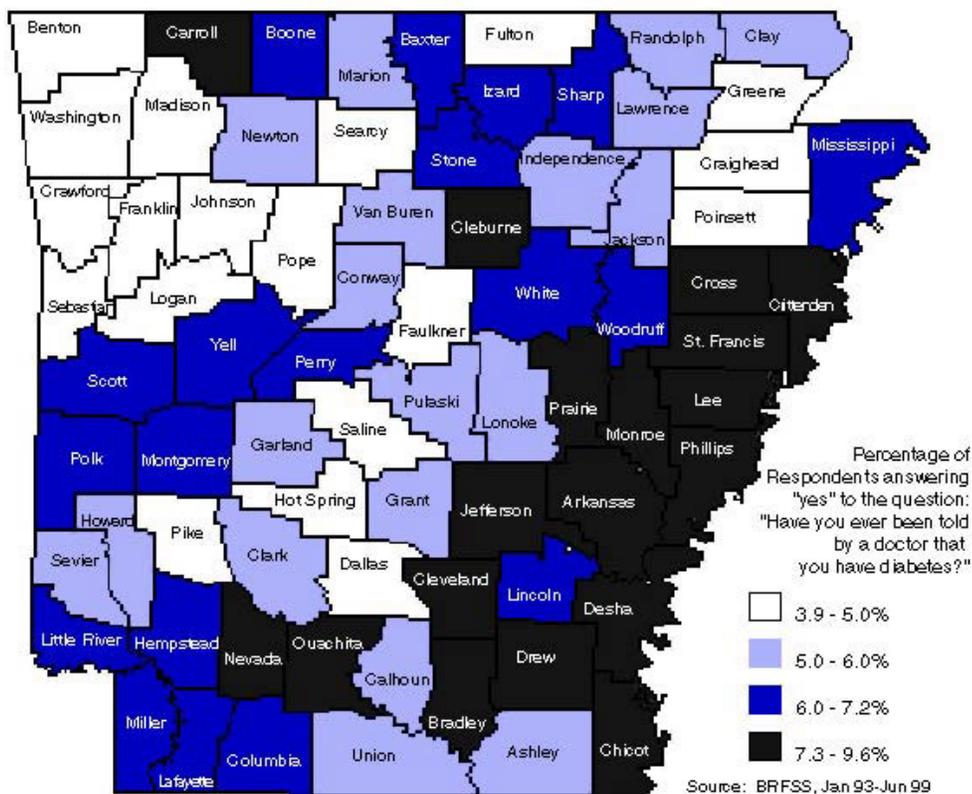


The Burden of Diabetes in Arkansas

Diabetes Prevalence in Arkansas,
1993-99



Map compiled by the Arkansas Diabetes Control Program
Arkansas Department of Health
(501) 681-2093

Surveillance report prepared by:

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Appathurai Balamurugan, MPH

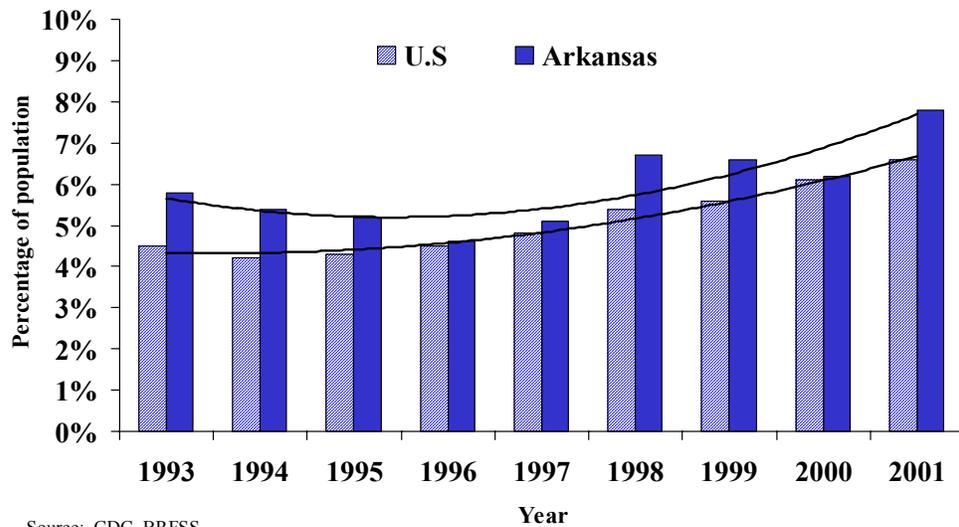
PREVALENCE

The Centers for Disease Control and Prevention (CDC) estimate that approximately 17 million people in the United States – nearly 7 percent of the adult population – have diabetes, with as many as one-third of those individuals unaware that they have the condition. Using data obtained from the 2001 Behavioral Risk Factor Surveillance Survey (BRFSS), it is estimated that approximately 156,600 Arkansans are aware that they have diabetes and that as many as 78,300 more may be suffering from this serious chronic condition but be unaware of it.

Approximately
235,000
Arkansas adults have
diabetes

One third of them are
probably unaware that they
have this serious condition

Figure 1. Trends in diabetes*, Arkansas and US, 1993-2001



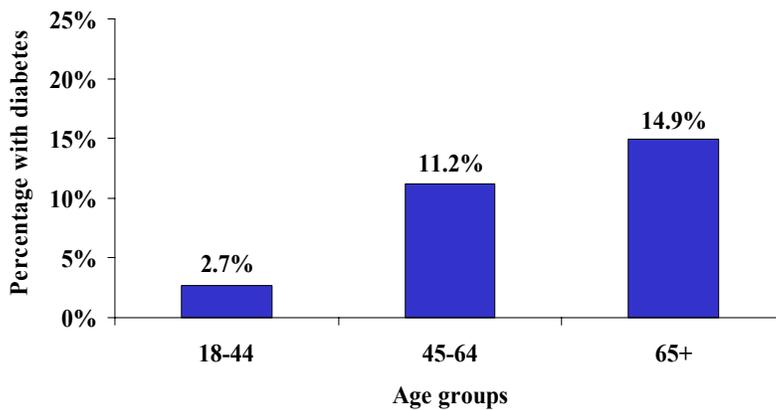
Source: CDC, BRFSS
* Self-reported awareness of diabetes

- Prevalence rose from 5.8 percent in 1993 to **7.8 percent** in 2001, a gain of 34 percent over the period.
- This rate of increase within Arkansas was slightly less than the 47 percent growth seen nationally.
- Arkansas' prevalence is 18 percent higher than the median value for other states.
- **Two percent of women reported having had gestational diabetes.** Gestational diabetes is, of course, a risk factor for adverse birth outcomes (such as low birth weight and complications of labor and delivery, among others) as well as for the mother's development of Type 2 diabetes later in life.

