

## Health-Related Data from a Community Risk Reduction Program: Healthy U™ of DelMarva

Todd A. Astorino & Wendy McGill

*California State University, San Marcos*

### Abstract

The primary aim of this study was to examine baseline data from participants in a community coalition aiming to reduce disease risk and enhance lifestyle modification. Adults (N = 5,876) residing in the Eastern Shore of Maryland enrolled in the program, and were encouraged to re-enroll the following year. Incentives were offered to enhance participation and program adherence. Cooking demonstrations, exercise classes, and lectures were held, and community-wide messages espousing healthy behavior were spread to increase knowledge of healthy behavior. Participants filled out a survey, and body mass index (BMI) and waist-to-hip ratio (WHR) were measured. Frequency statistics were used to analyze data. BMI ( $29.73 \pm 7.38 \text{ kg/m}^2$ ), waist circumference ( $37.15 \pm 6.85 \text{ in.}$ ), and WHR ( $0.84 \pm 0.09$ ) surpassed healthy values. Intake of fruits and vegetables was low, inactivity was high (50% of members exercised less than two days/week), and diets moderate or high in fat were prevalent (70% of participants). Data confirm the rather unhealthy lifestyle of our local population. Future interventions to enhance wellness and reduce disease in this population are warranted.

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*Keywords: overweight, BMI, exercise, chronic disease*

### Introduction

Chronic disease including heart disease, type II diabetes, hypertension, and hyper-cholesterolemia has increased in the last 20 years. Data from the Centers for Disease Control (CDC) report that twelve million Americans have diagnosed diabetes, with a marked increase in this disease from 1996 – 2000. Furthermore, 61 million Americans have some form of cardiovascular disease, and 59 million Americans are obese. Yet, improved health may be unlikely due to continued advances in technology and greater preference for white-collar careers that make the typical United States citizen more sedentary. Data from the Department of Health and Human Services (1996) report that only 25% of Americans are regular exercisers, and approximately 60% do not meet the current exercise recommendations. This sedentarism is alarming, considering that regular exercise is the primary treatment recommended by practitioners to decrease incidence of these debilitating conditions. Moreover, Lee, Blair, & Jackson (1999) showed that cardiovascular fitness as measured by

maximal oxygen uptake ( $\text{VO}_2\text{max}$ ) is negatively related to premature mortality.

So, what practical strategies are available for individuals seeking to adopt a healthy lifestyle? It is evident that initiating an exercise routine is paramount, yet long-term success is low, as approximately 50 percent drop out within one yr (ACSM, 2000). Dietary changes are important, yet the widespread advertisement of low-carbohydrate diets may confuse individuals, and these diets may not be the optimal long-term solution. What is evident, however, is that individuals seeking behavior modification require a consistent, precise message of the virtues and traits of a healthy lifestyle as well as a strong support system (Martin & Dubbert, 1985). This includes heightened awareness at local businesses as well as meeting places including churches, recreation centers, and clubs. Moreover, incentives have been shown to enhance participation (Heyward, 2002).

Recently, Healthy U™ of Delmarva was developed, with the goal of increasing awareness

of healthy behaviors and reducing risk of chronic disease in a population with historically poor health due to sedentarism, high prevalence of smoking, and poor dietary practices. Recent data (2000, 2004) from the CDC report mortality rates from heart disease (392 per 100,000 persons) and cancer (267 per 100,000 persons) and diabetes incidence (11%) to be higher in this region than anywhere in the United States, so strategies to reduce health risks in this population are warranted. This community coalition is unique in that it is entirely composed of volunteers, has promoted cooperation among local health organizations, and has called upon local media, businesses, churches, and Universities to blanket the community with information about healthy living. Furthermore, it is a self-driven program in which participants can take part in as many or few events held throughout the year.

The primary aim of the study was to report health-related data from initial enrollees of Healthy U™ of Delmarva. It was hypothesized that high rates of sedentarism, smoking, and hypercholesterolemia would be evident, emphasizing the need for future health intervention programs in this region.

## **Methods**

### **Study Design and Setting**

Experts in the areas of medicine, nutrition, counseling, rehabilitation, disease, and exercise physiology collaborated to establish this coalition and design the survey. Community partners including health departments, hospitals, schools, media, and Universities also participated in this project. Advertisements were spread in local media outlets to publicize the Healthy U™ campaign for January 28 – April 30, 2003. We recommended completion of 30 min of daily exercise, ingestion of five servings of fruits and vegetables per day, and smoking cessation. Enrollment was confined to individuals > 18 yr residing in the three lower shore counties of Maryland (Wicomico, Somerset, and Worcester), approximate population equal to 156,000. Exclusion criteria included pregnant women, non-adults (individuals <18 yr), institutionalized individuals, and persons living outside the tri-

county region. These were confirmed via initial consultations with prospective members.

