A Battle We Can't Afford to Lose

The Burden of Overweight and Obesity in Texas:

The Costs in Dollars and Lives

Never has there been a more critical time to ensure a healthy future for our children. In the past 20 years, obesity in U.S. children has doubled, putting a growing number of kids at risk for a lifetime of health problems. If we do nothing, the repercussions will be staggering. The statistics inside, from the Texas Department of Health's in-depth study ***"The Burden of Overweight and Obesity in Texas, 2000-2040,"*** tell the story.

Decisive action is needed to control this epidemic of overweight and obesity.

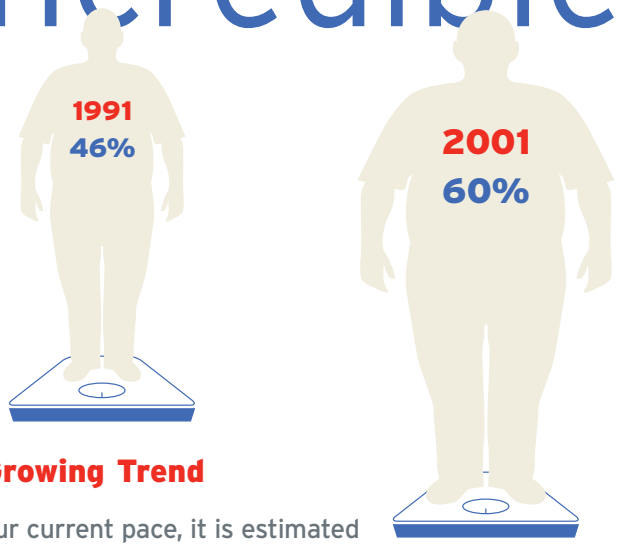
Our Current Health Crisis

In the period of just 10 years – from 1991 to 2001 – the percentage of overweight and obese adult Texans rose by almost one-third, from 46 percent of the population to more than 60 percent. Even more troubling, obesity rates alone nearly doubled, from 13 percent of the population to almost 25 percent – a full quarter of all adult Texans. Increased risks for heart disease, stroke, diabetes, arthritis and cancer are just some of the problems overweight and obese adult Texans face. More than 300,000 deaths each year are attributed to overweight and obesity in the United States.

$10.5 Billion and Counting

In total, overweight- and obesity-associated costs for Texas adults were estimated at $10.5 billion during 2001. This included $4.2 billion in direct health care costs and $6.3 billion in indirect costs. Indirect costs included the value of lost productivity such as wages and household work due to illness, disability and premature death.

Growing at an Incredible



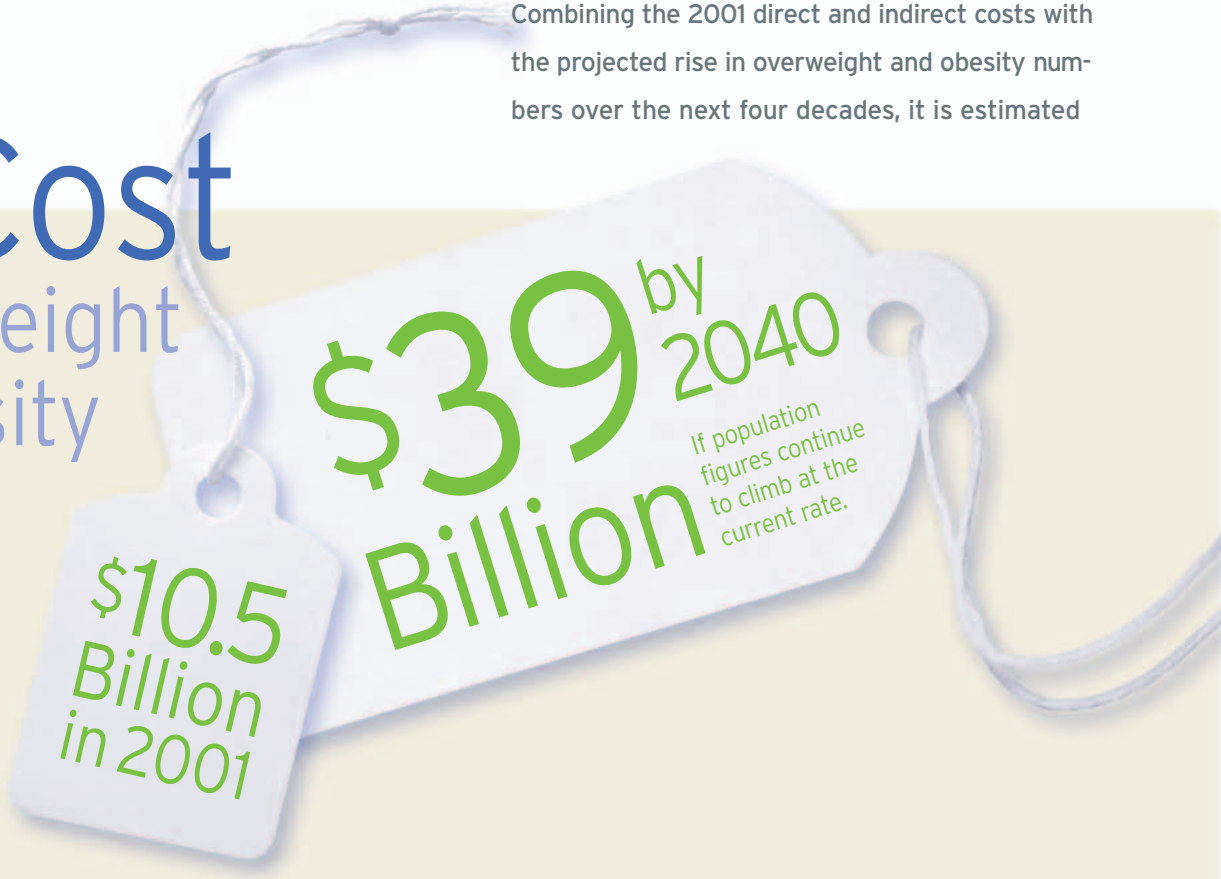
A Growing Trend

At our current pace, it is estimated that by the year 2040 the number of overweight Texas adults will increase by 94 percent and the number of obese adults will increase by 174 percent. By these estimates, nearly 75 percent of Texas adults will be overweight or obese in 2040 – about 20 million people.

Tomorrow's Cost in Dollars

Combining the 2001 direct and indirect costs with the projected rise in overweight and obesity numbers over the next four decades, it is estimated

The Cost of Overweight and Obesity



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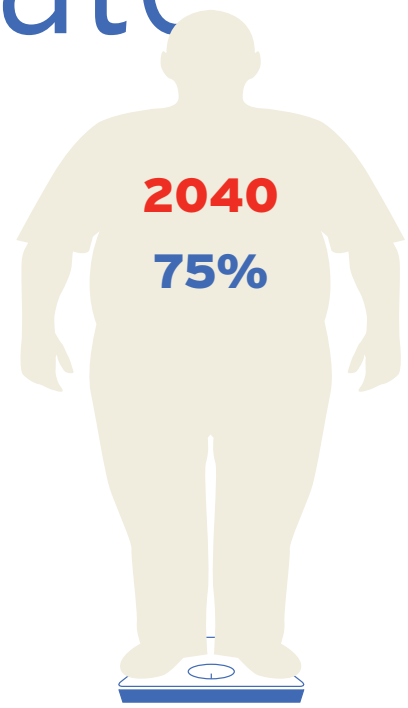

that overweight and obesity could cost Texans $26 billion by the year 2040. If population figures continue to climb at the rate seen during 1990-2000, that estimate could rise as high as $39 billion in direct and indirect costs.

Tomorrow's Cost in Lives

Life expectancy is estimated at 3 to 20 years shorter for overweight and obese Texans. But it's not just adults we need to worry about: obese children have a 50 percent chance of becoming obese adults. Obese adolescents face an even graver statistic, with a 70 percent to 80 percent chance of remaining obese as adults. To stop this cycle, we can look at the numbers and act now to improve the health of all Texans. According to recent statistics, about 35 percent of Texas school-age children are currently overweight or obese. For the first time in American history, this generation of children may have a shorter lifespan than their parents.

"To keep Texas strong, we must take action to reverse our health crisis and eliminate the staggering statistics for our future. Together, we must begin to develop a new strategy to set a healthier course. The cost is already too high. Texas can't afford to look the other way."

Susan Combs, Texas Agriculture Commissioner

Our Future

square meals

Early intervention is critical. That's why Texas is taking a lead role in redefining the school nutrition environment, which can provide as much as 60 percent of a child's daily meals. With groundbreaking and nationally recognized school nutrition policies and an unprecedented focus on promoting healthy, nutritious food, the Texas Department of Agriculture's Square Meals program works with school administrators, foodservice professionals, teachers, parents and schoolchildren to help turn the tide.

For details, go to **www.squaremeals.org** or call **(888) TEX-KIDS** for information on getting involved.

For the first time in American history, this generation of children may have a shorter lifespan than their parents.

"The alarm has been sounded. We must take steps to prevent the spread of overweight and obesity in Texas." Doctor Eduardo J. Sanchez, Texas Commissioner of Health

EVERY ACTION MAKES A DIFFERENCE. Even small steps can lead to big changes. Get started by calling the Texas Department of Agriculture at **(888) TEX-KIDS** to request a family action packet. You can also visit **www.squaremeals.org** for tips on everything from easy ways to change your family's eating habits to fun ideas for adding more physical activity into your family's day.

square meals

Nourishing children's bodies and minds.

A Program of the Texas Department of Agriculture's
Food and Nutrition Division

Texas Department of Agriculture • Susan Combs, Commissioner

For more information contact:

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1100 W. 49th St., Austin, Texas 78957
(512) 458-7111 • feedback.healthimprovement@tdh.state.tx.us

Cost Study Information: For more information about the study ***"The Burden of Overweight and Obesity in Texas, 2000-2040,"*** contact the **Office of Executive Support, Texas Department of Health at (512) 458-7111 ext 6517 or 6566** or via e-mail at **Rick.Danko@tdh.state.tx.us** or **Donna.Nichols@tdh.state.tx.us**.

