
Prevalence of Diabetes Mellitus Among Insureds of a Health Insurance Company in Puerto Rico: 1997-1998.

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Objective. The purpose of this study was to determine the prevalence of diabetes mellitus in persons covered by a health insurance company.

Methods. The medical claims of persons insured with Triple S Health Insurance Co. of Puerto Rico, whose main diagnosis was diabetes (ICD9-250.0-9), were selected for analysis. Prevalence and medical utilization rates were estimated. General characteristics and services utilization were compared by age and sex using the chi-square distribution.

Results. Overall prevalence was 4.73%. Prevalence in the male population (5.07%) was higher than that of females (4.43%) in all age groups, but the difference was not statistically significant ($p > 0.05$). The proportion of diabetic cases was larger in the > 60 age group. 64% of the cases had 1 or more visits to a physician office, 2% were hospitalized, and almost 3% had emergency room

visits. 29% of the cases had insulin prescriptions while 59% had oral prescriptions. The younger age group (≤ 44 years) had a larger utilization rate of emergency room and hospital admissions. Health service utilization varied by age and sex, however, the only significant difference was observed in glucose test services utilization ($p < 0.05$).

Conclusions. The prevalence of diabetes in this group was lower than the prevalence reported in the Behavioral Risk Factor Surveillance System. This may be partially explained by the fact that the study group did not represent the composition of the Puerto Rican population. Prevalence studies using other groups will be helpful to determine the prevalence of diabetes in Puerto Rico.

Key words: Diabetes mellitus, Puerto Rico, Prevalence, Epidemiology, Insureds.

Hispanic Americans living in the United States have an increased prevalence of type 2 diabetes, greater numbers of risk factors for diabetes, and greater incidence of type 2 diabetes-related complications (1). Population estimates of the prevalence of type 2 diabetes, far more common than type 1 diabetes, range between 9% and 11% in Hispanics compared with 6% in non-Hispanic white Americans (2). Diabetes is two to three times more common in Mexican-American and Puerto Rican adults than in non-Hispanic whites. In addition, it

has been reported that Hispanics residing in the United States have a lower mortality from all causes compared with non-Hispanics, a lower mortality from cancer and cardiovascular diseases but a higher mortality from type 2 diabetes (3-4). In Puerto Rico, diabetes has been the third leading cause of death since 1989, only preceded by cardiovascular disease and cancer.

The relative distribution of the two major forms of diabetes, type 1 and type 2, often shows large variations between communities and ethnic groups (5-6). The Puerto Rican population residing in the island comprises a mix of many ethnically distinct groups and, therefore, it is difficult to determine differences in race-specific prevalence of diabetes.

Diabetes has been consistently acknowledged as a serious public health problem in Puerto Rico; however, its future potential for increase and its complications remains unknown. Thus, the purpose of this study was to determine the prevalence of diabetes mellitus among insureds of a health insurance company that serves approximately one-third of the population residing in Puerto Rico.

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Methods

Study group. Diabetic patients were defined as all active Triple S insured persons during 1997 and 1998 whose main diagnosis in the service claims was diabetes mellitus (ICD 250.0-250.9), gestational diabetes (ICD 648.8) or diabetes-related complications as reported by a physician or a hospital. In addition, persons with more than one glucose test or diabetes-related medications (oral hypoglycemics

