

Evaluation of worksite wellness programs

by

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ABSTRACT

This research used quantitative and qualitative research methods to evaluate the effect of worksite nutrition education methods on employee behavior change.

Quantitative evaluation was used to evaluate nutrition education provided to employees via newsletters and individual counseling with a Registered Dietitian. Each method of nutrition education occurred over a four-month time frame. All employees completed surveys and anthropometric measures (height, weight, and blood pressure measured) pre- and post-intervention. Qualitative evaluation was used to gather opinions/perceptions about the worksite nutrition environment (i.e. vending) via pre-intervention employee focus groups and post-intervention interviews. The intervention consisted of each worksite receiving a worksite wellness toolkit via CD-ROM discussing improvement in vending to implement over a five-month period.

Results from the quantitative research methods suggest improvement of nutrient intakes following the intervention for both the newsletter and the counseling groups; neither method was more effective than the other. Fruit and vegetable servings increased significantly from pre- to post-intervention with subsequent increases in estimated nutrient intakes of vitamin C, magnesium, potassium and dietary fiber. Total fat, saturated fat, percent fat, and dietary cholesterol decreased significantly. This study suggests age was a significant predictor of estimated fruit/vegetable servings and dietary fiber intake whereas gender was a significant predictor of estimated potassium, magnesium, dietary fiber, total fat, saturated fat, and dietary cholesterol intakes. Results from the qualitative research suggest that intervention via CD-ROM is difficult to

accomplish. After receiving the intervention via CD-ROM, just one of four sites utilized the toolkit. The site which utilized the toolkit was successful in accomplishing an improvement in vending, as well as the cafeteria.

Improvement in health outcomes and high returns on investment (ROI) make a worksite wellness program worth a company's time and money. Healthcare reform will be increasing the expectations and outcomes of preventive healthcare, including worksite wellness.

CHAPTER 1: INTRODUCTION

Healthcare Costs in US

Overweight and obesity are contributing risk factors to cardiovascular disease (CVD). They contribute an estimated \$51.5 billion and \$78.5 billion, respectively to annual adult medical expenses (Finkelstein, Fiebelkorn, & Wang, 2003). In Iowa, approximately \$783 million was spent on medical care related to obesity in 1998. Ultimately, adult obesity has placed an economic burden on states constituting approximately six percent of adult medical expenses.

The annual economic cost of CVD in the United States (U.S.) costs more than any other diagnostic group (National Institutes of Health (NIH), 2008a)]. It is estimated that \$475.3 billion was spent on CVD in 2009 [coronary heart disease (CHD) \$165.4 billion, stroke \$68.9 billion, high blood pressure (HBP) \$73.4 billion, and congestive heart failure (CHF) \$37.2 billion] (American Heart Association (AHA), 2009a)].

Healthcare Reform

President Obama is currently working with Congress to reform healthcare (U.S. Department of Health and Human Services (HHS), 2009b)]. This Administration believes that health care reform should meet eight objectives; one is to invest in prevention and wellness. The U.S. government states, “Preventative care is paramount to stopping the root causes of disease as well as detecting diseases in their early stages when treatment is most effective” (HHS, 2009a). In a letter sent to President Obama in September 2009, the American Dietetic Association (ADA) President reported the U.S.

spends an estimated \$147.0 billion annually addressing conditions and the numerous diseases associated with overweight and obesity such as diabetes, heart disease, kidney disease and arthritis (Pavlinac, 2009). “ADA believes the experts are right when they call for shifting from our current system that is designed to treat the sick and injured to a better one that promotes a healthy lifestyle and includes more preventive services...It makes sense to rely on proven nutrition strategies to prevent and manage many of the most expensive and prevalent diseases facing Americans.”

Chronic Disease

Delayed diagnosis of chronic diseases, such as obesity or HBP, increases the likelihood of full-blown clinical presentation, indicators, and consequences. The prevalence of obesity in U.S. adults was 27.4 percent in 2008 (National Health Interview Survey (NHIS), 2008a)] and HBP affected 31.3 percent of U.S. adults in 2000 (Fields et al., 2004). Dietary intake and physical activity play an important role in the control of body weight and risk of developing chronic diseases such as HBP or CVD.

Worksites as a Means of Change

A major worksite health-related goal for Healthy People 2010 was that a minimum of 75.0 percent of worksites offer a comprehensive health promotion program (HHS, 2000). Nutrition education is an important component of worksite wellness and can be offered in a variety of modes at a worksite. The most common mode is printed materials; however other forms are also effective such as face to face contact, telephone, and internet. The Task Force for the Community Guide, a branch of the Centers for

Disease Control and Prevention (CDC), reported strong evidence that worksite wellness programs improve dietary fat intake, blood pressure, cholesterol, and number of days lost from work due to illness or disability (Task Force Community Preventive Services, 2007). A worksite wellness program can lead to a 25.0 to 30.0 percent reduction in healthcare and absenteeism costs (Chapman, 2003) and ultimately improve the health and productivity of employees.

Thesis Organization

This thesis includes an introduction, literature review, methods and two manuscripts, followed by a conclusion and references for the first three chapters.

CHAPTER 2: LITERATURE REVIEW

Obesity

Obesity continues to be a health and economic concern in the U.S. (CDC, 2009b). The Surgeon General has declared the prevalence of obesity among adults in the U.S. an epidemic (Jackson et al., 2002). The prevalence of obesity doubled between 1980 and 2002 in adults age 20 years and older (Ogden et al., 2006). In just nine years (1997 to 2008), prevalence of obesity increased eight percent (NHIS, 2008a). Between 1999 and 2004, the prevalence of obesity continued to increase among men, but no increase was observed among women suggesting body weight increases may be leveling off in women (Ogden, et al., 2006). King and colleagues (2009), using the National Health and Nutrition Examination Survey (NHANES) data, found that over the past 16 years obesity prevalence increased from 28.0 to 36.0 percent in the 40 to 74 year old age group. The National Center for Health Statistics (NCHS) published an early release of selected data estimates (January to March 2008), including obesity prevalence, using the National Health Interview Survey (NHIS) data. Obesity prevalence, among adults aged 20 years and over, was 27.4 percent, up from 2007, but not significantly (NHIS, 2008a). Obesity and overweight status has not only increased in the United States, but around the world. The obesity levels in Great Britain, between 1980 and 2002, almost tripled (Rennie & Jebb, 2005).

The prevalence of obesity varies by age group; currently, 40 to 59 year olds have the highest prevalence at 30.0 percent, while 20 to 29 year olds have the lowest at 25.2 percent (NHIS, 2008a). Approximately 25.0 percent of normal weight or overweight

middle-aged adults (30-59 years old) will become overweight or obese, respectively, over a four year period (Vasan, Pencina, Cobain, Freiberg, & D'Agostino, 2005). The long term (10 to 30 years) risk for a young to middle-aged individual (30-59 years old) becoming overweight, obese, or extremely obese ($BMI \geq 35$) is approximately one in two, one in four, and one in ten, respectively.

Obesity is also correlated with educational status; individuals with a high school diploma or less are more likely to be obese, whereas college graduates are least likely to be obese (CDC, 2008). Finally, the prevalence of obesity is greater in populations with limited financial resources. According to Finkelstein and colleagues (2004) 20.0 percent of the total U.S. adult population, 21.0 percent of Medicare recipients, and 30.0 percent of adult Medicaid recipients are obese.

Overweight and obesity among Iowans tracks very similarly to the national statistics (Figure 1). According to the Iowa Department of Public Health (IDPH), using Iowa Behavioral Risk Factor Surveillance System (BRFSS) data from 2006, 37.2 percent of Iowans were overweight and 25.7 percent were obese (IDPH, 2007). Combined, over half of all Iowans, 62.9 percent or about 1.5 million Iowans are overweight or obese. Among Iowans, the age group 55 to 64 years old had the highest prevalence of overweight and obesity at 73.5 percent, whereas the lowest rate was found in the age group 14 to 18 years with 39.0 percent being overweight or obese. One of the Healthy People 2010 objectives was to reduce the proportion of obese adults to 15.0 percent (HHS, 2000). By 2007, no state met this target and more than half of the states had 25.0 percent or more of their population classified as obese (CDC, 2008).

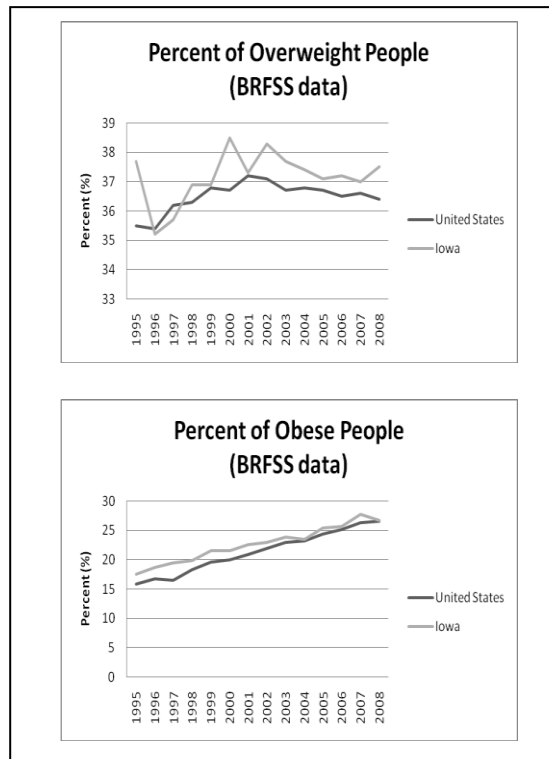


Figure 1. Percent of Overweight and Obese People

Defining Obesity

Body mass index (BMI) is calculated as weight in kilograms divided by height in meters squared (Ogden, et al., 2006) and is used to classify people into five different weight status categories: underweight (BMI <18.5), normal (BMI 18.5-24.9), overweight (BMI 25.0-29.9), obese (BMI 30.0-39.9), and extremely obese (BMI >39.9) (CDC, NCHS, 2008; Ogden, et al., 2006). BMI correlates with body fat, but does not measure body fat. BMI is accurate for most people, but does not take into account body type, for example bone structure or muscle mass. Therefore, athletes who have a high percentage of muscle weight may be classified as overweight despite not having excess body fat (CDC, 2009b).

Increasing BMI increases the risk of death. Individuals with a BMI of 35.0 or greater account for the largest number deaths associated with obesity (Flegal, Graubard, Williamson, & Gail, 2005). Men and women classified as obese at 40 years of age, lose 7.1 and 5.8 years of life respectively, compared to their normal weight counterparts (Peeters et al., 2003). Finally, overweight individuals have four to five more premature deaths (death before 70 years of age) per 100 people than normal weight individuals; obese individuals have 10 to 11 more deaths per 100 people than normal weight individuals.

Costs Associated with Obesity

High rates of obesity influence health and economic status of Americans (CDC, 2009b). Obesity increases the risk of developing CHD, type 2 diabetes, certain types of cancers (endometrial, breast, and colon), HBP, and dyslipidemia, to name a few. An estimated 300,000 people per year die from obesity related diseases. Using Medical Expenditure Panel Survey (MEPS) and National Health Accounts (NHA), estimated total annual medical spending for adult medical expenses attributed to overweight and obesity, are \$51.5 billion and \$78.5 billion, respectively (Finkelstein, et al., 2003). Obesity alone accounts for \$26.8 billion in MEPS data and \$47.5 billion in NHA data (NHA estimates include nursing home costs, whereas MEPS data does not). Total annual medical, Medicare, and Medicaid expenditures attributed to obesity are approximately \$75 billion, \$17 billion, and \$21 billion, respectively. Iowa spent approximately \$783 million on healthcare related to obesity for the total adult population, \$165 million for Medicare, and

\$198 million for the Medicaid population. Ultimately, obesity has placed an economic burden on states, averaging about six percent of all adult medical expenses.

Heart Disease and High Blood Pressure

CVD is the leading cause of death in the U.S., (Jones et al., 2009). CVD affects an estimated 80,000,000 adult Americans which is about one in three individuals (Lloyd-Jones et al., 2009). The National Heart, Lung, and Blood Institute's (NHLBI) Framingham Heart Study (FHS) determined the lifetime risk of developing CVD, after 40 years of age, is two in three for males and more than one in two for females (NIH, 2006). CVD includes CHD (16,800,000 people nationally), stroke (6,500,000), CHF (5,700,000), HBP (73,600,000), and many others (IDPH, 2005; Lloyd-Jones, et al., 2009). Obesity contributes many risk factors that increase the chance of a person developing CVD including inactivity, high fat diet, HBP, high cholesterol, and diabetes (Mensah, Brown, Croft, & Greenlund, 2005).

