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## Lighten Up Iowa: An Interdisciplinary, Collaborative Health Promotion Campaign

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## Lighten Up Iowa: An Interdisciplinary, Collaborative Health Promotion Campaign

### Abstract

In Iowa, obesity nearly doubled between 1990 (12.8%) and 2002 (22.9%). Rural areas, like Iowa, tend to have a higher prevalence of obesity and are difficult to reach with health promotion efforts. The Iowa Department of Public Health, Iowa Games, and Iowa State University Extension deliver Lighten Up Iowa, a friendly team competition promoting physical activity and fruit/vegetable consumption. In 2003, Lighten Up Iowa reached 1,400 teams (12,000 Iowans in 99 counties) that logged 2.6 million miles of physical activity and lost 23.5 tons of weight. Pre- and post-surveys indicate significant ( $p < 0.05$ ) increases in physical activity and fruit/vegetable consumption.

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## Introduction

Approximately 64% of adult Americans are considered overweight or obese according to the most recent National Health and Nutrition Examination Survey (NHANES) data. One-third of Americans are obese, which is a 100% increase or doubling since 1976-1980 (Variyam, 2002). Overweight is defined as having a body mass index ( $BMI = \text{weight in kilograms}/\text{height in cm}^2$ ) of 25.0-29.9. Obesity is defined as having a BMI of 30 or more.

Trends are similar in Iowa, where nearly two-thirds of adults (61.2%) are either obese or

overweight according to Behavioral Risk Factor Surveillance System (BRFSS) data (Centers for Disease Control and Prevention, 2004a). Obesity among Iowans nearly doubled between 1990 (12.8%) and 2002 (22.9%) (Centers for Disease Control and Prevention, 2004a).

The obesity epidemic has significant implications for Cooperative State Research, Education, and Extension Service (CSREES) initiatives and programming related to its mission of "a safe, sustainable, competitive U.S. food and fiber system and strong, healthy communities, families, and youth through integrated research, analysis, and education." The CSREES outcome, "healthy, well-nourished children, youth and families" is directly affected by the obesity epidemic.

A healthy and well-nourished population is predicated upon people having the knowledge, desire, and means to make health-promoting choices. People making decisions for themselves and their families about what to eat must understand what is healthy and appealing in the context of their lives. Extension programs that create and disseminate knowledge to promote positive health behaviors, while addressing the diversity of needs in the population, often serve as the change agents for positive health behaviors. Thus, these Extension programs address two of the primary functions of CSREES:

1. Produce, apply, and adopt applied research-based knowledge in innovative ways to address problems and issues.
2. Provide leadership in the delivery of research-based knowledge through Extension, outreach, and information to strengthen the capacity of public and private decision-makers.

In this article we offer a closer look at obesity trends and describe an interdisciplinary, collaborative health promotion campaign that targets this growing health concern.

## **The Problem: Overweight and Obesity**

Nationwide trends also indicate that, between 1963 and 1999, the number of overweight children almost tripled and doubled for teens (Ogden, Flegal, Carroll, & Johnson, 2002). In Iowa, ongoing surveillance of children ages 0 to 5 years participating in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) demonstrates a steady increase of overweight (95th percentile weight for height) between 1985 (7.6%) and 2003 (11.6%) (Iowa WIC Program, 2004). In 2001, 31.9% of Iowa high school youth participating in the Youth Risk Behavior Survey (YRBS) "thought they were overweight"; 23.8% were actually overweight or at risk for overweight according to BMI (body mass index) (Grunbaum et al., 2002). At risk of being overweight is defined as being between 85th and 94th percentile of BMI for the appropriate child/youth age/sex group.

Overweight and obesity are not benign conditions; four of the 10 leading causes of death have strong links to nutrition. Overweight and obesity contribute to diabetes, cardiovascular disease, some cancers, as well as other degenerative diseases. Death due to poor diet and physical inactivity rose 33% over the past decade and will soon surpass tobacco use as the leading cause of preventable death (Mokdad, Marks, Stroup, & Bergerding, 2004). Currently, 18.1% of all deaths are attributed to tobacco use, and 16.6% are attributed to poor diet and physical inactivity, but recent projections suggest that poor diet and physical inactivity will overtake tobacco in the coming years.

