The Implications of Future Demographic Change on Obesity and the Economic Cost Associated with Obesity in Georgia, 2000-2040

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Abstract: In this paper we examine the implications of future demographic change, particularly the size, composition, and racial/ethnic diversification of population, on obese adult population in Georgia and the economic costs associated with these obese adults from 2000 to 2040. The number of obese adults is projected to increase from 1.5 million in 2000 to 4.3 million in 2040, along with an increase in total costs from $2.1 billion to $6.2 billion. Decomposition analysis suggests that the changes in obesity are predominantly driven by population growth, aging and diversification of population in Georgia. The demographic changes in Georgia are likely to resemble those of the nation, with minorities becoming the majority by 2042. The projected trends for Georgia may be applied to the nation, which depends on the assumptions made about population growth and changes in obesity. This analysis provides information about how obesity could develop through 2040 and what factors contribute to this development.

Keywords: Obesity, projections, prevalence, cost.

1. INTRODUCTION

In this paper we examine the impact of future demographic change, particularly size, composition, and racial/ethnic diversification of population, on obesity and the cost associated with obesity in Georgia. Each year health care expenditures rise considerably due to the growth and aging of the population [1]. Obesity is considered one of the main health concerns in contemporary America. For adults and also for children the percentage of the population that is considered obese has increased substantially for the past years [2-4]. Linked to the increases in obesity prevalence are concerns about whether obesity will have a negative effect on the positive past trends in life expectancy [2, 5]. The public health risk of obesity is based on findings which support that being obese increases morbidity as well as mortality [6-9]. Obesity is considered to increase the risks of developing certain conditions such as hypertension and type 2 diabetes [10]. Flegal *et al*., for instance, were able to show the association between body mass index (BMI) and certain causes of death using data from the National Health and Nutrition Examination Survey (NHANES) [7]. In addition, obesity is said to contribute as much to morbidity as do poverty, smoking and excess alcohol consumption [11].

Besides observing differences in obesity for males and females [12, 13], higher body mass indices are also more likely found among minority population members due to an association between low socioeconomic status and obesity [14] and a variety of other factors such as historical and cultural aspects. Based on data for adults 20 years of age and older from the NHANES 2007-2008, the age-adjusted obesity prevalence rates are as follows with 95% confidence intervals in parenthesis: 38.7% (33.5 – 43.9) of Hispanics and 44.1% (40.0 – 48.2) of non-Hispanic African Americans had a BMI of greater or equal to 30 compared to 32.4% (28.9 – 35.9) non-Hispanic Whites in the United States [15]. The prevalence of obesity is thus likely to be especially high in areas with growing and diverse populations.

The State of Georgia provides an excellent setting for an analysis of the potential effects and the costs of obesity because of the prevalence of these conditions in its population as well as the rapid diversification of its population. Georgia had the 6th highest rate of adult obesity among all U.S. states in 2003 at 25.2 percent and had the 9th highest rate of obese adults in 2007 at 28.7 percent [16, 17]. Georgia is one of the most rapidly growing states in the U.S., the population in Georgia increased from 8.2 million in 2000 to 9.7 million in 2008. This is an increase of 1.5 million. In terms of numerical increase and/or percent population growth, Georgia ranked 4th among the fastest growing states for the period from 2000 to 2008, with an increase of 18.3 percent [18]. We examine Georgia also because its population is diversifying rapidly: in 1990 more than 70% of Georgia's population was non-Hispanic White, compared to 63% in 2000. The Non-Hispanic White population decreased to 59% by 2007. In addition, obesity is prevalent in Georgia's adult population: 27.3% of the adult population had a BMI of 30 or higher in 2008 [18]. Identifying the potential future development of the obese adult population in Georgia might also be informative for the U.S. as a whole, since the characteristics of Georgia are similar to those projected for the nation, becom-

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1874-9186/11

ing a majority minority population by 2042 with approximately 30% Hispanics and around 12% African Americans [19]. Currently, Georgia has a proportionately larger minority group than the nation. In 2000 slightly more than 28 % of the Georgia population was African-American (non-Hispanic) and approximately 5.3% was Hispanic (independent of race), while in 2007 about 30% of its population was African American (non-Hispanic) and 7.8 was Hispanic.