CHD is a disease that reduces blood flow through the coronary arteries to the heart whereas stroke is a shortage of blood to the brain which includes atherothrombotic brain infarction, ischemic, hemorrhagic, and transient ischemic attack (TIA) (IDPH, 2005). HBP, high blood cholesterol level, and current smoking status are risk factors associated with CHD (Lowe et al., 1998). CHD mortality decreased from 1980 to 2002 by 52.0 percent in males and 49.0 percent in females (Ford & Capewell, 2007). Interestingly, between 1980 and 1989 women's mortality from CHD decreased by 5.4 percent, but increased 1.3 percent between 2000 and 2002. Among men the mortality

rate decreased from 1980 to 1989 by 6.2 percent annually, slowed to 2.3 percent from 1989 to 2000, and then leveled off. The findings explaining the rise in CHD mortality are inconsistent.

Blood pressure (BP) is a measure of the force of the blood against the artery walls and is measured as millimeters of mercury (mmHg) (HHS, 2006). HBP can cause damage to arteries and organs such as the heart, kidneys, brain, and eyes. BP consists of two measurements systolic and diastolic blood pressure. Systolic BP is the force of the blood against the artery wall when the heart beats and diastolic BP is the force of the blood against the artery wall when the heart relaxes. Practitioners commonly refer to the systolic BP over the diastolic BP. The NHLBI categorizes BP into four categories: normal (BP <120mm Hg/<80mm Hg), prehypertension (BP 120-130mm Hg /80-89mm Hg), stage 1 hypertension (BP 140-159mm Hg /90-99mm Hg), and stage 2 hypertension (BP \geq 160/100 mm Hg) (NIH, 2008b). It is important to note that only one value, systolic or diastolic, has to meet the criteria for classification.

Between 1999 and 2000, 65 million or 31.3 percent of adults living in the United States were affected by HBP (Fields, et al., 2004), which is 7.3 percent higher than data from 1988 to 1991 suggesting 43 million or 24.0 percent of adult Americans were living with HBP (Burt et al., 1995). Because HBP is asymptomatic, many do not know they are afflicted and it is a challenge to treat because a physician is not consulted (Ong, Cheung, Man, Lau, & Lam, 2007). HBP is a risk factor for myocardial infarction, stroke, heart failure, and renal failure (Fields, et al., 2004). Obesity and an aging population have contributed to the increase in HBP (Fields, et al., 2004). The NHANES 2003 to 2004 data suggests the prevalence of HBP has not significantly increased since 1999 (Ong, et

al., 2007). This plateau in HBP prevalence may be due to new clinical guidelines on the management of HBP, improvement in the control rates, increased use of antihypertensive medications (Gu, Paulose-Ram, Dillon, & Burt, 2006) or improved medical procedures (AHA, 2009).

The annual economic cost of CVD in the U.S. is more than any other diagnostic group (NIH, 2008a). It is estimated that \$475.3 billion was spent on CVD in 2009 [CHD \$165.4 billion, stroke \$68.9 billion, HBP \$73.4 billion, and CHF \$37.2 billion (AHA, 2009a)]. By comparison, the economic burden of all cancer and benign neoplasms in 2008 was less than half of what was spent on CVD. According to the Centers for Medicare and Medicaid Services (2007), approximately \$32.7 billion dollars was spent in 2006 on short-term hospital stays related to CVD or \$10,201 per discharge.

Prevention and treatment of risk factors can decrease or delay the onset of CVD. Three major risk factors include HBP, high blood cholesterol, and smoking. Controlling, reducing, or eliminating these major risk factors is very important to reduce the mortality rate of an individual. Using the NHANES II Mortality Follow-up Study, Mensah and colleagues (2005) found that the risk of dying from CHD was 51.0 and 71.0 percent lower for men and women, respectively, if none of the three major risk factors were present. Middle-aged women who did not smoke cigarettes, were not overweight, maintained a healthful diet known to effect CHD (minimal trans fats, lower glycemic load, higher cereal fiber, higher marine omega-3 fatty acids, higher folate, and higher polyunsaturated to saturated fat ratio), exercised moderately or vigorously for at least 30 minutes a day, and consumed alcohol moderately, had an 80.0 percent lower risk of

developing CHD compared to the rest of the population (Stampfer, Hu, Manson, Rimm, & Willett, 2000).

Dietary Intake: Fruits and Vegetables

The United States Department of Agriculture (USDA) 2005 Dietary Guidelines for Americans (DGA) recommends individuals following a 2000 calorie diet consume a minimum of two cups of fruit and two and one-half cups of vegetables daily (HHS, USDA, 2005). A cup of vegetables is considered one cup of cut-up raw or cooked vegetables or two cups of raw leafy vegetables. One cup of fruit is considered one cup of fresh, frozen, or canned fruit, two medium size fruits, or one-half cup of dried fruit. Fruit and vegetable intake recommendations can range from two and one half cups to six and one half cups based caloric intakes between 1200 and 3200 calories.

Prior to the 2005 DGA, four servings of vegetables and two servings of fruits daily were recommended for active women and most men (HHS, USDA, 2000). A serving of vegetable was considered one cup of raw leafy vegetables or one-half cup of cooked or raw vegetables; a serving of fruit was considered one medium whole fruit, or one-half cup of chopped, cooked, or canned fruit. Much of the previous research has utilized the 2000 DGA or previous versions regarding recommendations of fruit and vegetable servings. Therefore, it is noteworthy that approximately two servings of fruits and two servings of vegetables are equivalent to one cup of fruit and one cup of vegetables, respectively.

Many methods have been used to estimate fruit and vegetable intake: Continuing Survey of Food Intakes by Individuals (CSFII), BRFSS (Guenther, Dodd, Reedy, &

Krebs-Smith, 2006; Smith-Warner, Elmer, Fosdick, Tharp, & Randall, 1997), Healthy Eating Index and more recently NHANES. NHANES uses a single 24-hour recall whereas the CSFII uses two 24-hour recalls (Guenther, et al., 2006) and the BRFSS a series of six questions (Blanck, Gillespie, Kimmons, Seymour, & Serdula, 2008). Food frequency questionnaires (FFQ) and three-day diet records are more commonly used in research (Smith-Warner, et al., 1997), but not monitoring due to time and cost concerns. BRFSS modules have been shown to underestimate fruit and vegetable intake compared to other methods such as the FFQ and 24-hour dietary recalls. Smith-Warner and colleagues (1997) found that fruit and vegetable intake estimates were approximately 40.0 percent lower for the BRFSS module compared to the FFQ and dietary recalls. Differences may exist related to the questions asked; for example, after 1994, BRFSS questions did not consider fruits and vegetables part of mixed dishes (i.e. casseroles or soups), or fried potatoes as a vegetable (Guenther, et al., 2006). Ultimately, in addition to the aforementioned inaccuracies, intake on one day is not an accurate indication of usual daily intake due to day-to-day variations (Guenther, et al., 2006).

In the U.S., most individuals do not meet the recommended intake of fruits and vegetables (Guenther, et al., 2006). Most research used DGA recommendations prior to 2005 not the 2005 DGA, which has slightly lower fruit and vegetable recommendations than years prior. Guenther and colleagues used 1999-2000 NHANES and CSFII 1994-1996 data determined to meet the 2000 DGA and examined it relative to the 2005 DGA. Assuming a sedentary population and two servings per cup, only 17.0 percent of women aged 51 to 70 years and 11.0 percent of all other sex-age groups met the 2005 DGA recommendations. Active individuals have higher fruit and vegetable recommendations;

therefore, those meeting the recommended amount of fruits and vegetables would be even less. Blanck and colleagues (2008) examined fruit and vegetable intake from 1994 through 2005 and found that consumption decreased from 3.4 times per day in 1994 to 3.2 times per day in 2005. The slight decrease was due to decreased consumption of fruit juice and potatoes not fried. In 1994, 24.6 percent of the U.S. population ate fruit and vegetables five or more times per day, this increased only slightly to 25.0 percent by 2005. This trend was true for both men and women; most age and sex groups' fruit and vegetable intake remained constant from 1994 to 2005. Between the years 1988 and 2006, individuals who ate five or more fruits and vegetables a day decreased from 42.0 percent to 26.0 percent (King, et al., 2009). Men meeting five fruit and vegetables daily decreased more than women over this 16 year period (18.8 and 14.2 percent decreases, respectively). Ultimately, most Americans do not meet the recommended amount of fruit and vegetables.

According to the IDPH (2007), Iowans consume on average, three and one-half servings of fruits or vegetables per day. Only 19.9 percent of Iowans eat five or more servings of fruits and vegetables every day, which tracks with national statistics (Figure 2). Females (24.8 percent) eat substantially higher amounts of fruits and vegetables than males (14.6 percent). Those 75 years and older (31.4 percent), college graduates (26.9 percent), and incomes greater than \$75,000 (22.4 percent) are most likely to meet the five or more servings per day.

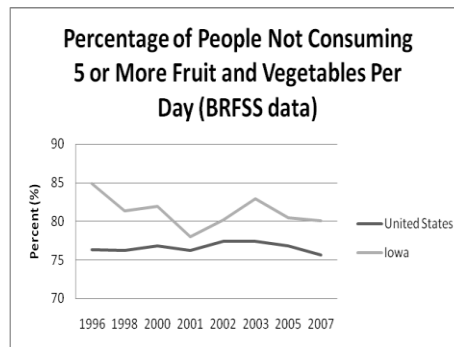


Figure 2. Percentage of People Not Consuming Five or More Fruit and Vegetables per Day

Physical Activity

Physical activity (PA) is defined as “any bodily movement that uses skeletal muscle and results in caloric expenditure” (Caspersen, Powell, & Christenson, 1985). Exercise is defined as “physical activity that is planned, structured, or repetitive that results in the improvement or maintenance” of physical fitness. PA/exercise can be classified as moderate or vigorous intensity. Metabolic equivalent (MET) is used to measure a person’s metabolic response (AHA, 2009b) under various conditions of PA/exercise. A MET is “a ratio comparing a person’s metabolic rate while seated and resting to their metabolic rate while performing” an activity. Moderate intensity activity is any activity that is three to six METS, burns 3.5 to seven kilocalories (kcal) per minute, or corresponds to 50.0-70.0 percent of max heart rate (HR) (CDC, 2009c). An example for a healthy individual would be walking briskly at three miles per hour (mph). Vigorous activity is classified as any activity greater than six METS, an activity that burns more than seven kcal per min, or corresponds to greater than 70.0 percent of max HR. An example of this, for a healthy person, would be jogging at five mph. Healthy People 2010 defines regular leisure-time PA as “engaging in moderate leisure-time

physical activity for greater than or equal to 30 minutes at a frequency greater than or equal to five times per week or engaging in vigorous leisure-time physical activity for greater than or equal to 20 minutes at a frequency greater than or equal to three times per week.” (NHIS, 2008a)

U.S. Physical Activity guidelines released October 2008 (HHS, 2008) represented the first official set of PA guidelines. These guidelines provide practical guidelines for Americans, were designed to parallel the DGA, and provide both absolute and relative guidelines. Absolute guidelines state “adults should accumulate 500-1000 MET minutes of physical activity a week” whereas relative guidelines state “adults should perform at least 150 minutes a week of moderate intensity aerobic activity or 75 minutes a week of vigorous-intensity aerobic physical activity or an equivalent combination of moderate and vigorous intensity aerobic activity.”

The number of people performing PA on a regular basis has decreased over the years. From 1988 to 2006, the number of people performing PA at least 12 times per month decreased by 10.0 percent (King, et al., 2009). Men’s PA habits have decreased more than women. In 1988, 57.0 percent of men performed PA at least 12 times per month where as only 43.0 percent completed PA 12 times per month in 2006. Over this same 16 year time period, women’s PA only decreased six percent. NHIS and IDPH data following Healthy People 2010 definition of PA yield somewhat different results.

NHIS PA data from early 2008 (adults 18 years of age and older), using the Healthy People 2010 recommendations, suggest 29.5 percent of adults engaged in leisure-time PA (NHIS, 2008a). PA increased from 29.8 percent in 1998 to 32.8 percent in 2003, but declined to 30.2 in 2004. The data also suggested as age increases, regular

leisure-time PA decreases. Interestingly, adults engaging in no leisure-time PA during a similar timeframe increased slightly between 2000 (38.5 percent) and 2005 (40.0 percent).

In Iowa, using the same guidelines as Healthy People 2010, 48.4 percent of respondents met the PA guidelines while 11.9 percent reported engaging in no PA at all (IDPH, 2007). Males were more likely than females to report engaging in the recommended amount of PA; those with higher annual incomes and education levels also reported engaging in more PA. Finally, PA among adults also varies by region or state; 38.6 percent of adults in Louisiana compared to 60.8 percent in Alaska met recommendations (CDC, BRFSS, 2007). Overall, Iowans report meeting the moderate activity guidelines well above the 30.0 percent recommended by the 2010 Health Objectives, but are 5.0 percent below the recommendation for vigorous physical activity.

Relationship between Obesity, CVD, Dietary Intake, and PA

Obesity, CVD, fruit, vegetable, fat, and cholesterol intake, and PA interact synergistically. Dietary intakes play an important role in the control of body weight and the risk of developing HBP or CVD. A healthy adult can lower their risk for developing CVD in seven steps: 1) smoking cessation, 2) including at least two and on-half cups of fruits and vegetables per day, 3) exercising regularly, 4) reduce stress, and reduce or control 5) HBP, 6) cholesterol, and 7) weight (CDC, 2007).

