [normal: 10.5-13.0 seconds] and INR 6.3), renal failure (creatinine: 5.5 mg/dL [normal: 0.6-1.0 mg/dL] and blood urea nitrogen: 65 mg/dL [normal: 6-20 mg/dL]), and liver failure (ALT: 7,600 U/L [normal: 30-65 U/L], AST: 13,700 U/L [normal: 15-37 U/L], and bilirubin: 3.3 mg/dL [normal: 0-1.0 mg/dL]). The patient was presumptively treated for malaria. Bacterial cultures of blood, urine, and cerebrospinal fluid showed no growth, and a malaria smear of peripheral blood was negative. Three days after admission, the patient developed shock, seizures, and excessive bleeding at venipuncture sites; he died the following day.

Tests performed at CDC on serum samples collected on the second day of illness were negative for IgM and IgG antibody to South American arboviruses (i.e., YF, dengue, St. Louis encephalitis, and Venezuelan equine encephalomyelitis viruses); serum samples collected on days 3-7 also were negative for IgM and IgG antibody to YF virus. Serum specimens collected on days 4, 5, and 7 of illness and a post-mortem liver sample were positive for YF virus RNA by RT-TaqMAN™ PCR tests. Virus isolation was attempted by inoculation of serum samples onto Vero and AP-61 cells in tissue culture, and by inoculation of postmortem plasma onto Vero cells in tissue culture and intracerebrally into suckling mice. No virus was recovered.

Histopathologic examination of a postmortem percutaneous needle sample of the liver demonstrated massive acidoophilic hepatocellular necrosis with minimal inflammation. Immunohistochemistry (IHC) tests using a cross-reactive, polyclonal flavivirus antibody and a polyclonal YF-virus–specific antibody were positive. IHC tests for New World arenaviruses (Ma-chupio, Guanarito, and Sabia viruses), spotted fever rickettsiae, dengue virus, and Leptospira spp. were negative. A postmortem serum sample was negative for IgM and IgG antibody to Leptospira spp. and New World arenavi-
ruses, and negative for Machupo virus by ELISA antigen capture. A blood sample collected on day 2 was negative for malaria by PCR test.

The deceased traveler was one of 15 U.S. citizens who visited the Amazon as part of a fishing trip. The patient slept aboard an air-conditioned fishing boat and wore DEET-impregnated clothing while fishing. Before traveling to the Amazon, the traveler had not received medical consultation, YF vaccine, or malaria prophylaxis. Information on the outfitter’s website stated, “The International medical community suggests yellow fever and malaria prophylaxis for the Amazon region. This is not a requirement to enter Brazil, but merely a suggestion.” A brochure from the group’s travel agent stated, “We do not suggest any inoculations of any kind for this trip. . . . But to make sure you are worry free, consult with your personal physician.”

The 15 U.S. citizens living aboard this fishing boat (including the patient) were interviewed or investigated by the Texas Department of Health. Other than the patient, none reported febrile illnesses. Eight (53%) were appropriately vaccinated for YF according to World Health Organization (WHO) guidelines (i.e., within the preceding 10 years and ≥10 days before arrival in Manaus). Of the seven that were not appropriately vaccinated, one had received YF vaccine 11 years earlier, one had been vaccinated 5 days before arrival in Manaus, and one was unsure whether he had been vaccinated in the military >30 years earlier. Of the four persons (including the patient) who were never vaccinated, three stated that they had been “unconcerned” about the risk for YF. Three (20%) of the 15 reported taking malaria prophylaxis.

CDC Editorial Note: This case represents the third reported YF death in a U.S. citizen following travel to the Amazon region since 1996.1,2 YF can initially manifest as fever, headache, myalgias, arthralgias, epigastric pain, or vomiting.4 Illness can progress to liver and renal failure, and thrombocytopenia and abnormal coagulation can cause hemorrhagic symptoms and signs. Definitive diagnosis is made by viral culture of blood or tissue specimens or by identification of YF virus antigen or nucleic acid in tissues (especially liver) using IHC, ELISA antigen capture, or PCR tests. Although antibodies are not always present in the first week of illness, detection of YF-specific IgM antibody by capture ELISA with confirmation of ≥4-fold rise in neutralizing antibody titers between acute- and convalescent-phase serum samples also is diagnostic.

On returning home, viremic travelers can establish new foci of YF transmission where susceptible vectors are present. The geographic range of Aedes aegypti, a mosquito that transmits YF virus among humans, includes the southern United States. Patients with suspected or confirmed YF should be isolated from contact with mosquitoes during at least the first 5 days of illness, and local or state health departments must be notified immediately.7 YF is one of three diseases (along with cholera and plague) designated by the International Health Regulations as internationally quarantinable and requires international reporting of all suspected and confirmed cases within 24 hours.8

Commercial outfitters and travel agents should ensure that health information provided to travelers is consistent with CDC and WHO YF vaccination and malaria prophylaxis recommendations. Undervaccination of travelers at risk for YF might be an increasing problem. Using a mathematical model based on U.S. arrivals to countries where YF transmission occurs and on YF vaccine doses sold to U.S. civilians, overall coverage among U.S. travelers to regions where YF is endemic might have declined 50% from 1992 to 1998.9 The degree to which inaccurate health information contributes to apparently decreasing coverage is unknown.

Because of the severity of YF illness, the potential for epidemics, and the availability of an efficacious vaccine, CDC recommends vaccination of persons aged ≥9 months traveling to nonurban areas where YF is endemic (i.e., sub-Saharan Africa and tropical South America, including Amazonas states in Brazil and Venezuela). To allow for an adequate immune response, vaccination should be completed ≥10 days before travel. Some countries, other than the United States, require YF vaccination for travelers returning from countries where YF is endemic and may impose quarantine if the traveler does not have official vaccination documentation or a written medical waiver. Although recent reports described occurrence of severe systemic illness potentially related to recent YF vaccination,10 the rarity of these events does not warrant changes in YF vaccination recommendations. Before international travel, persons should review CDC recommendations (http://www.cdc.gov/travel) for prevention of vectorborne and other travel-related diseases.

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