A recent study (Finkelstein, Fiebelkorn, & Wang, 2004) estimated the national cost of obesity at \$75 billion in 2003; in Iowa, the cost was \$783 million. Obesity has already surpassed tobacco in healthcare costs. A 36% and 77% increase in inpatient/outpatient spending and medications among obese individuals has been reported in comparison to 21% and 28% increases among smokers (Sturm, 2002). Startling as these figures may seem, the costs associated with childhood overweight have not been included in these estimates. Ultimately, healthcare costs related to obesity and associated chronic diseases have the potential to financially cripple this country in 20-30 years.

Physical inactivity and lack of good dietary habits, including fruit and vegetable consumption, contribute to overweight and obesity. Nationwide, 58% of adults 18 years of age and over do not engage in any vigorous physical activity lasting 10 minutes or more per week (Centers for Disease Control and Prevention, 2004c). In Iowa, only 19.5% of adults report participating in regular, vigorous physical activity (Iowa Department of Public Health, 2002). Regular physical activity has been associated with decreased risk of coronary heart disease (Manson et al., 1999), obesity (King et al., 2001), type 2 diabetes mellitus (Paffenbarger, Lee, & Kampert, 1999), osteoporosis (Branca, 1999) and postmenopausal endometrial cancer (Moradi et al., 2000) in adults. Increased longevity (Lee & Paffenbarger, 2000; Lissner, Bengtsson, Bjorkelund, & Wedel, 1996) and lower rate of disability (Westerterp, 2000) have also been associated with regular physical activity.

Nationwide and in Iowa, less than half of adults are physically active at levels recommended to maintain good health (Centers for Disease Control and Prevention, 2004b) and about one-quarter of adults report not getting regular leisure physical activity of any kind (Centers for Disease Control and Prevention, 2003). The Centers for Disease Control and Prevention (CDC) defines recommended levels of physical activity as either moderate activity (small increases in breathing and heart rate) for 30 minutes 5 days or more per week or vigorous activity (large increases in breathing or heart rate) for 20 minutes or more 3 days per week. Nationwide, 22.6% of adults

report meeting the five or more servings of fruits and vegetables daily; only 19.8% of adult Iowans report meeting this recommendation (Centers for Disease Control and Prevention, 2004a).

The Iowa Department of Public Health (IDPH), Iowa Games and Iowa State University Extension (ISUE) recognized the magnitude and impact of the overweight/obesity problem and launched a collaborative health promotion campaign, Lighten Up Iowa. The objectives of the program are to:

1. Increase physical activity levels.
2. Make better food choices.

Lighten Up Iowa operates on the theory that if participants increase daily physical activity and make better dietary choices, weight loss may follow and health status will improve. The focus is to reduce the burden and disparities of overweight, obesity and associated chronic diseases.

## Methods

Lighten Up Iowa is a unique, low-cost initiative using friendly team competition (2-10 people) to promote physical activity and improved dietary habits. Individuals are encouraged to form a team at work, with family, in community/civic organizations, or in spiritual communities. This builds upon a local support system within a community to maximize individual success. Engaging individuals as teams, Lighten Up Iowa is able to affect individual behavior, as well as the culture of worksites or existing community organizations. Healthy competition among teams is a motivating factor, although the ultimate goal is for every team member to be a winner.

Each of the program sponsors takes an active role in promotion and recruitment for Lighten Up Iowa. The IDPH promotes the program through their state and local level health departments and ISUE through each of its 99 county offices and 14 regionally located Nutrition and Health Field Specialists. Local staff has access to posters, fliers, registration materials, press releases, newspaper story ideas, and a slide show presentation for community presentations at local civic, service, philanthropic, and spiritual organizations. Iowa Games promotes the program through their network of corporate sponsors with employee wellness programs, in addition to past Games participants.

Mass media has been used to promote and recruit for the program. Numerous television spots, radio talk shows, and newspaper stories have emerged across the state in response to regular press releases that originate from one of the program sponsors. In addition, billboards, a 30-minute cable program broadcast and 30-second public service announcement, including both of Iowa U.S. senators, were used for promotion and recruitment efforts.