BMI/Weight

Ong and colleagues (2007) reported a direct, positive relationship between HBP, BMI, and age. Weight is positively correlated with BP and weight loss has been shown to lower BP (He, Whelton, Appel, Charleston, & Klag, 2000; Neter, Stam, Kok, Grobbee, & Geleijnse, 2003). Diets high in fruits and vegetables, low-fat dairy, and lower in fast food and soda have been associated with lower weight, BMI, and waist circumference over time (Newby et al., 2003). Decreasing the risk of excessive weight gain ultimately decreases risk of HBP.

Dietary Factors

Many factors influence BP homeostasis, but dietary factors have a prominent role (Appel et al., 2006). Dietary intake impacts both individuals taking antihypertensive medication and those not on medications. In fact, the use of antihypertensive medication could be reduced if more diet education, resulting in behavior change, occurred. HBP can be controlled by maintaining a healthy weight, being moderately physically active most days of the week, and eating a diet that includes low sodium foods, drinking alcohol in moderation, and taking blood pressure medication as directed (HHS, 2006).

Decreasing sodium intake is important, as sodium intake increases, BP also rises (Appel, et al., 2006). Seven years after an 18 month weight loss program a 77.0 percent reduction in the occurrence of hypertension, based on BP readings was shown. A 35.0 percent reduction in the occurrence of hypertension, based on BP readings, was shown among participants following a reduced sodium diet (He, et al., 2000). Individuals on a low sodium diet with no other diet or exercise modifications showed a slight decrease in

BP; however, individuals on the Dietary Approaches to Stop Hypertension (DASH) diet with reduced sodium intake showed the greatest decrease in BP (Bray et al., 2004; Vollmer et al., 2001). The DASH diet focuses on eating a diet low in saturated fat, cholesterol, and total fat and increased fruits, vegetables, and fat-free or low-fat dairy products (HHS, 2006). It also encourages increasing whole grains, fish, poultry, and nuts. The DASH diet, paired with a reduced sodium intake, is the best dietary modification to lower BP (Bray, et al., 2004; HHS, 2006; Vollmer, et al., 2001).

In addition to lowering sodium intake, increasing potassium intake will decrease BP (Appel, et al., 2006). This may explain why the DASH diet with sodium restriction is most effective. The DASH diet, which is high in fruits and vegetables, provides about 4.7 grams of potassium per day (HHS, 2006) which meets the recommended amount for males and females 14 years of age and older (USDA, 2009). This intake is higher than typical consumption by American men (2.9 to 3.2 grams) and women (2.1 to 2.3 grams) (Institute of Medicine of the National Academies, 2004).

Higher intakes of fruit and vegetables are also inversely related to low-density lipoprotein cholesterol (LDL-C), total cholesterol, total cholesterol to high-density lipoprotein cholesterol (HDL-C) ratio, and LDL-C/HDL-C ratio, but do not appear to have an effect on triglycerides (TG) or HDL-C (Mirmiran, Noori, Zavareh, & Azizi, 2009). These alterations in serum lipids decrease the risk of CVD. This diet was also associated with a lower occurrence of CHD despite increased energy intake; likely the result of decreased percent energy from total and saturated fat intake.

Overweight and obese individuals have been shown to consume higher amounts of total fat, saturated fat, and cholesterol and less amounts of dietary fiber than their

normal weight counterparts (Davis, Hodges, & Gillham, 2006). On average, overweight and obese people consume one less serving of fruit per day than normal weight individuals; however, the amount of vegetables consumed, with and without French fries and all potatoes, did not differ between overweight/obese individuals and normal weight individuals. Davis and colleagues also reported kcal intake did not differ significantly between overweight/obese individuals and normal weight individuals; however, even slight differences (i.e. 200 kcals per day) leads to significant weight gain (20 pounds per year). Drapeau and colleagues (2004) reported individuals eating less fat and more fruit gained less weight over a five year period than the individuals eating more fat. Consumption patterns do influence macronutrient and micronutrient intakes; those eating less fat had lower vitamin C and higher dietary fiber intake. Higher intake of fruit correlated with increased energy and dietary fiber intake, as well as maintained vitamin C intake. Numerous studies have suggested that consuming a healthy diet, defined as high in fruits and vegetables and low in fat, can decrease body weight or prevent weight gain over time (Kahn et al., 1997; Newby, et al., 2003).

Physical Activity

PA has been shown to influence BMI change over time (Kahn, et al., 1997). More vigorous activities, such as jogging/running and aerobics/calisthenics, have been associated with a decrease in BMI; in fact, running or jogging for one to three hours per week has been shown to reduce BMI in both females and males. Aerobics/calisthenics have been shown to decrease BMI in men; however, women need to perform aerobics a minimum of four hours per week to decrease BMI. Less vigorous activities, such as

housework or home repair, were not associated with BMI change, but outside activities such as gardening or mowing were associated with decreased BMI if men performed the activity greater than four hours per week and women more than one hour per week. Walking, another less vigorous activity, has not been shown to alter BMI at one to three hours per week; however, four or more hours per week decreased BMI in both men and women. Women decreased their BMI twice as much as men did.

PA also decreases a person's risk for developing CVD, diabetes, and psychosocial problems (Yusuf et al., 2004). Increasing PA decreases risk for CVD, in both men and women with and without pre-existing CVD (Wannamethee & Shaper, 2001). PA does not have to be vigorous; an increase in both light and moderate activity (for example gardening and walking) is sufficient to lower CVD risk. HBP, a sub category of CVD, is negatively correlated with amount and type of PA. A meta-analysis of 54 clinical trials including 2419 participants reported aerobic exercise decreased BP (Whelton, Chin, Xin, & He, 2002). Aerobic exercise has been shown to decrease systolic BP (3.8 mm Hg) and diastolic BP (2.6 mm Hg). BP was lowered among those with and without HBP, overweight, or normal weight individuals. Study results suggest the type of aerobic activity did not matter; all types reduced BP despite variable frequency (less than 120 minutes per week to greater than 150 minutes per week) and duration (less than 10 weeks to greater than 24 weeks).

Worksite Wellness

One of the major worksite health related goals for Healthy People 2010 was ≥ 75 percent of worksites to offer a comprehensive health promotion program (HHS, 2000).

In December 2000, the Surgeon General held a Listening Session on Overweight and Obesity (Jackson, et al., 2002) resulting in the Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity. According to this report, worksites are considered a setting where strategies to combat the overweight and obesity epidemic are needed. Worksites need to educate adults on overweight and obesity, just as schools educate children. During the report's development, concern was expressed regarding cost of programs, employer liability, and litigation related to targeting overweight and obesity. It was concluded that research was needed to determine costs, productivity benefits, and overall health benefits from worksite wellness initiatives.

The Task Force on Community and Preventive Services, authors of the Community Guide supported by HHS, also recommended worksite-based initiatives combining nutrition and PA (Task Force Community Preventive Services, 2007). The most frequent intervention initiatives identified were: nutrition education; individualized dietary and exercise prescriptions; behavior modification training; provision of self-directed materials; and group exercise.

Chief executive officers (CEOs) from 160 of the largest companies in the U.S. identified their employees as their primary asset (Business Roundtable, 2007). Poor health status in employees, such as obesity, heart disease, diabetes, and others jeopardize business primary asset. Poor employee health has been linked to higher direct health care costs, disability rates, absenteeism, workers' compensation, and rates of injury as well as lower work output (Partnership for Prevention, 2005). In fact, Linnan and colleagues (2008) reported 39.0 percent of 730 worksites experienced a 10.0 to 15.0 percent increase in health care costs. The Health Enhancement Research Organization (HERO) has

identified seven risk factors associated with an increase in health care costs – depression (70.0 percent), high stress (42.0 percent), high blood glucose (31.0 percent), overweight (21.0 percent), former tobacco use (19.0 percent), current tobacco use (12.0 percent), HBP (11.0 percent), and lack of exercise (10.0 percent) (Goetzel et al., 1998).

Many CEOs introduce a worksite wellness program to decrease company costs (Business Roundtable, 2007). Productivity losses related to both personal and family illnesses cost U.S. employers \$1,685 per employee per year or about \$225.8 billion annually (Stewart, Ricci, Chee, & Morganstein, 2003). Improvement in health outcomes and high returns on investment (ROI) make a worksite wellness program worth a company's time and money. ROI analysis measures the cost of a program compared to the financial return (Cavallo, 2006). In a review of 73 studies on worksite wellness programs, a savings to cost ratio of \$3.50 to \$1.00 was demonstrated through reduced absenteeism and health care costs (Aldana, 2001). Another review of 42 studies of worksite wellness programs reported a \$5.93-to-\$1.00 savings-to-cost ratio (Chapman, 2003). This review also reported 28.0 percent, 26.0 percent, and 30.0 percent reduction in sick leave absenteeism, health costs, and workers compensation and disability management claims cost, respectively. The emphasis on ROI has shifted the focus of worksite wellness programs over the years (Business Roundtable, 2007). In the past, programs focused on maintaining general health and wellness. Currently, they focus on identifying, managing, or reducing specific and potentially costly health risks. Disease management, tobacco cessation, and weight management programs are the three most common worksite wellness programs.

Cost-effectiveness for worksite wellness programs focusing on weight loss varies from \$1.44 to \$4.16 per pound of body weight lost (Task Force Community Preventive Services, 2007). These costs may seem expensive to some; however healthcare costs are a matter of perception. In April 2003, when promoting the *Steps to a Healthier US*, Tommy Thompson, Secretary of Health and Human Services, stated “Approximately 95 percent of the \$1.4 trillion that we spend as a nation on health goes to direct medical services, while approximately five percent is allocated to preventing disease and promoting health. This approach is equivalent to waiting for your car to break down before you take it in for maintenance. By changing the way we view our health, the *Steps [Steps to a Healthier U.S.]* initiative helps move us from a disease care system to a true health care system” (Kelley et al., 2004).

Overweight/Obese Employees

As of 2001, approximately 70.0 percent of men and 53.0 percent of women, who were employed full-time, were classified as overweight or obese (Finkelstein, Fiebelkorn, & Wang, 2005). Employers have many costs associated with employees who are overweight or obese. Normal weight men and women miss an average of 3.0 and 3.4 days, respectively, each year due to illness or injury. In contrast, male employees classified as obese, with a BMI greater than 34.9, miss approximately two more work days than their normal-weight counterparts; women who are obese with a BMI of 35.0 to 39.9 miss approximately three more days than their normal-weight counterparts and women with a BMI greater than or equal to 40 miss eight more days due to illness or injury than their normal-weight counterparts. In addition, cost to employers (including

medical expenditures and absenteeism) for overweight and obese employees range from \$175 per overweight male to \$2027 per extremely obese ($\text{BMI} \geq 40$) male and \$588 for overweight females to \$2485 for extremely obese ($\text{BMI} \geq 40$) females. Although the extremely obese represent just three percent of the population they account for 21.0 percent of the costs related to obesity.

Worksite Interventions

Many types of intervention can be provided at a worksite including employee assistance programs (44.7 percent) such as mental health or counseling services, back injury prevention (45.0 percent), stress management (24.9 percent), nutrition (22.7 percent), health care consumerism (21.6 percent), and weight management (21.4 percent) programs (Linnan, et al., 2008). Disease management programs for CVD (26.1 percent), diabetes (25.0 percent), obesity (16.4 percent), and chronic obstructive pulmonary disease (COPD) (15.6 percent) are also offered at many sites. The number of employees tends to impact programs offered with larger worksites offering more programs than smaller worksites.

Nutrition Education

The most frequent form of nutrition education provided by worksite wellness programs are printed materials such as health awareness, information programming, and health risk appraisals (Linnan, et al., 2008). Other sources of nutrition education provided by worksite wellness programs include the internet, face-to-face education, and telephone. One worksite nutrition education program reported increased fiber intake and

decreased total fat and saturated fat (Abood, Black, & Feral, 2003); a finding consistent with other studies of nutrition education interventions (Buzzard et al., 1990; Gorbach et al., 1990).

Telephone versus Print

Telephone calls to individuals are a cost-effective method of nutrition education that can be used to deliver personal nutrition advice (Esters et al., 2008). Yet, compared to stage tailored newsletter (catered towards an individual's readiness to change), magazine, or individual reports-delivered methods, the telephone call was least popular. Some participants stated a lack of time to talk on the phone or preferring to read a magazine. Although the telephone method was least preferred by the participants, those individuals who set goals during the telephone conversation, were more likely to learn something they had not previously known. The education session times were the same for both sessions, however the one-on-one counseling session included an additional 40 minutes of cost for travel and mileage. Compared to a hypothetical one-on-one counseling session a telephone intervention call cost approximately \$10.92 less.