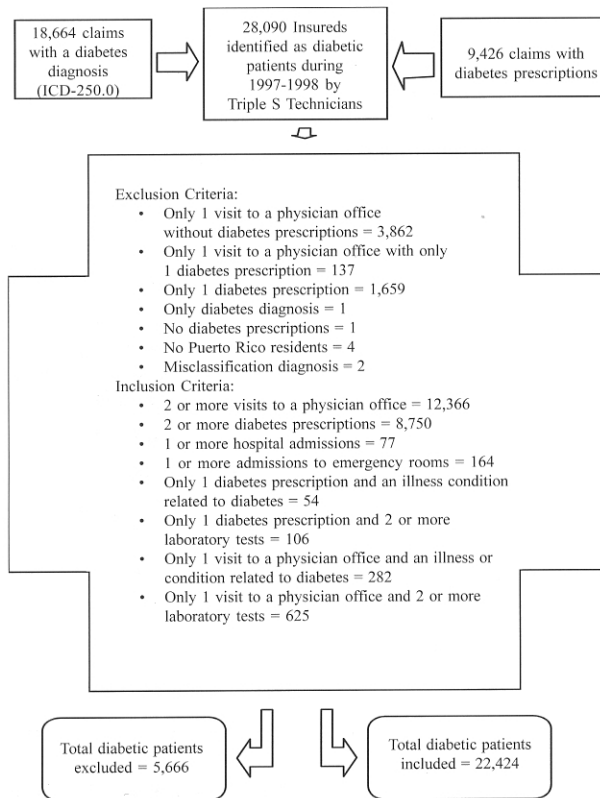


Figure 1. Diagram for the selection process of the Triple S insureds

or insulin) were also included. Persons with only one visit to a medical office or one claim for drugs or laboratory tests were excluded. This was done to minimize the possibility of including persons with a non-reliable or preliminary diagnosis of diabetes. Personnel of the Division of Technical Services of Triple S were responsible for identifying medical claims that met the study inclusion criteria and to provide the information to the researchers in a computer file. A total of 22,424 persons who met the inclusion criteria were identified. Figure 1 summarizes the procedure utilized in selecting the study group. Prevalence of type 2 diabetes and its 95% confidence interval was estimated using as the denominator an average of the population of insureds during the two-year study period. General characteristics and service utilization were compared using the chi-square distribution. Data analysis was performed using SAS version 8 (7).

Results

Overall, 4.73% (95% CI: 4.67%-4.79%) of insureds were diagnosed with diabetes during 1997 and 1998. The prevalence among males was 5.07% (95% CI: 4.98%-5.17%) and 4.43% (4.35%-4.51%) in females, but this difference was not statistically significant ($p=0.13$) (Table 1). Among insureds, the prevalence of diabetes among those aged 65 years and over was more than two times (28.51% versus 11.36%) the prevalence in those aged 45-64.

Table 2 shows the distribution of age and service utilization of diabetic patients by sex. Overall, the proportion of diabetic cases was largest in the ≥ 45 age group (81.5%) and lowest in the younger group (1.7%). Nearly 51% were males and 49.6% were females. The majority of the insureds had pharmacy plan (82.5%), with females having a lower coverage than males (85% vs. 79.9%).

Table 1. DM Prevalence among Triple S Insureds by Age Group and Sex, Puerto Rico, 1997-1998

Age group (years)‡	Male			Female			Total		
	Mean*	DM cases	Prevalence†	Mean*	DM cases	Prevalence†	Mean*	DM cases	Prevalence†
≤ 17	72,518	211	0.29	69,328	182	0.26	141,846	393	0.28
18-44	90,131	1,837	2.04	109,705	1,921	1.75	199,836	3,758	1.88
44-64	50,631	6,494	12.83	62,206	6,327	10.17	112,837	12,821	11.36
≥ 65	9,451	2,759	29.19	9,673	2,693	27.84	19,124	5,452	28.51
≥ 18	150,213	11,090	7.38	181,584	10,941	6.02	331,797	22,031	6.64
Total	222,731	11,301	5.07	250,912	11,123	4.43	473,643	22,424	4.73

* Mean population of insureds between 1997-1998

† Prevalence per 100 insureds

‡ Difference was not statistically significant ($p \geq 0.05$)

Table 2. General Characteristics and Service Utilization of Triple S Insureds with Diabetes Mellitus by Sex, Puerto Rico, 1997-1998