Iowa is predominantly rural, and rural communities are more difficult to reach with health promotion efforts. In addition, rural areas tend to have a higher prevalence of obesity (Sturm, 2002) than urban areas. Lighten Up Iowa has its own Web site, <http://www.lightenupiowa.org>, and corresponds weekly to teams by e-mails to reach both rural and urban areas statewide. The Web format for this program was chosen related to the growing number of consumers accessing the Web for information and services, in addition to a lower cost of program administration.

The registration fee for each team participant (\$10) includes a training t-shirt and admission to the Iowa Games volkswalk held at the summer games. Teams have the option to register to compete in one or both of the following categories: 1. total accumulated physical activity and/or 2. weight loss. Participants competing in total accumulated physical activity are encouraged to monitor physical activity on a daily basis. A conversion chart of physical and daily activities is provided to convert estimated time of activity into miles. Participants are also encouraged to use a pedometer, which is offered at a nominal fee (\$6). Teams registering for the weight loss competition are required to submit an "honor" weight to their team captain at the beginning, mid-point, and end of the program.

Each week of the 5-month program (January - June), the team captain receives an e-mail including tips on nutrition and physical activity, motivational tips for overcoming obstacles, and tips for sticking with a lifestyle, which includes more physical activity and increased fruit and vegetable consumption. The team captain is responsible for distributing this information via e-mail and making it available for all team members. The tips are also posted on the Web site for 2 weeks.

Team captains report the total accumulated activity and team weights using the Lighten Up Iowa Web site. On the Web site, participants can compare their team's success with others across the state or within their local county/community. Winning teams are those with the highest average accumulated activity per team member and highest percentage weight loss over the 5-month program.

## Program Outcomes and Impacts

The first year (2002) Lighten Up Iowa was introduced, 139 teams in Central Iowa participated in a pilot challenge program. Participants lost a total of 6,000 pounds and the overall positive feedback on the program prompted the sponsors to go statewide with the campaign the following year. In 2003, Lighten Up Iowa engaged approximately 12,000 Iowans in all 99 counties on a 5-month

challenge to increase physical activity and improve dietary habits. During the 5-month program, 2.6 million miles of physical activity were logged and 23.5 tons (47,000 pounds) of weight were lost.

During the 2003 campaign, a pre-, post-, and 5-month post-survey on physical activity and dietary habits was administered to a random sample of teams (N=160 teams) to evaluate the program. The random sample equally represented metropolitan statistical areas (MSAs) and non-metropolitan statistical areas (non-MSAs). Participants in the program were predominantly female, Caucasian, age 35-54, and had education beyond secondary education. Seventy percent had never smoked in their entire life, and 91% had never been told they had diabetes. Table 1 provides the complete demographic profile of the survey respondents.

**Table 1.**  
Demographics of Pre-Survey Respondents

<b>Demographic Variable</b>	<b>Pre- Intervention</b>	<b>Post- Intervention</b>	<b>5-Month Post- Intervention</b>
<b>Gender</b>			
Male	16%	14%	19%
Female	83%	86%	81%
<b>Race/Ethnicity</b>			
Caucasian/White	96%	96%	99%
African-American/Black	2%	1%	1%
Hispanic/Latino	1%	1%	1%
Asian	<1%	<1%	0%
Native American/ Indian	<1%	0%	1%
Other (More than 1 race could be chosen)	<1%	1%	0%
<b>Age</b>			
18-24 years	5%	4%	1%
25-34 years	15%	13%	11%
35-44 years	28%	26%	22%
45-54 years	34%	38%	38%
55-64 years	15%	15%	28%

65+ years	2%	3%	0%
<b>Education</b>			
Less than high school	1%	1%	0%
High school or GED	13%	10%	7%
Some college/technical school	34%	35%	26%
College degree or higher	51%	54%	66%
Metropolitan - MSA	48%	51%	56%
Respondents (N)	953	416	151

In addition to demographic data, the survey gathered information on participants' physical activity and dietary habits. Questions were administered such that responses could be compared with BRFSS (Behavioral Risk Factor Surveillance System) data. A 72% (N=953), 31% (N=417), and 11% (N=151) response rate was achieved with the pre, post, and 5-month post-surveys, respectively. While the response rates diminished from pre- to post-intervention, demographic profiles of respondents were comparable for all three surveys.