Kris-Etherton and colleagues (2002) also found telephone counseling increased adherence and improved outcomes of dietary and PA changes. Participants received a 15 minute weekly contact from a health specialist (dietitian, nurse, or counselor) for seven weeks to improve their total cholesterol, LDL-C, LDL/HDL, and TG. Participants improved their knowledge, ability, and confidence to make more appropriate diet and exercise choices. Finally, the participants experienced a greater decrease in energy from total fat and saturated fat as well as an increase in dietary and soluble fiber intake,

compared with a control group. In a review of nine studies, telephone counseling improved dietary fat, fruit, and vegetable intake in persons who received counseling in these areas (Vanwormer, Boucher, & Pronk, 2006).

Print versus electronic (CD, web, etc.)

Nutrition education can now be delivered in more ways than just print media. Society as a whole is more fluent using technology, therefore electronic sources such as compact disc (CD), Personal Digital Assistant (PDA), and internet sites are new ways to share nutrition information. Despite all the electronic options, print-delivered nutrition education still has its place. Print-delivered nutrition education, focusing on reduction of saturated fat intake, was read and saved more often among participants than the CD-ROM delivered material (Kroeze, Oenema, Campbell, & Brug, 2008a). Participants also thought the print-delivered feedback was more personally relevant.

Kroeze and colleagues (2008b) examined fat reduction outcomes among adults receiving one of three interventions – interactive computer-tailored CD-ROM, print-delivered version with identical information, or generic fat reduction information. Participants of interactive-tailored (CD-ROM) and print-tailored interventions had no significant difference for any outcome measure. When these tailored materials (print and CD-ROM) were compared to a generic approach, the individually tailored were more effective. Both of the individually tailored materials showed an energy intake significantly lower than the generic approach at six months post-intervention.

Tailored nutrition education methods improve outcomes of the nutrition education intervention. Information is tailored to the individual's dietary habits and stage of change

with recommendations specific to the individual. Tailored nutrition is the intervention received from a registered dietitian (Brug, Oenema, & Campbell, 2003).

Emails

Educating employees at worksites can also be done using email. Block and colleagues (2004) determined that e-mail delivering nutrition information was effective at increasing fruit and vegetable intake and lowering fat intake. Employees at corporate sites participating in a 12-week program showed significant improvement in their stage of change for fruit and vegetable intake, as well as fat intake.

Registered Dietitians

Registered dietitians (RDs) can help improve the health and well-being of individuals with many health concerns (Hunt, Hilgenkamp, & Farley, 2000). Since nutrition is related to many parts of overall wellness, RDs have an important role in wellness programs. A survey of 150 worksite wellness programs in the United States found that wellness programs involved many areas of nutrition: assessment, individual counseling, and disease prevention programs (Hickerson & Gregoire, 1992). Hospital settings were more likely to employ RDs for a wellness program whereas worksites were more likely to employ health educators or registered nurses (RNs).

It is the position of the ADA that dietitians play a fundamental role in health promotion and disease prevention (Stitzel, 2006). The skills of RDs are needed to impact employees motivation to join and succeed in a wellness program (Ferko-Adams, 2002). RDs have training and work experience that gives them the ability to assess, propose,

plan, implement, and evaluate clients to help them achieve their goals. Dietitians understand the impact of lifestyle on health conditions, stages of change, provide valid advice to employees as well as their family members of all ages, and utilize the problem solving skills to help determine the best way to plan, implement, and assess wellness programs. Participants of a worksite wellness program consisting of eight one-hour weekly educational sessions with a RD, decreased their energy intake, total fat intake, saturated fat intake, and cholesterol intake by approximately 840 kilocalories, 45 grams, 18 milligrams, and 158 milligrams per day, respectively (Abood, et al., 2003).

Worksite Nutrition Environment

Current Status of Worksites

Worksite wellness programs may include modifications to the worksite environment to promote positive health behaviors. Devine and colleagues (2007) identified barriers to healthful eating at the worksite, which included work schedules, ongoing layoffs leaving more work for the remaining employees, stress-related eating, and a work culture that rewarded working through breaks. Many of the employees stated they supported worksite opportunities to stay healthy and prevent obesity, but were worried about being classified as obese and discrimination from their employer.

Barriers to Available Food

Employees from multiple workplaces within a large manufacturing company identified a number of challenges in the worksite's nutrition environment (Devine, et al., 2007). For example, employees shared that healthier food options were more expensive

and were not easily accessible, they tended to be outside the normal cafeteria flow. Many chose not to use worksite cafeterias due to lack of healthier options or a reluctance to leave their work station due to stress/layoffs. Employees were concerned about being laid off and wanted to be perceived as more productive.

Cafeterias and vending machines have an impact on the health of employees by offering healthy or less healthy choices (Linnan, et al., 2008). Seventy-four percent of worksites with more than 750 employees had a cafeteria available for workers, whereas only 12.9 percent of worksites with 50 to 99 employees had an onsite cafeteria. Food and beverage vending machines were offered in 79.6 percent of worksites; only 37.4 percent labeled healthy food choices and 5.6 percent offered promotions of available healthy food. As part of worksite initiatives, cafeterias and vending could offer portion sizes reflecting the DGA and healthier options priced competitively or lower than less healthy options. Finally, just 6.1 percent of worksites offered catering policies to ensure healthy foods were available at the work-sponsored events.

Impact on Health

Work-related strain and poor worksite food choices to chronic health problems have been reported by employees (Devine, et al., 2007). Work-related strain has been correlated with obesity among both men and women (Brunner, Chandola, & Marmot, 2007). Increased stress at the workplace, causing poor worksite food choices, can lead to chronic health problems such as obesity, which increase employee absences, injury (Xiang et al., 2005), other chronic diseases (Chandola et al., 2008), and health care costs (Finkelstein, et al., 2004) all of which decrease employee productivity.

Food Purchasing Behaviors

The intention to purchase healthy foods does not ultimately lead to the behavior of purchasing healthy foods (Weijzen, de Graaf, & Dijksterhuis, 2008). Only 73.0 percent of employees who intended to choose a healthy snack followed through on their intention, whereas 92.0 percent who intended to choose an unhealthy snack did so. Nutrition and health are not the most important influences on an individual's food purchases. The most important influence of lunch food selection is convenience, followed by taste, cost, and health (Blanck, et. al., 2007). However, an individual's age also influences food selection; nutrition and weight control are more important to older adults whereas cost and convenience are most important to younger adults (Glanz, Basil, Maibach, Goldberg, & Snyder, 1998).

Cost is an important influence of food purchasing whether it is from a cafeteria or a vending machine. As prices of low-fat snack items in vending machines decreased, purchasing has been shown to increase (French, et al., 2001). Labels and signage near or on a vending machine promoting healthier low-fat options also increased the purchase of low-fat items. Pricing strategies have also been shown to increase purchases of fruits and vegetables (French, et al., 1997); decreasing the cost of fruits and vegetables by 50.0 percent and advertising increased fruit and vegetable purchases four-fold and two-fold, respectively. Interestingly, neither price reduction on low-fat items or posted signage affected profits, which is a common concern among worksites.

Implementing a Worksite Wellness/Health Promotion Program

When contemplating a worksite wellness program, companies should consider: 1. integration of the program into the company's mission; 2. commitment from and participation from managerial staff; 3. employee involvement during the planning process; 4. activities meeting employees needs and wants; and 5. adequate resources and funding for the program (CDC, 2009a).

The first step to starting a worksite wellness program is to convince the managerial staff the importance of having a wellness program (Department of Health and Family Services, 2006). It is important to provide the managerial staff with a definition of worksite wellness and the benefits (decreased health care costs, better productivity, etc.).

Step two is examining how to get started, including gaining commitment from stakeholders and creating a workgroup and assessment of the wellness program. A key component of worksite wellness includes involving employees in the workgroup and throughout the development process (CDC, 2009a).

Step three includes conducting a needs assessment of the worksite by completing an environmental assessment and/or an employee survey (Department of Health and Family Services, 2006). It is important to meet employee needs by offering the programs at convenient times and places, rewarding for employees meeting their goals, offering a variety of programs, and changing the workplace environment to help support healthy lifestyles such as providing healthy choices in the vending machines or posting signage encouraging healthy behaviors (CDC, 2009a).

Step four prioritizes programs to be offered (general health education, physical activity, nutrition, etc.) by reviewing employees' input, program strategies, and resources needed (Department of Health and Family Services, 2006). Factors to consider when prioritizing programs include programs shown to change behavior, number of employees benefiting, and finally anticipated outcomes and impact of the program (CDC, 2009a).

Step five includes making decisions where efforts should be most focused by using the assessment and survey results to develop an action plan that includes a timeline, budget, and evaluation plan to address specific goals (Department of Health and Family Services, 2006). After the activities are determined it is important to create an action plan for the activities (CDC, 2009a). The action plan needs to address four things – who will do the work, resources available to support the activity, target dates up to the delivery date of the activity, and presenting the activity plan to the senior management. It is important to assign responsibilities to different employees and have team leaders. Teams may want to choose a specific topic such as assessment, nutrition, PA, or policy. When searching for resources to help support the activities local or state public health departments, organizations such as the AHA, ADA, or Young Men's Christian Association (YMCA), and government agencies such as the CDC or USDA should be explored. The timeline should include the date the program will start and should avoid busy times like vacation season or holidays. The second component of step five includes marketing and implementing the plan (Department of Health and Family Services, 2006). Some ideas to get employees involved could include kick-off parties, rewards for participants who meet their goals, or managerial staff participation and promotion in the programs (CDC, 2009a).

The final step (six) is program evaluation (Department of Health and Family Services, 2006). Evaluating whether the program was effective, whether or not the goals were met, effectiveness of different activities, activities that were successful or needed improvement, and identifying next steps and reporting the results to the managerial staff and stakeholders are key components for evaluating a worksite wellness program (CDC, 2009a). The plan should always continue to be revised to help maintain the new healthy environment (Department of Health and Family Services, 2006).

Barriers to starting and keeping a program

Many companies have reported barriers to starting or keeping a wellness program (Linnan, et al., 2008). Barriers included lack of employee interest (63.5 percent), staff resources to run the program (50.1 percent), funding (48.2 percent), participation of high health risk (48.0 percent), and management support (37.0 percent). Only 49.0 percent of the programs collected data throughout the program to help guide the future direction of the program and less than one-third of the sites had a three to five year strategic plan in place for the worksite programs. Had these programs followed the six step approach discussed previously, some of the barriers could have been eliminated.

Review of Worksite Wellness Benefits

Health promotion or worksite wellness programs focus on improving individuals health behaviors (Institute for International Medical Education, 2002). The Task Force for the Community Guide, a branch of the CDC, reported strong evidence for the effectiveness of worksite wellness programs improving, dietary fat intake, blood

pressure, cholesterol, and the number of days lost from work due to illness or disability (Task Force Community Preventive Services, 2007). The Task Force also suggested that worksite wellness programs increase employees' awareness of health issues and increases detection of certain diseases or risks of certain diseases at earlier stages allowing for more effective treatment. A ROI of \$3.48 for every dollar spent on worksite wellness (Aldana, 2001; Chapman, 2003) has been suggested and others report a 25 to 30 percent reduction in healthcare and absenteeism costs (Chapman, 2003) ultimately, improving the health of employees presents a cost-savings to both the employee and employer.

CHAPTER 3: METHODS

Introduction

Two discrete studies examining worksite wellness interventions comprise this thesis. In the first study, two different methods of worksite wellness targeting the individual employee (newsletters and one-on-one counseling) were employed. Participants either received eight newsletters, published by Iowa State University Extension (ISUE), over a 16 week period or one-on-one counseling with a RD three times over a 16 week period. Both groups of participants completed the same evaluation tools [Block Food Frequency survey (Block, Gillespie, Rosenbaum, & Jenson, 2000), salt survey, and NHIS Adult Health Behaviors physical activity questions (National Health Interview Survey, 2008b)] and anthropometric measures (BP, height, and weight) both pre- and post-intervention. The second study of worksite wellness focused on improving the nutrition vending environment at the worksite.

Study 1

Participants

Newsletters

Six small businesses in Iowa were identified and contacted by their health insurance carrier, Iowa Farm Bureau, to participate in a worksite wellness pilot program. Small businesses were identified as those with higher than average prevalence of care or prescription claims related to HBP. ISUE Nutrition and Health program specialists promoted and explained the program to employees at each site. Participants (N=112)

were volunteers from each of the six worksites; participants were an employee or spouse of an employee at the worksite and not pregnant. All protocols followed during this study were approved by the Iowa State University Human Subjects Review Board. Participants were given and signed an informed consent document (Appendix A) describing their rights as a research participant and describing the research project prior to participation.

Individual Counseling

Iowa State University (ISU) employees were recruited to participate in an already existing employee benefit – three individual counseling sessions with a RD. Participants were recruited via lists of employees already interested in counseling sessions, new employee orientation sessions, Inside Iowa State (a monthly electronic and hard copy newsletter to ISU employees), and the College of Human Sciences electronic newsletter. Participants (N=49) volunteered and represented employees of ISU, and were not pregnant. All protocols followed during this study were approved by the Iowa State University Human Subjects Review Board. Participants were given and signed an informed consent document describing their rights as a research participant and describing the research project prior to participating (Appendix B).