	Male (N=11,301)		Female (N=11,123)		Total (N=22,424)	
	Cases	%	Cases	%	Cases	%
Age group (years)						
≤17	211	1.9	182	1.6	393	1.7
18-44	1,837	16.2	1,921	17.3	3,758	16.8
45-64	6,494	57.5	6,327	56.9	12,821	57.2
≥65	2,759	24.4	2,693	24.2	5,452	24.3
Pharmacy cover plan						
Yes	9,610	85.0	8,893	79.9	18,503	82.5
No	1,691	15.0	2,230	20.1	3,921	17.5
Number of visits to physician's office (Average 5.12)						
1-2	2,531	35.1	2,463	33.8	4,994	34.5
3-4	1,653	22.9	1,678	23.0	3,331	23.0
≥5	3,024	42.0	3,143	43.2	6,167	42.5
Total	7,208	100.0	7,284	100.0	14,492	100.0
Number of visits to emergency room (Average 1.13)						
1-2	281	97.9	287	99.3	568	98.6
3-4	4	1.4	2	0.7	6	1.0
≥5	2	0.7	0	0.0	2	0.4
Total	287	100	289	100.0	576	100.0
Number of admission to hospital (Average 1.17)						
1-2	230	96.6	214	96.4	444	96.5
3-4	7	3.0	6	2.7	13	2.8
≥5	1	0.4	2	0.9	3	0.7
Total	238	100.0	222	100.0	460	100.0

A total of 14,492 (64.6%) diabetic cases had one or more visits to a medical office in which a diagnosis of diabetes was primarily recorded. Of these, 42.5% had more than five visits. In contrast, only 576 (2.57%) had one or more visits to the emergency room and 460 (2%) were hospitalized (Table 2).

A total of 9,741 (43.4%) diabetic cases had some type of glucose test performed, with 12% having more than five tests (Table 3). More than half of the cases (59.4%) had a diabetes oral prescription, with 65% having more than five. Female diabetic cases had more glucose tests (46.5%) than males, while males had more oral prescriptions (62.6%) than females. A total of 6,522 (29%) cases had insulin prescriptions with a slightly larger proportion of insulin prescriptions in females than in males. A number of conditions or procedures commonly related to diabetes mellitus were identified in these patients, being retinopathy the most frequent in both sexes (Table 3). Significant

differences by sex were found in the proportion of glucose tests, oral hypoglycemics' prescriptions and related conditions ($p < 0.05$).

Figures 2-4 show service utilization rates among the diabetic insureds by age and sex. Overall, both males and females in the younger age group (≤ 44 years) had the highest utilization rate of emergency room services and hospital admissions. However, females were more likely to have hospital admissions (35.6/1000 and 39.0/1000), while males were more likely to have emergency rooms visits (45.4/1000 and 40.9/1000) (Figure 2). The 45-64 female age group had the highest utilization rate of physician's office visits and glucose test claims (Figure 3). Finally, the oldest age group had the highest utilization rate of pharmacy prescription claims with males having a higher utilization rate than females (Figure 4). When differences by age group and sex were analyzed, only glucose test service utilization was statistically significant ($p < 0.05$).

Table 3. Management of Triple S Insureds with Diabetes Mellitus by Sex, 1997-1998

	Male (N=11,301)		Female (N=11,123)		Total (N=22,424)	
	Cases	%	Cases	%	Cases	%
Number of glucose tests*						
1-2	3,035	66.5	3,251	62.8	6,286	64.5
3-4	1,007	22.1	1,278	24.7	2,285	23.5
≥ 5	522	11.4	648	12.5	1,170	12.0
Total	4,564	100.0	5,177	100.0	9,741	100.0
Number of anti-diabetic oral prescriptions (Average 11.1)*						
1-2	1,315	18.6	1,284	20.5	2,599	19.5
3-4	1,071	15.1	998	16.0	2,069	15.5
≥ 5	4,687	66.3	3,970	63.5	8,657	65.0
Total	7,073	100.0	6,252	100.0	13,325	100.0
Number of insulin prescriptions (Average 9.1)						
1-2	781	25.0	866	25.5	1,647	25.3
3-4	463	14.8	491	14.4	954	14.6
≥ 5	1,879	60.2	2,042	60.1	3,921	60.1
Total	3,123	100.0	3,399	100.0	6,522	100.0
Number of conditions or procedures related to DM*†						
Retinopathy	1,018	9.0	987	8.9	2,005	8.9
Amputation	337	3.0	311	2.8	648	2.9
Renal Failure	175	1.6	103	0.9	278	1.2
Polyneuropathy	100	0.9	98	0.8	198	0.9
Gestational DM	—	—	108	1.0	108	0.5
Others	15	0.1	19	0.2	34	0.1

* p < 0.05

† Categories are not mutually exclusive.