In addition to determining the potential future obese population, we also focus on how the burden of obesity is going to develop. Besides the consequences of obesity for the individual and their families and their quality of life, obesity is also associated with a high economic burden – consisting of direct and indirect costs – for the community, the state and the country. For the U.S., obesity related expenditures were estimated to be $75 billion and as for the State of Georgia, total costs for obesity were estimated to be $2.1 billion in 2003 [20], resulting in costs of $1431.15 per each obese adult person in Georgia. Hoque *et al*. used similar techniques to project overweight and obesity, with the costs associated with overweight and obesity in Texas [21]. As far as we can determine, no previous study has examined the impact of future demographic change on obesity and costs associated with obesity in Georgia. Thus, this paper is unique in representing the first attempt to examine the implications of future demographic change, particularly the size, aging and racial/ethnic diversification on obesity and costs associated with obesity in Georgia. This is particularly important because knowledge of future demographic change is essential for health policy purposes.

2. DATA AND METHODS

The objective of this analysis was to examine the impact of future demographic change on obese adults and the costs associated with obese adults in Georgia from 2000 to 2040. The analysis was performed in four stages. The first stage involved the preparation of detailed projections of the population by age, sex, and race/ethnicity in Georgia. Population projections were completed using a cohort component projection technique of standard form. The second stage involved the derivation of age, sex and race/ethnicity-specific rates of obesity. We computed the prevalence rates from the Behavioral Risk Factor Surveillance System (BRFSS) data. The third stage involved the computation of projected obese adults in Georgia. We applied the computed rates of obesity to the projected population by age, sex, and race/ethnicity from 2000 to 2040 to compute the projected obese adults in Georgia. The fourth stage involved the computation of decomposition effects due to changes in population growth, aging, and racial/ethnic diversification. Detailed descriptions of these stages are given below:

2.1. Projections of Population

Population projections were completed with a cohort-component projection technique. The basic characteristics of this technique employ the use of separate cohorts - persons with one or more common characteristics- and the separate projection of each of the major components of population change - fertility, mortality, and migration- for each cohort. These component projections are then combined in the demographic equation as follows:

$$P_t = P_o + B - D + NM$$

Where; P_t = population for the projected year, P_o = population at the base year, B = births between P_0 and P_t, D = deaths between P_0 and P_t, and NM = net migration between P_0 and P_t.

Data for the age-, sex and race/ethnicity-specific Census 2000 population of Georgia served as the baseline population and was derived from Summary File 1 of the 2000 Census of Population and Housing. Race/ethnicity was categorized as Anglos (non-Hispanic Whites), Blacks (non-Hispanic Blacks), Hispanics (persons of Spanish origin of all racial and ethnic groups), and Others (all other non-Anglo, non-African American, non-Hispanic racial and ethnic groups). Baseline age-specific fertility rates by race/ethnicity were calculated using three-year averages for births to women residing in Georgia (1999, 2000, 2001). The same was done for death rates, which were used to compute a life table for Georgia for males and females in Georgia by race/ethnicity. The Georgia Department of State Health Services was the source for both death and birth data. Baseline net migration rates by age, sex, and race/ethnicity for the state of Georgia were computed by using the vital statistics method for the period of 1990-2000. To project these rates, we assume that Georgia's fertility and mortality will follow the national fertility [22, 23] and mortality [22-24] patterns as they were projected by the Census Bureau. We also assume that the annual net migration rates that were observed between 1990 and 2000 remain constant. We conducted the analysis using different annual net migration scenarios (zero net migration, half of the annual net migration observed between 1990 and 2000, as well as annual net migration between 2000 and 2007), but we believe that the scenario presented here (constant 1990-2000 annual net migration) is most likely to characterize the future patterns.