SPECIAL POPULATIONS

The Arkansas Diabetes Prevention and Control Program is particularly aware that the burden of diabetes is not equally distributed across all groups of citizens in the state. Specifically, data from the 2001 BRFSS indicate that the elderly and blacks in Arkansas suffer a disproportionate burden from the disease than do their younger white counterparts.

Figure 2. Diabetes in Arkansas, by age, 2001

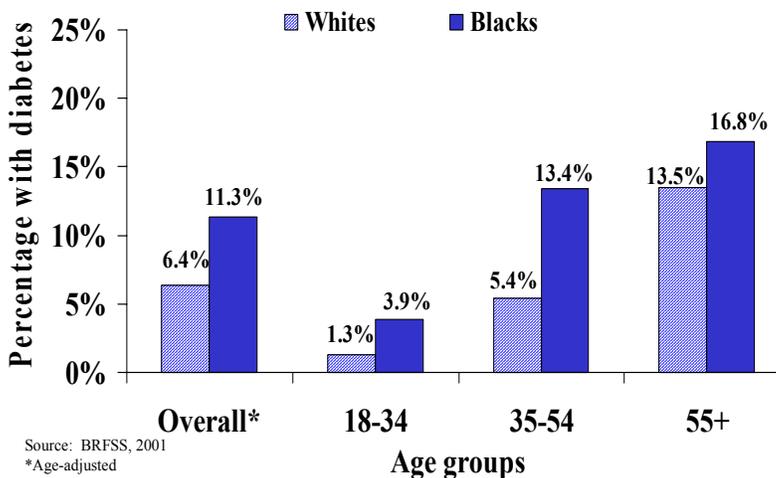


Source: BRFSS, 2001

As seen in Figure 2, in the year 2001 BRFSS, **diabetes was reported more often in the older age groups**, with a substantial increase in prevalence after the age of 45. The proportion of persons aged 45 to 64 reporting diabetes is more than 4 times the proportion of such persons aged 18 to 44. This pattern is not surprising, since **diabetes is most often diagnosed between the ages of 45 and 65**.

Further, the **prevalence of diabetes among blacks in Arkansas (11.3%) was 77 percent higher than among whites (6.4%; see Figure 3)**.

**Figure 3
Diabetes in Arkansas by ethnicity and age, 2001**



Source: BRFSS, 2001
*Age-adjusted

The differences between whites and blacks are most notable in the younger age groups (ages 18 to 34 and 35 to 54), when the **proportion of blacks with diabetes is between two and three times greater than the proportion of whites** with diabetes (see Figure 3). Among older Arkansans (ages 55 and older) the disparity is decreased, with the prevalence of diabetes among blacks only 25% higher than the prevalence seen among whites.

MORTALITY

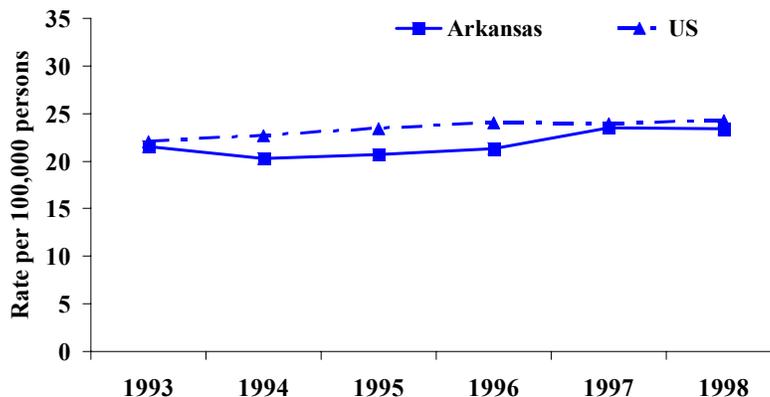
In Arkansas, diabetes was listed as the primary cause of death in nearly 700 deaths in 1999 – just over two percent of the deaths occurring in the state in that year.

- Diabetes was the 7th leading cause of death in the state in 1999.
- One in five diabetes deaths (21%) occurred prematurely – that is, among persons below the age of 65 years.
- Diabetes accounted for more than 9,000 years of potential life lost because of deaths in 1999 alone.
- On average, each diabetes death in the year 1999 resulted in 14 years of potential life lost for that individual.

In 1999, diabetes killed more than 68,000 persons nationally.

Diabetes was the 8th leading cause of death in the US that year.

Figure 4
Diabetes mortality, Arkansas and US, 1993-1998*



Source: CDC
*Age-adjusted

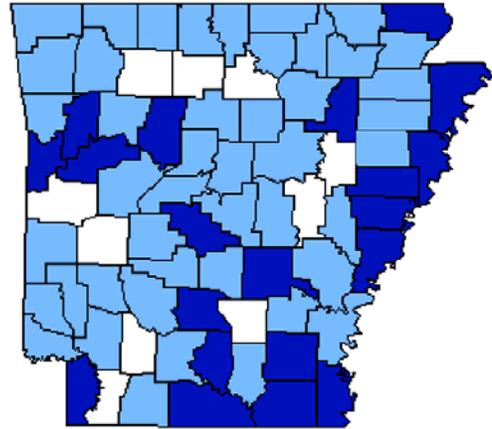
In recent years, diabetes mortality rates in Arkansas and the US overall have risen approximately 10 percent (see Figure 4). Between the years 1993 and 1998, the diabetes mortality rate in Arkansas was typically lower than the rate observed nationally. However, a dramatic increase of 10 percent between 1996 and 1997 brought Arkansas to national levels.

