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Impact of Diabetes in Riverside County

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Key Findings

- African Americans had the highest age-adjusted death rate from diabetes (38 per 100,000) in Riverside County according to aggregate data from 2001 to 2003.[6]
- Whites had the lowest age-adjusted death rate (14 per 100,000), which was half the rate of Hispanics (29 per 100,000).[6]
- 15.6 percent of the county's children aged 12-17 years are overweight or obese.[4]
- Roughly 21 million dollars was spent on treating uncontrolled diabetes at Riverside County hospitals in 2004, compared to 13 million dollars in 2001.[7, 8] (unadjusted costs)
- 7.5 percent of the county's overweight or obese adults have diabetes compared to 3.9 percent among those not overweight or obese.[4]

Introduction

Diabetes mellitus is a growing health problem. Type 1 diabetes occurs when the body's immune system destroys insulin-producing cells in the pancreas. Type 2 diabetes develops when the body does not use insulin properly and eventually loses its ability to produce the hormone entirely. Since the 1970's, the risk of developing diabetes among U.S. adults has more than doubled.[1] This is largely attributable to increasing rates of obesity and physical inactivity among adults and children. More children are being diagnosed with Type 2 diabetes, a trend with profound implications given that persons who develop Type 2 diabetes before the age of 20 have higher rates of end-stage renal disease and mortality in middle age than those who develop diabetes later in life.[2] This paper will examine trends in diabetes morbidity, mortality, treatment, cost, and risk factors for developing diabetes.

Prevalence

According to the California Health Interview Survey (CHIS, 2003), the prevalence of diabetes in the Riverside County adult population is estimated to be 6.1 percent (CI 4.6 - 7.6), or roughly 74,000 adults, with nearly half over the age of 65. The prevalence among adults in California is an estimated 6.6 percent.[4]

In addition, the National Health and Nutrition Examination

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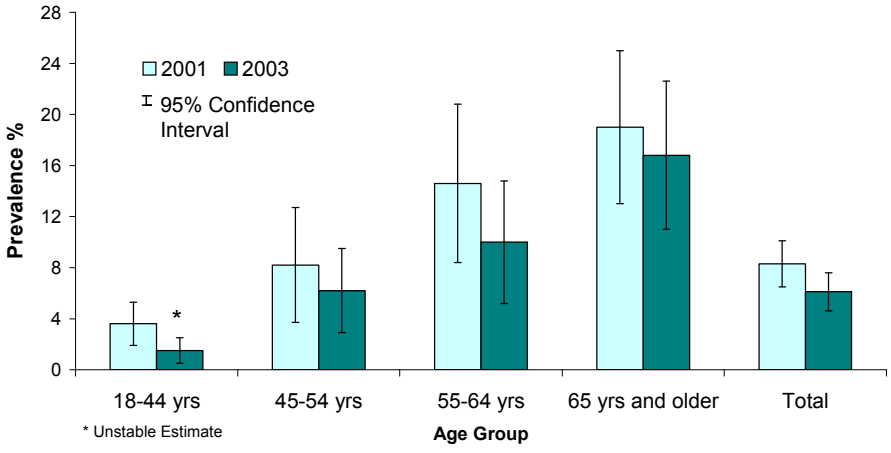
Exhibit 1 **Diabetes Prevalence by Age Group, Adults 18 and Over, Riverside County, 2001 vs. 2003**



Age Group	2001	2003
18-44	3.6	1.5
45-54	8.2	6.2
55-64	14.6	10.0
65+	19.0	16.8
Total	8.3	6.1

Source: California Health Interview Survey, 2001 and 2003

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Survey (NHANES) has shown that about 30% of people with diabetes in the U.S. are undiagnosed, suggesting that the number of Riverside County residents living with diabetes may approximate 100,000.[5]
Type 2 diabetes accounts for roughly 90 percent of diabetes diagnoses in Riverside County as compared to 84 percent in California.[4, 9] All subsequent analyses include persons with both Type 1 and Type 2 diabetes unless otherwise specified.

There are several possible explanations for these findings: 1) since the trend consists of only two data points, either year could be considered an aberration; 2) the dramatic influx of residents from surrounding counties may be altering sample-based statistics by effectively changing the composition of the sample pool; and 3) as the population of Riverside County has increased, the number of persons with diabetes has remained fairly stable, causing a decreased prevalence rate. The population of Riverside County increased 12% from 2000 to 2003.[10] More research and data needs to be collected in order to make the most accurate determination of the local prevalence trend.