TDA M(N) 599 07/04

THE BURDEN OF OVERWEIGHT AND OBESITY IN TEXAS, 2000-2040

INTRODUCTION

Between 1991 and 2001, the prevalence of obesity among Texas adults rose from 13% to almost 25%.[1] This increase is a cause for great concern because of the health risks associated with overweight and obesity. Overweight and obesity are associated with increased risks for several diseases including coronary heart disease, ischemic stroke, congestive heart failure, hypertension, hypercholesterolemia, type 2 diabetes mellitus, osteoarthritis, gallbladder disease, asthma, sleep apnea and cancers of the cervix, colon, endometrium, gallbladder, kidney, ovary, and post-menopausal breast.[2-5] In addition, life expectancy decreases with increasing degrees of obesity with estimates ranging from 3 to 20 years of life lost, depending on age, gender, race and smoking status.[6-8] More than 300,000 deaths each year in the United States might be attributable to overweight and obesity.[7]

The economic consequences of the rising prevalence of overweight and obesity include increased costs for health care, and lost wages and productivity due to morbidity and premature mortality associated with excess body weight. There are several published estimates of the direct healthcare costs of overweight and obesity for the United States, but few studies provide estimates of the indirect costs associated with overweight and obesity.[9-12] Although state-specific estimates can be derived from these national studies, variations in the population structure and the prevalence of overweight and obesity might reduce the reliability of state-specific estimates based on national data. A recent study estimated that direct healthcare costs for obesity alone in Texas totaled $5.3 billion in 2003 dollars, based on national medical expenditure data.[13]

This report provides:

1. Estimates of the direct and indirect costs to society of overweight and obesity among adults for the state of Texas during 2001, based primarily on state-specific data;
2. the projected number of normal weight, overweight, and obese adults in Texas for the years 2000 through 2040; and
3. the projected annual costs of overweight and obesity among Texas adults through the year 2040 based on the 2001 cost estimates and the population projections.

DATA SOURCES

This report is based on several data sources:

TEXAS BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM (BRFSS)

The Texas BRFSS is an ongoing telephone survey of state residents' health conditions and behaviors coordinated by the Centers for Disease Control and Prevention.[14] The survey began in Texas during 1987. During 2001, there were 5,916 respondents, and the overall response rate was 40%. Data from the 2001 Texas BRFSS were used to estimate the prevalence of overweight and obesity based on respondents' self-reported height and weight. Combined data from the 1999-2002 Texas BRFS were used to establish age, sex, and race/ethnicity-specific overweight and obesity baseline prevalence for the population projections.

TEXAS HOSPITAL INPATIENT DISCHARGE DATA

The Texas Health Care Information Council collects data on discharges from more than 400 Texas hospitals; a public-use data file without patient identities is available.[15] Each patient-level record includes demographic and geographic data, diagnoses, procedures, sources of payment, and total charges. Hospital discharge data for the year 2001 were used in this study

to determine the number of overweight- and obesity-related hospital discharges.

TEXAS PERSONAL HEALTHCARE EXPENDITURES

The Centers for Medicare and Medicaid Services (CMS) release state-level estimates for personal healthcare expenditures.[16] The most recent state-specific data available were for the year 1998. The 1998 data for Texas were used in this study and adjusted for changes in price with the national consumer price index for medical care to estimate healthcare expenditures during 2001.[17]

NATIONAL HEALTH INTERVIEW SURVEY (NHIS)

The National Center for Health Statistics administers the NHIS each year to a probability sample of approximately 43,000 civilian, non-institutionalized households in the United States.[18] The survey collects data on topics including demographics, socioeconomic status, health status, and use of healthcare services. This study used data from the 2001 NHIS to estimate the average number of lost work days among employed persons and bed disability days among unemployed persons.

MEDICAL EXPENDITURE PANEL SURVEY (MEPS)

The Agency for Healthcare Research and Quality conducts the MEPS to collect data about health care expenses and utilization.[19] Ongoing since 1996, the MEPS comprises four survey components: household, nursing home, medical provider and insurance. This study used data from the 1998 MEPS household component to estimate the fraction of total healthcare costs expended for adults aged 18 and older. The household component is a panel survey that collects data from a nationally representative subset of households that participated in the NHIS during the previous year. The MEPSnet software program is available on-line and allows access to data from the household and insurance component surveys.[20]

CURRENT POPULATION SURVEY (CPS)

The U.S. Bureau of Census conducts the CPS for the Bureau of Labor Statistics. The CPS collects data about the U.S. civilian, noninstitutionalized labor force each month from a probability sample of 60,000 households; periodic supplements that collect additional data are also conducted.[21] This study used age and gender-specific mean income data from the 2001 annual demographic supplement to the CPS to estimate the dollar value of lost workdays and of bed-disability days.

TEXAS MORTALITY DATA

The Bureau of Vital Statistics at the Texas Department of Health collects and reports mortality data for the state. This study used the 2001 Annual Vital Statistics Report to obtain the number of deaths among adults by sex and by age group, as well as age-specific life expectancies for Texas residents.[22]

METHODS

This study used a cost-of-illness approach to calculate prevalence-based estimates of the direct and indirect economic costs of overweight and obesity.[23] Direct costs considered in this study included costs of personal healthcare expenditures for hospital care, healthcare providers, medications, home health care, nursing home care, and other personal health care.[24] No attempt was made to estimate direct costs for non-medical expenses such as transportation to and from healthcare facilities, personal care provided by family members or costs for weight loss programs and aids. For indirect costs, this study used human-capital methods developed by Rice and others to estimate the value of lost wages and household work due to overweight and obesity-attributable morbidity and premature mortality.[23] No attempt was made to estimate indirect costs for reduced quality of life attributable to overweight and obesity.[25]

Prevalence of overweight and obesity

This study estimated the prevalence of overweight and obesity based on data from the 2001 Texas BRFSS.[1] Body mass index (BMI, weight in kilograms divided by height in meters squared) was calculated from respondents' self-reported height and weight. Based on guidelines from the National Institutes of Health, individuals were classified as overweight if they had a BMI between 25.0 and 29.9 kg/m2, and obese if they had a BMI of 30 kg/m2 or greater.[3]

Population Attributable Fractions

Population attributable fractions were calculated for morbidity from diseases and lost productivity days related to overweight and obesity and all-cause mortality associated with increasing body-mass index (BMI). The population attributable fraction equation used in the study is p*((RR-1)/RR), where p is the prevalence of the risk factor in the population and RR is the risk ratio for the probability of disease in persons with and without the risk factor. This version of the attributable fraction equation produces reliable estimates when adjusted relative risks are used to account for confounding.[26] For each factor considered in the study, an attributable fraction was calculated for each BMI category used to define risks, and the category-specific estimates were added together to produce overall attributable fractions for overweight and for obesity.

Direct Healthcare Costs

Direct healthcare costs were based on estimates of disease risks associated with excess body weight obtained from published epidemiologic studies of the U.S. population or of large, U.S.-based cohorts. Based on consistent, statistically significant associations reported in these studies, overweight and obesity-attributable fractions were calculated for the following conditions: coronary heart disease, congestive heart failure, ischemic stroke, hypertension, type 2 diabetes mellitus, gallbladder disease (other than cancer), asthma, osteoarthritis, sleep apnea, colon cancer, kidney cancer, gallbladder cancer, cervical cancer, endometrial cancer, ovarian cancer, and post-menopausal breast cancer.[4, 5, 27-46] The relative risks used in this report are shown in Table 1.

Hospital inpatient discharge data for 2001 were obtained from the Texas Health Care Information Council public-use data file.[15] The number of hospital discharges among adults aged 18 and older was determined for each principal International Classification of Disease, Clinical Modification (ICD9-CM) diagnosis code for an obesity-associated condition.[47] *see Appendix* The number of hospital discharges for each primary diagnosis was multiplied by the calculated overweight

and obesity-attributable fractions for that condition. Next, the number of adult hospital discharges attributable to overweight and obesity were added together and these totals were divided by the number of routine hospital discharges among adults aged 18 and older (excluding discharges related to pregnancy and external causes of injury) to produce estimates of the proportion of healthcare costs attributable to overweight and obesity.

In addition, the median cost per discharge for each overweight- and obesity-associated diagnosis was calculated, and the attributable fraction for each condition was applied to determine the attributable costs. The total of the overweight- and obesity-associated attributable costs was divided by the costs for all adult hospital discharges (except pregnancy-related diagnoses) to produce a second set of estimates of the proportion of healthcare costs attributable to overweight and obesity.

Personal healthcare expenditures for Texas were obtained from estimates compiled by the CMS.[16] This study considered the following categories of healthcare expenditures to be related to overweight and obesity: hospital care, healthcare provider services (outpatient care), prescription drugs and other nondurable medical products, home health care, nursing home care, and other personal health care expenditures. This study excluded expenditures for dental care and durable medical equipment/vision products from the estimates.

To estimate the fraction of total healthcare costs expended for adults aged 18 and older, data from the 1998 MEPS household component were accessed through the MEPSnet software program.[20] For each healthcare expenditure category, the healthcare costs for persons aged 18 and older were divided by the costs for persons of all ages. These fractions were applied to the personal healthcare expenditures in Texas during 2001 to estimate personal healthcare expenditures among adults for each of the five expenditure categories. Finally, the expenditures in each category were multiplied by the overweight and obesity-attributable healthcare fractions.

Indirect Costs for Lost Productivity Due to Morbidity

Estimates of indirect costs for lost productivity (e.g., wages and the value of household work) due to morbidity were based on methods described by Rice et al.[23] Data from the 2001 NHIS were used to determine the average number of lost workdays per year among currently employed men and women, and the number of bed-disability days among men and women who were not currently employed, controlling for age and smoking status.[18] The ratio of lost days for overweight, obese and extremely obese (BMI ≥ 35 kg/m2) persons compared with persons of normal weight were calculated. Population attributable fractions for each weight category were calculated for men and women based on these ratios and the prevalence of overweight and obesity among Texas adults during 2001.

To estimate the dollar value of lost workdays and of bed-disability days, this study used age and gender-specific mean income data from the 2001 annual demographic supplement to the CPS, 2001 labor participation rates for Texas as reported by the U.S. Bureau of Labor statistics, and published values for household work.[17, 21, 24] The total number of lost workdays was estimated by multiplying the average number of lost workdays among men and women by the number of adults in Texas and the labor force participation rate. For the total number of bed-disability days, the average number of bed-disability days among men and women was multiplied by the number of adults in Texas and one minus the labor force participation rate. For employed men and women, the age-specific value of a lost workday was calculated by adding the average annual pay divided by 250 (e.g., the typical number of days spent at work during one year) plus the value of mean annual household work divided by 365. For unemployed men and women, the value of a lost day of productivity equaled the age-

specific value of mean annual household work divided by 365. The total value of lost workdays and bed-disability days was calculated by multiplying the total number of lost days by the value of an average day of income and/or household work. The age- and gender-specific values were added together to determine the total value of lost workdays and of bed-disability days, and these totals were multiplied by the overweight- and obesity-attributable fractions to estimate the cost of lost productivity attributable to overweight- and obesity-related morbidity.

