

PUBLIC HEALTH

Health Disparities Between Diabetic Patients Under Private and Public Health Coverage in Puerto Rico, 2000

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Objective. To examine health disparities between diabetic patients receiving services in private and public health sectors.

Methods. Insureds with service claims for diabetes (ICD-9 250 - 259) from two private insurance companies and two public health groups were selected. Personnel of the participant insurance companies were responsible for identifying medical claims that met the study inclusion criteria and providing the information in a computerized database file.

Results. Overall prevalence was 4.9%. Prevalence in the public sector (5.8%) was higher than that of the private sector (3.7%) ($p < 0.0001$). The overall prevalence among females of the public sector was

nearly twice (6.3%) the prevalence in the private sector (3.3%) ($p < 0.0001$). The prevalence of the majority of services analyzed was larger in the public sector. However, prevalence of specific services (glucose and glycosylated hemoglobin tests) was larger in the private sector. Differences between sectors in the prevalence of complications were also observed. Prevalence and service utilization also varied by age and sex in both sectors.

Conclusions. Significant difference exists in the prevalence of diabetes and health service utilization between the private and the public sector.

Key words. Diabetes, Health Disparities, Insurance Coverage, Health Reform, Puerto Rico

By the year 2010, the United States is committed to eliminate disparities in six areas of health experienced by racial and ethnic minority populations. Diabetes is one of these areas. To achieve this goal, it is required first, to identify the disparities that exist, and second, the possible causes of disparities including poverty, lack of access to quality health services, environmental hazards in homes and neighborhoods, levels of education of the affected population and the need for effective prevention programs tailored to specific community needs (1).

Recently, several studies conducted in the Puerto Rican population have shown a high prevalence of diabetes (2-5). However, differences were observed between groups,

being the prevalence of diabetes larger in the public sector covered by the Health Reform, compared with persons receiving services in the private sector. These observed differences might imply that factors such as socioeconomic status, health habits or education could be operating in this group.

The familiar susceptibility of type 2 diabetes has been widely demonstrated (6-8), and it has been stated that the higher prevalence of type 2 diabetes in Hispanics, particularly Puerto Ricans, could be explained by heritable traits or disease susceptibility (9-10).

Although current health access for the poor is not a major problem in the island, quality of those services still need to be determined. The aim of this paper is to examine health disparities, especially by age and sex, between diabetic patients receiving services during the year 2000 in Puerto Rico from private health insurance companies and those under the Public Health Reform.

Methods

The Puerto Rico Health Reform was initiated in 1993 with health care delivery through a predominant private system. The medically indigent population now receives private health insurance paid by the government that

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provides them access to health care with participant providers of their choice. A diabetic patient was defined as any active insured in four participant private insurance companies and the Puerto Rico Health Reform whose main diagnosis in the service claims was for diabetes (ICD-9 250.9). These four companies cover 39.4% of the total population in Puerto Rico. In addition, persons receiving medical orders for glucose tests or prescriptions for oral hypoglycemics and insulin for the treatment of diabetes were also included. Personnel of the participant insurance companies were responsible for identifying medical claims that met the study inclusion criteria and providing the information in a computerized database file. 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 non-reliable or suspected diagnosis of diabetes. General characteristics, diabetes complications (except cardiovascular diseases), and health service utilization were compared between groups. Prevalence of diabetes and its 95% confidence intervals (CI) were estimated using as denominator the average of insureds during the study period. Differences between the private and public sectors were compared using the chi-square or Fisher's exact test. Data analysis was performed using SAS PC version 8.1 (Cary, NC, USA. SAS Institute Inc., 1999-2000).

Results

A total of 73,100 diabetes cases were identified within the participant insurance companies. The overall prevalence of diabetes in the private sector was 3.7% (95% CI: 3.67% - 3.8%) compared with 5.8% (95% CI: 5.7% - 5.8%) in the public sector (p<0.0001). Prevalence increased with increasing age in both sectors (Table 1). Overall prevalence in those aged 65 years and over was 4.3 times

higher than those aged 35-44 (15.9% vs. 3.7%). In addition, the overall prevalence among females in the public sector (6.3%) was nearly twice the prevalence in the private sector (3.3%) (p<0.0001). This difference is due to a larger proportion of females with diabetes in the older age group. Although the overall prevalence of diabetes among males was slightly higher in the public sector (5.2%) than the private sector (4.2%) (p<0.0001), the differences among specific age groups were less dramatic.