2.2. Measures of Prevalence of Obesity

Data for the sex-specific obesity prevalence rates by age are based on the Behavioral Risk Factor Surveillance System (BRFSS) for Georgia for 1999-2002 and can be seen in Fig. (**1**). Pregnant women were excluded from the analysis. Self-reported weight and height are used to calculate the body mass index by dividing the weight of the respondent in kilograms by the square of the respondent's height in meters. Using the definition of the National Institutes of Health, individuals are classified as being obese by having a BMI equal to or greater than 30.0 kg/m^2. A four-year average was used to gain more stable results. The prevalence rates derived from the BRFSS are the basis for our projection of obesity in adults. We believe that the extreme growth in obesity prevalence, which could be observed in the past years, is not sustainable over time, since everyone would be considered obese in due time. In order to project how obesity prevalence could change, we investigated the national rates of change for obesity in the BRFSS data from 1990 to 2002. We assume that the rates of change are going to slow over time, with prevalence rates decreasing linearly by one-fourth of the 1990 to 2002 rate of change for the period between 2000 and 2010, and decreasing an additional one-half of the previous decades' prevalence in each of the following three decades. These adjusted rates of change were then applied to

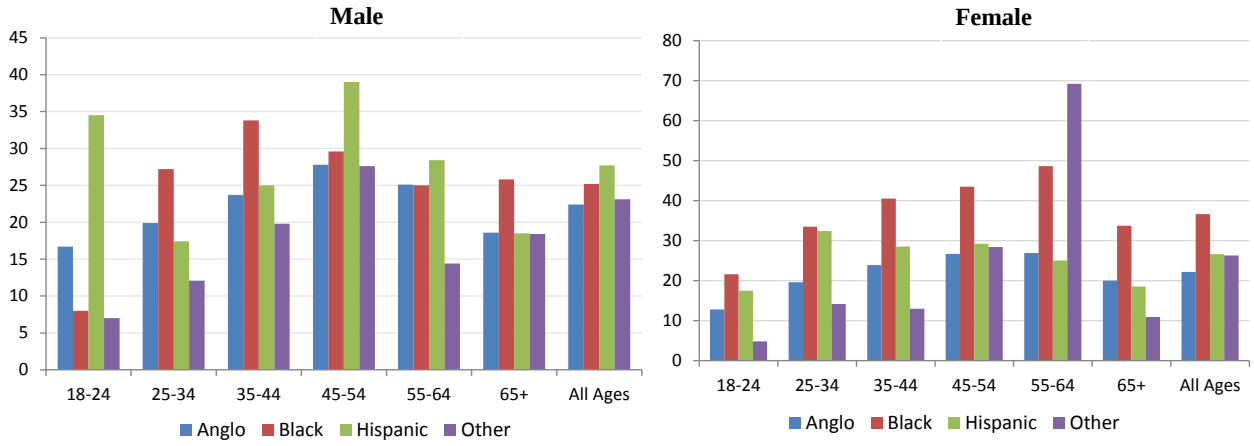

Fig. (1). Obesity Prevalence Rates (Percent obese) for Males and Females in Georgia, by Age, Sex, and Race/Ethnicity 1999-2002.

the baseline prevalence of obesity resulting in the projected prevalence rates.

Our assumptions regarding the future population of Georgia as well as the change in obesity prevalence highly influence the projection and therefore our results. If our assumptions do not match the actual development of the adult population our projection will show a wrong picture, as it is the case with all projections. We believe that the results shown here are a reasonable view into the future of Georgia's population as well as its obesity trends.

2.3. Projected Cost of Obesity

The projected costs of obesity were derived from previously published direct and indirect cost estimates for the State of Georgia. According to previously published 2003 cost estimates for obesity, total annual direct and indirect costs were $1,431.15 for each obese adult in Georgia [22]. These values were multiplied by the projected number of obese adults to project the cost of obese adult status in Georgia using 2003 constant dollars.We used constant rates simply because we did not have the data necessary to compute a linear trend.

2.4. Decomposition Analysis

Finally, we use decomposition techniques to identify how each of the three factors studied affected changes in the number of obese adults relative to the population base. Decomposition analysis is a technique for identifying the proportion of a difference between two crude rates that is attributable to each of a set of demographic factors [25, 26]. Decomposition analysis is clearly an appropriate technique for discerning how demographic factors will affect the number of obese adults in Georgia at different points in times. By using decomposition techniques, we discern what part of the change in obese adults for each of the four time periods (2000-2010, 2000-2040, 2010-2020, 2020-2040) is attributable to population change, aging and diversification of population.