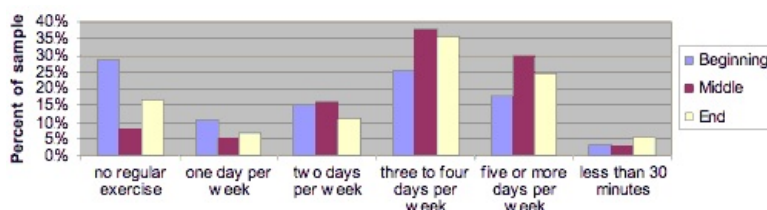
The priority of the sponsors of this program was keeping participants engaged in the program rather than having them complete the survey. Thus, methods to increase survey response (reminder cards, telephone calls, and re-mailing surveys) were not employed in this program. In addition, limited availability of funds also precluded follow-up with survey non-respondents. It is possible, and a limitation of this study, that those respondents completing all three surveys (beginning, middle, and end) were those experiencing the most success with the program.

Results of the surveys indicate significant ( $p < 0.05$ ) changes in the frequency of physical activity per week and amount of time spent in moderate and vigorous physical activity per week. Complete results for physical activity appear in Figures 1 - 3. Although a decrease in the frequency of exercise and time spent in moderate exercise per week occurred between the post-survey and 5-month post-survey, the 5-month post-survey results remained significantly improved compared to the pre-survey.

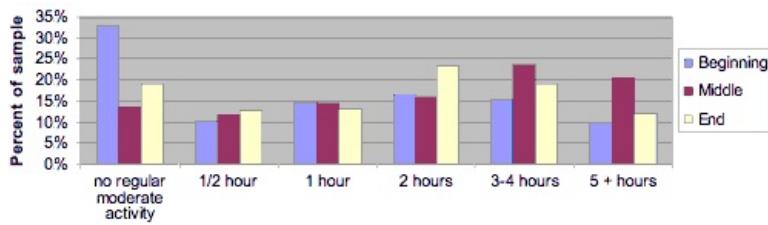
In the pre-test survey, about 41% of participant respondents reported being physically active at levels recommended to maintain good health, a proportion comparable to the Iowa adult population overall (45% in 2002). At post-intervention and 5-month post-intervention, 54% and 55% of participant respondents reported being physically active at recommended levels, reflecting a 33% improvement in meeting the CDC's recommended activity levels.

Of pre-intervention respondents, 23% reported getting no regular physical activity of any kind, again a proportion comparable to that of Iowa adults overall (22% reported no leisure activity in 2002). At post-intervention and 5-month post-intervention, only 7% and 12% of participant respondents respectively, reported getting no regular physical activity of any kind, reflecting a 70% and 50% improvement. The "less than 30 minutes" response represents those participants reporting physical activity but not lasting 30 minutes in duration.

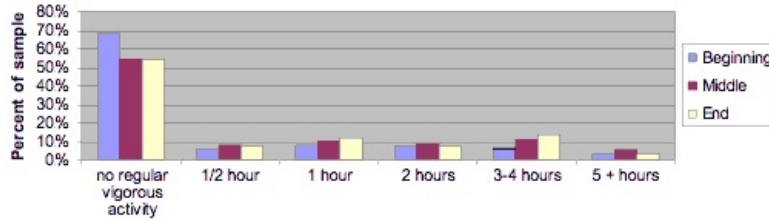
**Figure 1.\***  
Days of Exercise/Week



**Figure 2.**  
Amount of Moderate Activity/Week



**Figure 3.**  
Amount of Vigorous Activity/Week



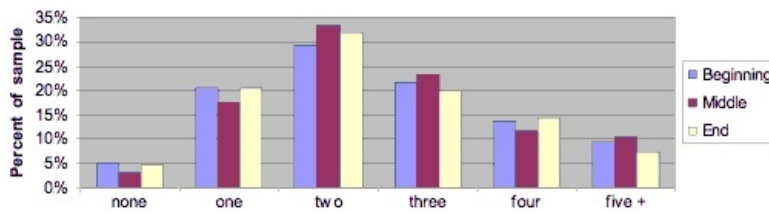
Significant increases ( $p < 0.05$ ) were also seen in the frequency of regular meals and consumption of whole grain breads, fruit, vegetables, and water. Complete results for fruit and vegetable consumption appear in Figures 4 - 6. Consumption of fruits and vegetables increased significantly between the pre- and post-survey, but did not change or decreased somewhat between the post-survey and the 5-month post-survey. Ultimately, consumption of fruits and vegetables at the 5-month post-survey remained significantly greater than at the pre-survey.