It is important to remember, however, that these figures may underestimate the total mortality associated with diabetes for several reasons:

- Diabetes is underreported on death certificates as the cause of death. The CDC estimates that among persons known to have diabetes, only 4 of 10 have diabetes listed as a cause of death.
- Persons with diabetes are 2 to 4 times more likely to die of heart disease or stroke than are persons without diabetes.
- Deaths caused by kidney disease are also more common among persons with diabetes than among persons who do not have diabetes

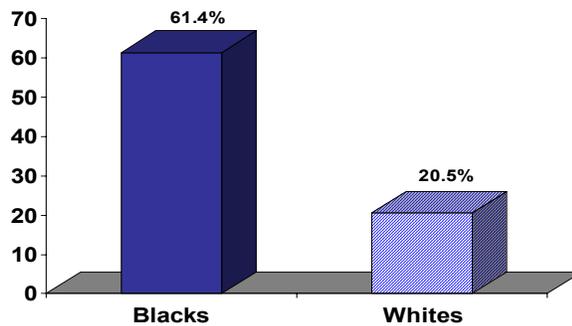
The mortality burden is not equally distributed across the state. As can be seen in Figure 5, some counties have experienced substantially higher mortality rates in the recent decade than other counties. In this figure, the darker counties are those that evidenced the highest diabetes mortality rates in the period, while the counties left uncolored are those for which there was insufficient data to make a judgment.

Figure 5
Diabetes mortality by Arkansas county, 1990-1998



SPECIAL POPULATIONS

Figure 6
Diabetes mortality rates, by racial group, Arkansas 1999



In very important ways it can be demonstrated that the burden of mortality associated with diabetes is not borne equally across all population groups within the state. For example:

- Taking into account differences in age within the two groups, the **diabetes mortality rate for blacks is 3 times the rate seen among whites** (see Figure 6).
- The proportion of premature diabetes deaths is greater

among blacks than among whites (see Table 1).

Among whites in Arkansas, one fourth (25%) of all diabetes deaths in 2001 occurred in persons 65 years of age or younger and only 4 percent occurred in persons under the age of 45. Among blacks, however, approximately one third (32%) of diabetes deaths occurred in persons under the age of 65 and 7 percent occurred in younger persons (45 years of age or younger).

Table 1
Premature diabetes deaths by race, Arkansas 2001

	Percentage of diabetes death occurring in age group	
	≤ 45 years of age	≤ 65 years of age
White	4%	25%
Black	7%	32%

Complications

If left untreated or uncontrolled, diabetes can lead to serious and even life-threatening complications. Some conditions that may result from uncontrolled diabetes include:

➤ **Heart disease**

Adults with diabetes are **2 to 4 times more likely to die of heart disease** than adults without diabetes.

➤ **Stroke**

Persons with diabetes are **2 to 4 times more likely to have a stroke** than persons without diabetes.

➤ **High blood pressure**

It is estimated that approximately **65 percent of persons with diabetes have high blood pressure**.

➤ **Blindness**

Diabetes is a primary cause of new cases of blindness in adults. Nationally, diabetic retinopathy causes from 12,000 to 24,000 new cases of blindness each year. In the 2001 Arkansas Behavioral Risk Factor Surveillance Survey, **26 percent of persons with diabetes reported that they had been told their diabetes had affected their eyes**.

➤ **Kidney disease**

Diabetes is the leading cause of end-stage renal disease (ESRD), responsible for approximately 40 percent of all new cases. Data from the End-Stage Renal Disease Registry maintained by the National Institutes of Health, indicate that in Arkansas in the year 2001:

- **More than 1000 persons with diabetes (32% of the total number of cases) were reported to have ESRD.**
- **Persons with diabetes accounted for some 40 percent of**
 - The new cases of ESRD diagnosed,
 - Those ESRD patients undergoing dialysis, and
 - Deaths occurring among dialysis patients in Arkansas in 2001.
- **More than 200 persons with diabetes had undergone kidney transplants.**

➤ **Nervous system disease**

As many as 70 percent of people with diabetes have some form of nervous system damage, including impaired sensation or pain in the feet or hands, digestion problems, carpal tunnel syndrome, and other nerve problems.

➤ **Amputations**

CDD reports that more than half of lower limb amputations in the United States occur in people with diabetes. In Arkansas in 2001,

- More than 1000 non-traumatic lower extremity amputations were performed in Arkansas hospitals. An overwhelming **63 percent of these amputations were performed on persons with diabetes.**
- Nationally, age-adjusted rates of lower extremity amputation were 28 times higher among persons with diabetes than among persons without diabetes.

➤ **Dental disease**

Periodontal disease (a type of gum disease that can lead to tooth loss) is more common and often more severe among persons with diabetes than among their non-diabetic counterparts.

➤ **Complications of pregnancy**

The rate of major congenital malformations (birth defects) in babies borne to women with pre-existing diabetes can be as high as 5 percent among women who receive preconceptive care and 10 percent among women who do not receive preconceptive care. Between 3 and 5 percent of pregnancies among women with diabetes result in the death of the newborn; the rate for women who do not have diabetes is less than 2 percent.

➤ **Other complications**

Diabetes can directly cause acute life-threatening events, such as diabetic coma. In general, people with diabetes are more susceptible to many other illnesses. For example, they are more likely to die of pneumonia or influenza than people who do not have diabetes.

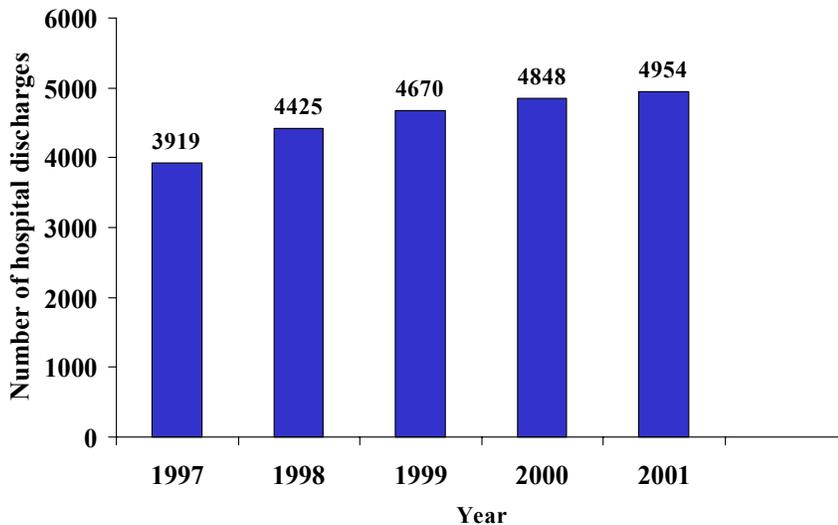
SPECIAL POPULATIONS

Information on the disparities in the occurrence of complications of diabetes is limited. However, given the greater prevalence of diabetes among blacks generally, it is not unexpected to find that:

- More blacks (35%) than whites (23%) report that they have been told that their diabetes has affected their eyes.
- Among Arkansans with ESRD who are undergoing dialysis, the majority (51%) are black, compared to 47 percent who are white.