Discussion

The overall prevalence of diabetes in this study was lower than the 9.6% reported by the 1999 Behavioral Risk Factor Surveillance System survey conducted among people aged 18 years or more (18). This difference persists but is less marked when the prevalence calculation included cases aged 18 years or more in our group (6.6%). The age and sex distribution of the study group was similar to the Hispanic diabetic population residing in the United States (9).

Health insurance companies have traditionally compiled patient information derived from medical claims. The data compiled is comprehensive enough to provide information about general clinical and socio-demographic characteristics of specific diseases such as diabetes. However, one concern about the data obtained from this

source is its validity, since the information was not collected for research purposes and could be inaccurate. The population in this study included individuals covered in a private health insurance company that serves almost one-third of the Puerto Rican population. The higher prevalence of diabetes cases in all male age groups, even when not statistically significant, could be partially explained by the particular characteristics of the insurance group such as age, sex and socioeconomic group that may not represent the composition of the Puerto Rican population. For example, people aged 65 years or more under Medicare could be underrepresented in the study group. Some criteria were included in the study to maximize the probability of including people having the disease and excluding false positives.

The economic costs to the individual and society induced by diabetes have been widely reported (10-15).

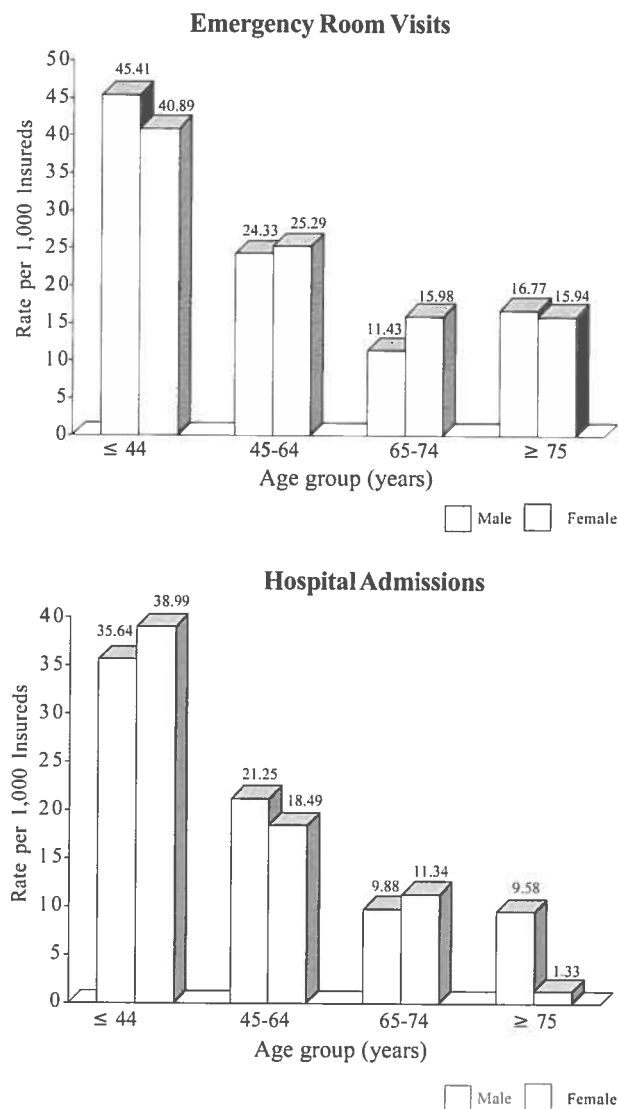


Figure 2. Emergency room and hospital admission services use rates among diabetic insureds by age group and sex, Puerto Rico, 1997-1998