Pre/Post Screening Newsletters and Individual counseling

Employees agreeing to participate attended a screening session to: 1. sign informed consent, 2. measure height, weight, and blood pressure (BP), and 3. complete the pre-survey [Appendices C (newsletter) and D (counseling)].

Anthropometrics - Newsletters

All participants' height and weight were measured with clothes on and without shoes. Of the six sites for the pre-intervention measurement, three sites measured height using a non-stretchable tape measure fastened to a wall, one site used PVC pipe with a tape measure taped to it, one used a standing measurement scale, and one site was unknown due to self-reporting. The same devices were used for the post-intervention measurements with the exception of one site (a stadiometer was used instead of a tape measure taped to the wall). All measurements were recorded using inches to the nearest one-quarter inch. If the height of a participant varied between pre- and post-measurements, the average of the two heights was taken.

Weight was measured using an analog scale for two sites, a digital scale in three sites, and one site was unknown due to self-reporting. All weights were measured once. Weight status was categorized using BMI according to Ogden, et al., (2006) and the NCHS (2008): underweight (BMI <18.5), normal (BMI 18.5-24.9), overweight (BMI 25.0-29.9), obese (BMI 30.0-39.9), and extremely obese (BMI >39.9).

BP was measured by a registered nurse (RN) or a trained professional using a manual cuff (four sites) or an ISUE Nutrition and Health program specialist using an automated cuff (two sites). All blood pressures were measured once; if two or more measurements were taken, the numbers were averaged. BP was categorized according to the NHLBI (2008): normal (BP <120mm Hg/<80mm Hg), prehypertension (BP 120-139mm Hg/80-89mm Hg), stage 1 hypertension (BP 140-159mm Hg/90-99mm Hg), and stage 2 hypertension (BP ≥160/100mm Hg) (Table 1). Both systolic and diastolic pressure had to be less than 120 and 80, respectively, in order to place the individual in

the normal category. Systolic and diastolic pressures do not both have to fall in the same category for the categories of hypertension; only one of the pressures (diastolic OR systolic) must be in the category to classify the person as prehypertensive, stage 1, or stage 2.

Table 1. Blood Pressure Classifications (National Institutes of Health, 2008b)

	Systolic Blood Pressure (mm Hg)	Diastolic Blood Pressure (mm Hg)
Normal	<120	<80
Prehypertension	120-139	80-89
Stage 1 Hypertension	140-159	90-99
Stage 2 Hypertension	≥ 160	≥ 100

Anthropometrics – Individual Counseling

All participants' height and weight were measured with clothes and without shoes. A non-stretchable tape measure was fastened to a wall and a right-angle headboard was used for reading the height measurement of the subjects. All measurements were recorded in inches to the nearest one-quarter inch. A portable analog Health-O-Meter Doctor's scale was used to measure the participants' weight. Weight was recorded to the nearest one-half pound. Weight status was categorized according to Ogden, et. al., (2006) and the NCHS (2008): underweight (BMI <18.5), normal (BMI 18.5-24.9), overweight (BMI 25.0-29.9), obese (BMI 30.0-39.9), and extremely obese (BMI >39.9). The same protocol was used for both the pre and post intervention measurements.

BP was measured using the Omron Women's Advanced Automatic Blood Pressure Monitor (Bannockburn, Illinois). The measurement was taken at the beginning

of the session with the participants sitting with their left arm resting on the table. At the request of a participant a second BP reading would be taken and the two were averaged. BP was categorized according to the NHLBI (2008) as described previously.

Survey – Newsletter and Individual Counseling

The pre- and post-surveys included knowledge questions (eight multiple choice and eight true false), physical activity questions from the NHIS, and fruit/vegetable questions and meat/snack questions from the Block Food Frequency Food Screener survey (Block, et al., 2000).

The Block Food Frequency Food Screener survey is a validated and reliable tool that provides fruit/vegetable and meat/snack scores (Block, et al., 2000). The 1995 Block 100-item Food Frequency Questionnaire (Block, Clifford, Naughton, Henderson, & McAdams, 1989) was used to validate the Food Screener. The Food Frequency Questionnaire is a validated tool to use when estimating nutrient intakes (Block, 1986, 1990; Mares-Perlman, 1993). The Food Screener produced similar results as full-length Food Frequency Questionnaire (Block, et al., 2000). The Spearman rank-order correlation coefficient ($r = 0.41$ to 0.72) showed the Food Screener is an accurate predictor of fruit/vegetable score and meat/snack score nutrients.

Prediction equations provide estimates of specific nutrient intakes per day. A fruit/vegetable score, not including beans/legumes, is used in a prediction equation to determine fruit and vegetable servings, whereas a fruit/vegetable score, including beans/legumes, provides the estimated nutrient intake of vitamin C, magnesium, potassium, and dietary fiber. The meat/snack score is used in a prediction equation to

predict total fat, saturated fat, percent fat, and dietary cholesterol intakes. When using the full-length questionnaire five or more servings of fruit and vegetable per day was considered 'high,' three to four servings per day 'low,' and one to two servings per day 'very low.' This survey also considered 35.0 percent of calories from fat as a very high fat intake.

Currently, there are no validated tools to estimate salt or sodium intake due to the wide variability of sodium in products at restaurants, grocery store shelves, and prepared at home. A five question survey, similar to the Block Food Frequency survey, was created to examine/capture change in salt/sodium intake from pre to post (Appendices C and D). A score was calculated to reflect the change in frequency of salt/sodium consumption, not predict actual salt or sodium intake.

Physical activity was explored using five physical activity questions from the 2008 NHIS. NHIS is one of the major data collection programs of the NCHS which is part of the CDC (NHIS, 2008). The NHIS is the main source of data on health and has been used for monitoring trends in health and progression towards nationally set health goals.

Finally, knowledge (portion sizes, fruit and vegetable nutrients, healthy fats, whole grains, and exercise) of the participants' pre- and post-wellness program was also examined. Eight multiple choice and eight true/false questions were included on the pre- and post-surveys. Each question was based on a main concept from the newsletters and included questions both on physical activity and nutrition.

Intervention - Newsletters

Participants received the first of eight bi-weekly newsletters at the completion of the screening session, which included measuring height, weight, and blood pressure as well as completing the pre-survey (Appendix C). Subsequent issues were distributed to participants by their employer. The series of eight bi-weekly newsletters (16 week period) contained information on the Dietary Approach to Stop Hyper tension (DASH) diet, included DASH sample menus, and recipes. Nutrition topics included appropriate serving sizes, advantages of increasing fruits, vegetables, and whole grains, and information on various fats, to name a few (Table 2). The proper technique and positive effects of physical activity as well as a description of moderate intensity physical activity was also provided in the newsletters. Incentives participants received corresponded to newsletter topics and included pedometers, stretch bands, and calendars with recipes. Sixteen weeks after receiving the first newsletter, extension staff measured weight and BP and participants completed the post-survey (Appendix C).

Table 2. Main Newsletter Topics

	Nutrition	Physical Activity (PA)
Issue 1	<ul style="list-style-type: none"> • Serving sizes • Serving vs. Portion • Nutrition Facts Label 	<ul style="list-style-type: none"> • Moderate intensity PA
Issue 2	<ul style="list-style-type: none"> • Increasing fruit intake • Fruit facts 	<ul style="list-style-type: none"> • 10,000 Steps a Day
Issue 3	<ul style="list-style-type: none"> • Increasing vegetable intake • Tips for buying vegetables 	<ul style="list-style-type: none"> • Strength training using resistance bands
Issue 4	<ul style="list-style-type: none"> • Lower fat dairy products • Natural vs. processed cheese • Choosing calcium-rich foods/supplements 	<ul style="list-style-type: none"> • Stretching
Issue 5	<ul style="list-style-type: none"> • Whole grains • Dietary Fiber • Ways to trim 100 calories 	<ul style="list-style-type: none"> • Quick Fit (15 minute fitness routine)
Issue 6	<ul style="list-style-type: none"> • Choosing protein foods • Increasing Fish • Meat alternatives 	<ul style="list-style-type: none"> • Physical activity excuses
Issue 7	<ul style="list-style-type: none"> • Facts about fats • Fats and cholesterol 	<ul style="list-style-type: none"> • Strength training • Fitness program activities
Issue 8	<ul style="list-style-type: none"> • Sodium Smart • Sodium and potassium recommendations 	<ul style="list-style-type: none"> • Walking • Choosing correct shoes

Intervention – Individual Counseling

RDs providing individual counseling in this study included an ISU employee providing services to the employee wellness program and a graduate student. Employees met with the RD for the first session in January 2009. During the first session, the RD collected the informed consents (Appendix B) and pre-survey (Appendix D), which were sent electronically via email prior to attending the first session. The participants

completed anthropometrics at the first session (protocol described under anthropometrics).

The first counseling session was 45 minutes to one hour, while the second and third sessions were approximately 30 minutes each. The second and third sessions were scheduled three to four weeks after the first and second visits, respectively. Primary topics discussed by the RDs were *MyPyramid*, snacks, exercise, portion control, and increasing fruit and vegetable intake. Many participants expressed interest in weight loss; however, this topic was not discussed directly by the RDs, rather healthy eating was promoted. During the first session each participant set one dietary and one activity lifestyle goal. At the second and third sessions the goals were reviewed and kept, revised, or new ones were set if the previous goals had been met.

Approximately 16 weeks after the first session (four weeks after the last visit), participants were asked to complete the post-survey (Appendix D) and anthropometrics (described under anthropometrics). As an incentive for participating in the study, all participants received an ISU Extension Food and Fun for Healthy Families calendar, exercise stretch band, and a pedometer. Subjects completing all three sessions as well as follow-up survey and anthropometrics were eligible to participate in a free healthy cooking demonstration.

Statistical Analysis

Statistical analysis of the data was performed using SPSS for Windows (v17.0; Chicago, IL). Descriptive statistics and paired samples t-tests were used to examine the demographic information and pre-/post-intervention nutrient intakes. Paired samples t-

tests and repeated measures ANOVA were used to explore change in participant nutrient intakes between pre- and post-intervention. Wilcoxon signed rank test were used to examine change in BP stages and weight status. Non-parametric statistics (McNemar Test) was used to examine PA relative to 2008 PA recommendations. Analyses of two participant subgroups [two worksites (same company) receiving newsletters and participants receiving individual counseling] were examined using independent samples t-test, Pearson's chi-square test, and repeated measures ANOVA. The level of statistical significance for all analyses was set at $p < 0.05$.

Study 2

Participants

Changing the Environment Intervention

ISUE Nutrition and Health Program Specialists identified a worksite in each of four communities (Boone, Perry, Bloomfield, and Ottumwa) previously involved in the CDC-funded Iowans Fit for Life project; worksites had previously expressed interest in employee wellness. Each worksite was contacted and invited to participate in the study. The worksite was asked to identify six volunteers to participate in a focus group and schedule a 30 to 60 minute focus group session at the worksite prior to the intervention. Employment by the company was the only criteria to be eligible to participate in the focus group. Participants were given an informed consent document describing their rights as a research participant and the research project prior to participating in the focus group discussion.

Each site also identified a contact to receive the toolkit intervention and participate in a phone interview six months following receipt of the toolkit intervention. Participants were given an informed consent document describing their rights as a research participant and the research project prior to participating in the phone interview. All protocols followed during this study were approved by the Iowa State University Human Subjects Review Board.

Pre –Intervention Focus Group

A focus group was conducted at each of the four worksites. Participation at each worksite ranged from four to six participants for a total of 19 focus group participants. The focus groups were conducted in a group setting and guided by a set of pre-determined questions developed by the research team (Table 3). Focus group questions probed participants' perceptions of the options available to them from the vending machines located at their workplace, food options they would include if stocking the vending machine, and products typically purchased.

Table 3. Pre-Intervention Focus Group Questions

Pre-Intervention Employee Questions
1. Do you purchase food from the vending machines near your office? If so, how many times per week?
2. If you don't purchase items from the vending machines, why not?
3. What are some typical items that you currently purchase?
4. Give some examples of unhealthy choices in a vending machine; some healthy choices.
5. If your vending machine was empty and you could stock it, what items would you include in the machine?
6. If there are healthy and not as healthy items available, what percent of the time would you select the healthier choice?
7. Would you participate in a test panel to taste healthy foods?

Focus groups were held in either a conference room or closed cafeteria at the workplace over the lunch hour or in the afternoon. Those present in the room during the focus groups were participants and the researcher. The same researcher attended and conducted all focus groups. As participants arrived they were provided an informed consent (Appendix E). After signing the informed consent and all participants arrived, the discussion began. Focus group participants were arranged in a circle and the audio cassette player was placed in the center of the participants. To begin, the researcher explained the procedures of a focus group and then the audio cassette recorder was turned on. The researcher only spoke to ask the next question, answer a question by a participant, and redirect the participants back to the original question. Participants were allowed to discuss the questions with one another. Each focus group lasted approximately 20 minutes and was audio recorded for transcription to ensure accuracy of focus group participants' perceptions. After all questions were asked and answered the participants were thanked for their time and allowed to leave the room.