The total cost of diabetes includes direct medical costs (such as physician fees, home health care, hospital charges, pharmacy charges, supplies, and the like) and indirect costs (that is, the costs associated with disability, lost work time, premature mortality, etc.). Data are not available to estimate these total costs for the state of Arkansas. However, various sources provide information that may be used to get some perspective on the costs of diabetes borne by systems and individuals in Arkansas.

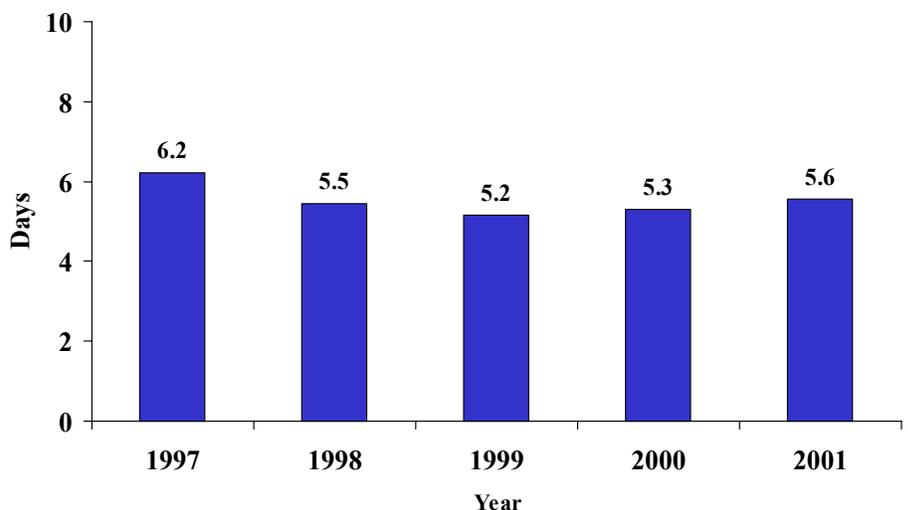
Figure 7
Hospital Discharge With Primary Diagnosis of Diabetes,
Arkansas Hospitals, 1997-2001



Arkansas' hospital discharge reporting system captures information about the number of and costs associated with hospitalizations related to diabetes. According to those records, **in 2001 there were nearly 5000 hospital admissions with a primary discharge diagnosis of diabetes** (see Figure 7). The number of such discharges has increased each year since 1997 (see Figure 8), although the reasons

for that increase is not known. The average length of those hospital stays during recent years has decreased from just over 6 days in 1997 to a low of 5.2 days in 1999. Since 1999 the average length of stay has increased steadily, suggesting that patient conditions are more severe or more complex, requiring additional time in the hospital. In addition, average charges for hospitalizations due to diabetes have increased each year since 1998, to a current **average of more than \$11,000 per hospitalization** (see Figure 9).

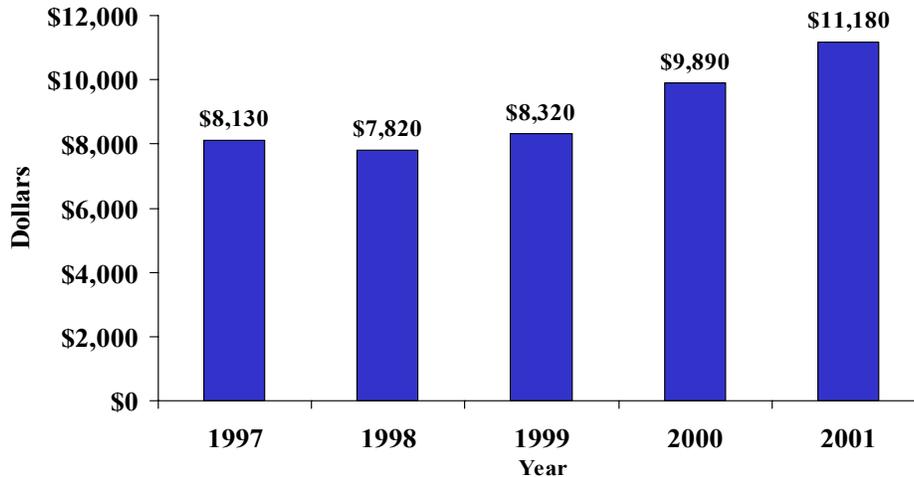
Figure 8
Average Length of Stay for Hospitalizations Due to Diabetes,
Arkansas, 1997-2001



Using this information, it can be estimated that **hospitalizations due**

to diabetes in Arkansas accounted for a total cost of more than \$55 million in the year 2001. It is important to remember that these figures include only hospital charges, and may not include the costs associated with physician services during the inpatient stay.

Figure 9
Average Charges for Hospitalizations Due to Diabetes,
Arkansas, 1997-2001



Among the most serious and costly hospitalizations are those that are caused by the serious complications of diabetes, including heart disease, diabetic ketoacidosis, and lower extremity amputations. Information from Arkansas' hospital discharge reporting system indicates that:

- **26 percent of the persons admitted to Arkansas hospitals for the treatment of cardiovascular disease also had a diagnosis of diabetes.** There were approximately 12,890 such hospital admissions in 2001.
- **More than 1100 hospitalizations occurred in 2001 for the treatment of ketoacidosis.** This condition is related to uncontrolled diabetes and may be associated with symptoms such as confusion and loss of consciousness.
- Some 681 non-emergency lower extremity amputations (LEAs) were performed during the year 2001 on persons with diabetes, compared to 395 such amputations on persons without diabetes. From a different perspective, **63 percent of the LEAs performed during the year were performed on persons with diabetes**, even though only 7 percent of the overall adult population has diabetes.

It has been estimated that the average cost of managing the complications of type 2 diabetes over a 30-year period is \$47,240 per patient, with:

- 50 percent associated with managing cardiovascular disease and lower extremity amputations,
- 20 percent associated with renal disease, and
- 10 percent associated with eye disease.

