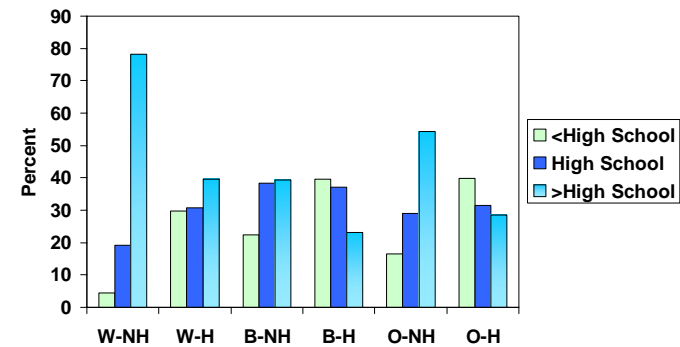


III. Factors Associated with Diabetes Risk

Socioeconomic Status

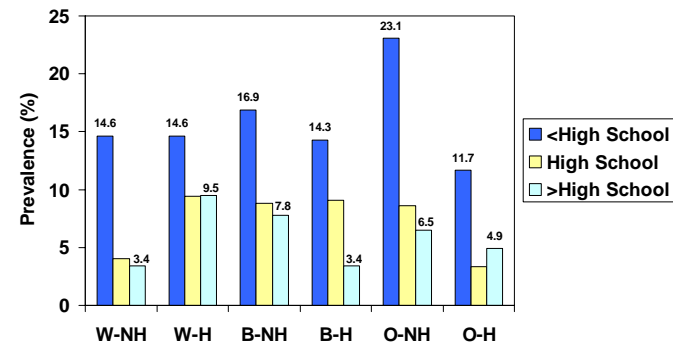
In developed countries, like the United States, lower levels of education and income are associated with an increased risk of Type 2 diabetes mellitus. In fact, socio-economic factors are thought to account for much of the increased diabetes risk among US minorities compared to the Non-Hispanic White population. For example, in the National Health Nutrition and Examination Survey III (3), after adjusting for socio-economic differences, the excess risk of diabetes among black women compared to white women was almost eliminated.

Figure 7: Percent of Race-Ethnic Groups in the USVI that Achieve Various Educational Levels: BRFSS 2001-2003



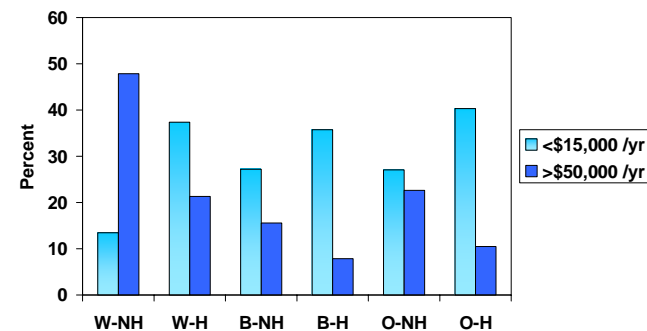
W-NH=White Not Hispanic; W-H=White Hispanic; B-NH=Black Not Hispanic; B-H=Black Hispanic; ONH=Other Race Not Hispanic; OH=Other Race Hispanic.

Figure 8: Prevalence of Diabetes by Level of Education among Race-Ethnic Groups in the USVI: BRFSS 2001-2003



W-NH=White Not Hispanic; W-H=White Hispanic; B-NH=Black Not Hispanic; B-H=Black Hispanic; ONH=Other Race Not Hispanic; OH=Other Race Hispanic.

Figure 9: Percent of Race-Ethnic Groups that Fall within Lower and Higher Annual Household Income Categories in the USVI: BRFSS 2001-2003

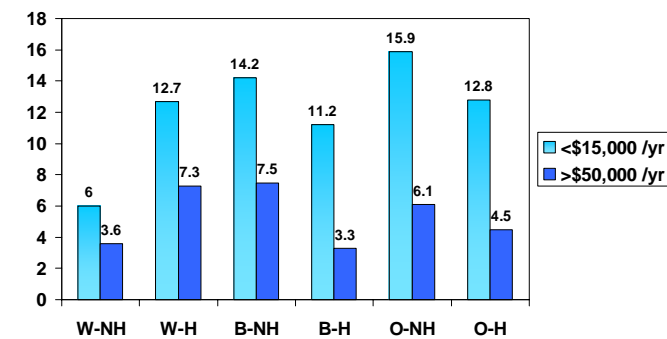


W-NH=White Not Hispanic; W-H=White Hispanic; B-NH=Black Not Hispanic; B-H=Black Hispanic; ONH=Other Race Not Hispanic; OH=Other Race Hispanic.