Intervention

Each worksite was provided a toolkit intervention on a compact disc (CD) describing how to improve vending machine options and information about starting a worksite wellness program. Worksites were encouraged to modify vending machine options available, based on information from the toolkit and assessment using a vending machine tool included in the toolkit, to improve employee access to healthy foods.

Table 4. Post-Intervention Toolkit User Questions

Post-Intervention Toolkit User Questions
1. Did you use the toolkit? If yes, how many times did you look at it?
2. What was most/least helpful about the toolkit?
3. What did you like most/least about the toolkit?
4. What would you add to the toolkit?
5. Did you take any steps to make changes in your vending? If yes, what?
6. Did you take any steps to make changes in your vending? If yes, what?
7. How do you plan to continue to use the information?
8. How do you plan to continue to use the information?
9. What would you add/change about the vending machine assessment tool?

Vending Machine Tool

The vending machine tool, Nutrition Environment Measures Survey – Vending (NEMS-V), is similar to the NEMS tool created by Emory University ("Nutrition Environments Measures Survey," 2008). NEMS measures focus on examining community and consumer nutrition environments ("Nutrition Environments Measures Survey," 2008). Type and location of food outlets, availability of healthful choices, pricing, promotion of foods, and placement of healthier food products are all observed. One ISUE Program Specialist and one employee from the IDPH Iowans Fit for Life program developed the tool in collaboration with Emory University. The tool categorizes

vending items into three categories – green, yellow, or red. Green represents healthiest, yellow healthier, and red least healthy food and beverage options. The categories were formulated using the Institute of Medicine (IOM) guidelines (Institute of Medicine of the National Academies, 2007) with adaptations for adult consumers. Green (Tier 1) foods, provide at least one serving of fruit, vegetable, whole grain, or non-fat/low-fat dairy products, and meet the 2005 DGA. Yellow (Tier 2) foods, do not provide a serving of fruit, vegetable, and/or whole grain, but do meet the 2005 DGA. Both green and yellow foods have less than 35 percent calories from fat, less than 10 percent of calories from saturated fat, zero trans fats, 35 percent or fewer calories from sugars, and 200 mg or less of sodium. Beverages in the green category include water without flavoring or additives, plain one percent and skim milk, and 100 percent juice. Beverages in the yellow category include sport drinks, tea, plain two percent milk, and flavored (skim, one percent, and two percent) milk. The IOM guidelines were adapted in this study conducted with an adult population to include fruit juice, flavored milk, sport drinks, diet pop with caffeine and tea with artificial sweeteners in the yellow category. Seltzer water and club soda were included in the green category.

NEMS-V (Appendix G) contains five parts – directions, vending location cover page, individual machine cover page, vending machine picture, and food and beverage recording sheet. The vending location cover page asks a series of 11 questions to assess the environment of the vending machine. The individual machine cover pages asks a series of 11 questions related to the type of vending machine available, users, and promotion of healthy items. The vending machine picture facilitates coding of red, yellow, and green products available in the vending machine to provide a visual of the

amount of each colored product. The final part of the tool was the recording sheet. This allowed the person to categorize each product, such as beverage, fruit or vegetable, salty, etc., and then color code that particular product. Based on the outcome, the person could then utilize the toolkit described below to find ways to improve the vending machine choices.

Worksite Wellness Toolkit

The worksite wellness program toolkit (WWPT) had three main parts – worksite wellness program implementation, improving vending machine choices, and a vending machine assessment tool. The WWPT was a 38-page CD based toolkit created using Microsoft Office Publisher 2007 (Redmond, WA). The WWP implementation section described six steps to starting a WWP at a company: 1. why a company should start a WWP, 2. how to get started, 3. assessing the worksite, 4. where efforts should be focused, 5. programming/activities for the worksite, and 6. evaluating the program (CDC, 2009a; Department of Health and Family Services, 2006). The second portion of the toolkit discussed increasing the amount of ‘green’ and ‘yellow’ foods in vending machines based on Institute of Medicine (IOM) guidelines, contacting vendors, and promoting healthier vending machines. The third portion provided links to the five sections of the vending machine assessment tool. The WWPT also provided other resources the company could use to implement other parts of the WWP not described in detail within the toolkit.

Post-Intervention Interview

After receiving the toolkit, the contact at each site signed an informed consent (Appendix F). Six months after the intervention, the contact at each worksite was interviewed, via telephone, using a set of nine pre-determined questions (Table 4) about their experience using the toolkit and vending machine assessment tool.

Qualitative Analysis

Methods recommended by Kruger (2009) were used for the focus group discussions; however the recommended 10 to 12 participants for each focus group was not achieved. The focus group members represented a homogeneous sample at each site to limit censoring due to being in the presence of people who differ greatly from themselves. This helped increase comfort and sharing of focus group participants' opinion. Focus groups were kept small enough to allow each person the opportunity to share their opinions. Four focus groups were conducted to help understand perspectives of different worksites. Each of the focus groups and interviews were audio-taped and transcribed verbatim to ensure all questions and participant responses were documented. Transcripts were then reviewed by the research team to categorize participant responses into common themes.

CHAPTER 4: WORKSITE WELLNESS INFLUENCES NUTRIENT INTAKES AMONG EMPLOYEES

A paper to be submitted to *American Journal of Health Promotion*

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ABSTRACT

Purpose. To examine the influence of two worksite wellness interventions, newsletters and individual counseling, on changing health behavior change.

Design. Quasi-experimental. Participants self-selected to participate in a worksite wellness intervention offered by their employer. Each participant completed pre- and post-surveys.

Setting. Small businesses (newsletter) and a large, public university (individual counseling) in the Midwest.

Subjects. Total number of participants N=157. Newsletter – employee or employee spouse; female participants were not pregnant (N=112). Counseling – employees of the university; female participants were not pregnant (N=45).

Intervention. Participants either received eight bi-weekly newsletters or individual counseling with a RD (three times, two hours total) over 16 weeks.

Measures. Participants completed pre- and post-intervention surveys.

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Analysis. SPSS v. 17.0; Descriptive statistics, paired samples t-tests, repeated measures ANOVA used to identify change in nutrient intakes; McNemar Test used to examine participants meeting PA guidelines. Level of statistical significance: $p < 0.05$.

Results. Both interventions resulted in desirable change in dietary behavior/nutrient intakes. Fruit/vegetable servings, vitamin C, potassium, magnesium, and dietary fiber significantly increased; total fat, saturated fat, percent fat, and dietary cholesterol significantly decreased. Salt score exhibited a significant decrease in paired t-tests but not ANOVA with age as a covariate and sex/intervention as independent variables.

Conclusions. Both interventions result in a positive behavior change; however, a cost difference to deliver the intervention exists.

Key Words. Nutrition education, worksites, newsletters, registered dietitian.

Manuscript format: research; Research purpose: intervention testing/program evaluation; Study design: quasi-experimental; Outcome measure: behavioral; Setting: workplace; Health focus: nutrition; Strategy: skill building/behavior change; Target population age: adults

INTRODUCTION

Cardiovascular disease (CVD) remains the leading cause of death in the United States (U.S.).¹ Annually, CVD costs more than any other diagnostic group;² \$475.3 billion was spent on CVD in 2009.³ Overweight and obesity, risk factors for CVD, contribute estimated annual adult medical expenses of \$51.5 billion and \$78.5 billion,

respectively.⁴ Overweight, obesity and CVD present a significant cost to employers through healthcare claims and lost work days.

Dietary behaviors (i.e. fruit, vegetable, fat and cholesterol intake) and physical activity (PA) interact synergistically to influence risk of overweight, obesity, and CVD. Maintaining a healthy body weight, consuming recommended amounts of fruits and vegetables daily, and exercising regularly, have been identified as steps healthy adults can take to reduce risk for CVD.⁵

Fruit and vegetable consumption increases the intake of potassium and dietary fiber, both shown to lower CVD risk.^{6, 7} The U.S. Department of Agriculture 2005 Dietary Guidelines for Americans (DGA) recommends individuals following a 2000 calorie diet consume a minimum of two cups of fruit and two and one-half cups of vegetables daily.⁸ Most individuals do not meet the recommended intake of fruits and vegetables.⁹ Between 1988 and 2006, individuals who ate five or more servings (one serving equals 1/2 cup) of fruits and vegetables a day decreased from 42.0 percent to 26.0 percent.¹⁰

PA guidelines released October 2008 represent the first set of guidelines issued by the Federal Government.¹¹ These guidelines provide absolute, relative, and practical guidelines and parallel the DGA. Absolute guidelines state “adults should accumulate 500-1000 MET minutes of physical activity a week” whereas relative guidelines state “adults should perform at least 150 minutes a week of moderate intensity aerobic activity or 75 minutes a week of vigorous-intensity aerobic PA or an equivalent combination of moderate and vigorous intensity aerobic activity.” Muscle strengthening activity (MSA) guidelines are met by performing MSA at least twice a week. The number of individuals

meeting PA recommendations varies relative to the PA criteria; however, Behavioral Risk Factor Surveillance System data¹² and National Health Interview Survey (NHIS) data¹³ over the past ten years suggest that less than half of all adults are meeting PA recommendations. Between 1988 and 2006, those performing PA at least 12 times per month decreased by 10.0 percent.¹⁰

One of the major worksite health-related goals for Healthy People 2010 was ≥ 75 percent of worksites to offer a comprehensive health promotion program.¹⁴ The Task Force for the Community Guide, a branch of the Centers for Disease Control and Prevention (CDC), reported strong evidence for the effectiveness of worksite wellness programs improving dietary fat intake, cholesterol, blood pressure, physical activity, and number of days lost from work due to illness or disability.¹⁵

PA is an important component of worksite wellness. A one month PA intervention delivered via print materials at the worksite, has been shown to help employees improve their physical activity participation.¹⁶ In a similar study, no significant improvement in participants meeting CDC recommendations for PA was observed.¹⁷

Nutrition education, another component of worksite wellness, can be offered in a variety of modes, including print materials, internet, face-to-face education, and telephone. Printed nutrition education was read and saved more often and evaluated more favorably among participants than CD-ROM delivered material.¹⁸ Participants receiving the same nutrition education via interactive-tailored CD-ROM and print materials resulted in similar and significant reductions in total fat and energy intake.¹⁹

Nutrition education delivered by registered dietitians (RDs) at the worksite has also been shown to improve the health and well-being of individuals.²⁰ Participants of a worksite wellness program consisting of eight one-hour weekly educational sessions with a RD, significantly decreased their energy intake, total fat intake, saturated fat intake, and cholesterol intake.²¹

Improvement in health outcomes and high returns on investment (ROI) make a worksite wellness program worth a company's time and money. ROI analysis measures the cost of a program compared to the financial return.²² A ROI of \$3.48 for every dollar spent on worksite wellness²³ has been suggested; others report a 25 percent reduction in healthcare and absenteeism costs.²⁴ Despite the high ROI employers continue to look for the most cost effective method of providing worksite wellness to employees.

PURPOSE

The purpose of this study was to examine worksite wellness programming, print newsletters and individual counseling, to elicit health behavior change. In this study, fruit and vegetable intake, estimated nutrient intakes (vitamin C, potassium, magnesium, dietary fiber, total fat, saturated fat, percent fat, and dietary cholesterol), as well as salt and physical activity scores were examined pre- and post-intervention.

METHODS

Design

Two methods of worksite wellness programming, newsletters and individual counseling, were implemented. Participants either received eight newsletters, published by the extension service of a Midwestern university, over a 16-week period, or individual counseling with a RD three times (two hours total) over a 16-week period. Both groups completed pre- and post-intervention surveys [Block Food Frequency survey,²⁵ salt survey, and NHIS Adult Health Behaviors physical activity questions²⁶]. Participants were given and signed an informed consent document describing their rights as a research participant and describing the research project prior to participation. All protocols followed during this study were approved by the university's Human Subjects Review Board.

Samples

Newsletters

Six small businesses in a Midwestern state were identified and contacted by their health insurance carrier to participate in the newsletter worksite wellness program. Businesses were identified by higher than average prevalence of healthcare or prescription claims related to high blood pressure (HBP). Extension program specialists promoted and explained the program to employees at each worksite. Participants (N=112) from each of the six worksites were an employee or spouse of an employee at the worksite; females were not pregnant.

Individual Counseling

Employees from a Midwestern university were recruited to participate in an existing worksite wellness program benefit – three individual counseling sessions with a RD. Participants were recruited via list of employees' interest in counseling sessions, new employee orientation sessions, a university monthly electronic and hard copy newsletter to employees, and a college electronic newsletter. Participants (N=49) were employees of the university; females were not pregnant.

Measures

Pre/Post Intervention Surveys

All participants completed the pre- and post-intervention surveys including fruit/vegetable questions and meat/snack questions from the Block Food Frequency survey²⁵ and physical activity questions from the NHIS.²⁶

The Block Food Frequency survey is a validated and reliable tool that provides fruit/vegetable and meat/snack scores.²⁵ Prediction equations provide estimates of specific nutrient intakes per day. A fruit/vegetable score, not including beans/legumes, predicts fruit and vegetable servings, whereas a fruit/vegetable score, including beans/legumes, predicts vitamin C, magnesium, potassium, and dietary fiber intakes. The meat/snack score predicts total fat, saturated fat, percent fat, and dietary cholesterol intakes.