Current data indicates that diabetes prevalence increases linearly with age. In Riverside County, 16.8 percent of those 65 and older have been diagnosed with diabetes.[4] This group of nearly 37,000 people may also have significant co-morbidities and disabilities that can make diabetes management especially challenging.

Exhibit 2

Hospital Admissions, Length of Stay, and Cost for Diabetes in Riverside County Hospitals, All Ages, 2001 and 2004

	2001	2004
Total Hospital Admissions for Diabetes	897	1000
Admissions per 10,000 population	5.5	5.3
Range of Admission Length (Days)	1 to 40	1 to 41
Median Length of Stay (Days)	3	3

Source: Office of Statewide Health Planning and Development (OSHPD), 2001 and 2004

Hospitalizations

In 2004, the overall hospitalization rate for diabetes in Riverside County was 5.3 admits per 10,000 population.[8, 10] The Healthy People 2010 objective for "Uncontrolled Diabetes Hospitalizations" is 5.4 admits per 10,000 population aged 18-64.[11] Because the data from the Office of Statewide Health Planning and Development (OSHPD) has limited age information, a direct comparison to the HP 2010 indicator is not presently possible.

The lower admission rate in 2004 compared with 2001 could be an aberration, a sign of improving diabetes management, or a result of population growth. It is difficult to know whether improvements in diabetes control are having an impact at the community level. Additional data will be used in the future to determine if a trend exists.

Despite the decreased hospital admission rate, the increase in the raw number of admissions for diabetes is a burden on the already overtaxed hospital system. Reducing the overall number of hospital admissions remains a primary goal of public health prevention efforts for diabetes.

A hospital admission for diabetes can have costly implications, both physically and financially. The total inpatient cost of treating diabetes (Exhibit 3) has risen dramatically due to an increasing number of admits and increasing health care costs. Diabetes creates a large cost burden on county programs designed to care for those with no health coverage. A large portion is also billed directly to the patient (13%).[7, 8] A comprehensive cost analysis of diabetes is beyond the scope of this paper but will be addressed in the future.

Total Cost (Unadjusted) by Payment Source for Patient Care Expenditures: Uncontrolled Diabetes Admissions in Riverside County Hospitals, 2001 and 2004 **Exhibit 3**

	2001		2004	
*Source of Payment **	*Cost ***	*Percent (Total Cost)*	*Cost ***	*Percent (Total Cost)*
Medicare	$3,503,397	27%	$4,566,605	22%
Medi-Cal	$3,950,430	30%	$5,825,462	28%
Private Insurance	$3,236,389	25%	$5,780,817	27%
County Indigent[a]	$399,919	3%	$696,550	3%
Self-Pay	$1,610,449	12%	$2,654,604	13%
Other Government[b]	$250,007	2%	$1,155,394	5%
Other[c]	$79,236	1%	$456,344	2%
TOTAL	$13,029,827	100%	$21,135,776	100%

Source: Office of Statewide Health Planning and Development, 2001 and 2004

Notes

* Payment Source indicates the category of payer who is expected to pay or did pay the greatest share of the patient's bill. Information confirming complete payment of charges is not currently available.

** Cost includes all charges for services rendered during the length of stay for patient care at the facility, based on the hospital's full established rates. Charges include, but are not limited to, daily hospital services, ancillary services and any patient care services. Hospital-based physician fees are excluded. Prepayment (e.g. deposits and prepaid admissions) are not deducted from Total Charges. Charges are unadjusted for inflation.

See additional notes section on back page (pg 6)