Diabetes represents a significant economic burden in many countries. In the Americas, the economic costs of diabetes are substantial with hospitalization accounting for the largest percentage of direct costs. The American Diabetes Association published a study in 1997 in which estimated direct medical costs of diabetes and its complications reached \$44.1 billion and indirect costs due to disability and premature death at \$54.1 billion, for a total economic cost of \$98.2 billion (16). Our data showed that 2% of diabetic cases had hospitalizations due to diabetes. Among those with hospital admissions, 95% had one or two admissions, and 21% of the adolescent group had 3 or more admissions, thus representing a substantial direct

cost. However, the hospitalization admission rate in the Puerto Rican group was lower than in the U.S. (5.9% in 1996). In addition, nearly about 14% of persons with diabetes in the U.S. had a diabetes-related emergency room visit, and the highest rate of visit was among persons aged ≤44 years who had about twice the rates of the two older age groups. In Puerto Rico, we found that nearly 3%

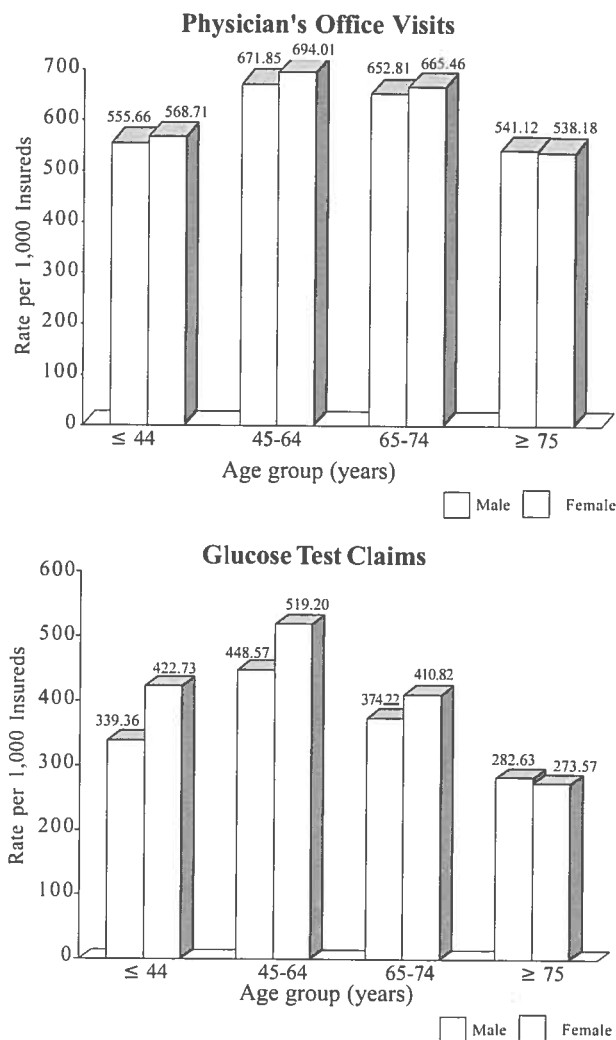


Figure 3. Physician's office and glucose test services use rates among diabetic insureds by age group and sex, Puerto Rico, 1997-1998

of our group had emergency rooms visits. This difference could be explained by differences in the data coding. We selected only diabetes direct hospitalizations or emergencies, while published statistics in the U.S. have included diabetes as one of the three diagnoses in the claims.

In 1996, persons with diabetes in the U.S. reported that they made almost 143 million contacts with physicians

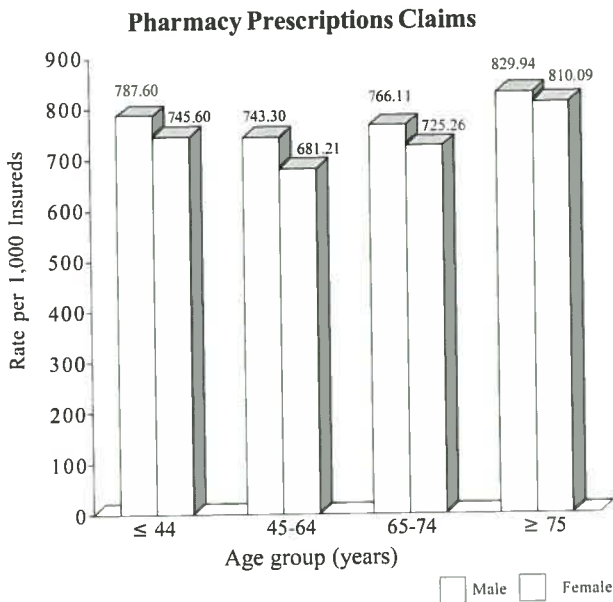


Figure 4. Pharmacy services use rates among diabetic insureds by age group and sex, Puerto Rico, 1997-1998.