### **Subjects**

Individuals (N = 5,876, 80% women, 20% men) of various ethnicity (71% Caucasian, 27% African-American, and 1% Hispanic) enrolled in the program in 2003. A majority of members (63.9%) had some college, graduated from college, and/or pursued graduate study. This sample was equal to approximately 4% of the regional population. They were recruited by word-of-mouth as well as via advertisements in the local media.

### **Program Enrollment**

Individuals initially enrolled at a kickoff event in January, 2003 or at local businesses, churches, Universities, schools, non-profit agencies, and community centers during the three-month sign-up period. To enroll, individuals filled out a survey containing items pertaining to demographic information as well as health status (exercise/smoking habits, diet, and chronic disease). The internal consistency reliability coefficient of this survey was 0.91. Enrollees were given identification numbers which allowed us to monitor members and prevent anyone from enrolling twice in the same year. They also underwent several anthropometric measurements. Members in 2003 were eligible to re-enroll in Healthy U™ from January 2004 to April, 2004 at another kickoff event as well at multiple sites within the community. The experimental protocol was approved by local University Institutional Review Boards, and written informed consent was obtained from all participants.

### **Measures**

Body height, weight, and hip and waist circumference (WC) were measured by trained technicians according to standardized procedures (Heyward, 2002). A standard tape measure was used to quantify waist (narrowest part of the torso) and hip (widest part of the buttocks) circumference. This device was also used to measure subjects' height with shoes off, as the tape measure was applied to a wall. A standard calibrated scale was used to measure body weight. Weight and height were used to

calculate body mass index (BMI = mass (kg)/height in m<sup>2</sup>), and criteria used to represent ‘overweight’ and ‘obesity’ followed current recommendations (Kuczmarski & Flegal, 2000).

**Incentives**

A new car and monthly monetary prizes were incentives used to enhance participation. The car was eligible to all members who initially signed up and then re-enrolled in 2004. This was given away by random drawing in June, 2004. Monthly monetary prizes were allotted to individuals who participated in Healthy U<sup>TM</sup>-sponsored activities (cooking and exercise classes, community walks/runs, education seminars, etc.) through random drawings. Approximately 5,000 entries were received for each monthly drawing. Members who participated in more activities had more entries for the drawings.

**Statistical analyses**

Data from all participants were analyzed using SPSS Version 11.0 (Chicago, IL). Data were

initially cleaned and screened and outliers were identified. In the case of missing data, the average value for that variable was inputted. Tests of normality, skewness, and kurtosis of the distribution of each variable were conducted and revealed normal distributions for all variables. Frequency and descriptive data (mean ± SD) from a sample of 5,818 individuals are reported for all variables. Linear regression was used to examine relationships between variables. Statistical significance was set at p < 0.05.

**Results**

Local businesses (43.2%) were the most popular avenue to join Healthy U<sup>TM</sup>, followed by educational settings (10.5%), non-profit businesses (10.2%), and churches (8.0%). Lower educated members (16.9 – 22.9%, respectively) were more apt to join via their local church versus college graduates (6.5%).

**Physical data.** Baseline anthropometric data for members are shown in Table 1.

Table 1  
Baseline demographic and physical data for Healthy U<sup>TM</sup> participants (N = 5,818)

Parameter	Mean (SD*)	Minimum	Maximum	95% CI <sup>†</sup>
Age (yr)	44.27 ± 9.09	18.00	96.00	44.04 – 44.50
Height (in)	65.40 ± 3.45	50.00	83.50	65.31 – 65.49
Weight (kg)	82.15 ± 21.03	45.78	230.91	81.61 – 82.69
BMI (kg/m <sup>2</sup> )	29.75 ± 7.35	16.77	75.18	29.56 – 29.94
Waist (in)	37.10 ± 6.84	21.50	74.50	36.92 – 37.27
Hip (in)	44.02 ± 5.95	28.50	76.00	43.86 – 44.17
WHR	0.84 ± 0.09	0.58	1.36	0.84 – 0.84

\* SD standard deviation; † confidence interval

Mean BMI, WC, and WHR were higher than recommended values. Incidence of overweight (29.2%) and obesity (40.3%) from BMI was high in Healthy U<sup>TM</sup> members. Overweight was less prevalent in women (27%) versus men (38%), and onset of obesity was similar between women (40%) and men (43%). Obesity was higher in the uneducated, as 74.1% of participants with less than 8th grade education

were obese/overweight compared to 64.9% of college graduates. Ethnic differences in obesity were also apparent, as 82.6% of African-American participants were overweight or obese compared to lower incidence in Caucasians (65.7%) and Hispanics (60.3%).