Indirect Costs for Lost Productivity Due to Mortality

For mortality, this study used age - and sex-adjusted relative risks for all-cause mortality among nonsmokers in increasing categories of BMI based on measured height and weight.[48] The data from the Alameda County Health Study and the NHANES I Epidemiologic Follow-Up Study (EFS) were selected for use because these two cohort studies included both men and women, and also included a substantial proportion of non-white persons. Mortality data were obtained from the Bureau of Vital Statistics at the Texas Department of Health.[22] The number of adult deaths was multiplied by the overweight and obesity-attributable fractions of mortality to determine how many deaths were attributable to overweight and obesity.

This study used mean income data from the 2001 annual demographic supplement to the CPS, and published estimates of the value of household work to calculate estimates of the present value of future earnings for each of the following age groups: 18-24, 25-34, 35-44, 45-54, 55-64, 65-74, and 75 years and older.[23, 24, 49] Since the median income in Texas during 2001 was 96.8% of the U.S. median income, mean income values from the CPS were multiplied by 0.968.[50] To account for persons who were not in the work force, mean income values were multiplied by the labor force participation rate for each age group.[49] The adjusted annual mean income and the value of household work were added for each age group, and these figures were multiplied by the probability of survival to the middle of each age group.[22] For the 75 years and older age group, this study used the probability of survival to age 80. The present value of future earnings and household work was calculated for each age group based on the expected years of life remaining.[22] Finally, in each age group, the number of deaths was multiplied by the attributable fractions of mortality and this product was multiplied by the present value of future earnings and household work. Estimates were prepared for discount rates from 0% to 6% to examine the impact of the discount rate on the projected value of lost productivity.[24, 51] The total value of lost productivity due to overweight and obesity-attributable mortality was the sum of the age group-specific estimates.

Sensitivity Analysis

This study examined the impact of changing several of the assumptions on which these estimates were based to determine which factors had the greatest effect on the direct and indirect costs of overweight and obesity. For direct costs, the prevalence of overweight and obesity among adults was varied by substituting BMI data based on measured height and weight from the 1999-2000 National Health and Nutrition Examination Survey (NHANES).[52] For indirect morbidity costs, the prevalence of overweight and obesity among adults was varied by substituting BMI data based on measured height and weight reported by the 1999-2000 NHANES.[52] This study also used the upper and lower bounds of the estimated number of lost workdays and bed-disability days from the NHIS to examine the precision of these estimates. For indirect mortality costs, estimates using age- and gender-adjusted relative risks for all-cause mortality from the Alameda County Health Study and the NHANES III EFS were compared with estimates using age- and gender- specific relative risks relative risks for all-cause mortality among adults aged 30 years and older from the American Cancer Society's Cancer Prevention Study II.[48, 53] This study also examined the influence of the discount rate for the present value of future earnings on the indirect mortality cost estimates. Based on federal guidelines for choosing discount rates, and the

long-term impact of premature mortality on lost future earnings, a 4% discount rate was selected as the most likely estimate of the value of lost earnings.[51] Finally, the total costs of overweight and obesity were calculated based on the highest, lowest and most likely (best) values for each of the direct and indirect costs.

RESULTS

During 2001, there were approximately 15,311,363 adults aged 18 and older living in Texas, of which about 36% were overweight and 24% were obese (Table 2). A higher proportion of men were overweight compared with women, but the prevalence of obesity was the same among men and women. More than twice as many women had a BMI ≥ 40 kg/m2 compared with men.

More than 94,000 hospital discharges in Texas during 2001 were attributable to overweight and obesity (Table 3). Approximately 2.8% of all routine hospital discharges were attributable to overweight, and 3.4% were attributable to obesity. Estimates of the proportion of healthcare costs attributable to overweight and obesity based on costs per discharge instead of the number of discharges yielded similar results: 2.9% of hospital discharge costs were attributable to overweight, and 3.4% were attributable to obesity. One-third of the overweight and obesity-attributable discharges were for hospitalizations related to coronary heart disease, 15% were for congestive heart failure, 13% for ischemic stroke and 12% for type 2 diabetes. Among men, the highest overweight and obesity-attributable fractions were for type 2 diabetes (54%) and hypertension (34%). Among women, the highest overweight and obesity-attributable fractions were for type 2 diabetes (44%) and gallbladder disease (28%).

Healthcare expenditures among adults aged 18 and older totaled $67.1 billion in Texas during 2001 and accounted for almost 92% of all healthcare expenditures in the state for that year (Table 4). Based on overweight and obesity prevalence data from the 2001 Texas BRFS, overweight and obesity-attributable costs totaled $4.2 billion. Based on data from the 1999-2000 NHANES, total costs for overweight and obesity in Texas during 2001 were $4.4 billion. This increase was due to a higher prevalence of obesity reported from NHANES (30.5%) compared with the Texas BRFSS (24.1%), which increased the obesity-attributable fraction from 3.4% to 4.0%, although a lower prevalence of overweight (34% compared with 36.5%) reduced the overweight-attributable fraction from 2.8% to 2.5%.

During 2001, overweight-and obesity-associated morbidity accounted for 2.1% and 9.7% of total morbidity-related lost productivity among Texas adults (Table 5). Combined overweight- and obesity-associated indirect morbidity cost estimates ranged from $1.04 billion to $1.29 billion, depending on the standard errors for the estimated number of workdays and bed-disability days, and the prevalence of overweight and obesity based on self-reported versus measured height and weight data.

Obesity-attributable fractions of mortality based on data from the NHANES I EFS (11%) and the Alameda County Health Study (11.9%) were similar. However, no deaths could be attributed to overweight based on NHANES I EFS while 0.7% of deaths were attributable to overweight based on the Alameda County Health Study. Based on NHANES I EFS data, 16,281 deaths were attributable to obesity among adults in Texas during 2001; based on Alameda County data, 1,036 deaths were attributable to overweight and 17,613 were attributable to obesity (Table 6).

Indirect costs for lost productivity due to overweight and obesity-attributable mortality were calculated for discount rates from 0% to 6% (Table 7). Based on published recommendations and U.S. Treasury interest rates during 2001, a 4% real discount rate yielded the best estimates of present value of future earnings.[49, 55] Lost productivity due to obesity-attributable mortality cost $4.5 billion in Texas during 2001 based on

NHANES I EFS data. Lost productivity due to overweight and obesity-attributable mortality cost $5.2 billion in Texas during 2001 based on Alameda County Health Study data.

Since the association between excess weight and mortality decreases as age increases, this study compared mortality cost estimates based on age and gender-specific relative risks reported from the ACS CPS II with the age-adjusted estimates based on the Alameda County and NHANES III EFS data. Obesity attributable fractions of mortality decreased from 13.7% among men aged 30-64 years to 2.9% among men aged 75 years and older; and from 12.1% to 3.4% among women. Overweight attributable fractions of mortality decreased from 9% among men aged 30-64 years to 3.1% among men aged 75 years and older; and from 7.1% to 2.4% among women. Based on these fractions and on gender-specific present value of future earnings estimates discounted by 4%, 16,810 deaths were attributable to overweight and obesity among Texas adults aged 30 years and older during 2001, with associated lost productivity costs of $7.2 billion.

Total costs attributable to overweight and obesity among adults in Texas during 2001 ranged from $9.1 billion, based on the lowest cost estimates from all categories, to $14.0 billion based on the highest cost estimates (Table 8). The most reliable estimate for overweight and obesity-attributable costs is $10.5 billion, which includes $4.2 billion in direct costs for health care, $5.2 billion in indirect costs for lost productivity due to mortality and $1.1 billion in indirect costs for lost productivity due to morbidity.

PART TWO: PROJECTED NUMBER OF NORMAL WEIGHT, OVERWEIGHT AND OBESE PERSONS IN TEXAS, 2000-2040

METHODS

Texas State Data Center population projections

The estimated number of normal weight, overweight and obese adults in Texas was based on population projections provided by the Texas State Data Center (TSDC) in the Institute for Demographic and Socioeconomic Research at the University of Texas at San Antonio. Population projections for each year from 2000 through 2040 are available for individual years of age (from 0-1 to 85+) for both sexes and for four racial/ethnic groups in each of the 254 Texas counties and for the state as a whole. A complete description of the TSDC projections and of the methods used to produce them is provided on the TSDC Web site.[54]

The use of four mutually exclusive racial/ethnic groups in the 2000-based TSDC projections required making certain assumptions about racial/ethnic identification because of a change in the race/ethnicity identification procedure in the 2000 Census and the need to make 1990 to 2000 comparisons to project future rates of change. The racial/ethnic groups included in the TSDC projections are **Anglos** (non-Hispanic persons who identified themselves as being members of only the White race and those who indicated White race in combination with any other single race, except Black or African American), **Blacks or African Americans** (non-Hispanic persons who are of the Black race or who indicate Black race in combination with any other single race/ethnicity group identification), **Hispanics** (persons who are of Hispanic origin who are of any race), and an **Other** category composed of persons in all other race groups who are not of Hispanic origin or who claim three or more racial identities. A rationale for the racial/ethnic groups used in the projections is available on the TSDC Web site under the discussion of comparability of 1990 and 2000 racial/ethnic groups.[54]

The TSDC projections were made using the cohort-component population projection method. Because population change is a function of the components of births, deaths and net migration (which includes both migration from and to other areas in the United States and immigration from and to other nations) this method involves the projection of future populations making certain assumptions about future rates of births (fertility), deaths (mortality or survivability) and migration (both net domestic and international migration) with the number of births added to, the number of deaths subtracted from, and the net number of migrants added to (if it is net inmigration) or subtracted from (if it is net outmigration) a starting population value (in this case the 2000 Census Count). These component changes are computed and applied for each population cohort. Each cohort consists of the persons from a given age, sex, and racial/ethnic group (e.g. Anglo males 18 years of age). Thus the total number of cohorts used consists of 85 age groups for two sexes for four racial/ethnic groups, a total of 680 cohorts for each county and for the state as a whole. The TSDC uses birth rates and survival rates (the proportion of persons who survive from one age to another; that is, do not die) based on 1999-2000 rates for individual age, sex and racial/ethnic cohorts in each county and the entire state. The sum of projections for each cohort for all counties is controlled to the state level projection for the same cohort.