Mortality

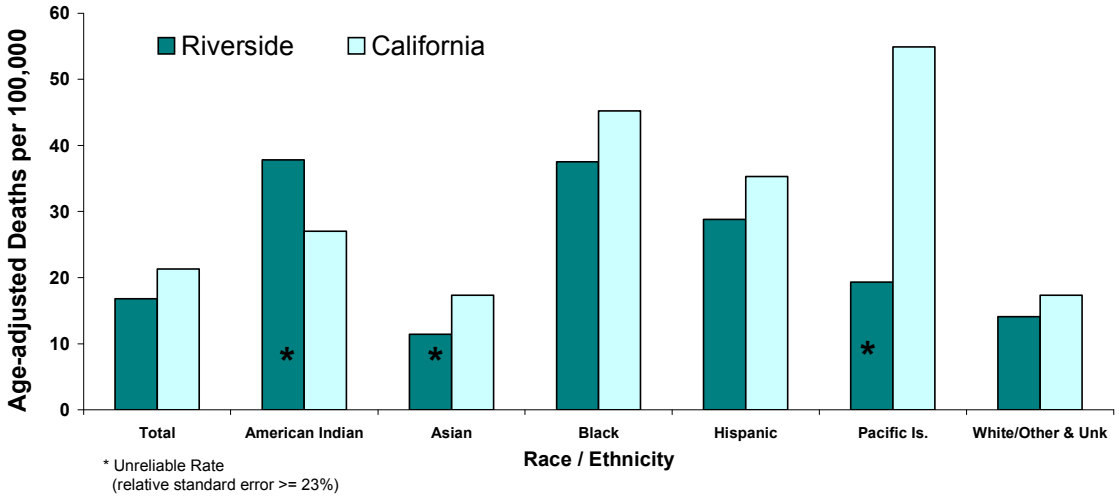
Even with the most exceptional treatment, serious complications of uncontrolled diabetes can lead to death. Mortality data provides an important, albeit imperfect, glimpse at the glaring disparities in diabetes' impact among different races (Exhibit 4). CHIS estimates of prevalence by race would also be useful but are limited by small sample size.

The highest statistically stable mortality rate in Riverside County is among Blacks / African Americans at 37.5 deaths per 100,000 population.[6] Hispanics also have an elevated rate of 28.8 per 100,000 population compared to whites with 14.1 deaths per 100,000 population.[6]

With an average of 16.6 deaths per 100,000 population in 2001-2003, Riverside County ranks 22nd in the state (out of 58 counties) for diabetes mortality.[12] This remains essentially unchanged from the 1999-2001 average annual death rate of 16.5 deaths per 100,000 population when Riverside was ranked 26th in the state.[13]

Minimizing the disproportionate impact of diabetes risk factors on minority groups is pivotal. Efforts at reducing disparities in diabetes must address culture, language, economics, genetic predisposition, and health care access barriers in order to be effective.

Age-Adjusted Death Rates: Diabetes by Race/Ethnicity, Riverside County and California, 2001-2003 (avg.) **Exhibit 4**

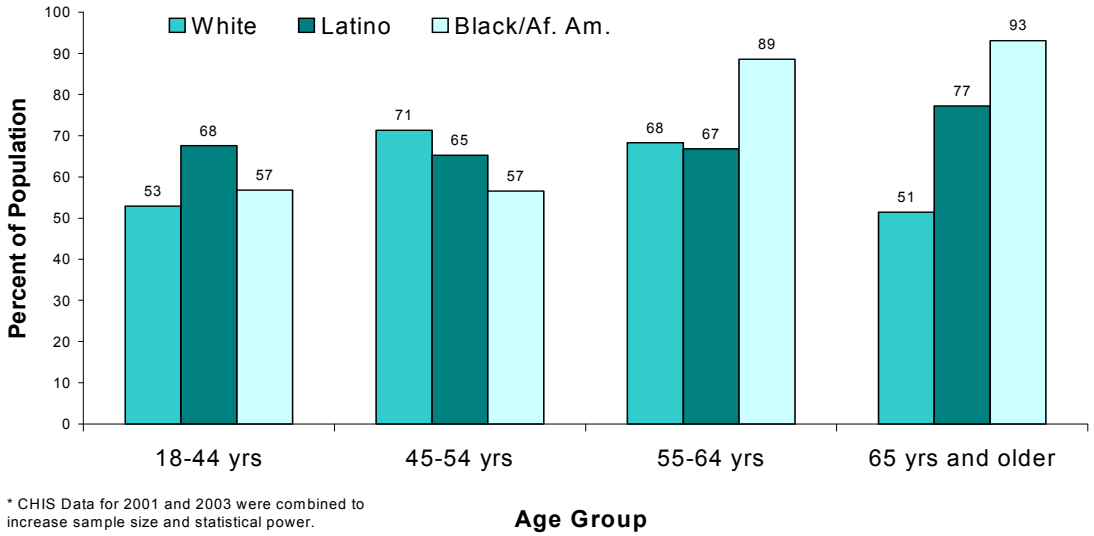


* Unreliable Rate
(relative standard error >= 23%)

Source: California Department of Health Services, 2001-2003

Exhibit 5

Percent Overweight or Obese by Race and Age, Adults 18 and Over, Riverside County, 2001-2003*



* CHIS Data for 2001 and 2003 were combined to increase sample size and statistical power.