PA was explored using five PA questions from the 2008 NHIS. Participants' self-reported PA was categorized as meeting or not meeting the 2008 PA and MSA guidelines.¹¹

Currently, there are no validated tools to estimate salt or sodium intake due to the wide variability of sodium in products at restaurants, grocery store shelves, and prepared at home. A five question survey, similar to the Block Food Frequency survey, was created to examine change in consumption of high salt/sodium foods pre- to post-intervention. The salt score reflects change in consumption frequency of high salt/sodium foods, not actual salt or sodium intake; a higher salt score indicates a higher salt or sodium intake.

Intervention - Newsletters

Participants received the first of eight bi-weekly newsletters after completing the pre-intervention survey. Subsequent issues were distributed bi-weekly to participants by their employer. The newsletters were based upon the Dietary Approaches to Stop Hypertension (DASH) diet. The DASH diet focuses on eating a diet low in saturated fat, cholesterol, and total fat and increased fruits, vegetables, and fat-free or low-fat dairy products.²⁷ It also encourages increasing whole grains, fish, poultry, and nuts. An overview of the nutrition and PA topics in the newsletters appear in Table 1. Incentives participants received corresponded to newsletter topics and included pedometers, stretch bands, and calendars with recipes. Sixteen weeks after receiving the first newsletter, participants completed the post-survey.

Intervention – Individual Counseling

RDs providing individual counseling included a university wellness program employee and a graduate student. During the first session with the RD, participants

returned the informed consent and pre-surveys, which had been emailed prior to the first session.

The first counseling session was 45-minutes to one-hour, while the second and third sessions were approximately 30-minutes each. The second and third sessions were scheduled three to four weeks after the first and second visits, respectively. Primary topics discussed by the RDs were *MyPyramid*, snacks, exercise, portion control, and increasing fruit and vegetable intake. Many participants expressed interest in weight loss; however, this topic was not discussed directly by the RDs, rather healthful eating was promoted.

Approximately 16 weeks after the first session (four weeks after the third visit), participants were asked to complete the post-survey. As an incentive for participating in the study, participants received a calendar with recipes at the first session. At the second and third sessions, participants received a resistance stretch band or a pedometer. Subjects completing all three sessions as well as the post-survey were eligible to participate in a free healthy cooking demonstration.

Statistical Analysis

Statistical analysis of the data was performed using SPSS for Windows (v17.0; Chicago, IL). Descriptive statistics and paired samples t-tests were used to examine the demographic information and pre-/post-intervention nutrient intakes. Paired samples t-tests and repeated measures ANOVA were used to explore change in participant nutrient intakes pre- and post-intervention. Non-parametric statistics (McNemar Test) was used to examine PA relative to 2008 PA recommendations. Analyses of two participant

subgroups [two worksites (same company) receiving newsletters and participants receiving individual counseling] were examined using independent samples t-test, Pearson's chi-square test, and repeated measures ANOVA. The level of statistical significance for all analyses was set at $p < 0.05$.

RESULTS

A total of 157 participants (N=112 newsletter, N=45 counseling) completed the worksite wellness interventions. Age and gender distribution of the participants appear in Table 2. Sample size varied on specific analyses due to incomplete data on some surveys.

Results of paired samples t-tests for estimated nutrient intakes appear in Table 3. Fruit/vegetable servings and fruit/vegetable score nutrients (fiber, potassium, magnesium, vitamin C) increased significantly among all participants ($p < 0.05$). Interestingly, further examination by gender revealed a significant increase of fruit/vegetable servings and fruit/vegetable score nutrients among males, but not females. Meat/snack score nutrients (total fat, saturated fat, percent fat, and cholesterol) decreased significantly among all participants ($p < 0.05$). Again, further examination revealed a gender difference; a significant decrease of meat/snack score nutrients was seen among females, but not males. Salt score decreased significantly among all participants ($p < 0.05$); examination by gender revealed a significant decrease in salt score among males, but not females. No significant change was seen in participants meeting any of the PA guidelines.

Repeated measures ANOVA, where age was entered as a covariate and gender and mode of intervention were included as independent variables was used to examine change in dietary behaviors. Fruit and vegetable servings increased significantly from pre- to post-intervention (data not shown; $p < 0.05$) with subsequent increases in estimated nutrient intakes of vitamin C, magnesium, potassium and fiber (Figure 1a). Total fat, saturated fat, percent fat, and dietary cholesterol also decreased significantly (Figure 1b). No significant change was noted from pre- to post-intervention for salt score (data not shown).

Results of the repeated measures ANOVA suggest that age and gender are predictive of select estimated nutrient intakes and change in estimated nutrient intakes. Age was a significant predictor ($p < 0.05$) of estimated fruit/vegetable servings and dietary fiber intake; with age, estimated fruit/vegetable servings increased while estimated dietary fiber intake decreased. Gender was a significant predictor ($p < 0.05$) of estimated potassium, magnesium, dietary fiber, total fat, saturated fat, and dietary cholesterol intakes. Males were predicted to have higher estimated intakes of potassium, magnesium, and dietary fiber. Conversely, being female predicted lower estimated intakes of saturated fat and dietary cholesterol, but a higher total fat intake.

Age was a significant predictor ($p < 0.05$) of change in estimated fruit/vegetable servings as well as change in potassium, magnesium, and dietary fiber intakes; older participants were less likely to exhibit change in these estimated intakes.

Two plots of estimated marginal means of specific nutrient intake from pre- to post-intervention for each intervention appear in Figure 2. Visual examination of the slopes suggests potential difference between the intervention's outcomes. It appears that

the newsletter intervention was more effective in decreasing cholesterol intake, whereas individual counseling may have been more effective in increasing the magnesium intake. These results prompted further examination of the data by intervention. For this additional analysis, a subgroup of the newsletter data was selected for comparison with the individual counseling data. This was necessary due to differences in the demographic profiles of the businesses participating in the worksite wellness intervention. Two worksites of the same company were selected, which more closely reflected the university population. Both the university and selected worksites were predominately high school to college educated employees performing white collar job descriptions.

An independent sample t-test and chi-square revealed significant differences (data not shown; $p < 0.05$) in age and sex distribution between the two intervention group. The repeated measures ANOVA, where age was entered as a covariate and gender and intervention were independent variables, was used to examine change in nutrient intakes by intervention. Fruit and vegetable servings increased as a result of the interventions, but there was no significant difference between interventions (data not shown). Fruit/vegetable score nutrients (Figure 3a) significantly increased and meat/snack score nutrients (Figure 3b) significantly decreased among all participants; however, no difference was seen between interventions

Results of these worksite interventions suggest fruit and vegetable servings, including vitamin C, potassium, magnesium, and dietary fiber significantly increased while total fat, saturated fat, percent fat, and dietary cholesterol significantly decreased between pre- and post-intervention. The salt score decreased significantly ($p < 0.05$) according to the paired sample t-test between pre- and post-intervention, but not when

age, sex, and intervention were entered into the repeated measures ANOVA model. It appears both newsletters and individual counseling can be effective in changing behavior; however, one method is not more effective than the other.

DISCUSSION

The purpose of this study was to examine the influence of two worksite wellness interventions, newsletters and individual counseling, on employees' health behavior. Results suggest both interventions influence behavior change, which is consistent with previous studies.^{18, 19, 21}

In this study, participants (average age 49.3 years; 87.8 percent female) receiving individual counseling intervention decreased total fat, saturated fat, and dietary cholesterol, but not significantly. Another university worksite wellness program consisting of educational sessions with a RD, reported significant decreases in participants' (participants average age 34.3 years; 96.0 percent female) energy intake, total fat intake, saturated fat intake, and cholesterol.²¹ This discrepancy is likely due to the time the participants spent with the RD (two hours over a 16 week period versus eight hours over eight weeks).

Print materials have been shown to improve participants' nutrient intakes and amount of PA performed.¹⁶⁻¹⁸ This study showed improvement in total fat and saturated fat intakes among participants (average age 40.4 years; 61.4 percent females), but not significantly. In a previous study, participants receiving print-tailored material (participants average age 43.4 years; 55.3 percent females) exhibited a significant

decrease in total fat, saturated fat, and energy intake among participants at one-month and six-month follow-ups.¹⁹ Conversely, participants receiving generic print information (participants average age 44.1 years; 56.0 percent females) exhibited no change.

In this study, participants meeting PA guidelines improved from pre- and post-intervention, but not significantly. In a previous study, participants were placed in either a stage-matched or social-cognitive intervention. Stage-matched participants received one of five printed booklets, based on their stage of motivational readiness, whereas participants in the social-cognitive intervention received the standard booklet. Both methods equally increased participants PA participation.¹⁶ In another study, participants receiving PA print materials with bi-weekly reinforcement letters were able to significantly improve their PA between pre- and post-intervention; however, no significant improvement in participants meeting 1996 CDC recommendations for PA was observed.¹⁷ CDC recommendations for PA in 1996 stated adults should accumulate 30 minutes of moderate intensity PA on most, if not all, days of the week. This is similar to the 150 minutes of moderate intensity PA per week current recommendation.¹¹

Results of the current study suggest both interventions (newsletter and individual counseling) were effective in improving nutrient intakes, but one was not more effective than the other. In addition, it suggests that age is predictive of estimated fruit/vegetable servings and dietary fiber, whereas gender predicts estimated potassium, magnesium, dietary fiber, total fat, saturated fat, and dietary cholesterol intakes. As age increased, estimated fruit/vegetable servings increased, but dietary fiber intake decreased. It is possible that while older participants made a concerted effort to increase fruit/vegetable servings, they decreased intake of other sources of fiber (i.e. grains) to compensate for

the increased caloric intake. The ANOVA model in this study also predicted higher estimated intakes of potassium, magnesium, and dietary fiber among males. Conversely, it predicted females to have lower estimated intakes of saturated fat and dietary cholesterol; however, a higher estimated intake of total fat. It may be that males are more successful in increasing intake whereas women may be more successful in restricting intake. Surprisingly, the mean total fat intake between males and females was similar at pre- and post-intervention, 87.0 grams and 84.4 grams, and 90.1 grams and 86.0 grams, respectively.

Age was a significant predictor of change in estimated fruit/vegetable servings as well as change in estimated potassium, magnesium, and dietary fiber intakes. As age increased change in estimated fruit/vegetable servings, potassium, magnesium, and dietary fiber intakes all decreased. It is likely that the decreased caloric needs occurring with age decreases total food intake.

Worksite wellness programs focusing on improving lifestyle behaviors benefit both the employee and employer. Poor employee health has been linked to higher direct health care costs, disability rates, absenteeism, workers' compensation, and rates of injury as well as lower work output.²⁸ Improvement in health outcomes and high ROI make a worksite wellness program worth a company's time and money. In a review of 73 studies on worksite wellness programs, a savings to cost ratio of \$3.50 to \$1.00 was demonstrated through reduced absenteeism and health care costs.²³

Both newsletters and individual counseling with an RD in this study influenced nutrient intake of employees; however, the more cost effective method would be the newsletters. The cost for implementing the newsletter intervention in this study was

approximately one-tenth that of the individual counseling. The cost of newsletters would be higher if developed and customized by the individual employer; however, a number of agencies/organizations including university extension services provide such materials.

Limitations and Future Directions

While the findings of this research are interesting, limitations do exist. First, this study included participants who self-selected, which usually indicates heightened awareness and predisposition to making behavior change. Results would likely have been different if participants had been randomly selected. Second, all surveys were self-reported which has inherent limitations. Survey responses can be skewed by the respondent anticipating the desirable responses expected. Participant education and income levels were not available, which compromised comparison of the interventions. A subgroup receiving the newsletter intervention, which more closely reflected the university population (education and occupation) receiving individual counseling was selected. Examination of the 2008 U.S. Census information suggests the mean income levels of the counties where the worksites were located was similar.²⁹ Finally, although this study did not include control groups for comparison, previous studies have demonstrated interventions are significantly more effective in changing behavior relative to controls.³⁰⁻³²

Future research needs to explore cost-effective means of worksite wellness addressing the most prevalent chronic diseases (overweight, obesity, CVD, hypertension). Healthcare reform provides the impetus for effective, efficient preventive healthcare, including worksite wellness.

SO WHAT?

Results of this study indicate both newsletters and individual counseling with a RD result in positive behavior change. These findings reiterate the importance nutrition education plays in changing individuals' behavior. Both of the interventions demonstrated positive behavior changes in fruit and vegetable intake and nutrient intakes (vitamin C, potassium, magnesium, dietary fiber, total fat, saturated fat, percent fat, and dietary cholesterol). Given the relationship between nutrient intakes and chronic diseases, it would benefit worksites to implement a worksite wellness program emphasizing nutrition education. While this study did not show an improvement in participants meeting PA guidelines, it does not mean that PA education should not be promoted in worksite wellness programs. Further, future research is needed to examine different nutrition education and PA education methods at the worksite.