Cost is also inversely related to the degree of glycemic control – that is, it is more costly to manage patients who show less control (as evidenced by higher HbA1c levels).

In addition, information from the National End State Renal Disease registry indicates that the average cost to treat a person with ESRD totals \$46,691 per patient per year. Of this amount, \$16,860 (36%) is associated with inpatient care, \$18,913 (41%) is associated with outpatient care, and \$8,944 (19%) is associated with physician and supplier (e.g., pharmaceutical, consumable medical supplies) costs.

SPECIAL POPULATIONS

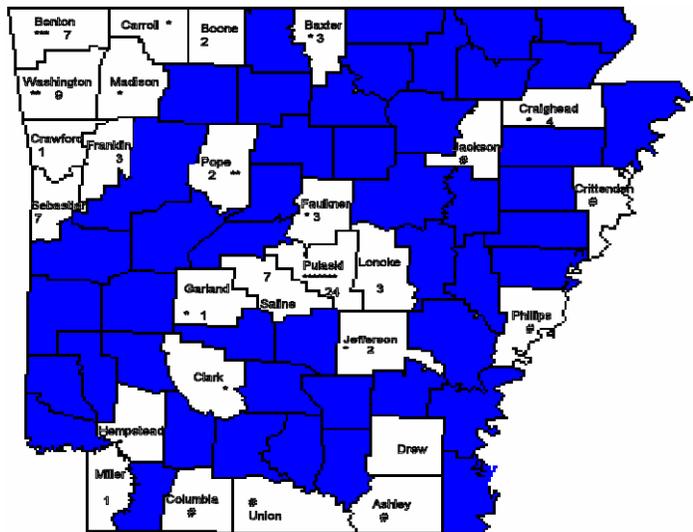
Younger persons and blacks appear to be particularly burdened by the costs associated with the treatment of diabetes and its complications. It has already been noted that the percentage of premature deaths caused by diabetes is greater among blacks than among whites (see “Mortality”). In addition, the percentage of hospitalizations due to serious complications of diabetes is greater among blacks and younger persons, compared to their white and/or older counterparts. Specifically,

- Among those persons with diabetes who were hospitalized for non-traumatic lower extremity amputations, 46 percent were among persons less than 65 years of age, compared to 31 percent of persons without diabetes.
- Among those persons with diabetes hospitalized for the treatment of cardiovascular disease, 21 percent were black, compared to 17 percent of persons without diabetes.
- Among those persons with diabetes hospitalized for the treatment of ketoacidosis, 64 percent were among persons under the age of 45, and 89 percent were among persons under the age of 65.

As noted in Figure 8, not all counties have certified diabetes educators to provide education and support for persons with diabetes. As of April 2002, there were a total of 81 certified diabetes educators and 25 educational programs recognized by the American Diabetes Association. A number of additional programs were at that time seeking certification, and statewide partners, including the Arkansas Diabetes Prevention and Control Program, are working to increase the number of certified diabetes educators available to the population.

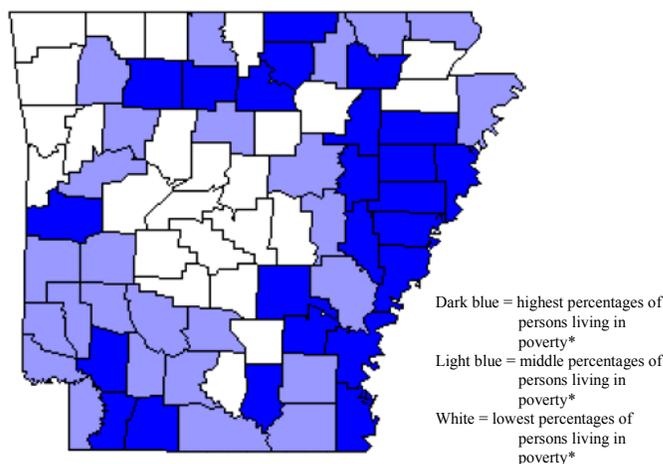
Nonetheless, these and other geographic disparities in healthcare resources mean that those persons with diabetes who live in areas with more limited access to care incur greater costs associated with getting care (e.g., time, travel expense and lost wages).

Figure 11
Diabetes educators, Arkansas 2002, by county



SPECIAL POPULATIONS

Figure 12
Percentage of persons living in poverty*, by county, Arkansas 2001



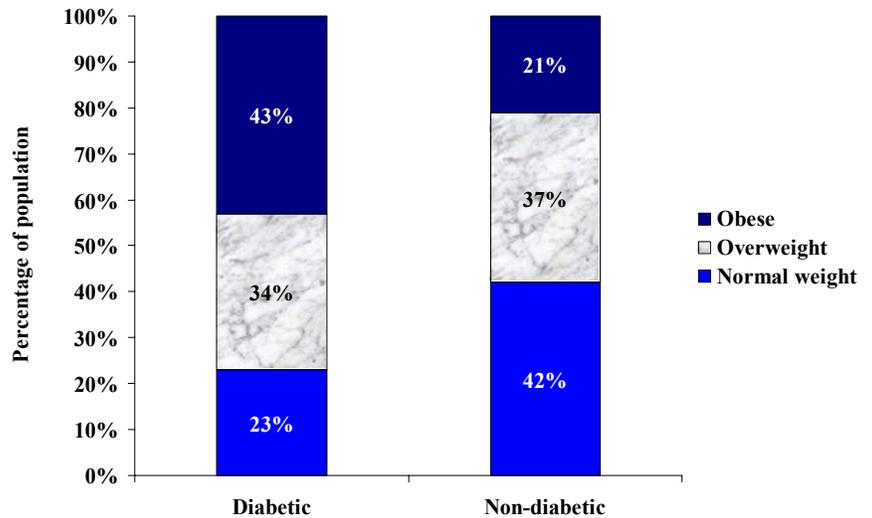
* At or below 100% of federal poverty

Persons living in poverty present as a special population in terms of diabetes, since they are least able to bear the costs of getting care. On the 2001 BRFSS, 12 percent of persons with diabetes (an estimated 19,000 persons statewide) reported that they were not currently covered by any health plan. These individuals and their families, thus, incurred more out-of-pocket expenses for health care.

After an individual has developed diabetes the focus of care is directed toward the prevention of complications. For the state’s population as a whole, however, the prevention of the disease itself must be a priority. The prevention of diabetes depends ultimately on the reduction of risk factors. While some of the risk factors for diabetes – such as age and racial origin – are not modifiable, other risk factors can be changed. It is these risk factors – primarily obesity, which is influenced by physical activity and eating habits – that are the focus of primary prevention efforts.