Source: California Health Interview Survey, 2001 and 2003

Risk Factors

Obesity

Obesity is a well-established risk factor for developing Type 2 diabetes. According to CHIS 2003, roughly 60 percent of the adult population in Riverside County was at risk for developing diabetes due to being overweight or obese (see note at left).[4]

In 2003, a staggering 71.5 percent of Riverside County residents aged 55 to 64 were overweight or obese—a 4.7 percentage point increase from 2001.[3, 4]

Diabetes prevalence among those overweight or obese (7.5 %) is twice as high as those not overweight or obese (3.9%).[4]

Exhibit 5 illustrates differences in the prevalence of overweight or obese among different race groups within Riverside County. Over the age of 65, the differences jump to nearly 40 percentage points between African Americans and whites, while Hispanics have a nearly 20 percentage point difference

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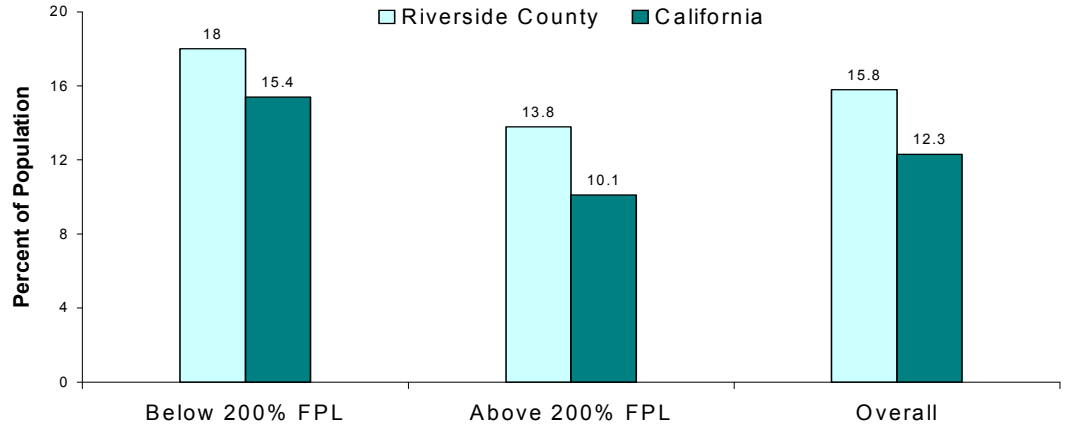
Note

Body Mass Index (BMI) is a ratio of weight in kilograms (kg) divided by height in meters (m) squared. CHIS calculated BMI based on respondents' reported height and weight. Federal standards classify BMI of 25-29.9 kg/m^2 as overweight, and BMI of 30.0 kg/m^2 as obese. [9]

Exhibit 6

Percentage of Adolescents Age 12-17 Who Are Overweight or Obese by Income Level, Riverside County and California, 2001 and 2003*



* CHIS Data for 2001 and 2003 were combined to increase sample size and statistical power.

Source: California Health Interview Survey, 2001 and 2003

Note

The 2003 FPL was $12,384 for a family of two, $14,680 for a family of three, and $18,810 for a family of four, http://www.census.gov/hhes/poverty/threshld/thresh03.html (accessed October 5, 2006).

from the other races within that age group.[3,4] Native American and Asian sample populations were too small to generate reliable estimates in Riverside County.

Poverty

In 2003, diabetes was more prevalent among persons living below 200% of the Federal Poverty Level (FPL) than those living above this threshold (6.6% vs. 5.7%).[4] This disparity is even more pronounced at the state level where 8.8 percent of those below 200% FPL have diabetes compared to 5.4 percent of those above 200% FPL.

In addition, the childhood obesity crisis in Riverside County is consequently expanding the diabetes risk pool—with children in poverty disproportionately at risk. Nearly 20 percent of children living below 200% FPL were considered overweight or obese in a combined sample of 2001 and 2003 CHIS data.[3,4] At 13.8 percent, youth above 200% FPL have a much lower prevalence of obesity. In addition, obesity is more prevalent among children in Riverside County than in California overall.