Figure 7 shows the percent of individuals with less than high school, high school and more than high school education in each of the various race-ethnic categories. These BRFSS data indicate that the Non-Hispanic White group had 2 to 3 times fewer individuals who earned less than high school education. The average BRFSS prevalence of diabetes for the years 2001-2003 is displayed by level of education in Figure 8. In all race-ethnic categories in the USVI individuals with less than high school education have a greater likelihood of being diabetic compared to those with higher levels of education.

Figure 9 shows data from the BRFSS on the percent of individuals in each race-ethnic category with a family income less than (<) \$15,000 per year or more than (>) \$50,000 per year. Compared to Non-Hispanic Whites all other race-ethnic categories had 2 to 3 times more individuals with annual household incomes < \$15,000. Estimates of the prevalence of diabetes within the two income categories are shown in Figure 10. These data indicate that in all race-ethnic categories, individuals who have family incomes than \$15,000 have a greater likelihood of being diabetic compared to those with family incomes above \$50,000 per year. Future efforts to reduce the burden of diabetes in the USVI will require a clear understanding of the factors which increase diabetes risk among Virgin Islands residents with low educational achievement and low incomes.

Figure 10: Prevalence of Diabetes by Lower and Higher Annual Household Income Categories among Race-Ethnic Groups in the USVI: BRFSS 2001-2003



W-NH=White Not Hispanic; W-H=White Hispanic; B-NH=Black Not Hispanic; B-H=Black Hispanic; ONH=Other Race Not Hispanic; OH=Other Race Hispanic.

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Virgin Islands Department of Health
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VIRGIN ISLANDS DIABETES SURVEILLANCE REPORT

In 2003 the prevalence of diagnosed diabetes in the USVI was 9.7%.

As the 5th leading cause of death in the U.S Virgin Islands diabetes mellitus has a significant influence on the quality of life experienced by the average Virgin Islander. This report summarizes the *impact* of diabetes in the USVI in terms of its frequency and complications. The report also includes information on factors associated with the risk of developing diabetes and its complications, including limitations in diabetes self management education. Most of the data presented is drawn from the Behavioral Risk Factor Surveillance System (BRFSS). Additional sources of data include Hospital Discharge Reports, reports from Public Health Clinics and whenever possible data from population-based epidemiological studies. The BRFSS collects information on a population-based sample of Virgin Islands residents age 18 and older.

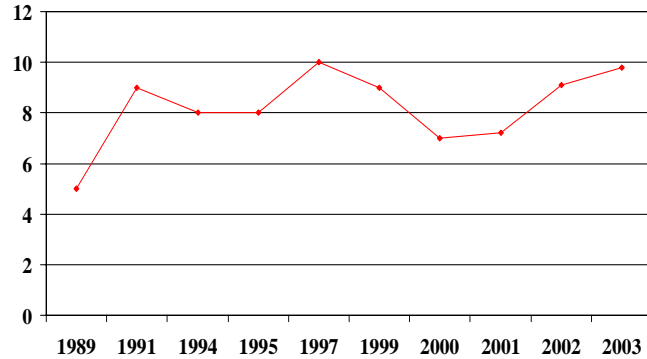
While those who have the disease bear the greater part of the burden of diabetes mellitus, the impact of diabetes mellitus on the USVI population extends beyond the acute and chronic complications of the illness. The costs associated with providing health care services for diabetic patients are borne by the families of patients and the population in general. Therefore, careful monitoring of the disease burden and development of intervention programs to lessen the burden are in the best interest of all Virgin Islanders.

I. Prevalence of Diabetes

Overall Frequency

Data from the BRFSS indicate that in 2003 the prevalence of diagnosed diabetes in the USVI was 9.7%. If the estimates of diagnosed diabetes from the BRFSS for 2001 and 2002 are averaged together with the current rate, the resulting estimate is 8.7%. Figure 1 shows the pattern of prevalence rates of self-reported diagnosed diabetes over the preceding decade. These data suggest that a doubling of the prevalence of diagnosed diabetes has occurred in the USVI since 1989. However it is not clear whether this apparent rise in self-reported diagnosed diabetes reflects improvement in detection and diagnosis or a true increase in incidence of the disease.

Figure 1: Trend in the prevalence of diabetes by year: BRFSS



The majority of residents of the USVI are from US ethnic minority groups (predominantly non-Hispanic black). Therefore, the high prevalence of diagnosed diabetes in the USVI may reflect this fact. However, there are indications that the impact of diabetes in the USVI may be even greater than that suggested by the BRFSS data. One consideration in this regard is that at any time in the population a number of individuals who have diabetes are undiagnosed. Data from the National Health Nutrition and Examination Survey III (1) show that among African American adults age 20 and older on the US mainland, 9.6% have diagnosed diabetes while 4.4% have undiagnosed diabetes. Similarly, a population-based survey of Virgin Islands residents of the same age reported that 4.1% had undiagnosed diabetes (2). Therefore, considering that the recent BRFSS estimates of diagnosed diabetes are around 9%, it is likely that over 13% of Virgin Islands residents have diabetes mellitus.