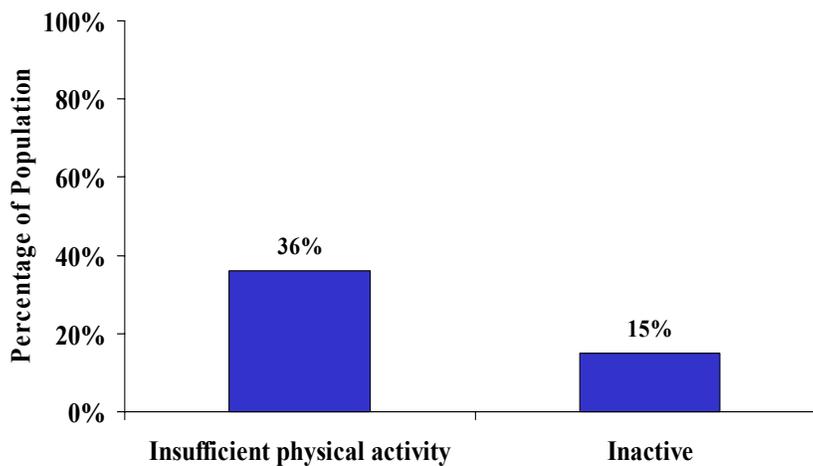
The BRFSS is the primary source of information concerning the status of Arkansans on these critical risk factors and behaviors. Overall, in 2001 the survey indicated that some **60 percent of Arkansas’ adults could be categorized as overweight or obese**, using reported height and weight to calculate body mass index. However, as seen in Figure 11, persons with diabetes are more likely to be obese or overweight (77% combined categories) than persons without diabetes (58%).

Figure 13
Weight status, by body mass index, Arkansas adults, 2001



The BRFSS also provides information about physical activity and nutritional patterns in the state. Results of the most recent interviews (2001) indicate that just over half (51%) of Arkansas adults do not engage in sufficient physical activity (see Figure 14). **More than a third (36%) of adults report physical activity patterns that are classified by the CDC as insufficient physical activity** (see appendix for details) and 15 percent can be said to be physically inactive in their daily lives.

Figure 14
Physical Activity, Arkansas adults, 2001



Source: BRFSS, 2001

Similarly, every two years respondents to the BRFSS have been asked to report on their eating habits, in an effort to assess their adherence to recommendations to eat at least 5 fruits and

vegetables per day. In the BRFSS 2000, **more than three quarters (78%) of Arkansas adults reported not eating enough of the recommended fruits and vegetables.**

Of particular concern is the finding that a similar pattern of risk exists among Arkansas teens. The Youth Risk Behavior Survey (YRBS) is administered to Arkansas youth (grades 9 through 12) every two years and provide valuable information about the health behaviors of the state's teens. In 2001,

- **Only one in five (20%)** reported that they **ate the recommended 5 or more fruits and vegetables per day**
- **14 percent were overweight** (adjusting for their age and height)
- Approximately **a third (34%) reported physical activity patterns judged to be insufficient** by the CDC.

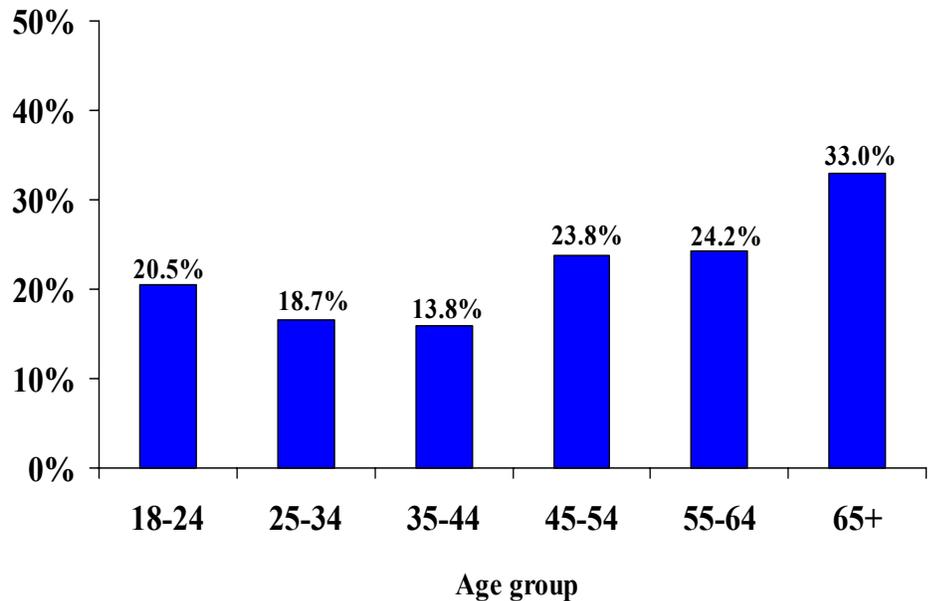
Taken together these findings suggest that a large number of Arkansas' youth may be at risk for developing diabetes.

SPECIAL POPULATIONS

There are important age, gender, and racial differences in the patterns of risk factors among Arkansas adults and youth. These patterns, presented briefly below, provide insights into potential target groups for prevention of diabetes.

First, results from the BRFSS indicate that older persons (particularly those 45 years of age or older) are less likely to eat the recommended servings of fruits and vegetables daily (see Figure 15).