The TSDC projections use 2000 Census population counts together with assumptions about future birth, survival and net migration rates to project future populations. Future trends in birth and survival rates were projected based on historical patterns, and alternative assumptions regarding net migration were used to determine three alternative population projection scenarios.[54] These scenarios use the same fertility and survival assumptions but three different sets of migration rates. One scenario assumes no net migration (that in and outmigration are either equal

or there is no migration), referred to as the 0.0 migration scenario. A second scenario assumes rates of age, sex, and race/ethnicity net migration equal to one-half those of 1990 to 2000 and similar to the average of the rates from 1980 through 2000, referred to as the 0.5 migration scenario. A third assumes a continuation of the 1990-2000 rates of age, sex, and race/ethnicity net migration and is referred to as the 1.0 migration scenario. For most purposes, the TSDC recommends the relatively conservative 0.5 scenario because the growth rate during 1990-2000 was unusually high and the 2000 Census showed a substantially higher population in the U.S. and in Texas than anticipated.[54]

Prevalence of normal weight, overweight and obesity among Texas adults

Estimates of the prevalence of normal weight, overweight and obesity among Texas adults by age group, race/ethnicity and sex were derived from data collected during 1999-2002 by the Texas BRFSS.[1] Respondents' self-reported height and weight were used to calculate their body mass index (BMI, weight in kilograms divided by height in meters squared). Based on guidelines from the National Institutes of Health, individuals were classified as of normal weight if their BMI was less than 25.0, overweight if their BMI was 25.0-29.9 kg/m2, and obese if their BMI was 30 kg/m2 or greater. These prevalence estimates were applied to the TSDC population projections to estimate future numbers of normal weight, overweight and obese persons by age, sex, and race/ethnicity (Table 1).

Projected changes in prevalence of normal weight, overweight and obesity among Texas adults

In the United States, the prevalence of overweight and obesity has increased dramatically during the past 20 years.[55] The increase in the prevalence of obesity has been so rapid during recent years that the rate of increase is not likely to be sustainable over time. For this reason, future changes in the prevalence of normal weight, overweight and obese adults were assumed to decrease incrementally over time. Changes in the prevalence of normal weight, overweight and obesity were based on data from the 1990-2002 national BRFSS, which uses self-reported height and weight to calculate body-mass index (BMI) for individual respondents.[1] The rates of change in prevalence were assumed to slow over time with rates of change assumed to decrease linearly to one-fourth the 1990-2002 decade equivalent from 2000 to 2010, and to decrease by an additional one-half of the previous decade's prevalence in each of the next three decades. The projected numbers of adults by weight status through the year 2040 were also completed with the assumption that the prevalence of normal weight, overweight and obesity would not change from the 1999-2002 baseline values (e.g., baseline prevalence).

RESULTS

Based on population projections from the Texas State Data Center, the number of adults in Texas is expected to increase from 15 million in 2000 to between 20 million and 40 million in 2040 (Table 9). In the 0.5 population migration scenario, which is considered to be the most reliable scenario, the proportion of Anglo adults in Texas is expected to decrease from 57% in 2000 to 34% in 2040. In this same scenario, the proportion of Hispanic adults in Texas is expected to increase from 28% in 2000 to 50% in 2040, while the proportion of Black adults is expected to remain almost unchanged.

The population projections for the number of normal weight, overweight and obese Texas adults through the year 2040 were based on combined data from the Texas BRFSS for the years 1999-2002 (Table 10). Among both sexes in the Anglo, Hispanic and Other race/ethnicity groups, the prevalence of overweight and of obesity increased by age group among adults aged 18 through 64 years, and decreased among adults aged 65 years and older. Among Black men, the prevalence of obesity increased with age across all age groups. Adults in the Black and Hispanic race/ethnicity

groups had the highest prevalence of obesity across all age groups.

Age, gender and race/ethnicity-specific prevalence estimates for the years 2000, 2010, 2020, 2030 and 2040 based on the 0.5 population migration scenario are included in this report (Table 11A-E). Based on these projections, the prevalence of obesity among Texas adults will increase from 24.0% among men and 23.1% among women in 2000 to 34.6% among men and 35.7% among women in 2040. These changes reflect not only the increasing number of obese adults but also increases in the proportion of Hispanic adults, among whom the prevalence of obesity is substantially higher compared with Anglo adults.

Among Texas adults, the number of obese persons is projected to increase from 3.5 million in 2000 to between 6.8 and 14.2 million in 2040 (Table 12). Given that the 0.5 population migration scenario yields the most likely projections, the number of obese adults in Texas is expected to reach 9.6 million by the year 2040, almost three times the number of obese adults in the state during 2000. Even if the prevalence of overweight and obesity do not change from the 1999-2002 baseline, the number of obese adults is expected to double to 7.1 million by 2040. The greatest increases in the number of obese adults are expected to occur among Hispanic persons, with an almost five-fold increase in the number of obese Hispanic males and females in 2040 compared with 2000 (Tables 13A-E).

PART THREE: PROJECTED COST OF OVERWEIGHT AND OBESITY IN TEXAS, 2000-2040

METHODS

The projected costs of overweight and obesity among Texas adults for the years 2010, 2020, 2030 and 2040 were based on the 2001 cost estimates described previously in this report. The combined direct and indirect costs were determined for a single overweight and a single obese adult. These values were multiplied by the projected number of overweight and obese adults in each of the years 2010, 2020, 2030 and 2040 to yield cost estimates in 2001 dollars.

RESULTS

Based on the 2001 cost estimates for overweight and obesity, total annual direct and indirect costs were $471 for one overweight adult in Texas and $2,249 for one obese adult. Based on these figures and the projected number of overweight and obese adults in Texas through the year 2040, the annual costs of overweight and obesity are expected to rise from $10.5 billion during 2001 to between $18.8 billion and $39.0 billion in 2001 constant dollars by 2040 (Table 14). Based on the 0.5 population migration scenario, the annual costs of overweight and obesity will total $26.3 billion in 2001 constant dollars by 2040. This projection includes direct and indirect costs of $4.7 billion for overweight adults and $21.6 billion for obese adults. Even if the prevalence of overweight and obesity remains close to the 1999-2002 baseline, the annual cost of overweight and obesity is projected to almost double to $20.5 billion in 2001 constant dollars by the year 2040 compared with 2001.

DISCUSSION

The economic costs of overweight and obesity in Texas during 2001 were an estimated $10.5 billion. Overweight- and obesity-associated healthcare costs accounted for 6.3% of total healthcare expenditures among Texas adults during 2001. If current trends in the increasing prevalence of overweight and obesity among both children and adults persist, annual costs associated with excess weight might reach $39 billion by the year 2040. Even if the prevalence of overweight and obesity among Texas adults remains close to the 1999-2002 estimates presented in this study, the costs of overweight and obesity will continue to rise as the Texas population increases.

Although there are several estimates of costs associated with overweight and obesity based on national data, few state-specific estimates have been reported.[9-13] State-specific data can be difficult to obtain, and some of the information used to estimate state-level costs may have to be inferred from national data, as was done in this study to determine the percentage of healthcare expenditures attributable to adults. In a state-specific study published by Finkelstein et al, the estimated direct healthcare costs of obesity for Texas adults were $5.3 billion during 2003.[13] This figure represents 6.1% of total adult healthcare expenditures in Texas. The estimates from the Finkelstein et al study included all medical expenditures reported by participants in the Medical Expenditure Panel Survey, even those that might not be attributable to obesity, such as dental care and glasses. State-specific estimates of the costs of healthcare attributable to overweight were not presented.

The overweight- and obesity-attributable healthcare cost estimates presented in this report are based on attributable fractions derived from hospital discharge data. This method may underestimate costs for conditions such as osteoarthritis and hypertension, which might not require hospitalization for treatment but might incur high costs for visits to healthcare practitioners and medications. In addition, this study used ratios from the national Medical Expenditure Panel Survey to estimate the proportion of healthcare

expenditures incurred by adults in Texas based on data collected by the Centers for Medicare and Medicaid Services. If and when state-level data on healthcare expenditures among adults and children become available, this information should be used in place of the estimates presented in this report.

If the prevalence of obesity continues to increase in Texas, the number of adults who become disabled and/or die prematurely from obesity-related conditions could increase. This report did not examine the potential impact of an increase in the number of obesity-attributable deaths beyond the proportion expected from the 2001 base-year estimates. A greater number of premature deaths might mitigate some of the projected rise in healthcare costs. However, most healthcare expenditures tend to occur at the extremes of life, and so any potential savings in long-term ambulatory care might be offset by an increase in end-of-life-related healthcare expenditures. In addition, rising numbers of persons with obesity-associated disabilities would increase the indirect costs associated with lost productivity. It is difficult to determine how much these two factors might affect the cost estimates given in this report.

Although the number of overweight and obese adults in Texas and the United States is expected to continue to increase, few projections exist that quantify the extent or rate of change. A recent study based on national BRFSS data used a linear time trend to project the prevalence of overweight and obesity among adult men and women in the United States.[56] The study estimated that among men, the prevalence of overweight would reach 39% by 2020 and the prevalence of obesity would reach 46%. Among women the prevalence of overweight was estimated to reach 42% by 2020 and the prevalence of obesity was estimated to reach 38%. These estimates are higher than the projections presented in this report, chiefly since the estimates in the published study are based on a linear time trend while the projections in this report are based on a logarithmic time trend. In the current analysis, the rates of prevelance change were assumed to slow over time since the rapid increase in the prevalence of overweight and obesity in Texas and the United States observed during the 1990s was considered to be unsustainable. If the prevalence of overweight and obesity continued to increase on a linear trend in Texas and reached the levels reported in the published study, the associated annual costs of overweight and obesity in Texas could reach $23.5 billion by the year 2020, an estimate that is $4.9 billion higher than the estimate of $18.6 billion in this report.

LIMITATIONS

The findings in this report are subject to several limitations. First, this study relied on secondary data from several sources to create these estimates. The reliability of these estimates depends on the availability and quality of data on weight-related morbidity and mortality. For example, this study did not include the costs of depression, obstetric complications and infertility, and low back pain in these estimates because valid estimates of the risks for these conditions were not located in published, peer-reviewed literature. As more information about weight-related health effects becomes available, these estimates should be adjusted to reflect the most current evidence.