3. RESULTS

Fig. (**1**) shown above provides information about the specific patterns of obesity prevalence in Georgia, as reported through the BFRSS, between 1999 and 2002. It can be seen that in all age groups and across the different race/ethnic groups Georgia males had prevalence below 40%, while this is not the case for Black and Other females. For males, the highest prevalence rates can be found for Hispanics in two age groups 45-54 and 18-24 with a prevalence of 39 and 34.5%, respectively. Other males have the lowest obesity prevalence. For males in general, there seems to be an increase in prevalence with age until it reaches a maximum and decreases again, this trend cannot be seen for Hispanic males. Georgia females give a different picture. Besides Others, which is a quite heterogeneous group, Black females have the highest obesity prevalence rates across all ages. While Black and Anglo female prevalence increases until age group 55-64, obesity prevalence rates reach its peak between age 25 and 34 for Hispanic females. As mentioned before, these are the baseline prevalence rates for obesity, which were projected and then applied to the projected adult population of Georgia.

Projected adult population (18 years of age and older) of Georgia by age and race/ethnicity from 2000 to 2040 are given in Table **1**. The total adult population of Georgia is expected to increase from 6.0 million in 2000 to 16.8 million by 2040 – a percent change of 179.4% (Panel I & II). The non-Hispanic White or Anglo population will increase from 4.0 million to 6.1 million, the non-Hispanic Black population will increase from 1.6 million to 5.3 million, the Hispanic population will increase from 299,258 persons to 4.0 million, and the non-Hispanic Other population will increase from 153,845 persons to 1.4 million. While all racial/ethnic groups are projected to increase, the Anglo population is only expected to increase by around 54% while the Hispanic population is expected to have a percent change of over 1200% - resulting in a Hispanic population that is more than 13 times as large in 2040 compared to 2000. Panel III shows that Anglos were the majority in 2000 with 65.7%, while by 2030 Anglos are expected to be less than half of the total population (44%). By 2040, 36.1% of the population is projected to be Anglo, followed by 31.3% non-Hispanic Black. Around 5% of Georgia's population was Hispanic in 2000, but by 2040 they are expected to be 24%. Others also increased from less than 3% of the population in 2000 to 8.6% in 2040.

Table 1. Size, Change, and Characteristics of the Adult Population (18 Years of Age and Older) by Race/Ethnicity in Georgia in 2000 and Projected to 2040

Year	Anglo	Black	Hispanic	Other	Total
Panel I: Population Size					
2000	3,956,327	1,607,789	299,258	153,845	6,017,219
2010	4,550,342	2,295,443	571,079	286,420	7,703,284
2020	5,108,022	3,116,260	1,128,533	514,833	9,867,648
2030	5,625,763	4,097,587	2,184,140	887,706	12,795,196
2040	6,084,758	5,257,514	4,028,297	1,440,409	16,810,978
Panel II: Percent Change in Population for Selected Time Periods					
2000-2010	15.0	42.8	90.8	86.2	28.0
2010-2020	12.3	35.8	97.6	79.7	28.1
2020-2030	10.1	31.5	93.5	72.4	29.7
2030-2040	8.2	28.3	84.4	62.3	31.4
2000-2040	53.8	227.0	1246.1	836.3	179.4
Panel III: Percent of Population by Race/Ethnicity					
2000	65.7	26.7	5.0	2.6	100.0
2010	59.1	29.8	7.4	3.7	100.0
2020	51.8	31.6	11.4	5.2	100.0
2030	44.0	32.0	17.1	6.9	100.0
2040	36.1	31.3	24.0	8.6	100.0
Panel IV: Percent of Population by Age Group for 2000 and 2040					
2000					
18-24	11.6	16.7	28.9	15.8	13.9
25-34	19.3	23.9	35.8	28.7	21.6
35-44	21.9	24.2	19.7	24.1	22.5
45-54	19.1	17.0	8.9	17.1	18.0
55-64	12.6	8.7	3.9	8.7	10.9
65+	15.5	9.5	2.8	5.6	13.1
2040					
18-24	10.2	12.4	13.4	7.5	11.5
25-34	15.4	17.4	18.0	12.8	16.3
35-44	16.0	17.6	16.9	14.1	16.6
45-54	16.6	19.0	11.0	13.8	15.8
55-64	14.3	14.3	19.6	16.6	15.7
65+	27.5	19.3	21.1	35.2	24.1