**Smoking.** Participants were asked questions regarding current and previous smoking status as

well as exposure to second-hand smoke. In our members, 38.1% had smoked 100 cigarettes in their lifetime. Smoking (> 100 cigarettes in their life) was more prevalent in men (45.2%) and in participants with less education (41.6 and 47.7%, respectively for < 8th grade and 9 - 11th grade) versus college graduates (33.6%). Similarly, regular smoking was more prevalent in members with < 8th grade education (29.9%), 9 - 11th grade (32.6%), and high school (18.1%) compared to college graduates (8.5%). The majority of participants (66.7%) had little exposure (< one days/week) to second-hand smoke, although 12.7% were exposed to it everyday. Everyday exposure was more common in African-Americans (15.3%) versus Whites (12.1%). In addition, participants with < 8th grade education (19.5%), 9 - 11th grade (25.7%), and high school graduates (18.1%) had higher prevalence of everyday second-hand smoke exposure compared to college graduates (6.9%).

**Diabetes.** Incidence of diabetes was 8.0% in our participants. The most common treatment was exercise combined with medication (60%). Diabetes incidence was higher in African Americans (12.9%) versus Whites (6.3%). Diabetes onset was highest in persons with < 8th grade education (23.4%), 9 - 11th grade (20.2%), and in high school graduates (10.7 %) versus college graduates (5.7%). The majority (85.4%) of reported diabetics were overweight or obese according to BMI.

**Cholesterol.** At baseline, 30.5% of members reported that they had high cholesterol. Hypercholesterolemia was more common in obese (43.6%) and overweight participants (31.6%) compared to normal weight members (22.8%).

**Completion of moderate and vigorous exercise.** Participants were asked the following questions to address their level of physical activity: 1) "How many days in the past week did you engage in continuous and vigorous activity that made you sweat and breathe hard and lasted 20 minutes or more?", and 2) "How many days in the past week did you engage in continuous moderate physical activity (like fast walking, slow bicycling, pushing a lawn mower,

or mopping floors) that did not make you sweat or breathe hard and lasted 30 minutes or more?" Exercise participation was poor, as completion of vigorous exercise was  $0.58 \pm 0.91$  days/week; whereas, participation in moderate exercise was  $0.41 \pm 0.82$  days/week.

**Fat intake.** Participants were asked if their diet was "low," "moderate," or "high" in fat. A majority of participants reported that their diet was moderate (61.0%) or high (16.6%) in fat. High-fat intake was more common in members with < 8th grade (24.7%), 9 - 11th grade (20.6%), and high school (18.7%) education compared to college graduates (12.8%). Reporting of moderate or high fat intake was lower in healthy weight members (67.8%) compared to overweight (77.9%) and obese individuals (84.5%).

**Fruit and vegetable intake.** A primary message of Healthy U™ is to intake five or more servings of fruits and vegetables per day. Only 2.4% of participants ingested five servings per day, and 45.8% had < one serving/day. Mean daily vegetable intake, with 1/3 being dark green, was  $2.05 \pm 1.22$  servings; whereas, daily intake of fruit was  $1.91 \pm 0.61$  servings. Education level altered intake of these foods, as < 8th grade (54.5%), 9 - 11th grade (45.4%), and high school graduates (52.0%) were less apt to eat fruits and vegetables (< 1 serving/day) compared to college graduates (41.5%).

**Health status.** Enrollees were asked "How would you rate your health on a scale of 1 - 10, with "1" = terrible and "10" = perfect. Average health rating was equal to  $7.20 \pm 0.70$ . A score of "5", or average health, was reported by 15.5 % of members. In 2003, 57.3% of Healthy U™ members rated their health as a "7" - "9." "Terrible" health was reported by 0.9% of the population, and 3.8% reported "perfect" health. More participants (15.5%) with < 8th grade education reported "perfect" health, compared to 10.2% of members with 9 - 11th grade education, and only 2.7% of college graduates.

**Reasons for enrolling in Healthy U™.** Participants were asked an open-ended question regarding their motivation for joining this

coalition, with a list of 13 possible responses. Frequencies of these responses are demonstrated in Table 2. The most frequent responses were

“lose weight” (73.9%), “increase wellness” (66.4%), and “increase physical activity” (58.5%).