A second limitation is that the prevalence estimates for overweight and obesity in Texas were based on self-reported height and weight data, which typically underestimate BMI.[57] According to the BRFSS, the prevalence of obesity among Texas adults is higher than that of the United States as a whole.[1] However, when compared with national prevalence estimates based on measured height and weight collected by the National Health and Nutrition Examination Survey, the self-reported obesity prevalence estimates for Texas were lower than measured estimates for the entire U.S.[52] If the actual prevalence of obesity in Texas is higher than this study reports, then the costs associated with obesity in Texas might be much higher than those presented herein.

The risk ratios upon which the attributable fractions for healthcare are based come from several different studies.[4, 5, 27-46] All of the study participants were volunteers, and the majority of the participants in these studies were white. In addition, all of the reported risk ratios were adjusted for at least two potential confounders, which might impact attributable fraction estimates. To compensate for this limitation, this study used an attributable fraction formula that is valid when used with adjusted risk ratios.[26] In addition, risk estimates from studies with a nationally representative sample were used whenever possible, and risk estimates for weight-related conditions had to be consistent in at least two studies prior to inclusion in the calculations. Thus, this study attempted to use the most valid risk estimates that were available at the time of the analysis.

Indirect costs for morbidity were estimated based on data from the National Health Interview Survey. These total estimates are higher than those reported in other studies because costs for unemployed persons and for overweight persons were included. Wolf and Colditz also used data from the National Health Interview Survey to estimate the cost of lost productivity among U.S. adults aged 17-64 with a BMI ≥ 30 kg/m2 in 1995 at $3.93 billion.[11] Adjusting this estimate for inflation and for the increased prevalence of obesity, this figure would be $8.95 billion in 2001, of which $0.67 billion might be attributed to Texas based on population. Tucker and Friedman studied the association between obesity and absenteeism among 10,825 employed adults and estimated that the cost difference between 1,000 obese and 1,000 lean employees was $128,600.[58] Based on this estimate, the cost of obesity-related absenteeism among Texas adults in 2001 would be $0.64 billion. This study estimated that the cost of lost workdays among obese adults, which included all adults aged 18 and older and also included the value of household work, was $0.87 billion, which is consistent with the previously published estimates.

The association between BMI and mortality decreases with age.[8, 59] Age-adjusted relative risks for BMI-associated mortality were used because the studies on which these risks were based used measured height and weight to calculate BMI and included the highest proportions of non-white participants.[48] This study estimated a single population attributable fraction for overweight and for obesity and used these fractions to estimate deaths and the value of lost wages across all age groups. To determine if these methods produced a reliable estimate for indirect mortality costs, these costs were also calculated using age- and gender-specific relative risks for BMI-associated mortality reported from the ACS CPS II.[53] More than 90% of CPS II participants were white, all were aged 30 and older, and more than 70% were female. In addition, self-reported height and weight were used to calculate BMI in the ACS CPS II. Estimates based on the ACS CPS II produced a figure for the number of deaths attributable to overweight and obesity that was similar to the estimates based on the Alameda County Health Study and the NHANES III EFS, but a much greater value for lost wages. This value was greater because of higher attributable fractions among younger persons and among overweight persons in the CPS II study. Since several studies report an association between overweight and reduced life expectancy, the best mortality estimates were based on the Alameda County Health Study data.[6-8, 48]

CONCLUSION

If the prevalence of overweight and obesity continues to increase, the costs for healthcare and productivity losses associated with excess body weight in Texas could reach $39 billion by 2040, almost four times the costs during 2001. In addition, increases in the number of overweight and obese Texas adults will result in more cases of overweight- and obesity-associated diseases and deaths. Policies and programs designed to decrease the prevalence of overweight and obesity through both prevention and treatment are needed to address this growing public health problem in Texas.

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Table 1. Relative Risks for overweight (BMI 25-29.9 kg/m^2) and obesity (BMI ≥30 kg/m^2)-associated morbidity and mortality

	Body Mass Index (BMI; kg/m^2)						
Disease	25-29.9	≥30	30-34.9	30-39.9	≥35	35-39.9	≥40
Coronary Heart Disease (27)							
Men	1.5		2.0		2.2		
Women	1.4		1.5		1.5		
Congestive Heart Failure (30)	1.3	2.0					
Ischemic Stroke							
Men (32)	1.4						
Women (33)	1.9[a]	2.4[b]					
Hypertension (27)							
Men	1.7		2.7		3.0		
Women	1.7		2.1		2.3		
Type 2 Diabetes (27)							
Men	3.5		11.2		23.4		
Women	4.6		10.0		17.0		
Gallbladder Disease (27)							
Men	1.4		2.3		2.9		
Women	1.9		2.5		3.0		
Asthma (35)	1.1			1.6			2.7
Osteoarthritis (35)	1.4			2.0			4.4
Sleep Apnea (38)	1.4[c]		2.1			2.8	3.5

Table 1 (cont'd). Relative Risks for overweight (BMI 25-29.9 kg/m^2) and obesity (BMI ≥30 kg/m^2)-associated morbidity and mortality

	Body Mass Index (BMI; kg/m^2)						
Disease	25-29.9	≥30	30-34.9	30-39.9	≥35	35-39.9	≥40
Colon Cancer (4)							
Men	1.2		1.5		1.8		
Women	1.1		1.3			1.4	1.5
Kidney Cancer (4)							
Men	1.2		1.4		1.7		
Women	1.3		1.7			1.7	4.8
Gallbladder Cancer (4)							
Men	1.0		1.8				
Women	1.0		2.1				
Cervical Cancer (4)	1.4		1.2		3.2		
Endometrial Cancer (4)	1.5		2.5			2.8	6.3
Ovarian Cancer (4)	1.2		1.2		1.5		
Postmenopausal Breast Cancer (4)	1.3		1.6			1.7	2.1

[a] Relative risk is 1.0 for BMI=25-26.9 kg/m^2, 1.8 for BMI=27-28.9 kg/m^2, and 1.9 for BMI=29-31.9 kg/m^2

[b] Relative risk is 2.4 for BMI ≥32 kg/m^2

[c] Relative risk is 1.4 for BMI=27-29.9 kg/m^2

Table 2. Body mass index by gender (number per 100 persons)—BRFSS* (1), Texas Adults, 2001

BMI (kg/m^2)	Total	Men	Women
<18.5	2.1	0.9	3.3
18.5-24.9	37.4	30.5	44.3
25-29.9	36.4	44.3	28.5
30-34.9	16.0	17.9	14.1
35-39.9	5.0	4.4	5.5
≥40	3.1	2.0	4.3
Overweight (25-29.9)	**36.4**	**44.3**	**28.5**
Obese (≥30)	**24.1**	**24.3**	**23.9**

*Behavioral Risk Factor Surveillance Survey

Table 3. Hospital discharges attributable to overweight (BMI 25-29.9 kg/m^2) and obesity (BMI ≥30 kg/m^2)– Texas adults, 2001

Condition	Total Number of Discharges	Overweight		Obesity	
		Attributable Fraction (%)	Overweight-Attributable Discharges	Attributable Fraction (%)	Obesity-Attributable Discharges
Coronary Heart Disease					
Men	80,791	14.8	11,957	12.4	10,018
Women	56,022	8.1	4,538	8.0	4,482
Congestive Heart Failure	64,420	9.2	5,927	12.3	7,924
Ischemic Stroke					
Men	19,734	11.5	2,269	11.3	2,230
Women	24,294	4.2	1,020	15.0	3,644
Hypertension					
Men	4,400	18.2	801	15.5	682
Women	8,523	11.7	997	12.9	1,099
Type 2 Diabetes					
Men	11,073	31.6	3,499	22.3	2,469
Women	12,100	22.3	2,698	22.0	2,662
Gallbladder Disease					
Men	9,251	12.7	1,175	14.4	1,332
Women	22,280	13.5	3,008	14.9	3,320
Asthma	13,070	4.5	588	10.0	1,307
Osteoarthritis	29,501	10.0	2,950	13.1	3,865
Sleep Apnea	457	5.5	25	13.9	64
Colon Cancer					
Men	3,058	7.4	226	8.6	263
Women	3,324	2.6	86	6.3	209
Kidney Cancer					
Men	1,613	6.8	110	7.4	119
Women	1,068	7.1	76	11.2	120
Gallbladder Cancer					
Men	214	0.0	0	10.5	22
Women	280	0.0	0	12.7	36
Cervical Cancer	1,577	7.8	123	9.4	148
Endometrial Cancer	2,008	9.5	191	15.6	313

Table 3 (cont'd). Hospital discharges attributable to overweight (BMI 25-29.9 kg/m^2) and obesity (BMI ≥ 30 kg/m^2) – Texas adults, 2001

Condition	Total Number of Discharges	Overweight		Obesity	
		Attributable Fraction (%)	Overweight-Attributable Discharges	Attributable Fraction (%)	Obesity-Attributable Discharges
Ovarian Cancer	1,468	3.7	54	5.2	76
Postmenopausal Breast Cancer	4,984	7.2	359	10.0	498
Obesity	4,826	0.0	0	100.0	4,826
Total Attributable Discharges			**42,678**		**51,729**
Overall Attributable Fraction*		**2.8**		**3.4**	

Attributable fraction = prevalence * (relative risk – 1/ relative risk)

*Estimated by dividing the total number of attributable discharges by the number of routine discharges among Texas adults during 2001 (1,501,876)

Table 4. Personal Healthcare Expenditures ($ Billions)—Texas, 2001*

Healthcare Expenditure	All Expenditures	% Among Adults	All Adult Expenditures	Overweight-Attributable Expenditures	Obesity-Attributable Expenditures	Total#
Hospital Care	30.54	93%	28.38	0.81	0.98	1.79
Physicians and Other Healthcare Professionals (Outpatient care)	22.27	88%	19.52	0.55	0.67	1.22
Home Health Care	3.18	92%	2.91	0.08	0.10	0.18
Medications and Durable Medical Goods	10.09	94%	9.52	0.27	0.33	0.60
Nursing Home Care	4.90	92%	4.48	0.13	0.15	0.28
Other Costs	2.35	96%	2.26	0.06	0.08	0.14
Total Healthcare Expenditures	73.32		67.07	1.90	2.31	4.21

*Numbers may not add exactly due to rounding

#Total for overweight and obesity combined

Table 5. Overweight (BMI 25-29.9 kg/m^2) and Obesity- (BMI ≥30 kg/m^2) attributable costs of morbidity-associated lost productivity (wages and household work)—Texas adults, 2001