Table 1. contd…

Year	Anglo	Black	Hispanic	Other	Total
Panel V: Percent Change in Population by Age Group from 2000-2040					
18-24	36.0	143.1	525.0	347.8	129.8
25-34	22.1	138.1	574.7	315.6	112.0
35-44	12.2	137.1	1057.0	447.1	105.6
45-54	33.8	266.6	1563.1	655.5	145.6
55-64	75.8	440.1	6723.0	1691.3	301.2
65+	171.8	561.3	10013.9	5765.4	414.9

The proportion of the total population that is 65 years of age or older is projected to increase from 13.1% in 2000 to 24.1% in 2040, an increase of 414.9%. Anglo population will increase by 171.8%, Black by 561.3%, Hispanic by 10,013.9% and Others by 5,765.4% (Panel IV & V).

The adult population that is projected to be obese in Georgia is given in Table **2**. In Georgia around 1.5 million adults were obese in 2000. This number is projected to almost triple by 2040. The absolute numbers of obese adults are expected to increase across all race/ethnicities as the total adult population did, yet the increase in absolute number of obese individuals cannot be solely explained but the population growth. The total adult population had a percent change of around 180% while the adult obese population has a percent change of around 190%. It can be seen that the percent change in obese population is less for Anglos and Hispanics than the percent change for the total adult population (51.7% for Anglos and 1201.9% for Hispanics for the obese population compared to 53.8% and 1246.1% for the total adult population). For Blacks and Others the percent change in obese population is greater than the percent change in the total adult population. This is especially striking for the Other population. As to the distribution of obesity across the racial/ethnic groups – shown in Panel III – Anglos had the greatest share in obesity in 2000 with 59%, followed by Blacks with 33.9%. Diversification can be seen with obesity as with the total population. By 2020, less than half of the adults who are considered obese are Anglos and by 2030 Blacks hold the greatest share of the obese population. In 2040, 38.6% of the obese population is projected to be Black, followed by 30.8% that are Anglos, 23.8% are Hispanic and 6.8% are Others (Panel III).

The aging of the population will markedly affect the obese rates by age groups in the projected years. The effects of aging are apparent for all racial and ethnic groups. The largest percent increase in obesity for all race/ethnicity groups is among those who are 65 years of age and older (Panel IV).

Table **3** shows the projection of the annual direct and indirect costs associated with obesity in Georgia. The total costs are projected to increase from $2.13 billion (in 2003 dollars) in 2000 to $6.18 billion in 2040 – an increase of 189.7%. For all race/ethnicities the direct and indirect costs are projected to increase. In 2000 more than half of the costs were spent on obese Anglos, while in 2040 the highest costs can be found for Blacks with $2.38 billion – more than the total costs associated with obesity in 2000. The projected costs associated with obesity will increase by 51.7% for Anglos, by 229.6% for Blacks, by 1201.9% for Hispanics and by 962.9% for Other population from 2000 to 2040.

In order to determine what is driving the changes in obesity in Georgia we used decomposition analysis. We try to identify how much of the change in crude rates is attributable to population change (also referred to as rate effect), aging and diversification of the population in terms of racial/ethnic distribution for three different time periods: 2000 to 2010, 2010 to 2020 and 2020 to 2040. The results of the decomposition analysis can be seen in Table **4**.

It can be seen from the table that population change (also called rate effect) has a small negative impact on obesity during all three time periods. This means that the growth of Georgia's population is not the reason why there is an increase in obesity. Instead of a growing population, the diversification as well as the aging of the population is driving the change in obesity in the projection. While the influence of diversification is positive throughout the projected periods, the effect of aging is positive during the first two periods and negative between 2020 and 2040.

For 2020-2040 the increase in obese adults would be even greater if it was not for the negative effect of population growth and population aging. Anticipating demographic change is of vital importance for understanding change in these critical health-related statuses.