Education

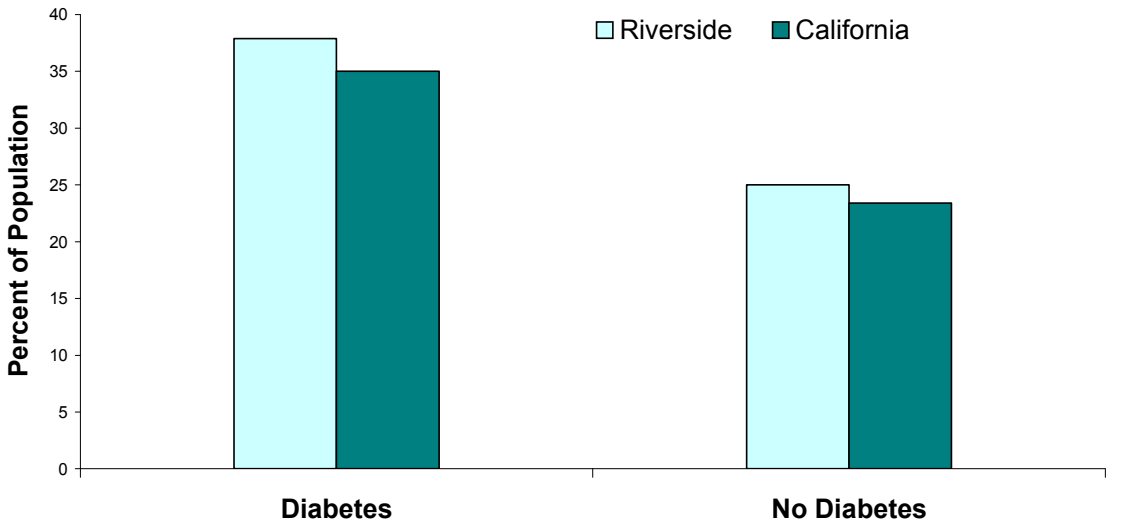
Diabetes prevalence has been shown to decrease as educational attainment increases.[9] However, there was essentially no association between educational level and diabetes prevalence in Riverside County based on analysis of CHIS 2003 survey data.[4]

High Blood Pressure

Diabetes and high blood pressure are highly interdependent conditions. Hypertension, can contribute to the development of serious complications among persons with diabetes while uncontrolled diabetes can exacerbate high blood pressure by elevating blood glucose and Na+ reabsorption. Among Riverside County residents, nearly 64 percent of those with diabetes also have been diagnosed with high blood pressure. In comparison, 22 percent of county residents without diabetes have high blood pressure.[4]

Exhibit 7

Percent of Residents with 10 or More Days of Poor Health in Past Month, by Age and Diabetes Diagnosis, Adults 18 and Over, Riverside vs. California, 2003



Source: California Health Interview Survey, 2001 and 2003

Quality of Life

Perhaps the most important issue for those with diabetes is how the disease or other related co-morbidities makes them feel on a daily basis. Whether it is a causal relationship or merely associative, persons with diabetes report feeling in poor health more often than persons without diabetes.

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Participants in the 2003 California Health Interview Survey were asked to report the number of days that they felt in "poor health" in the past month. The data presented in Exhibit 7 illustrates that nearly 38 percent of Riverside County adults with diabetes reported that they had 10 or more days of poor health in the past month, as compared to 25 percent of adults without diabetes.[4]

Stratifying these results by age and diagnosis status of other co-morbidities would help determine if diabetes was indeed the primary cause of poor health for the CHIS respondents. It is well-documented that diabetes has a direct impact on quality of life, mobility, independence, and overall well-being.

Conclusions Diabetes prevalence increases with age, yet as children are more commonly seen with adult-like risk profiles, prevalence among younger age groups is likely to increase. Preventing diabetes in the wake of increasing levels of obesity, especially among children, the poor, and persons of color, is crucial. Diabetes is taking a toll on Riverside County through financial costs, diminished quality of life, and even death. Increasing early diagnosis, improving diabetes management, and promoting healthy lifestyle changes are vital to prevent the severe complications that are disproportionately seen among race/ethnic minority groups. Public health and community resources must reach those most vulnerable to this disease.

Notes (cont. from pg. 3)

a. Funded in whole or in part by County Medical Services Program (CMSP), California Healthcare for Indigents Program (CHIP), and/or other Realignment Funds whether or not a bill is rendered.

b. Funds received through California Children's Services (CCS), the Civilian Health and Medical Program of the Uniformed Services (TRICARE), and the Veterans Administration

c. Includes: 1) payment from workers' compensation insurance VA). 2) Patient care pursuant to Hill-Burton obligations or who meet the standards for charity care 3) Any other payment including cases where no payment will be required by the facility, such as special research or courtesy patients.

Data Sources

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13. California Department of Health Services, County Health Status Profiles 2003

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