	Overweight	Obese	Total
Workdays Lost	896,459	4,140,786	5,037,245
Cost of Lost Workdays	$0.16 billion	$0.77 billion	$0.93 billion
Bed-Disability Days	1,006,028	4,646,889	5,652,916
Cost of Bed-Disability Days	$0.02 billion	$0.10 billion	$0.12 billion
Total Cost of Lost Productivity ($)	**$0.18 billion**	**$0.87 billion**	**$1.05 billion**

Table 6. Deaths and indirect costs of lost earnings attributable to obesity-attributable premature mortality—Texas, 2001

			NHANES I EFS*		Alameda County Study†		
Age (years)	Present Value of Future Earnings ($)‡	Number of Deaths§	Number of Obesity-Attributable Deaths	Total Value of Lost Earnings ($ millions)-	Number of Overweight-Attributable Deaths	Number of Obesity-Attributable Deaths	Total Value of Lost Earnings ($ millions) -
20-24	367,590	1,519	167	61.4	11	181	70.4
25-29	735,966	1,519	167	123.0	11	181	140.9
30-34	824,236	1,775	195	160.9	12	211	184.3
35-39	917,701	2,667	293	269.2	19	317	308.4
40-44	925,389	4,042	445	411.5	28	481	471.3
45-49	866,093	5,314	585	506.3	37	632	579.9
50-54	804,928	6,700	737	593.2	47	797	679.5
55-59	595,105	7,755	853	507.7	54	923	581.5
60-64	460,366	9,243	1,017	468.1	65	1100	536.2
65-69	212,115	11,922	1,311	278.2	83	1419	318.6
70-74	165,534	15,943	1,754	290.3	112	1897	332.5
75 and older	94,649	7,9611	8,757	828.9	557	9474	949.4
Total		**148,010**	**16,281**	**4,498.6**	**1,036**	**17613**	**5,152.9**

Attributable fraction = prevalence * (relative risk – 1/ relative risk)

*Overweight-attributable fraction = 0%; obesity-attributable fraction = 11%

†Overweight-attributable fraction = 0.7%; obesity-attributable fraction = 11.9%

‡Assumes a 4% discount rate; earnings includes wages and household work

§Bureau of Vital Statistics, Texas Department of Health (52)

-Numbers may not add exactly due to rounding

Table 7. Sensitivity analysis for costs of overweight and obesity among adults—Texas, 2001

Variations in Estimates	Overweight AF	Overweight Cost	Obesity AF	Obesity Cost	Total Cost
Direct Healthcare Costs					
2001 TX BRFS	2.8%	1.9	3.4%	2.3	4.2
1999-2000 NHANES	2.5%	1.7	4.0%	2.7	4.4
Indirect Costs					
Morbidity					
NHIS and TX BRFS Prevalence	2.1%	0.2	9.7%	0.9	1.1
NHIS and NHANES Prevalence	2.1%	0.2	12.4%	1.1	1.3
NHIS Lower Confidence Limits	2.0%	0.2	9.7%	0.9	1.0
Mortality - All-Cause					
NHANES I EFS	0.0%		11.0%		
PVFE Discount: 0%		0		7.2	7.2
1%		0		6.3	6.3
2%		0		5.6	5.6
3%		0		5.0	5.0
4%		0		4.5	4.5
5%		0		4.1	4.1
6%		0		3.8	3.8
Alameda County Study	0.7%		11.9%		
PVFE Discount: 0%		0.5		7.8	8.3
1%		0.4		6.8	7.2
2%		0.4		6.0	6.4
3%		0.3		5.4	5.7
4%		0.3		4.9	5.2
5%		0.3		4.4	4.7
6%		0.2		4.1	4.3

Table 8. Highest, lowest and best cost estimates for overweight and obesity among adults—Texas, 2001

	Overweight		Obesity		
Total Cost Estimates	AF	Cost	AF	Cost	Total Cost
Highest					
Healthcare	2.5%	1.7	4.0%	2.7	4.4
Mortality	0.7%	0.5	11.9%	7.8	8.3
Morbidity	2.1%	0.2	12.4%	1.1	1.3
Total		2.4		11.6	14.0
Lowest					
Healthcare	2.8%	1.9	3.4%	2.3	4.2
Mortality	0.0%	0	11.0%	3.8	3.8
Morbidity	2.0%	0.2	9.7%	0.9	1.1
Total		2.1		7.0	9.1
Best					
Healthcare	2.8%	1.9	3.4%	2.3	4.2
Mortality	0.7%	0.3	11.9%	4.9	5.2
Morbidity	2.1%	0.2	9.7%	0.9	1.1
Total		**2.4**		**8.1**	**10.5**

Table 9. Texas State Data Center population projections by migration scenario for Texas adults, 2000-2040

Year	0 Migration Scenario	0.5 Migration Scenario	1.0 Migration Scenario
2000			
Anglo	8,522,163	8,522,163	8,522,163
Black	1,653,286	1,653,286	1,653,286
Hispanic	4,282,901	4,282,901	4,282,901
Other	506,711	506,711	506,711
Total	**14,965,061**	**14,965,061**	**14,965,061**
2010			
Anglo	8,910,869	9,084,310	9,261,305
Black	1,892,876	1,985,022	2,081,808
Hispanic	5,268,387	6,037,391	6,932,569
Other	584,387	731,077	910,130
Total	**16,656,969**	**17,837,800**	**19,185,812**
2020			
Anglo	9,070,261	9,419,620	9,782,880
Black	2,070,749	2,279,814	2,510,316
Hispanic	6,326,351	8,175,165	10,659,366
Other	656,950	1,012,195	1,552,626
Total	**18,124,311**	**20,886,794**	**24,505,188**
2030			
Anglo	9,048,854	9,571,472	10,124,547
Black	2,156,665	2,493,470	2,882,946
Hispanic	7,382,497	10,739,800	15,792,678
Other	706,848	1,334,716	2,504,472
Total	**19,294,864**	**24,139,458**	**31,304,643**
2040			
Anglo	8,753,270	9,427,233	10,153,192
Black	2,164,768	2,631,877	3,199,756
Hispanic	8,285,449	13,614,586	22,612,750
Other	710,388	1,651,915	3,810,052
Total	**19,913,875**	**27,325,611**	**39,775,750**

Table 10: Prevalence (number per 100 persons) of normal weight, overweight and obese adults by age, sex and race/ethnicity for Texas, 1999-2002

	Men			Women		
Race/Ethnicity and Age Group	**Normal Weight**	**Overweight**	**Obese**	**Normal Weight**	**Overweight**	**Obese**
Anglo						
18-24	51.8	35.1	13.1	75.1	16.7	8.2
25-44	31.7	46.7	21.7	58.0	24.8	17.2
45-64	24.5	49.1	26.4	45.6	30.2	24.2
65+	35.5	46.8	17.7	49.9	32.4	17.7
All ages	31.7	46.5	21.8	53.1	27.9	18.9
Black						
18-24	41.7	33.8	24.5	49.1	26.9	24.0
25-44	21.9	44.0	34.1	35.5	30.7	33.8
45-64	22.7	44.4	32.9	19.6	39.0	41.4
65+	34.2	23.9	41.9	33.1	36.0	30.9
All ages	25.8	41.9	32.3	32.7	33.2	34.2
Hispanic						
18-24	50.1	34.0	15.9	58.9	25.5	15.5
25-44	24.0	46.1	29.9	35.4	33.7	30.9
45-64	17.4	48.6	34.0	28.9	31.8	39.3
65+	26.8	45.5	27.7	29.8	39.6	30.6
All ages	26.3	45.4	28.3	37.3	32.0	30.7
Other						
18-24	59.0	37.8	3.2	81.4	16.2	2.3
25-44	49.2	37.2	13.6	68.2	21.4	10.4
45-64	38.5	41.8	19.8	44.4	32.4	23.1
65+	62.6	29.7	7.7	50.4	26.5	23.0
All ages	48.9	38.1	13.0	62.5	23.7	13.9
Overall	**30.7**	**45.5**	**23.8**	**47.8**	**29.2**	**23.0**

Table 11A: Prevalence (number per 100 persons) of normal weight, overweight and obese adults by age, sex and race/ethnicity for Texas, 0.5 migration scenario, 2000

	Men			Women		
Race/Ethnicity and Age Group	**Normal Weight**	**Overweight**	**Obese**	**Normal Weight**	**Overweight**	**Obese**
Anglo						
18-24	52.7	34.2	13.2	76.2	16.6	7.1
25-44	31.8	46.6	21.7	58.0	24.8	17.2
45-64	24.6	49.1	26.4	45.7	30.1	24.2
65+	34.7	47.3	18.0	49.3	33.2	17.5
All ages	32.4	46.0	21.6	54.4	27.3	18.3
Black						
18-24	47.1	38.2	14.7	48.1	29.9	22.1
25-44	21.9	44.0	34.1	35.5	30.7	33.8
45-64	22.7	44.4	32.9	19.7	38.8	41.4
65+	35.9	25.0	39.1	35.1	33.3	31.5
All ages	27.7	41.4	30.9	33.3	33.0	33.7
Hispanic						
18-24	46.6	38.6	14.8	60.1	24.8	15.1
25-44	24.0	46.1	29.9	35.5	33.6	30.9
45-64	17.4	48.6	33.9	28.9	31.8	39.3
65+	25.8	46.1	28.1	33.3	35.4	31.3
All ages	27.7	45.0	27.3	38.6	31.7	29.8
Other						
18-24	61.5	36.5	1.9	84.5	12.1	3.4
25-44	48.6	37.9	13.5	68.0	21.5	10.5
45-64	38.3	41.8	19.9	44.6	32.2	23.2
65+	55.6	36.1	8.3	48.4	29.0	22.6
All ages	48.3	38.6	13.0	62.4	23.7	13.9
Overall	**31.0**	**45.0**	**24.0**	**47.9**	**29.0**	**23.1**

Table 11B: Prevalence (number per 100 persons) of normal weight, overweight and obese adults by age, sex and race/ethnicity for Texas, 0.5 migration scenario, 2010