Table 2  
Frequency of intended accomplishments of individuals (N = 5,818) joining Healthy U™

Accomplishment	Frequency of response (%)
Increase HDL	40.0
Lower LDL and TG	37.1
Decrease pain	22.0
Decrease reliance on current medications	17.8
Increase self-esteem	47.8
Quit smoking	9.4
Increase wellness	66.4
Increase vitality	53.4
Increase fruit/vegetable intake	53.6
Increase duration/frequency of physical activity	58.5
Decrease blood pressure	24.3
Lose weight	73.9

**Regression data.** Linear regression was used to examine predictors of BMI in our population. Significant pairwise relationships were found between health rating ( $p < 0.01$ ), times per week moderate ( $p < 0.015$ ) and vigorous ( $p < 0.01$ ) exercise, WHR ( $p < 0.01$ ), and BMI, yet correlations were relatively small ( $r < 0.10$ ). No significant predictors of BMI were evident. Rating of health was the only significant predictor ( $p < 0.01$ ) of completion of moderate or vigorous exercise, yet pairwise correlations were small ( $r = 0.13$ ).

**Discussion**

The primary aim of this study was to describe health-related survey data from a large population residing in the Eastern Shore of Maryland. Results showed that participants lead a rather unhealthy lifestyle, as prevalence of smoking, overweight/ obesity, sedentarism, and hypercholesterolemia was high. Mean BMI, WC, and WHR were higher than recommended values, suggesting a population with elevated chronic disease risk. Participants tended to overestimate their health status, considering the preponderance of chronic disease risk factors in

this population. Despite the implementation of our program, the majority of citizens in this community are still uneducated in the risks of an unhealthy lifestyle, thus warranting future intervention programs to enhance wellness in this population.

Our results are similar to obesity prevalence reported in previous studies examining health status in large populations. Data from the CDC (2002) showed that  $64.5 \pm 1.5\%$  of adults in the United States ages 20 – 74 yr are overweight ( $BMI > 25 \text{ kg/m}^2$ ), and  $30.9 \pm 1.6\%$  are obese ( $BMI > 30 \text{ kg/m}^2$ ). These values are comparable to frequency of overweight (69.3 %) and obesity (29.3%) of Healthy U™ enrollees in this study. Furthermore, CDC data revealed that incidence of overweight is higher in African American women ( $77.7 \pm 1.9\%$ ) compared to Caucasian women ( $57.2 \pm 2.7\%$ ), similar to findings in the present study. Individuals with a BMI between  $25.0 - 29.9 \text{ kg/m}^2$  are classified as “overweight” (Kuczmarski & Flegal, 2000), and they face augmented morbidity and mortality (USDA, 1995). These statistics further corroborate the widespread obesity epidemic in this country, and

warrant immediate, effective lifestyle intervention programs to mitigate the effect of this crippling disease on our society.

Reports (Booth, Gordon, Carlson, & Hamilton, 2000) have implicated type II diabetes as a health epidemic in the United States. Diabetes incidence has increased from approximately six million Americans in 1980 to over 11 million in 1999 (CDC, 2004). Data from the CDC in 2000 showed that 4.5% of the United States population is diagnosed with diabetes. By 2002, frequency of diabetes had increased to 8.7% of adults over 20 years old. In our members, 8.0% reported diagnosed diabetes. This is not surprising due to the marked inactivity and obesity in this population. Regular cardiovascular exercise (Katzmarzyk, Leon, Wilmore, Skinner, Rao, & Rankinen et al., 2003) has been shown to reduce onset of hyperglycemia as well as large waist circumference, which enhance diabetes risk.

Prevalence of hypercholesterolemia (30.5%) was higher in our cohort compared to recent data (CDC, 2001) in adults, which revealed that 18% of the population has high cholesterol. Current smoking was less common in Healthy U<sup>TM</sup> members (14.8%) compared to United States citizens in 1999 – 2001 (21.2%) (CDC, 2004), yet it is likely that smoking incidence was underestimated in our population as 21.7% of members did not respond to this question. Nevertheless, these data may underscore the enhanced risk of heart disease of our citizens due to widespread prevalence of these unhealthy behaviors. Educational programs must be continued to raise awareness and promote lifestyle change.