4. DISCUSSION

The results reported here suggest that demographic change will have an extensive impact on the increase in the number of obese adults in Georgia. For the overall projected period, the increase in obesity numbers will be mainly driven by more and more diversification, while population aging and growth lessen the effect of diversification. Independent of the cause, immense increases in obesity prevalence rates were projected and related increases in total demands on health care and other forms of support can be expected in Georgia. Almost a tripling of the costs associated with obesity are projected as well. If the prevalence rates of obesity develop as assumed here the annual costs associated with excess weight would reach $6.2 billion by the year 2040.

Table 2. Adult Population with Obesity in Georgia by Race/Ethnicity and Age Group in 2000 and Projected to 2040

Year	Anglo	Black	Hispanic	Other	Total
Panel I: Adult Population That is Obese in Georgia in 2000 and Projected to 2040					
2000	878,952	505,046	78,853	27,564	1,490,415
2010	1,017,725	722,820	150,170	59,150	1,949,865
2020	1,134,311	993,887	312,590	112,204	2,552,992
2030	1,235,969	1,305,285	595,740	191,914	3,328,908
2040	1,333,093	1,664,724	1,026,593	293,001	4,317,411
Panel II: Percent Change in Obese Persons for Selected Time Periods					
2000-2010	15.8	43.1	90.4	114.6	30.8
2010-2020	11.5	37.5	108.2	89.7	30.9
2020-2030	9.0	31.3	90.6	71.0	30.4
2030-2040	7.9	27.5	72.3	52.7	29.7
2000-2040	51.7	229.6	1201.9	963.0	189.7
Panel III: Percent of Adult Population That is Obese in Georgia in 2000 and Projected to 2040					
2000	59.0	33.9	5.3	1.8	100.0
2010	52.2	37.1	7.7	3.0	100.0
2020	44.5	38.9	12.2	4.4	100.0
2030	37.1	39.2	17.9	5.8	100.0
2040	30.8	38.6	23.8	6.8	100.0
Panel IV: Percent of Adult Population That is Obese in Georgia by Age Group in 2000 and Projected to 2040					
2000					
18-24	7.7	8.0	31.5	5.2	9.0
25-34	17.2	23.2	31.2	21.1	20.0
35-44	23.4	28.8	19.7	21.9	25.1
45-54	23.4	20.1	11.7	26.8	21.7
55-64	14.7	10.5	3.9	20.6	12.8
65+	13.6	9.4	2.0	4.4	11.4
2040					
18-24	6.9	5.8	13.8	2.2	7.8
25-34	13.8	16.6	17.4	8.2	15.4
35-44	17.4	20.6	17.8	11.5	18.3
45-54	20.6	22.0	14.8	19.0	19.6
55-64	17.1	16.7	20.9	33.8	19.0
65+	24.2	18.3	15.3	25.3	19.9
Panel V: Percent Change in Adult Population That is Obese by Age Group from 2000-2040					
18-24	36.0	137.6	471.7	348.8	150.3
25-34	22.1	136.5	627.2	314.1	122.6
35-44	12.2	135.4	1,070.0	454.6	111.4
45-54	33.8	260.2	1,547.3	654.3	162.3
55-64	75.7	423.9	6,831.4	1,651.0	328.3
65+	170.8	545.1	10,009.4	5,960.5	407.4

Table 3. Projected Cost Associated with Obesity in Georgia by Race/Ethnicity From 2000-2040 (Values shown in Thousands)*

Year	Anglo	Black	Hispanic	Other	Total
Assuming Rates of Net Migration Equal to 1990-2000					
2000	1,257,908	722,794	112,850	39,448	2,133,000
2010	1,456,512	1,034,460	214,915	84,652	2,790,540
2020	1,623,364	1,422,396	447,362	160,580	3,653,702
2030	1,768,851	1,868,052	852,590	274,657	4,764,150
2040	1,907,849	2,382,461	1,469,203	419,327	6,178,841

*Using 2003 Constant Dollars

Table 4. Decomposition of the Effects of Population Change, Age, and Race/Ethnicity on Obesity in Georgia