In relation to the diabetes-related complications included in this study, the prevalence of retinopathy and cerebrovascular disease were more common among the private sector (6.0% and 3.1%, respectively) than in the public sector (4.0% and 1.5%, respectively) (Table 2). In general, both sectors present higher diabetes-related complications in males than in females.

In order to place the health care burden of diabetes into perspective, health services utilization for the disease were compared in both sectors (Table 3). The prevalence of visits to physicians' office (94.5%), emergency room visits (8.8%), hospital admissions (3.0%) and insulin prescriptions (29.7%) were higher under the public sector than the private sector. However, the prevalences of glucose (65.9%) and glycosilated hemoglobin testing (40.2%) were higher for insureds under the private sector. In both sectors, prevalence of physicians' office visits and glucose testing were slightly greater in females than in males and the prevalence of prescription of oral agents was larger on males in the private sector.

While the overall diabetes-related costs were higher in the public sector (\$9,648,415.42) than the private sector (\$7,669,238.19), the average cost per insured was higher in the private sector (\$356.08 versus \$229.36).

Although overall diabetes related complications prevalence increased with age, retinopathy showed a peak

Table 1. Prevalence (%) of Diabetes by Age Group, Health Sector and Sex, Puerto Rico, 2000*

Age group (years)	Private Health Sector			Public Health Sector			Total
	Male	Female	Total	Male	Female	Total	
	n (Prevalence)	n (Prevalence)	n (Prevalence)	n (Prevalence)	n (Prevalence)	n (Prevalence)	
≤ 17	166 (0.2)	159 (0.2)	325 (0.2)	293 (0.2)	284 (0.2)	577 (0.2)	902 (0.2)
18-24	219 (0.7)	293 (0.8)	512 (0.8)	287 (0.6)	469 (0.9)	756 (0.8)	1,268 (0.8)
25-34	874 (1.8)	974 (1.6)	1848 (1.7)	763 (1.8)	1,007 (1.7)	1770 (1.8)	3,618 (1.7)
35-44	1,967 (4.0)	1,625 (2.7)	3592 (3.3)	1,804 (4.4)	2,264 (4.0)	4068 (4.2)	7,660 (3.7)
45-54	3,523 (8.5)	2,950 (5.9)	6473 (7.1)	3,838 (9.8)	5,478 (10.5)	9316 (10.2)	15,789 (8.7)
55-64	4,208 (15.4)	3,730 (11.2)	7938 (13.1)	5,756 (16.2)	8,678 (18.1)	14434 (17.3)	22,372 (15.5)
≥ 65	1,797 (15.0)	1,418 (11.7)	3215 (13.4)	7,314 (16.1)	10,962 (16.7)	18276 (16.4)	21,491 (15.9)
Total	12,754 (4.2)	11,149 (3.3)	23,903 (3.7)	20,055 (5.2)	29,142 (6.3)	49,197 (5.8)	73,100 (4.9)

* Data from four insurance companies. Prevalence = (Number of diabetic patients / Number of insureds)*100.

Table 2. Prevalence (%) of Diabetes-Related Complications by Health Sector and Sex, Puerto Rico, 2000*

Complications	Private Health Sector			Public Health Sector			Total
	Male	Female	Total	Male	Female	Total	
	n (Prevalence)	n (Prevalence)	n (Prevalence)	n (Prevalence)	n (Prevalence)	n (Prevalence)	
Retinopathy	767 (6.0)	667 (6.0)	1,434 (6.0)	842 (4.2)	1,144 (3.9)	1,986 (4.0)	3,420 (4.7)
Cerebrovascular disease	419 (3.3)	313 (2.8)	732 (3.1)	319 (1.6)	399 (1.4)	718 (1.5)	1,450 (2.0)
Renal failure	146 (1.1)	93 (0.8)	239 (1.0)	486 (2.4)	457 (1.6)	943 (1.9)	1,182 (1.6)
Amputations	80 (0.6)	33 (0.3)	116 (0.5)	274 (1.4)	228 (0.8)	502 (1.0)	615 (0.8)
Polyneuropathy	64 (0.5)	52 (0.5)	113 (0.5)	29 (0.1)	54 (0.2)	83 (1.2)	199 (0.3)
Dupuytren's contractures	3 (-)	4 (-)	11 (0.1)	22 (0.1)	45 (0.2)	67 (1.0)	74 (0.1)
Arthropathy	4 (-)	7 (0.1)	7 (-)	5 (-)	7 (-)	12 (-)	23 (-)

* Data from four insurance companies. Prevalence = (At least one complication claim / Number of diabetic patients)*100.