Figure 15
Percentage adults not eating recommended 5 servings of fruits/vegetables per day, by age, Arkansas 2001

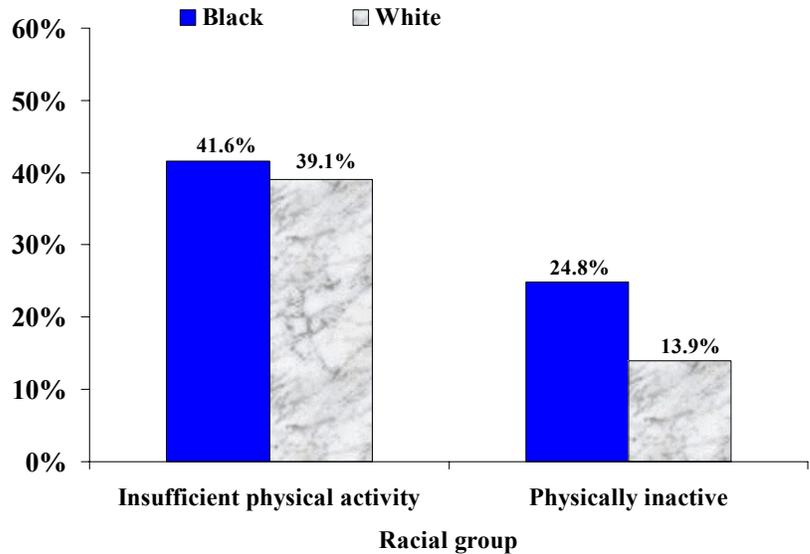


Source: BRFSS, 2001

In addition, black adults are more likely to be less physically active than recommended by experts (see Figure 16).

Although the proportions of persons who engage in insufficient physical activity are essentially the same among both whites and blacks (approximately 40% in both groups), the proportion of blacks who report no physical activity (25%) is substantially higher than the percentage of whites who reported no activity (14%). Interestingly, there were no real differences noted between male and female adults.

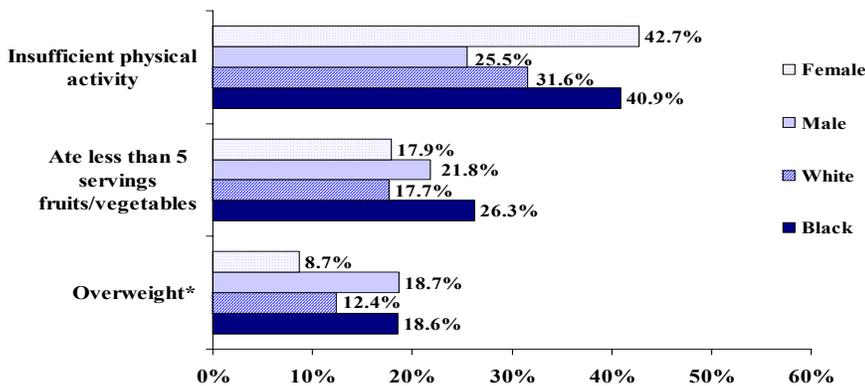
Figure 16
Reported physical activity, by race, Arkansas 2001



Source: YRBS, 2001

There are, however, differences between both gender and racial groups among Arkansas teens on each of the three risk factors being reviewed (see Figure 17). For example, substantially more blacks (19%) than whites (12%) and more males (19%) than females (9%) meet CDC criteria for overweight (defined as being at or above the 95th percentile for age and gender).

Figure 17
Reported physical activity among Arkansas teens, by race and gender, 2001



Source: YRBS, 2001; *Calculated by CDC, from self-reported height and weight, 95th percentile for age and gender

Similarly, more blacks (41%) than white (32%) and more females (43%) than males (25%) engaged in insufficient physical activity, according to CDC guidelines. In terms of eating habits, more blacks (26%) failed to meet the guidelines for daily fruit/vegetable consumption than whites (18%). The differences between males (22%) and females (18%) were less dramatic

in regard to their eating habits.

Once an individual has diabetes, disease management and the prevention of complications become the highest priorities. The Centers for Disease Control and Prevention, along with the American Diabetes Association and other national partners, recommend the following:

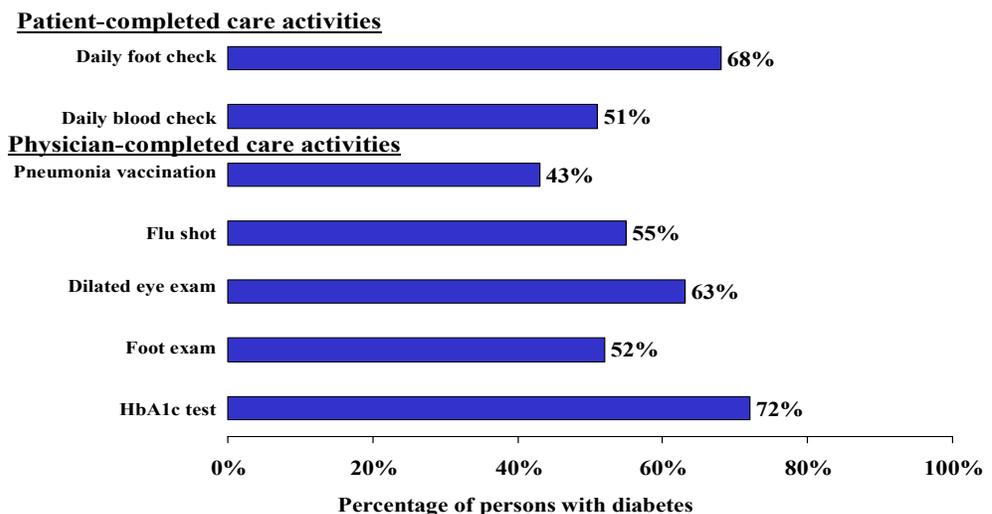
Care Activities	Frequency/Recommendation
General	
Pneumonia vaccination	Once in a lifetime or as recommended by doctor
Flu vaccination	Once each flu season
Diabetes Control	
Self-monitoring of blood glucose	Type 1 = 3-4 times a day Type 2 = at least daily
HbA1c (percentage)	At least 2 times per year or more frequently as recommended by doctor; maintain less than 7%
Prevention	
Diabetic eye disease (retinopathy)	Yearly dilated eye exam
Kidney disease (nephropathy)	Yearly
Urinalysis for protein	Yearly (if urinalysis is negative for protein)
Microalbumin	Yearly
Serum creatinine	At least yearly
Nerve disease (neuropathy)	Foot exam with each doctor visit
Comprehensive foot exam	Daily by patient
Cardiovascular Assessment	
Blood pressure	Every visit – maintain less than 130/80
Cholesterol	Yearly
LDL cholesterol	Less than or equal to 100 mg/dL
HDL cholesterol	Greater than 45 mg/dL
Total cholesterol	Less than 200 mg/dL
Triglycerides	Less than 150 mg/dL
Healthy Lifestyle Habits	
Exercise	20-45 minutes, 3 days a week, or as doctor recommends
Physical activity	Incorporate physical activity into daily activities
Smoking	No tobacco use
Weight management	Achieve and maintain a healthy weight

The Centers for Disease Control and Prevention’s Diabetes Prevention and Control Program has set national objectives related to increasing the percentage of persons with diabetes who receive the recommended dilated eye exams, foot exams, glycosylated hemoglobin (HbA1c) testing, and flu and pneumococcal vaccinations. Arkansas’ Diabetes Prevention and Control Program, in partnership with a wide range of partnering individuals and groups throughout the state, is actively working to ensure that persons with diabetes in Arkansas have the appropriate information about their disease and its management and have access to comprehensive, affordable care.