It is evident that regular physical activity is one of many panaceas for chronic disease. Completion of regular exercise may prevent onset of multiple risk factors for heart disease, including obesity, diabetes, stroke, hypertension, and dyslipidemia. However, participation in regular exercise remains low in our population. The Department of Health and Human Services (2003) reported that only 25% of people engage in regular exercise. The CDC reported that incidence of persons over 18 years old engaging

in moderate (> 30 min per day, five days/week) or vigorous exercise (> 20 min, three days/week) has been maintained at 30 – 32% from 1998 – 2001. In a cohort of 40,261 twins native to California (Hawkins, Cockburn, Hamilton, Mack, 2003), 22.3% of adults 20 – 44 years old met the guideline for moderate physical activity (> five days/week and > 30 min per session), and 42.3% met the recommendation for vigorous physical activity (> two days/week and > 30 min per session during which they breathed hard). In addition, a majority (57.5%) reported that they took part in regular activity to maintain or improve fitness, and only 6.6% of adults reported no leisure activity. This frequency of regular exercise is dramatically higher than that reported by our Healthy U<sup>TM</sup> participants. Failure to engage in moderate (12.2%) and/or vigorous exercise (16.1%) was high in our members, and only 14.8 and 35.9% of initial Healthy U<sup>TM</sup> members met the criteria for moderate and vigorous exercise. Completion of regular exercise is low in this region, and warrants further study examining community obstacles to exercise participation as well as institution of education and intervention programs. These data suggest that the goal of Healthy People 2010 to have 50% of the adult population regularly engaging in moderate or vigorous physical activity may be unattainable, as most citizens in the United States are relatively inactive.

A majority of Healthy U<sup>TM</sup> participants (59.0%) rated their health at or above a value of seven, indicating good health. In 2001,  $9.0 \pm 0.1\%$  of United States citizens reported fair or poor health, according to the CDC (2003). Poor health was more common in all adults > 45 yr old ( $11.9 - 32.2\%$ ) as well as African Americans ( $14.6 \pm 0.4\%$ ) and Native Americans ( $17.2 \pm 2.0\%$ ) compared to Whites ( $8.2 \pm 0.1\%$ ). In addition, poor health was more than threefold higher in poor versus nonpoor citizens. Based on data from Martikainen & Marmot (1999) in 7,973 Londoners, BMI gain over time is more rapid in lower-status persons, suggesting marked inequalities in health between people of higher and lower socioeconomic status

Is health status improved with participation in a community wellness program? In older adults (mean age = 67.0 ± 4.7 yr.), participation in a community-based wellness program consisting of structured and unstructured activities promoted enhanced health, self-efficacy, and reduced stress (Orsega-Smith & Payne, 2002). In six Missouri counties, community-based activities including cooking demonstrations, exercise groups, and blood pressure screenings reduced physical inactivity of local citizens (Brownson, Smith, Pratt, Mack, Jackson-Thompson, Deanet et al, 1996). It is apparent that these community programs, despite limited resources, may improve health. Moreover, even minimal improvements in health status in the form of small modifications in BMI, physical activity, or diet are superior to the anticipated exacerbation of these factors over time in at-risk individuals.

Two limitations of our program may be denoted. First, many participants did not graduate high school, so they may not understand various questions; thus, imprecise answers may have

been given. For example, many enrollees mentioned that they are unaware of the size of a “serving” of fruits and vegetables. When they were informed what a serving actually represented, many participants revised their intake of fruits and vegetables. Moreover, participants reported an average health score of 7.2 ± 0.7, which could be considered moderately healthy. The high incidence of obesity, sedentarism, and hypercholesterolemia in this population may not truly represent “healthy.” This potential lack of understanding of survey items as well as media messages regarding healthy lifestyle may present a large obstacle to lifestyle modification in uneducated populations. Consequently, it is our future goal to rectify the survey for these uneducated citizens to yield more precise images of their health. Second, we have yet to obtain data from re-enrollees (n = 1,739) in 2004, so at this time we cannot examine the efficacy of our intervention. Nevertheless, the intention of our program to raise awareness and espouse a healthy lifestyle within a regional community cannot be discounted.

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### **Acknowledgements**

The authors wish to thank all data collection volunteers and community partners who were essential to this project. Furthermore, we thank Ms. Neki Nettey for locating and providing us with the CDC frequency data. Lastly, we thank Mitzi Purdue, MPA for her countless enthusiasm, visionary spirit, and philanthropic generosity that have made this program possible.



Author Information

Corresponding Author: Todd A. Astorino, Ph.D  
Assistant Professor, Department of Kinesiology  
California State University, San Marcos  
Markstein Hall Room 352  
333 S. Twin Oaks Valley Road  
San Marcos, CA 92096-0001  
E-mail: [astorino@csusm.edu](mailto:astorino@csusm.edu)  
Ph.: 760-750-7351  
Fax.: 760-750-3436

Wendy McGill  
Department of Kinesiology  
California State University, San Marcos