	Men			Women		
Race/Ethnicity and Age Group	**Normal Weight**	**Overweight**	**Obese**	**Normal Weight**	**Overweight**	**Obese**
Anglo						
18-24	48.2	35.4	16.5	73.9	17.2	8.9
25-44	26.9	47.5	25.7	54.2	25.3	20.5
45-64	20.4	49.1	30.5	41.9	30.2	27.9
65+	31.3	48.4	20.4	46.2	33.9	19.8
All ages	27.8	46.8	25.5	50.2	28.0	21.8
Black						
18-24	42.0	39.6	18.4	41.4	30.9	27.7
25-44	14.0	44.7	41.4	28.3	31.6	40.1
45-64	17.6	44.8	37.5	13.0	39.2	47.8
65+	30.2	25.6	44.2	30.2	34.1	35.7
All ages	21.5	42.2	36.3	25.5	34.3	40.2
Hispanic						
18-24	41.5	39.9	18.6	55.5	25.6	18.9
25-44	16.7	47.4	35.9	28.3	34.6	37.1
45-64	12.3	48.8	38.9	22.5	31.9	45.6
65+	21.0	47.1	31.9	28.4	36.1	35.5
All ages	20.2	46.4	33.4	31.4	32.5	36.1
Other						
18-24	59.8	37.8	2.4	83.2	12.5	4.3
25-44	44.1	40.0	16.0	64.1	23.1	12.8
45-64	36.2	41.3	22.5	40.7	32.6	26.7
65+	53.6	36.9	9.4	44.7	29.7	25.6
All ages	44.3	39.8	15.8	55.7	26.0	18.3
Overall	**25.1**	**45.9**	**29.0**	**41.1**	**30.1**	**28.5**

Table 11C: Prevalence (number per 100 persons) of normal weight, overweight and obese adults by age, sex and race/ethnicity for Texas, 0.5 migration scenario, 2020

	Men			Women		
Race/Ethnicity and Age Group	**Normal Weight**	**Overweight**	**Obese**	**Normal Weight**	**Overweight**	**Obese**
Anglo						
18-24	45.5	36.0	18.6	72.4	17.5	10.1
25-44	23.9	48.0	28.2	51.9	25.6	22.5
45-64	18.0	49.2	32.8	39.7	30.4	29.9
65+	29.4	48.9	21.7	44.5	34.3	21.1
All ages	25.4	47.3	27.3	47.8	28.7	23.5
Black						
18-24	39.0	40.3	20.7	37.4	31.5	31.1
25-44	9.0	45.1	45.9	24.1	32.1	43.8
45-64	14.8	45.7	39.5	8.8	39.9	51.3
65+	27.0	25.9	47.2	27.5	34.5	38.1
All ages	17.4	42.2	40.3	21.2	35.0	43.8
Hispanic						
18-24	38.5	40.6	20.9	52.6	26.1	21.3
25-44	12.4	48.0	39.6	24.1	35.0	40.9
45-64	9.4	49.1	41.5	18.6	32.0	49.4
65+	18.4	47.7	34.0	25.6	36.6	37.8
All ages	16.2	47.1	36.7	27.1	32.9	40.0
Other						
18-24	58.8	38.5	2.7	82.4	12.7	4.9
25-44	42.2	40.2	17.7	63.2	22.9	13.9
45-64	34.9	41.0	24.0	38.6	32.6	28.8
65+	52.6	37.3	10.1	42.7	30.0	27.3
All ages	43.0	39.8	17.2	51.8	26.9	21.3
Overall	**21.7**	**46.4**	**31.9**	**37.1**	**30.9**	**31.9**

Table 11D: Prevalence (number per 100 persons) of normal weight, overweight and obese adults by age, sex and race/ethnicity for Texas, 0.5 migration scenario, 2030

	Men			Women		
Race/Ethnicity and Age Group	**Normal Weight**	**Overweight**	**Obese**	**Normal Weight**	**Overweight**	**Obese**
Anglo						
18-24	44.0	36.3	19.7	71.6	17.7	10.7
25-44	22.0	48.5	29.6	50.6	25.8	23.6
45-64	16.8	49.1	34.1	38.5	30.3	31.2
65+	28.4	49.2	22.4	43.6	34.5	21.8
All ages	24.4	47.6	27.9	46.8	29.2	24.1
Black						
18-24	37.3	40.6	22.1	35.2	31.7	33.1
25-44	6.6	46.0	47.4	21.6	32.1	46.3
45-64	13.2	45.3	41.4	6.9	39.7	53.4
65+	25.3	26.0	48.7	26.0	34.7	39.3
All ages	15.7	41.8	42.5	19.5	35.0	45.5
Hispanic						
18-24	36.8	41.0	22.2	51.1	26.3	22.6
25-44	10.1	48.3	41.6	21.8	35.3	43.0
45-64	7.9	49.2	43.0	16.5	32.1	51.4
65+	17.0	47.9	35.1	24.2	36.8	39.1
All ages	14.3	47.4	38.3	24.9	33.2	41.9
Other						
18-24	58.3	38.8	2.9	82.0	12.8	5.2
25-44	41.2	40.1	18.7	62.8	22.7	14.5
45-64	35.4	40.4	24.2	37.2	33.0	29.8
65+	52.1	37.5	10.4	41.6	30.2	28.2
All ages	43.4	39.5	17.1	49.9	27.4	22.7
Overall	**20.0**	**46.5**	**33.5**	**34.6**	**31.4**	**34.0**

Table 11E: Prevalence (number per 100 persons) of normal weight, overweight and obese adults by age, sex and race/ethnicity for Texas, 0.5 migration scenario, 2040

	Men			Women		
Race/Ethnicity and Age Group	**Normal Weight**	**Overweight**	**Obese**	**Normal Weight**	**Overweight**	**Obese**
Anglo						
18-24	43.2	36.4	20.4	71.2	17.8	11.0
25-44	21.1	48.6	30.3	49.9	25.9	24.2
45-64	16.2	49.0	34.8	37.9	30.2	31.8
65+	27.9	49.3	22.8	43.2	34.6	22.2
All ages	23.7	47.8	28.6	46.0	29.4	24.7
Black						
18-24	36.5	40.8	22.8	34.0	31.9	34.2
25-44	5.1	46.0	48.8	20.4	32.3	47.4
45-64	12.4	45.2	42.4	6.0	39.5	54.5
65+	24.4	26.1	49.5	25.3	34.8	40.0
All ages	14.9	41.5	43.6	18.2	35.2	46.6
Hispanic						
18-24	35.9	41.2	22.9	50.2	26.4	23.4
25-44	8.9	48.5	42.6	20.6	35.4	44.0
45-64	7.2	49.4	43.3	15.4	32.1	52.5
65+	16.3	48.1	35.7	23.4	36.9	39.7
All ages	13.2	47.7	39.1	23.6	33.5	43.0
Other						
18-24	58.0	39.0	3.0	81.8	12.9	5.3
25-44	40.4	40.6	19.0	61.9	23.2	14.9
45-64	34.6	40.5	24.8	36.7	32.8	30.4
65+	51.8	37.7	10.6	41.1	30.3	28.6
All ages	43.6	39.5	16.9	48.7	27.7	23.6
Overall	**18.7**	**46.7**	**34.6**	**32.5**	**31.8**	**35.7**

Table 12: Number (in millions) and prevalence (%) of normal weight, overweight and obese Texas adults by population migration scenario, 2000-2040

Year	Baseline Prevalence* N (%)	0 Migration Scenario N (%)	0.5 Migration Scenario N (%)	1.0 Migration Scenario N (%)
2000				
Normal weight	5.9 (39.6%)	5.9 (39.6%)	5.9 (39.6%)	5.9 (39.6%)
Overweight	5.5 (36.8%)	5.5 (36.8%)	5.5 (36.8%)	5.5 (36.8%)
Obese	3.5 (23.5%)	3.5 (23.5%)	3.5 (23.5%)	3.5 (23.5%)
2010				
Normal weight	6.8 (38.3%)	5.6 (33.4%)	5.9 (33.3%)	6.4 (33.2%)
Overweight	6.6 (37.3%)	6.3 (37.9%)	6.8 (37.9%)	7.3 (38.0%)
Obese	4.3 (24.4%)	4.8 (28.6%)	5.1 (28.7%)	5.5 (28.8%)
2020				
Normal weight	7.8 (37.4%)	5.4 (29.9%)	6.1 (29.4%)	7.1 (29.0%)
Overweight	7.9 (37.7%)	7.0 (38.5%)	8.1 (38.6%)	9.5 (38.7%)
Obese	5.2 (24.9%)	5.7 (31.5%)	6.7 (31.9%)	7.9 (32.3%)
2030				
Normal weight	8.9 (36.8%)	5.4 (28.0%)	6.6 (27.2%)	8.3 (26.5%)
Overweight	9.1 (37.9%)	7.5 (38.9%)	9.4 (39.0%)	12.2 (39.1%)
Obese	6.1 (25.3%)	6.4 (33.1%)	8.1 (33.8%)	10.8 (34.4%)
2040				
Normal weight	9.9 (36.1%)	5.3 (26.7%)	7.0 (25.6%)	9.9 (24.8%)
Overweight	10.4 (37.9%)	7.8 (39.1%)	10.7 (39.3%)	15.7 (39.4%)
Obese	7.1 (25.9%)	6.8 (34.2%)	9.6 (35.2%)	14.2 (35.8%)

*In this scenario, the prevalence of normal weight, overweight and obesity among Texas adults was not changed, and the 0.5 population migration scenario was used to project population changes

Table 13A: Number of normal weight, overweight and obese adults by age, sex and race/ethnicity for Texas, 0.5 migration scenario, 2000

	Men			Women		
Race/Ethnicity and Age Group	**Normal Weight**	**Overweight**	**Obese**	**Normal Weight**	**Overweight**	**Obese**
Anglo						
18-24	259,640	168,361	64,910	364,743	79,596	34,112
25-44	531,595	779,834	362,423	960,048	410,905	284,717
45-64	328,779	657,312	353,070	623,844	411,786	330,458
65+	219,964	299,430	113,796	435,239	293,078	154,523
All ages	1,339,978	1,904,937	894,199	2,383,874	1,195,365	803,810
Black						
18-24	63,419	51,528	19,819	65,271	40,574	29,990
25-44	82,064	164,652	127,668	143,248	123,853	136,202
45-64	45,459	89,041	65,882	45,136	88,730	94,695
65+	24,447	17,007	26,573	37,956	36,009	34,063
All ages	215,389	322,228	239,942	291,611	289,166	294,950
Hispanic						
18-24	219,279	181,522	69,705	246,446	101,477	61,852
25-44	264,582	507,819	328,981	361,060	342,203	314,100
45-64	79,472	221,522	154,517	139,343	153,088	189,297
65+	37,749	67,490	41,181	66,739	70,783	62,694
All ages	601,082	978,353	594,384	813,588	667,551	627,943
Other						
18-24	24,354	14,460	761	31,311	4,473	1,278
25-44	62,187	48,571	17,244	88,658	28,053	13,654
45-64	25,114	27,430	13,020	32,245	23,310	16,777
65+	8,080	5,252	1,212	9,322	5,594	4,351
All ages	119,735	95,713	32,237	161,536	61,430	36,060
Overall	**2,276,184**	**3,301,231**	**1,760,762**	**3,650,609**	**2,213,512**	**1,762,763**