Table 3. Prevalence (%) of Diabetes-Related Services Utilization by Health Sector and Sex, Puerto Rico, 2000*

Services	Private Health Sector			Public Health Sector			Total
	Male	Female	Total	Male	Female	Total	
	n (Prevalence)	n (Prevalence)	n (Prevalence)	n (Prevalence)	n (Prevalence)	n (Prevalence)	
Physician's office visits	9,572 (75.1)	8,552 (76.7)	18,124 (75.8)	18,894 (94.2)	27,588 (94.7)	46,482 (94.5)	64,606 (88.4)
Glucose testing	8,262 (64.8)	7,491 (67.2)	15,753 (65.9)	6,786 (33.8)	11,733 (40.3)	18,519 (37.6)	34,272 (46.9)
Oral agents prescriptions	6,498 (51.0)	4,517 (40.5)	11,015 (46.1)	9,604 (47.9)	13,569 (46.6)	23,173 (47.1)	34,188 (46.8)
Insulin prescriptions	2,115 (16.6)	1,796 (16.1)	3,911 (16.4)	5,418 (27.0)	9,214 (31.6)	14,632 (29.7)	18,543 (25.4)
Glycosilated hemoglobin testing	4,662 (40.2)	4,113 (40.3)	8,775 (40.2)	1,198 (7.0)	2,112 (8.4)	3,310 (7.9)	12,085 (18.9)
Emergency Room visits	268 (2.1)	250 (2.2)	518 (2.2)	1,652 (8.2)	2,672 (9.2)	4,324 (8.8)	4,842 (6.6)
Hospital admissions	202 (1.6)	180 (1.6)	382 (1.6)	656 (3.3)	836 (2.8)	1,492 (3.0)	1,874 (2.6)

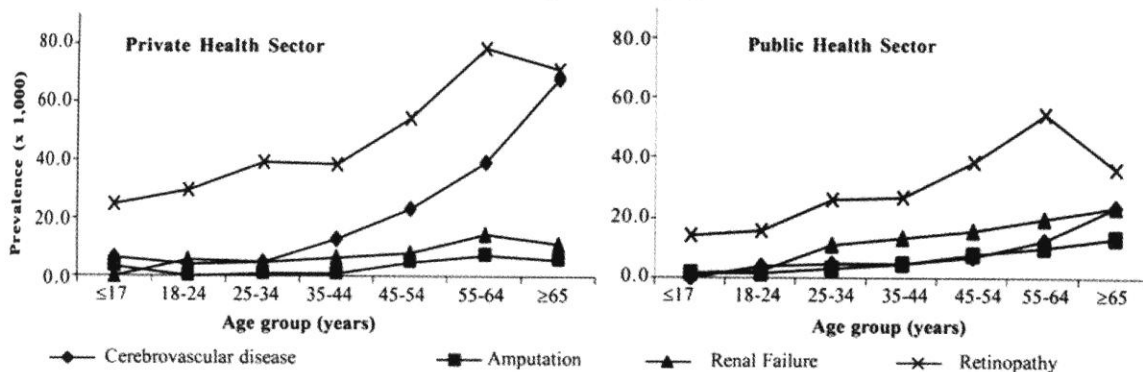
* Data from four insurance companies. Prevalence = (At least one service claim / Number of diabetic patients)*100.

1,000 public insureds). By the contrary, cerebrovascular disease, amputations, and renal failure increased steadily with age among insureds in the public sector (Figure 1).

In both health sectors the prevalence of diabetic patients who had visits to physicians' offices was determined to

be higher in the 55-64 age groups (82.1% for the private sector and 95.4% for the public sector). Hospital admissions and emergency room visits were larger in the younger age groups and decreased with increasing age (Table 4).

Figure 1. Prevalence (X 1,000) of diabetes-related complications by age and health sector, Puerto Rico, 2000



The overall prevalence of insulin prescriptions in both health sectors was larger in the younger and oldest age groups. On the contrary, prescriptions for oral agents were lower in the younger age groups and highest in the older age groups in both sectors (Table 4).