It is worth noting that Iowa was one of four states to receive funding through the Farm Security and Rural Investment Act of 2002, which provided free fruits and vegetables to youth in 25 schools across the state. Iowa also has a strong social marketing campaign, "Pick A Better Snack," used in schools across the state. It is possible that some of the change in fruit and vegetable consumption could be related to these campaigns where children influenced parental eating habits.

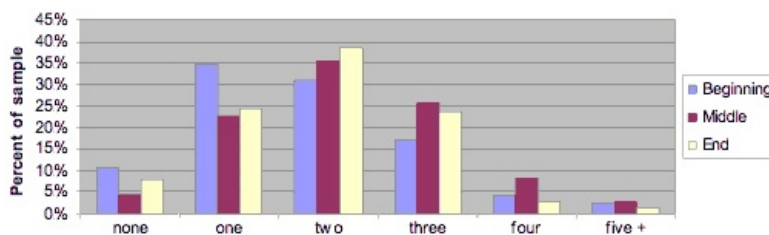
According to Iowa BRFSS data, 20% of all Iowa adults ate five or more servings of fruits and vegetables per day, exclusive of fried potatoes and potato chips. Unlike the BRFSS, the LUI survey allowed participants to count fried potatoes and potato chips in their counts of vegetables. Thus, among LUI participants, the proportion of those eating at least five servings per day was substantially higher than the state rate.

Pre-intervention 29% reported eating at least five servings of fruits and vegetables per day, 48% at the end of the intervention and 66% at the time of the 5-month post-survey. Participants reporting eating at least five a day continued to climb 5 months post-intervention, which may be attributable to self-selection bias. Those who were most motivated and likely to have been successful in LUI may have been more likely also to complete and return the survey 5 months after the intervention was complete.

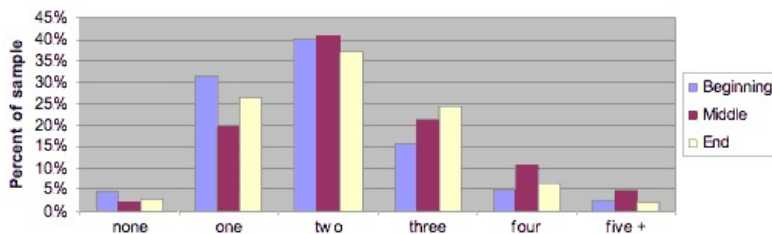
**Figure 4.**  
Consumption of Whole Grain Breads per Day



**Figure 5.**  
Consumption of Fruit per Day



**Figure 6.**  
Consumption of Vegetables per Day



Data were also analyzed in relationship to MSA and non-MSA participants. Positive changes observed in physical activity and nutrition behaviors did not differ between the MSA and non-MSA participants. This is in contrast to recent nationwide data, which suggests that adults residing in non-MSAs are less likely to engage in periods of vigorous physical activity than those residing in MSAs (Sturm, 2002). This same data reported that adult women are less likely to participate in vigorous physical activity than men (22% versus 30%).

It is particularly noteworthy that each of the behavioral changes was statistically improved at the 5-month post-survey when compared to the pre-survey. In other words, 5 months after the program had ended, behavior changes made during the program were being maintained at a level significantly better than that reported at the beginning of the program. Although seasonal (January versus June or October) could account for some of the observed changes in physical activity and dietary habits, it does not negate the positive changes that were maintained 5-months post-program. This program also engaged a high percentage of women (83%), which is an appropriate target audience because they are less likely to participate in vigorous physical activity (Sturm, 2002).