Frequency by Age

Age is an important consideration when examining the impact of diabetes mellitus on a population. In general, the frequency of diabetes mellitus increases with age. According to the 2003 BRFSS, the average age of a person with diagnosed diabetes in the USVI is 58.8 ±12.6. Figure 2 presents the average age-specific prevalence of diabetes mellitus in the USVI for the years 2001-2003. During that three year period, among adult Virgin Islanders age 20 and older, the prevalence of diagnosed diabetes increased within each advancing decade of age. Approximately 25% of Virgin Islanders age 70 and older have diabetes. In most populations the prevalence of diabetes mellitus begins to rise above 5% around age 40. The data for the USVI is consistent with this pattern.

One of the signs that diabetes mellitus is becoming an even greater problem for a population is that the disease begins to manifest itself in larger numbers at younger age. On the US mainland, there is concern that the frequency of Type 2 diabetes mellitus is increasing in children. The BFRSS does not ascertain diabetes in all age groups younger than age 20 or distinguish between Type 1 or Type 2 diabetes. However, the observation in Figure 2 that ~4.4% of those younger than age 20 have diabetes, suggest that more careful monitoring of childhood diabetes rates in the USVI may be warranted.

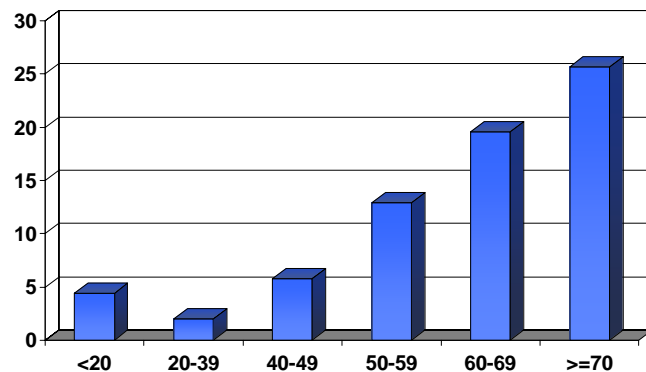
Prevalence of Diabetes by Gender

In most populations the prevalence of diagnosed diabetes is higher among women compared to men. This is also the case in the USVI. On average, for the period 2001-2003, the prevalence of diagnosed diabetes was 8.1% among men and 9.4% among women.

Prevalence of Diabetes by Race-Ethnicity

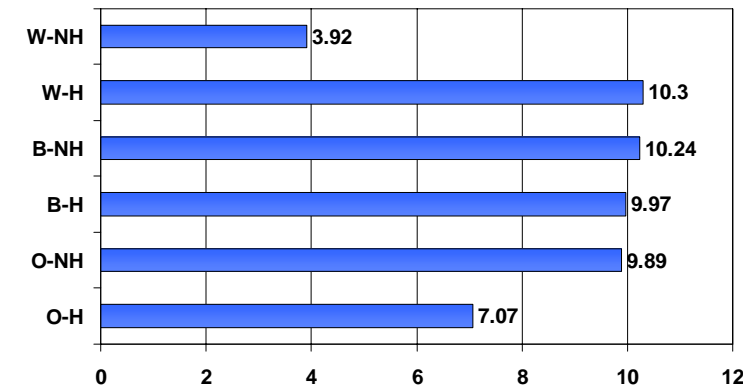
In the United States members of ethnic minority groups such as African Americans, Native Americans and Hispanic or Latino Americans have higher rates of diabetes compared to Non-Hispanic White Americans. The large proportion of Virgin Islanders (~80%) who classify themselves as being either of black race or Hispanic ethnicity suggests that the impact of diabetes might be relatively

Figure 2: Frequency of Diagnosed Diabetes by Age: BRFSS 2001-2003



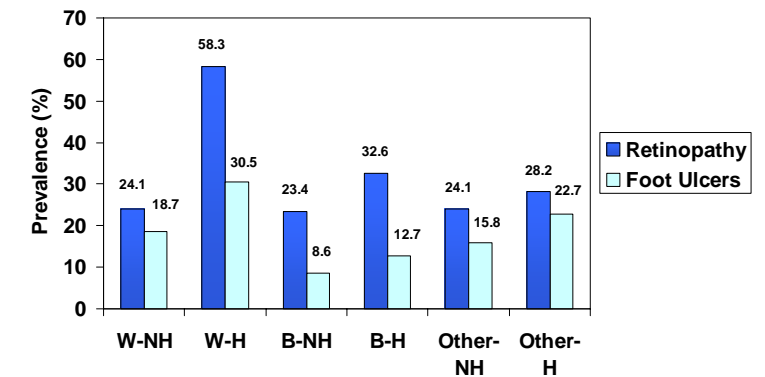
greater in the USVI than on the mainland. Figure 3 shows the average prevalence of diabetes for the USVI population according to self-reported race and ethnicity during the 3-year period from 2001-2003. These data indicate that the prevalence of diagnosed diabetes was from 2 to 3 times greater among other population sub-groups compared to Non-Hispanic Whites.