averaging 17.4 age-adjusted contacts per person. These contacts reflect health service use among persons with diabetes, rather than use due to diabetes. But, in that same year, physicians reported diabetes as one of the three diagnosis recorded in a total of 28 million office-based visits by ambulatory patients. Persons with diabetes averaged 3.4 ambulatory, office-based visits per person, thus reflecting office visits due to diabetes (17). In Puerto Rico, the average number of visits to physician's office is lower than in the U.S. in all age groups. In our study group, the larger utilization of pharmacy prescriptions in the male group could be explained by the larger pharmacy coverage plan in this group.

Although many diabetes complications are largely preventable, a large percentage of Puerto Ricans are overweight and identification of levels of glycosylated hemoglobin, triglycerides and eye examination in the Medicare population were found among the lowest in the U.S. and their territories (18).

The Puerto Rican government recently approved the creation of the Center for Research, Education and Medical Services for Diabetes that is expected to develop a model to coordinate and integrate clinical services and research for diabetes patients. In addition, the Puerto Rico Health Department and the Graduate School of Public Health are in the process of evaluating the current Diabetes Surveillance System and establishing a Data Management Center as the centralized repository of diabetes surveillance data in Puerto Rico. Knowledge of the real

magnitude and impact of diabetes in the island will encourage health professionals and public health officials to develop effective interventions geared at reducing the prevalence and related complications. In a recent study that stratified various interventions of diabetes according to their economic impact, it was concluded that a series of interventions are clearly cost effective such as eye care and pre-conception care, others were clear cost-effective including nephropathy prevention in type 1 diabetes and improved glycemic control, and others were possible cost-effective including nephropathy prevention in type 2 diabetes and self management training (19). Thus early detection of complications is vital, but primary prevention of risk factors such as obesity must be recognized as a primary target.

Resumen

El propósito de este estudio fue determinar la prevalencia de diabetes mellitus en personas cubiertas por una compañía de seguro médico de salud. Las reclamaciones médicas de los asegurados con la Corporación de Servicios de Salud de Puerto Rico (Triple S), cuyo diagnóstico principal era diabetes (ICD9-250.0-9) fueron seleccionadas para el análisis. Se estimó la prevalencia y las tasas de utilización de servicios. Las características generales y la utilización de servicios fueron comparadas por edad y sexo utilizando la distribución de ji-cuadrada. La prevalencia general de diabetes fue 4.73%. La prevalencia en los hombres (5.07%) fue mayor que en las mujeres (4.43%) en todos los grupos de edad, sin embargo esta diferencia no fue estadísticamente significativa ($p > 0.05$). La proporción de casos con diabetes fue mayor en el grupo de 60 años de edad o más. 64% de los casos tuvieron 1 o más visitas a oficina de médicos, mientras 2% fueron hospitalizados, y al menos 3% tuvieron visitas a sala de emergencias. 29% de los casos tuvieron prescripciones de insulina, mientras que 59% tuvieron prescripciones para antidiabéticos orales. El grupo de edad más joven (≤ 44 años) tuvo una mayor tasa de utilización de los servicios de visitas a salas de emergencia y admisiones hospitalarias. La utilización de servicios de salud varió por edad y sexo. Sin embargo, sólo las diferencias en utilización de las pruebas de glucosa fueron estadísticamente significativas ($p < 0.05$). La prevalencia de diabetes en este grupo fue menor que la prevalencia reportada en el "Behavioral Risk Factor Surveillance System" tal vez, debido a que este grupo de estudio no es representativo de la composición poblacional de Puerto Rico. Estudios de prevalencia utilizando otros grupos serían más adecuados para determinar la prevalencia de la diabetes en Puerto Rico.

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