Time Period	Total Effect	Composition Effect Due To			Percent of Change in Total Effect Due To			Percent of Absolute Change in Total Effect Due To		
		Rate Effect	Age	Race/Ethnicity	Rate Effect	Age	Race/Ethnicity	Rate Effect	Age	Race/Ethnicity
Assuming Rates of Net Migration Equal to 1990-2000										
2000-2010	0.5430	-0.0682	0.2713	0.3399	-12.55	49.96	62.59	10.03	39.93	50.03
2010-2020	0.5602	-0.0114	0.1151	0.4565	-2.03	20.55	81.48	1.95	19.75	78.30
2020-2040	-0.1903	-0.0857	-0.5472	0.4427	45.03	287.64	-232.67	7.96	50.88	41.16
2000-2040	0.9129	-0.1442	-0.0559	1.1130	-15.79	-6.13	121.92	10.98	4.26	84.76

The limitations of this analysis must, however, be recognized. Although the increase in the number of obese adults in Georgia and the United States is expected to continue, only few projections such as the one presented here exist that quantify the extent of the increase or the rate of change. A study by Flegal et al. based on national BRFSS data used a linear time trend to project the prevalence of overweight and obesity among adult males and females in the United States [6, 27]. The authors estimated that among males, the prevalence of overweight would reach 39 percent by 2020 and the prevalence of obesity would reach 46%. Among females, 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 here because the estimates in the published study are based on a linear time trend. In the present analysis, the rates of prevalence change were assumed to decrease over time since we consider the rapid increase in the prevalence of obesity in Georgia and the United States which was observed during the 1990's to be unsustainable. If the prevalence of obesity continued to follow a positive linear trend in Georgia and reached the levels reported in the published study, the associated annual costs of overweight and obesity in Georgia would exceed the projected cost of $6.2 billion in 2040 by far. Estimating the change in prevalence rates of obesity is challenging because it is impossible to know how the rates are going to develop and when behavioral changes will manifest.

Although we believe the assumptions underlying our analysis are reasonable given the past and the expected future trends, the projections reported here are based on a number of assumptions and limitations which must be acknowledged. First of all, it is essential to recognize that projections are subject to considerable inaccuracies when unforeseen changes alter the historical patterns on which the projections are based and assumptions are not met. The cohort component model applies rates to baseline populations. If these rates develop different from what was assumed, the accuracy of the projections will be affected. Variations in rates could regard, for instance, the future population growth, such as declines in the rate of population increase among minority populations. As mentioned before, increases or decreases in the prevalence of overweight and obesity due to changes in the population's dietary habits can have negative effects on the outcome of the projection as well. The reported projections of obese adults and the costs associated with obesity would be correct if the assumptions hold true in the coming years.

As mentioned before, obesity has increased immensely in Georgia over the past years. The costs connected with this development are a central concern. In 2003 the annual costs

associated with obesity were $2.1 billion; the future growth in the population is likely to increase these costs further. Thus, there is a critical need for policies and programs designed to decrease the prevalence of obesity through both prevention and treatment in order to address this growing public health problem in Georgia, and the nation.

The results of this analysis are not limited to the potential magnitude of the increases in the number of obese persons along with their demographic dimensions, and the costs associated with these increases, the results also suggest possible factors that should be considered in the developing policies to address the growth in the number and obese persons. For instance, the critical impact of diversification on the change in obesity shows the need to address opportunities for healthy living with the availability of affordable healthy choices. Minority populations need access to better nutrition and physical activities to improve their health outcomes. It is evident that although it may not be possible to alter patterns of population growth, projecting where such growth is likely to occur can assist policy makers in locating and sizing service facilities to address the problems associated with obese status, so informed decisions can be made. Similarly, the significance of population diversification for obesity as seen in the decomposition analysis makes clear that it is essential to target educational and prevention programs toward the needs of minority populations.

Finally, what is especially critical is to understand that the relationships between such factors as minority status and obesity stem from social and economic differentials which are alterable. Programs aimed at reducing socioeconomic disparities may thus also help to reduce the demand for services resulting from obese status by reducing the reasons for the disparities in prevalence between minority and other populations.

ACKNOWLEDGEMENTS

The author would like to thank Beverly Pecotte, editor and reviewers for their comments and helpful suggestions. Susanne Schmidt provided excellent research assistance. Special appreciation is due to Lisa Espinoza who patiently corrected repeated drafts of this work.

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Received: October 20, 2010 Revised: November 05, 2010 Accepted: November 05, 2010