## Program Replication and Expansion

This program has been replicated widely and is presently in progress in at least 15 other states (Alabama, Arizona, California, Colorado, Hawaii, Illinois, Kansas, Maine, Missouri, Montana, Nebraska, North Carolina, Pennsylvania, Virginia, and Wisconsin). The Lighten Up Iowa team has met with representatives of these states to share insights regarding the development, promotion, maintenance and evaluation of the program. In addition, the Lighten Up Iowa sponsors have been invited to present at a number of national and state professional meetings.

In 2004, Lighten Up Iowa expanded to include a youth component, Go the Distance. Youth teams can only compete in the accumulated physical activity division; there is no weight loss division for youth. The team size for youth teams is 2-30 participants per team to accommodate school classes that may choose to participate. This program has been promoted among schools, 4-H clubs, scouts, church youth groups, and other youth organizations throughout the state. In the first year of Go the Distance, 220 teams of approximately 3,000 youth are participating. Youth teams averaging 250 miles per team member over the 4-month program (January - May) will be placed in a drawing for monetary prizes (\$1000, \$500, and \$250). These will be awarded to the group or organization, which the team represents.

Also new in 2004 was a promotion to encourage more fruit and vegetable consumption among program participants. Lighten Up Iowa offers incentives during National Nutrition Month (March) to teams averaging five servings of fruits and vegetables a day per team member. The team captain reports fruit and vegetable consumption using the Lighten Up Iowa Web site. Teams averaging five servings of fruit and vegetables per team member are placed in a weekly drawing for gift certificates to be redeemed for fresh fruit and vegetable trays at a local grocer. A statewide grocery chain, which is a corporate sponsor of the Iowa Games, is assisting with this promotion.

An insurance company donated pedometers to the program in 2004, which were distributed to the first 5,000 participants. Finally, the Lighten Up Iowa Web site was translated into Spanish for the 2004 program. Iowa is experiencing an influx of Latino immigrants, which we have been unable to reach with this program. Because this population is at higher risk for chronic diseases associated with overweight and obesity (type 2 diabetes, heart disease, hypertension) ISUE staff is making a targeted effort to recruit these participants.

## Conclusions

One component of the CSREES mission is "to achieve, through *interdisciplinary teamwork and collaboration*, significant and equitable improvements in economic, educational, environmental, and social conditions in individuals, communities, States, and territories." IDPH, Iowa Games, and ISUE have created an interdisciplinary collaboration to launch this successful statewide health promotion campaign, Lighten Up Iowa. Each of the sponsors provides unique expertise, resources, and access to a different target audience for the program.

Lighten Up Iowa has been a core component of ISUE's plan of work, "healthy, well-nourished children, youth and families." This health promotion campaign has been instrumental in delivering research-based knowledge of nutrition and physical activity to Iowans of all ages. It has been used as a vehicle to deliver physical activity and nutrition education messages at the 2003 Iowa State Fair. Fair-goers were provided with a map of the fairgrounds, complete with walking distances between popular venues and distances needed to "walk off" favorite fair foods. Approximately



12,000 lowans were reached throughout the 5-month program, and an additional 10,000 lowans were reached at the Iowa State Fair.

ISUE provided human resources and financial support for the evaluation component of the program, developed an online version of the participant survey, and maintains the database for statistical analysis. The Lighten Up Iowa Web site and team captain's handbook were initially developed by ISUE. Statewide, ISUE staff has been fully engaged in the program through promotion, recruitment and participation. Each county extension office has been challenged to have a Lighten Up Iowa team and program participation is encouraged as a staff wellness program. The local Extension offices also provide registration materials and Internet access for teams lacking this service, thus visibility of the local Extension office has been enhanced in many communities.

The most significant outcome of Lighten Up Iowa was that each of the behavioral changes, physical activity, and dietary choices was statistically improved at the 5-month post-survey when compared to the pre-survey. Thus, behavior changes made during the program were being maintained at a level significantly better than that reported at the beginning of the program.

Lighten Up Iowa represents an innovative health promotion campaign using Web-based technology. The use of the technology provides a low-cost (time and money) opportunity that reaches large numbers of people of all ages.