Table 13B: Number of normal weight, overweight and obese adults by age, sex and race/ethnicity for Texas, 0.5 migration scenario, 2010

	Men			Women		
Race/Ethnicity and Age Group	**Normal Weight**	**Overweight**	**Obese**	**Normal Weight**	**Overweight**	**Obese**
Anglo						
18-24	259,150	190,252	88,764	377,845	88,095	45,689
25-44	398,714	703,676	380,318	787,998	367,433	297,724
45-64	341,678	820,034	509,218	714,598	515,583	475,717
65+	236,865	365,989	154,055	466,117	327,532	191,266
All ages	1,236,407	2,079,951	1,323,355	2,326,558	1,298,643	1,010,396
Black						
18-24	70,036	65,979	30,709	67,176	50,125	44,835
25-44	54,338	173,877	160,904	115,415	128,678	163,189
45-64	54,443	138,460	15,943	44,925	135,057	164,952
65+	24,858	21,042	36,415	37,357	42,149	44,160
All ages	203,675	399,358	343,971	264,873	356,009	417,136
Hispanic						
18-24	226,077	217,454	101,050	280,802	129,765	95,716
25-44	254,620	721,080	546,826	381,775	466,491	501,021
45-64	99,456	394,234	314,573	179,936	254,769	364,837
65+	45,865	102,852	69,509	81,954	104,356	102,373
All ages	626,018	1,435,620	1,031,958	924,467	955,381	1,063,947
Other						
18-24	26,330	16,659	1,061	34,958	5,249	1,814
25-44	69,624	63,162	25,219	98,373	35,427	19,697
45-64	44,106	50,234	27,347	53,911	43,132	35,390
65+	19,434	13,377	3,419	19,308	12,810	11,036
All ages	159,494	143,432	57,046	206,550	96,618	67,937
Overall	**2,225,594**	**4,058,361**	**2,565,330**	**3,722,448**	**3,706,651**	**2,559,416**

Table 13C: Number of normal weight, overweight and obese adults by age, sex and race/ethnicity for Texas, 0.5 migration scenario, 2020

	Men			Women		
Race/Ethnicity and Age Group	**Normal Weight**	**Overweight**	**Obese**	**Normal Weight**	**Overweight**	**Obese**
Anglo						
18-24	220,593	174,571	90,153	335,542	81,171	46,597
25-44	356,950	717,855	421,252	752,999	371,041	327,052
45-64	287,602	784,689	523,754	644,936	493,989	486,150
65+	308,056	512,326	227,381	558,943	430,778	265,240
All ages	1,173,201	2,189,441	1,262,540	2,292,420	1,376,979	1,125,039
Black						
18-24	62,022	64,054	33,000	57,633	48,475	47,993
25-44	40,629	202,302	206,078	108,795	145,220	197,900
45-64	52,481	161,726	140,031	34,712	158,122	203,204
65+	35,741	34,243	62,484	50,240	63,064	69,665
All ages	190,873	462,325	441,593	251,380	414,881	518,732
Hispanic						
18-24	257,292	271,716	139,760	327,028	162,056	132,310
25-44	237,393	919,097	758,560	409,869	596,547	696,057
45-64	116,230	603,822	510,236	218,122	374,707	578,421
65+	71,824	186,276	132,735	121,782	173,679	179,646
All ages	682,739	1,980,911	1,541,291	1,076,801	1,306,989	1,586,434
Other						
18-24	32,441	21,227	1,496	44,306	6,832	2,614
25-44	71,841	68,460	30,098	102,411	37,028	22,478
45-64	66,391	77,991	45,637	75,579	63,918	56,418
65+	44,177	31,360	8,451	43,158	30,332	27,551
All ages	214,850	199,038	85,682	265,454	138,110	109,061
Overall	**2,261,663**	**4,831,715**	**3,331,106**	**3,886,055**	**3,236,959**	**3,339,296**

Table 13D: Number of normal weight, overweight and obese adults by age, sex and race/ethnicity for Texas, 0.5 migration scenario, 2030

	Men			Women		
Race/Ethnicity and Age Group	**Normal Weight**	**Overweight**	**Obese**	**Normal Weight**	**Overweight**	**Obese**
Anglo						
18-24	207,682	171,401	93,289	326,257	80,491	48,698
25-44	322,251	710,777	433,900	717,333	366,068	335,274
45-64	239,621	699,329	486,773	553,111	434,175	447,537
65+	378,486	655,158	298,724	683,108	540,274	341,755
All ages	1,148,040	2,236,665	1,312,686	2,279,809	1,421,008	1,173,264
Black						
18-24	57,538	62,610	33,994	52,208	47,120	49,167
25-44	31,157	218,463	225,293	102,129	151,889	219,003
45-64	49,065	167,917	153,478	27,633	159,877	214,734
65+	50,683	52,133	97,728	70,116	93,463	106,072
All ages	188,443	501,123	510,493	252,086	452,349	588,976
Hispanic						
18-24	304,178	338,790	183,655	393,268	202,641	174,364
25-44	232,791	1,112,738	957,573	458,699	743,259	904,983
45-64	134,415	837,105	731,540	256,198	498,771	799,720
65+	117,966	332,912	243,710	188,687	286,932	304,905
All ages	789,350	2,621,545	2,116,478	1,296,852	1,731,603	2,183,972
Other						
18-24	36,876	24,552	1,824	50,150	7,841	3,162
25-44	83,531	81,407	37,926	123,283	44,622	28,409
45-64	82,979	94,821	56,778	85,872	76,130	68,795
65+	82,436	59,465	16,464	78,033	56,571	52,789
All ages	285,822	260,245	112,992	337,338	185,164	153,155
Overall	**2,411,655**	**5,619,578**	**4,052,649**	**4,166,085**	**3,790,124**	**4,099,367**

Table 13E: Number of normal weight, overweight and obese adults by age, sex and race/ethnicity for Texas, 0.5 migration scenario, 2040

	Men			Women		
Race/Ethnicity and Age Group	**Normal Weight**	**Overweight**	**Obese**	**Normal Weight**	**Overweight**	**Obese**
Anglo						
18-24	189,741	160,129	89,511	301,566	75,161	46,704
25-44	292,495	671,632	419,523	672,256	348,339	326,615
45-64	233,920	709,329	503,988	546,174	434,903	458,128
65+	377,979	668,099	308,802	687,752	551,267	353,490
All ages	1,094,135	2,209,189	1,321,554	2,207,748	1,409,670	1,184,937
Black						
18-24	55,606	62,231	34,703	49,919	46,828	50,184
25-44	23,468	210,018	222,777	92,149	145,943	214,249
45-64	53,341	193,997	182,248	26,897	175,543	245,085
65+	55,991	59,838	113,712	79,587	109,541	126,022
All ages	188,406	526,084	553,440	248,552	479,855	635,540
Hispanic						
18-24	346,537	397,166	221,126	451,532	237,542	209,927
25-44	250,581	1,366,283	1,201,410	530,813	913,619	1,136,785
45-64	153,996	1,055,750	925,343	302,689	630,862	1,031,322
65+	176,188	520,549	386,294	273,595	430,581	463,826
All ages	927,572	3,339,748	2,734,173	1,558,629	2,212,604	2,841,860
Other						
18-24	37,804	25,393	1,938	51,510	8,110	3,360
25-44	96,701	97,253	45,501	144,226	54,107	34,815
45-64	87,804	102,837	63,034	89,760	80,199	74,397
65+	133,425	97,033	27,234	121,411	89,450	84,613
All ages	355,734	322,516	137,707	406,907	231,866	197,185
Overall	**2,565,847**	**6,397,537**	**4,746,874**	**4,421,836**	**4,333,995**	**4,859,522**

Table 14: Estimated annual costs ($ Billions) of overweight and obesity among Texas adults, 2000-2040

Year	Baseline Prevalence*	0 Migration Scenario	0.5 Migration Scenario	1.0 Migration Scenario
2000				
Overweight	$2.4	$2.4	$2.4	$2.4
Obese	$7.9	$7.9	$7.9	$7.9
Total	$10.3	$10.3	$10.3	$10.3
2010				
Overweight	$2.9	$2.8	$3.0	$3.2
Obese	$9.8	$10.7	$11.5	$12.4
Total	$12.7	$13.5	$14.5	$15.6
2020				
Overweight	$3.5	$3.1	$3.6	$4.2
Obese	$11.7	$12.8	$15.0	$17.8
Total	$15.2	$15.9	$18.6	$22.0
2030				
Overweight	$4.0	$3.3	$4.1	$5.4
Obese	$13.8	$14.4	$18.3	$24.2
Total	$17.8	$17.7	$22.5	$29.6
2040				
Overweight	$4.6	$3.4	$4.7	$6.9
Obese	$15.9	$15.3	$21.6	$32.1
Total	$20.5	$18.8	$26.3	$39.0

*In this scenario, the prevalence of normal weight, overweight and obesity among Texas adults was not changed, and the 0.5 population migration scenario was used to project population changes

Appendix. Obesity-associated diagnoses and International Classification of Disease, ninth revision, Clinical modification (ICD9-CM) codes (47)

Diagnosis	ICD-9 Codes
Cardiovascular Disease	
Hypertension	401.0-402.91
Coronary Heart Disease	410.0-414.9
Congestive Heart Failure	428.0-428.9
Ischemic Stroke	433,434,436,437.1
Endocrine/Metabolic Disease	
Type 2 Diabetes Mellitus	250.00, 250.02
Obesity	278.00, 278.01
Gastrointestinal Disease	
Gallbladder Disease	574.0-576.9
Musculoskeletal Disease	
Osteoarthritis	715.0-715.9
Respiratory Disease	
Asthma	493.0-493.9
Sleep Apnea	780.51-780.57
Malignant Neoplasms	
Breast (Post-Menopausal Women Only)	174.0-174.9
Cervix	180.0-180.9
Colon	153.0-153.9
Endometrium	179,182.0-182.8
Gallbladder	156.0
Kidney	189.0-189.8
Ovary	183.0-183.9

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