The prevalence of glucose testing claims among private insureds ranged from 53.4% in the oldest age group to 73.4% in the 55-64 age group (Figure 2). In terms of the public sector, prevalence of glucose testing claims ranged from 21.0% in the oldest group to 49.7%

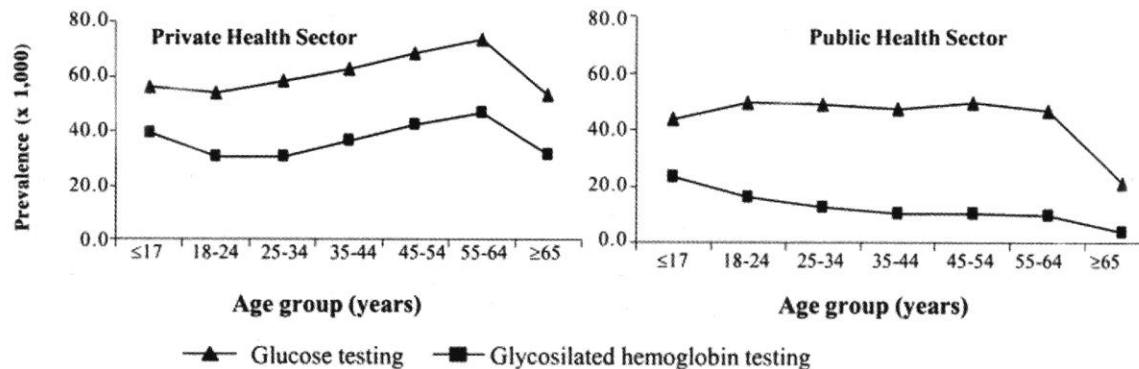
Table 4. Prevalence (%) of Diabetes-Related Prescriptions and Services Utilization by Age Group and Health Sector, Puerto Rico, 2000*

Age group (years)	Hospital admissions		Physician's office visits		Emergency room visits	
	Private sector	Public sector	Private sector	Public sector	Private sector	Public sector
	n (Prevalence)	n (Prevalence)	n (Prevalence)	n (Prevalence)	n (Prevalence)	n (Prevalence)
≤ 17	29 (8.9)	61 (10.6)	256 (78.8)	492 (85.3)	24 (7.4)	127 (22.0)
18-24	17 (3.3)	64 (8.5)	324 (63.3)	684 (90.5)	22 (4.3)	137 (18.1)
25-34	40 (2.2)	100 (5.6)	1,208 (65.4)	1,562 (88.2)	55 (3.0)	304 (17.2)
35-44	71 (2.0)	161 (4.0)	2,581 (71.9)	3,759 (92.4)	100 (2.8)	517 (12.7)
45-54	104 (1.6)	274 (2.9)	5,039 (77.8)	8,789 (94.3)	133 (2.1)	909 (9.8)
55-64	95 (1.2)	406 (2.8)	6,520 (82.1)	13,771 (95.4)	141 (1.8)	1,201 (8.3)
≥ 65	26 (0.8)	426 (2.3)	2,196 (68.3)	17,425 (95.3)	43 (1.3)	1,129 (6.2)
Total	382 (1.6)	1,492 (3.0)	18,124 (75.8)	46,482 (94.5)	518 (2.2)	4,324 (8.8)

Age group (years)	Insulin prescriptions		Oral agents prescriptions	
	Private sector	Public sector	Private sector	Public sector
	Cases (Prevalence)	Cases (Prevalence)	Cases (Prevalence)	Cases (Prevalence)
≤ 17	119 (36.6)	212 (36.7)	35 (10.8)	29 (5.0)
18-24	132 (25.8)	227 (30.0)	74 (14.5)	58 (7.7)
25-34	385 (20.8)	535 (30.2)	517 (28.0)	394 (22.3)
35-44	563 (15.7)	972 (23.9)	1,605 (44.7)	1,639 (40.3)
45-54	960 (14.8)	2,392 (25.7)	3,351 (51.8)	4,715 (50.6)
55-64	1,157 (14.6)	4,323 (30.0)	3,799 (47.9)	7,468 (51.7)
≥ 65	595 (18.5)	5,971 (32.7)	1,634 (50.8)	8,870 (48.5)
Total	3,911 (16.4)	14,632 (29.7)	11,015 (46.1)	23,173 (47.1)

* Data from four insurance companies. Prevalence = (At least one service claim / Number of diabetic patients)*100.

Figure 2. Prevalence (X 1,000) of Diabetes-Related Laboratory Tests by Age and Health Sector, Puerto Rico, 2000



terms of the public sector, prevalence of glucose testing claims ranged from 21.0% in the oldest group to 49.7% in the 18-24 age group. Prevalence of the glycosilated hemoglobin testing in the private sector showed a higher prevalence in the 55-64 age group (46.5%) and a lower prevalence in the 25-34 age group (30.4%). On the other hand, prevalence of glycosilated hemoglobin testing in the public sector decreased with increasing age.