Figure 3: Prevalence of Diabetes by Self-Reported Race and Ethnic Group: BRFSS 2001-2003



W-NH=White Not Hispanic; W-H=White Hispanic; B-NH=Black Not Hispanic; B-H=Black Hispanic; O-NH=Other Race Not Hispanic; O-H=Other Race Hispanic.

Figure 4: Prevalence of Retinopathy and Food Ulcers by Race-Ethnic Group in the USVI: BRFSS 2001-2003



W-NH=White Not Hispanic; W-H=White Hispanic; B-NH=Black Not Hispanic; B-H=Black Hispanic; ONH=Other Race Not Hispanic; OH=Other Race Hispanic.

II. Diabetes Complications

Long-term complications from diabetes mellitus include retinopathy, stroke, heart disease, kidney disease, including end-stage renal disease (ESRD) foot ulcerations and lower extremity amputations. Data were collected in the BRFSS for retinopathy, stroke, heart disease and foot ulcers. However, only retinopathy and foot ulcers were reported by diabetic patients in the BRFSS. Figure 4 shows the average frequency of retinopathy and foot ulcers in the major race-ethnic groupings in the USVI for the years 2001-2003. In all race-ethnic groupings the frequency of self-reported retinopathy averaged over 22%. Self-reported food ulcerations varied by race-ethnic grouping with White Hispanic patients tending to report the highest percentage (~30.5%). Also of note is that, compared to their Non-Hispanic counterparts in each race grouping, Hispanic individuals reported higher frequencies of these two complications.

Figure 5: Lower Extremity Amputations as a percent of total hospital admissions with diabetes listed as the primary diagnosis, Juan F. Luis Hospital

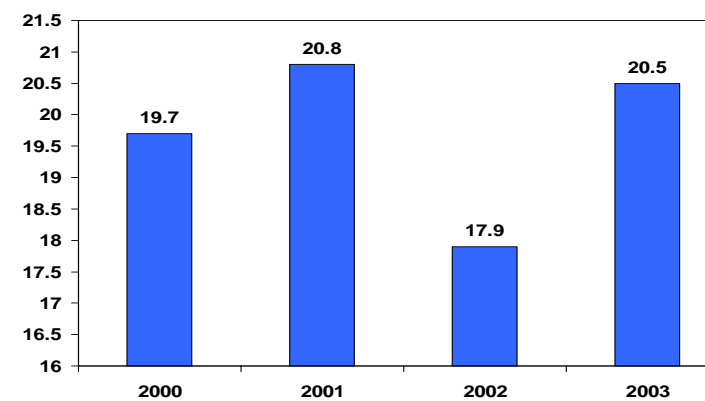
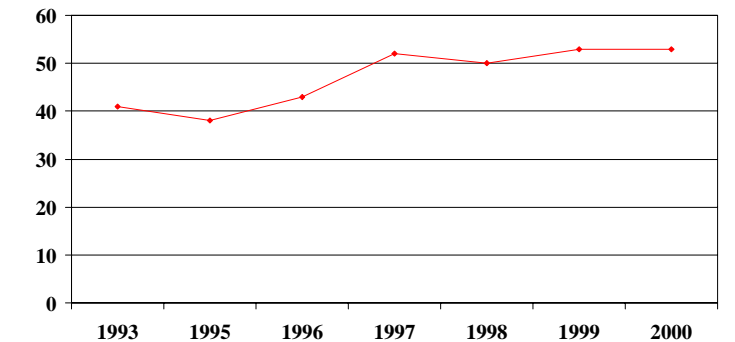


Figure 5 presents hospital discharge data on lower extremity amputations (LEA) among diabetic patients who visited the Governor Juan F. Luis Hospital on St. Croix during the years 2000-2003. On the average during these years lower extremity amputations accounted for almost one-fifth of all diabetic admissions to the hospital. An LEA is an extreme solution to poor management of leg and foot ulcers. Therefore efforts to improve foot care among diabetic patients in the USVI may be warranted.

Figure 6: ESRD patients with diagnosis of diabetes 1993-2000 (Medicare)



Source: Virgin Islands Medical Institute

Figure 6 shows the pattern of increasing numbers of end-stage renal disease (ESRD) patients on Medicare who had a diagnosis of diabetes during the 8-year period from 1993 to 2000. In general, this pattern is consistent with the growing numbers of elderly diabetic patients in the territory.