The Behavioral Risk Factor Surveillance Survey (BRFSS) provides annual information concerning the program’s progress toward achieving these goals as well as the percentage of persons with diabetes who engage in various care activities, in collaboration with their physicians. Some activities – such as checking one’s feet and blood glucose levels – can be accomplished by the individual alone, without the intervention of a healthcare professional. Other activities – for example, having a dilated eye exam, a flu or pneumonia shot, or HbA1c testing – require the direct assistance of a physician or other provider. In 2001 the Arkansas survey indicated that:

- Just over half (51%) of persons with diabetes reported that they check their blood glucose levels at least daily.
- Nearly three-quarters (72%) reported that a physician had checked HbA1c levels within the past year.
- Approximately two-thirds (68%) reported that they had checked their own feet daily.
- Just over half (52%) reported that a healthcare professional had performed a foot exam.
- Just under two thirds (63%) reported having had a dilated eye exam within the past year.
- The majority (55%) reported having had a flu shot within the past year.
- Only 40 percent reported having ever had a pneumonia vaccination.

Figure 18
Preventive care among persons with diabetes, Arkansas 2001

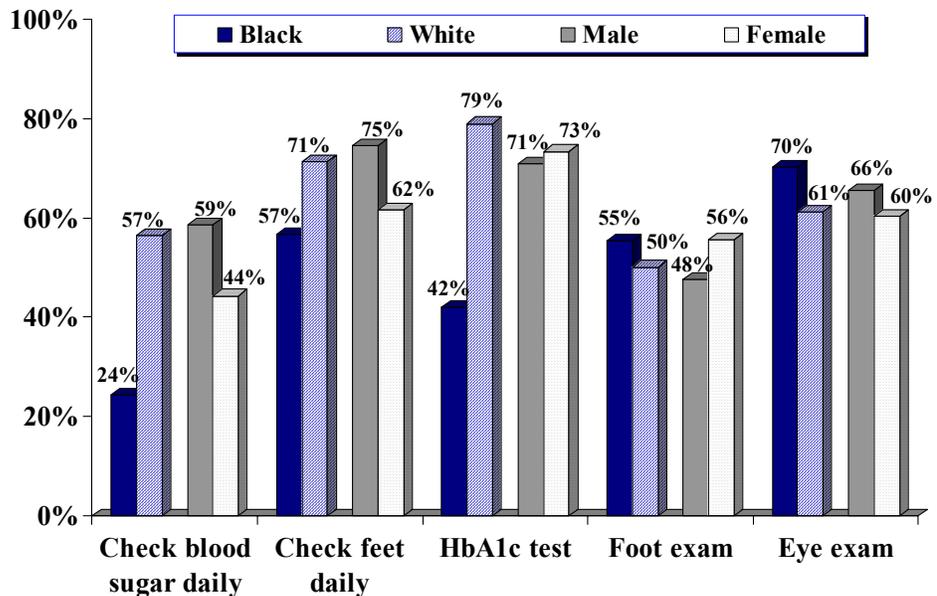


SPECIAL POPULATIONS

There were important racial and gender differences in the percentages of persons with diabetes engaging in the various types of preventive care. For example,

- **Daily blood sugar checks**
 - More whites (56.5%) than blacks (24.3%)
 - More women (58.6%) than men (44.3%)
- **Daily foot checks**
 - More whites (71.3%) than blacks (56.7%)
 - More women (74.5%) than men (61.7%)
- **HbA1c testing**
 - More whites (79.0%) than blacks (42.0%)
- **Professionally administered foot exam**
 - More men (55.6%) than women (47.6%)
- **Dilated eye exam**
 - More blacks (70.3%) than whites (61.2%)
 - More women (65.5%) than men (60.3%)

Figure 19
Preventive care activities by gender and race groups, Arkansas 2001



Definitions

Age-adjusted rates or proportions: A rate calculated in a manner that allows for the comparison of populations with different age structures.

Overweight: A body mass index (BMI) great than 25.0 kg/m². Using weight (in pounds) and height (in inches), BMI is calculated as 705 times weight divided by the square of the height.

Prevalence: The percent (proportion) of a population that has a disease or a risk factor at a given point in time.

Risk factor: A characteristic or behavior that is consistently associated with increased probability of disease or event.

Normal weight: Neither overweight nor obese (BMI < 25.0).

Overweight: BMI greater than or equal to 25.0 but less than 30.0.

Obese: BMI greater than or equal to 30.0.

Insufficient physical activity: (1) Engages in moderate physical activity (those activities that cause small increases in breathing, such as brisk walking, bicycling, vacuuming, gardening, etc.) or at least 10 minutes each time but on fewer than 5 days a week; or (2) On days when engages in moderate physical activity, total time per day spent doing the activities is less than 30 minutes and does not engage in vigorous physical activity at least 3 days a week for a total of at least 20 minutes per day.

Methods

All statistical analyses were completed using SAS (Version 8.2) and/or SUDAAN. All analyses of Behavior Risk Factor surveillance Survey and Youth Risk Behavior Survey were weighted analyses, taking into consideration the survey's designs and sampling frames. Age-adjusting was employed as appropriate to adjust for differences in age distributions between groups being compared. Comparisons were adjusted using the US Year 2000 standard million.

Figure 1: Trend Lines for US and Alabama were calculated using polynomial equations.

Figure 5: Mortality rates for each county were calculated by combining deaths occurring in 1994 through 1998 and calculating age-adjusted mortality rates for each county. County-specific rates were subsequently rank ordered and the 20 counties with the highest diabetes mortality rates were identified by shading in dark blue. The remainder were identified in a lighter shade. The counties left white are those which had insufficient data to calculate a stable rate.

Figure 7, 8, 9: ICD-9 codes 250.0-250.9 as first (primary) listed diagnosis.

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Information for this report was garnered from the following sources:

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