## References

- Branca, F. (1999). Physical activity, diet and skeletal health. *Public Health Nutrition* 2:391-396.
- Centers for Disease Control and Prevention. (2004a) *Behavioral risk factor surveillance system*. Retrieved February 20, 2004 from Centers for Disease Control and Prevention Web site <http://apps.nccd.cdc.gov/brfss/Trends/trendchart.asp?qkey=10010&state=IA>
- Centers for Disease Control and Prevention. (2004b). Prevalence of no-leisure-time physical activity - 35 States and the District of Columbia, 1998-2002. *Morbidity and Mortality Weekly Report*. 53(4): 82-86.
- Centers for Disease Control and Prevention. (2003). Prevalence of physical activity, including lifestyle activities among adults - United States, 2000-2001. *Morbidity and Mortality Weekly Report*. 52(32): 764-769.
- Centers for Disease Control and Prevention. (2004c). Summary health statistics for U.S. adults: National health interview survey, 2001. *Vital and Health Statistics*. 10(218).
- Finkelstein E. A., Fiebelkorn I. C., & Wang G. (2004). State-level estimates of annual medical expenditures attributable to obesity. *Obesity Research* 12:18-24.
- Grunbaum, J. A., Kann L., Kinchen, S. A., Williams, B., Ross, J. G., Lowry, R., & Kolbe, L. (2002). Youth risk behavior surveillance - United States, 2001. *Morbidity and Mortality Weekly Report*. 51(No. SS-4):1-64.
- Iowa Department of Public Health, State Center for Health Statistics. (2002). *Annual report, survey results from the 2001 Iowa BRFSS - behavioral risk factor surveillance system*.
- Iowa WIC Program. (2004). *Pediatric nutrition surveillance: Federal fiscal year 2003 report*.
- King, G. A., Fithugh, E. C., Bassett, D. R., McLaughlin, J. E., Strath, S. J., Swartz, A. M., & Thompson, D.L. (2001). Relationship of leisure-time physical activity and occupational activity to the prevalence of obesity. *International Journal of Obesity and Related Metabolic Disorders* 25(5):606-612.
- Lee, I. M., & Paffenbarger, R. S. (2000). Associations of light, moderate, and vigorous intensity physical activity with longevity. *American Journal of Epidemiology* 151:293-299.
- Lissner, L., Bengtsson, C., Bjorkelund, C., & Wedel, H. (1996). Physical activity levels and changes in relation to longevity. A prospective study in Swedish women. *American Journal of Epidemiology* 143:54-62.
- Manson, J. E., Hu, F. B., Rich-Edwards, J. W., Colditz, G. A., Stampfer, M. J., Willett, W. C., Speizer, F. E., & Hennekens, C.H. (1999). A prospective study of walking as compared with vigorous exercise in the prevention of coronary heart disease in women. *New England Journal of Medicine* 341:650-658.
- Mokdad, A. H., Marks, J. S., Stroup, D. F., & Bergerding, J. L. (2004). Actual Causes of Death in the United States, 2000. *Journal of the American Medical Association* 291:1238-1245.
- Moradi, T., Weiderpass, E. Signorella, L.B., Persson, I., Nyren, O., & Adami, H. O. (2000). Physical activity and postmenopausal endometrial cancer risk (Sweden). *Cancer Causes and Control* 11(0):829-837.

Ogden, C. L., Flegal K. M., Carroll M. D., & Johnson C. L. (2002). Prevalence and trends in obesity among US children and adolescents, 1999-2000. *Journal of the American Medical Association* 288(14): 1728-1732.

Paffenbarger, R. S., Lee, I. M., & Kampert, J.B. (1997). Physical activity in the prevention of non-insulin-dependent diabetes mellitus. *World Review of Nutrition and Dietetics* 82:21-218.

Sturm, R. (2002). Obesity outranks both smoking and drinking in its deleterious effects on health and health costs. *Health Affairs* 21(2):245-253.

Variyam, J. N. (2002). Patterns of caloric intake and body mass index among U.S. adults. *Food Review* 25(3): 16-20.

Westerterp, K. R. (2000). Daily physical activity and aging. *Current Opinion in Clinical Nutrition and Metabolic Care* 3:485-488.

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