Discussion

Socioeconomic and racial/ethnic disparities have been extensively documented in United States, in particular, racial disparities between African Americans and White populations (11-12). Diabetic patients face multiple risks that complicate their disease. For example, it has been demonstrated that people with diabetes are more likely than people without the disease to die from influenza complications (1), to have cardiovascular disease, renal disease, blindness, and lower-extremity disease.

This study showed that significant differences exist in the prevalence of diabetes and health service utilization of these patients between the private and the public health sector in Puerto Rico. In addition, this data suggest that prevention services are not adequately provided in these groups. Access to health care is not a major problem in Puerto Rico, thus, quality of services, patient education, and other social and demographic variables related to diabetes health care must be responsible for the observed differences.

Our data suggest that neither the private nor the public sectors fully met prevention quality indicators such as glycosilated hemoglobin testing. However, these indicators are less optimum in the public sector. Moreover, complications such as renal failure and amputations were 1.9 and 2.1 times, respectively, higher in the public sector, implying that in these patients the disease was more advanced. Indicators of disease complications such as hospitalizations, emergency room visits and medications such as oral hypoglycemics and insulin prescriptions were also higher in the public sector.

The Centers for Disease Control and Prevention (13) has recently published a cost-effectiveness analysis of hypothetical cohorts of individuals living in the United States, aged 25 years or older, who were newly diagnosed as having type 2 diabetes. They concluded that the direct effect of intensive glycemic control reduced the cumulative incidence of nephropathy and retinopathy complications by 11% to 27%. Intensified hypertension control reduced the cumulative incidence of nephropathy, retinopathy, and stroke complications, whereas reduction in serum cholesterol levels lowered the cumulative incidence of CHD

complications. As result of these control measures, cost was reduced and health outcomes were improved.

The Health Reform in Puerto Rico was partially initiated in 1993 and all the regions of the island were covered by the year 2000. Unfortunately, previous epidemiological data on diabetes in Puerto Rico is scarce making comparisons with current findings difficult. Thus, it is troublesome to assess whether the Health Reform, based on a managed care model, has improved the overall health of diabetic patients in the island.

However, several longitudinal studies have demonstrated that the average time for develop renal failure was approximately 10 to 20 years (14), 13 to 30 years for major circulatory problems leading to amputations (15-16) and 10 to 30 years for retinopathy (17-18). Based on this evidence, it can be postulated that patients insured by the Health Reform must have developed complications prior to the initiation of the new health service modality.

Despite this situation, it is clear that in Puerto Rico as in other countries, people with low socioeconomic levels and less education have a more complicated disease and as a consequence are over-utilizing health services. In contrast to the United States, access to health care does not explain this situation. Thus, other indicators such as quality and adequate prevention measures need to be explored.

It can be concluded that overall public health prevention activities of diabetes need to be improved in both sectors but primarily in the public sector. It is recommended that surveillance of diabetes prevalence and health service utilization must continue to evaluate the real impact of the health reform on this disease. In addition to quantitative data, indicators of quality of service need to be evaluated. Innovative and culturally sensitive prevention programs are needed in the Puerto Rican population if disparities in diabetic patients are to be diminished. This approach may include improvement of primary health care providers regarding the current knowledge of diabetes, its control and the promotion of an integrated approach to health care.

Resumen

Con el fin de examinar las disparidades de salud entre personas con diabetes recibiendo servicios en el sector privado y el sector público, se analizaron las reclamaciones por servicios relacionados a la diabetes (ICD-9 250 – 259) de dos aseguradoras de salud privadas y dos aseguradoras de salud públicas. El personal de las compañías aseguradoras participantes fue responsable de identificar las reclamaciones relacionadas a la diabetes, de aquellos individuos que cumplieron con los criterios de inclusión,

4.9%. La prevalencia en el sector público (5.8%) fue mayor que en el sector privado (3.7%) ($p < 0.0001$). La prevalencia de diabetes en las mujeres del sector público fue casi el doble (6.3%) que la prevalencia en el sector privado (3.3%) ($p < 0.0001$). La prevalencia de la mayoría de los servicios analizados fue mayor en el sector público. Sin embargo, la prevalencia de algunos servicios en particular (análisis de niveles de glucosa y de hemoglobina glucosilada) fue mayor en el sector privado. La prevalencia y uso de servicios también variaron por edad y sexo al comparar los sectores público y privado.

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