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TABLES AND FIGURES

Table 1. Main Newsletter Topics

	Nutrition	Physical Activity (PA)
Issue 1	<ul style="list-style-type: none"> • Serving sizes • Serving vs. Portion • Nutrition Facts Label 	<ul style="list-style-type: none"> • Moderate intensity PA
Issue 2	<ul style="list-style-type: none"> • Increasing fruit intake • Fruit facts 	<ul style="list-style-type: none"> • 10,000 Steps a Day
Issue 3	<ul style="list-style-type: none"> • Increasing vegetable intake • Tips for buying vegetables 	<ul style="list-style-type: none"> • Strength training using resistance bands
Issue 4	<ul style="list-style-type: none"> • Lower fat dairy products • Natural vs. processed cheese • Choosing calcium-rich foods/supplements 	<ul style="list-style-type: none"> • Stretching
Issue 5	<ul style="list-style-type: none"> • Whole grains • Dietary Fiber • Ways to trim 100 calories 	<ul style="list-style-type: none"> • Quick Fit (15 minute fitness routine)
Issue 6	<ul style="list-style-type: none"> • Choosing protein foods • Increasing Fish • Meat alternatives 	<ul style="list-style-type: none"> • Physical activity excuses
Issue 7	<ul style="list-style-type: none"> • Facts about fats • Fats and cholesterol 	<ul style="list-style-type: none"> • Strength training • Fitness program activities
Issue 8	<ul style="list-style-type: none"> • Sodium Smart • Sodium and potassium recommendations 	<ul style="list-style-type: none"> • Walking • Choosing correct shoes

Table 2. Participant Characteristics (N=157)

	Newsletter (N=112)	Counseling (N=45)
Males		
21-35	25 (51.02%)	1 (16.67%)
36-50	17 (34.69%)	1 (16.67%)
51-65	7 (14.29%)	4 (66.67%)
66+	0 (0.00%)	0 (0.00%)
Females		
21-35	20 (31.75%)	5 (12.82%)
36-60	24 (38.10%)	15 (38.46%)
51-65	14 (22.22%)	19 (48.72%)
66+	5 (7.94%)	0 (0.00%)

Table 3. Fruit/Vegetable, Meat/Snack Score Nutrients, Salt Score, and Physical Activity Guidelines

Variable	Males (N=55) $\bar{x} \pm SD$		Females (N=102) $\bar{x} \pm SD$		Total (N=157) $\bar{x} \pm SD$	
	Pre	Post	Pre	Post	Pre	Post
Fruit/Vegetable Servings ^a	3.94±1.61	4.48±1.46*	4.05±1.64	4.20±1.61	4.01±1.62	4.31±1.55*
Fruit/Vegetable Score ^b						
Fiber (gm)	18.35±4.86	20.08±4.45*	13.97±4.91	14.20±4.91	15.63±5.21	16.43±5.52*
Potassium (gm)	3.58±0.70	3.84±0.61*	3.02±0.70	3.06±0.71	3.23±0.75	3.36±0.78*
Magnesium (mg)	385.18±71.53	411.46±63.26*	310.39±70.71	314.08±72.48	338.78±79.59	351.04±83.64*
Vitamin C (mg)	140.28±40.40	155.38±34.25*	128.09±40.87	130.35±41.10	132.72±40.98	139.85±40.40*
Meat/Snack Score ^c						
Total fat (gm)	86.99±16.04	84.44±16.76	90.14±17.30	85.95±15.32*	88.92±16.83	85.36±15.85*
Saturated fat (gm)	29.31±5.88	28.37±6.14	22.85±6.34	21.32±5.62*	25.35±6.91	24.05±6.75*
Percent fat (%)	33.37±4.01	32.74±4.19	33.66±4.33	32.61±3.83*	33.55±4.19	32.66±3.96*
Cholesterol (mg)	297.90±53.17	289.63±53.42	216.09±55.71	202.46±49.56*	247.80±67.64	236.25±66.39*
Salt Score ^d	4.98±2.66	3.68±2.33*	3.88±2.48	3.71±2.43	4.33±2.60	3.70±2.38*
Meeting PA Guidelines						
PA (%) ^e	72.1	79.1	65.0	73.8	67.5	75.6
MSA(%) ^f	46.8	53.2	32.2	38.9	37.2	43.8
PA and MSA(%) ^g	44.2	48.8	28.2	34.6	33.9	39.7

*significant difference pre/post (p<0.05)

PA=physical activity; MSA=muscle strengthening activity

^a N=141

^b N=137

^c N=129

^d N=116

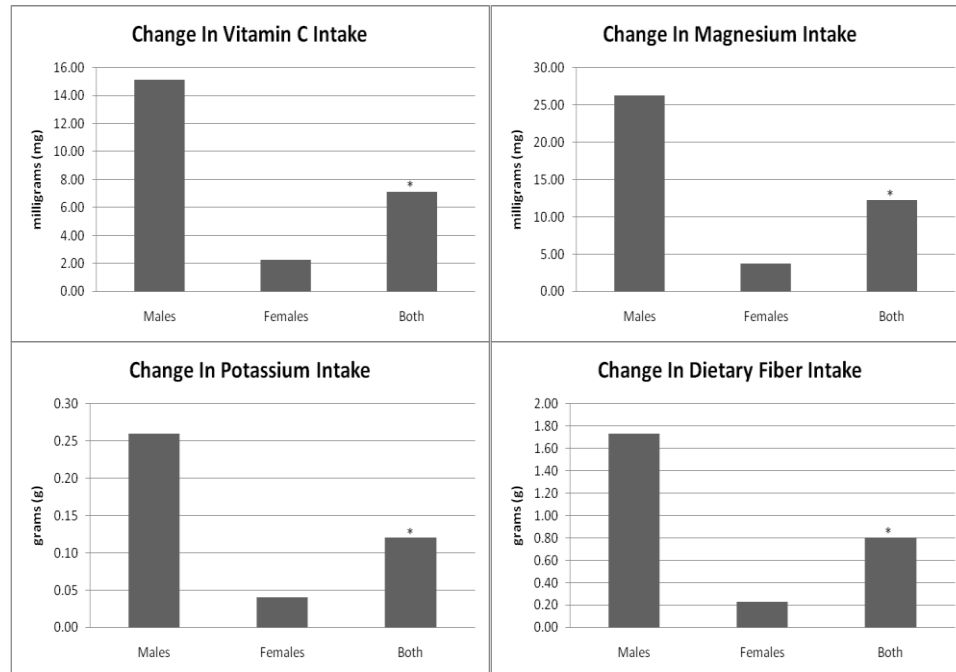
^e N=123

^f N=137

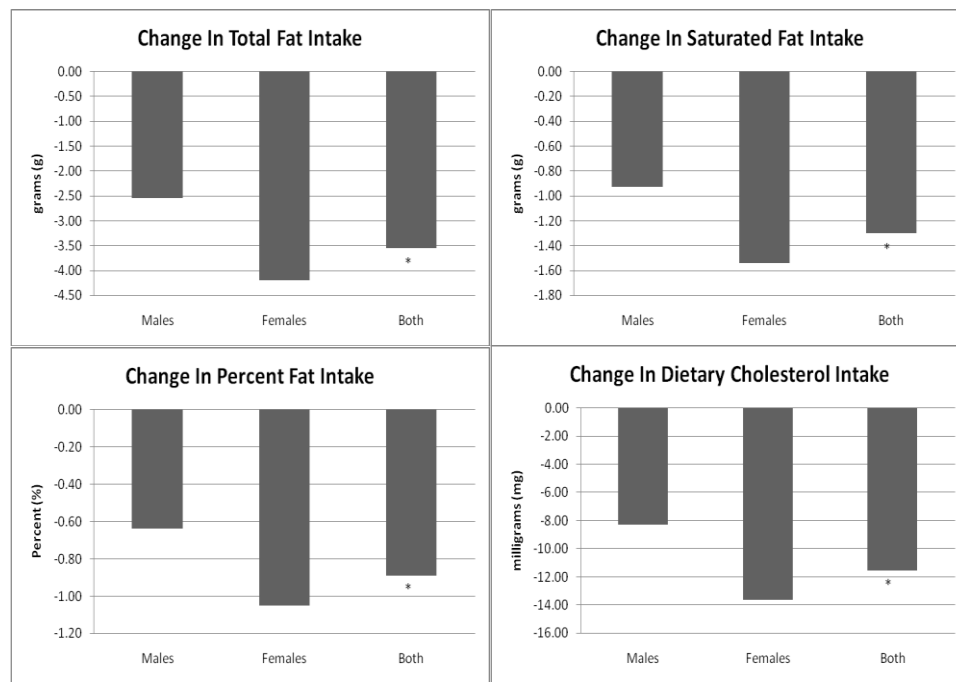
^g N=121

Figure 1. Change in nutrient intake among participants

a) Change in vitamin C, magnesium, dietary fiber, and potassium intake among males (N=52) and females (N=85)



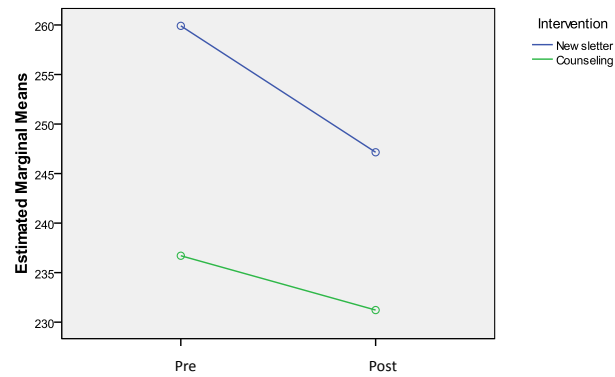
b) Change in total fat, saturated fat, percent fat, and dietary cholesterol intake among males (N=50) and females (N=79)



*significant change in nutrient (p-value<0.05)

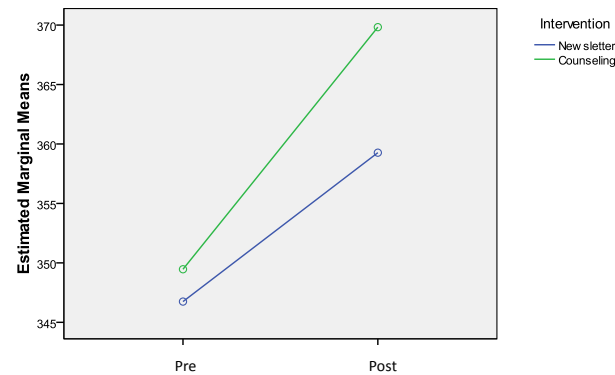
Figure 2. Suggested impact of newsletters and counseling intervention on nutrient intakes

a) Estimated Marginal Means of Cholesterol Intake (mg)



Covariates appearing in the model are evaluated at the following values: Age = 43.05

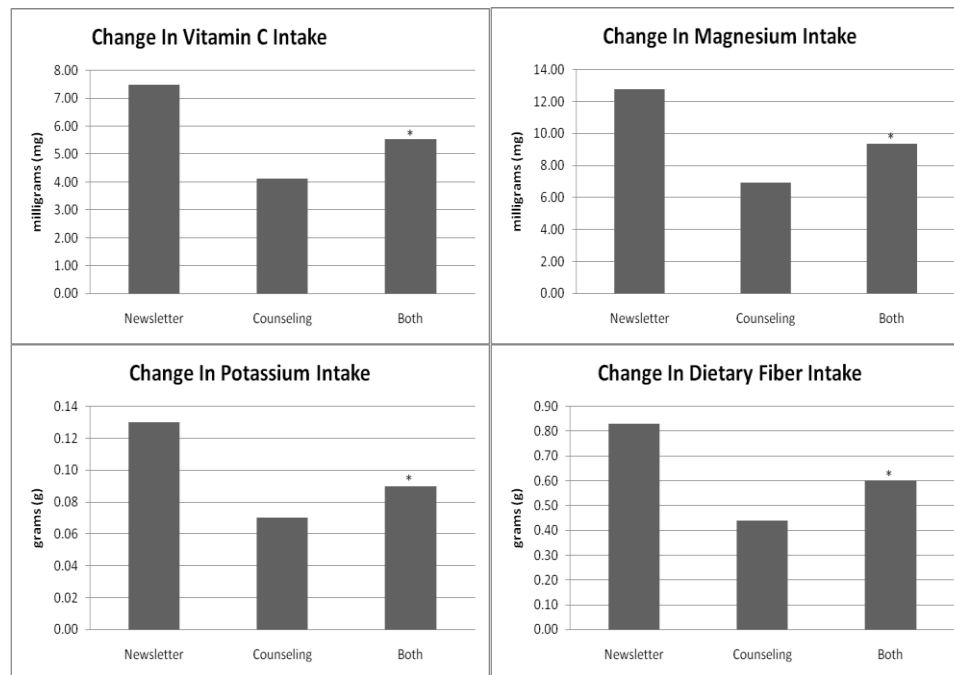
b) Estimated Marginal Means of Magnesium Intake (mg)



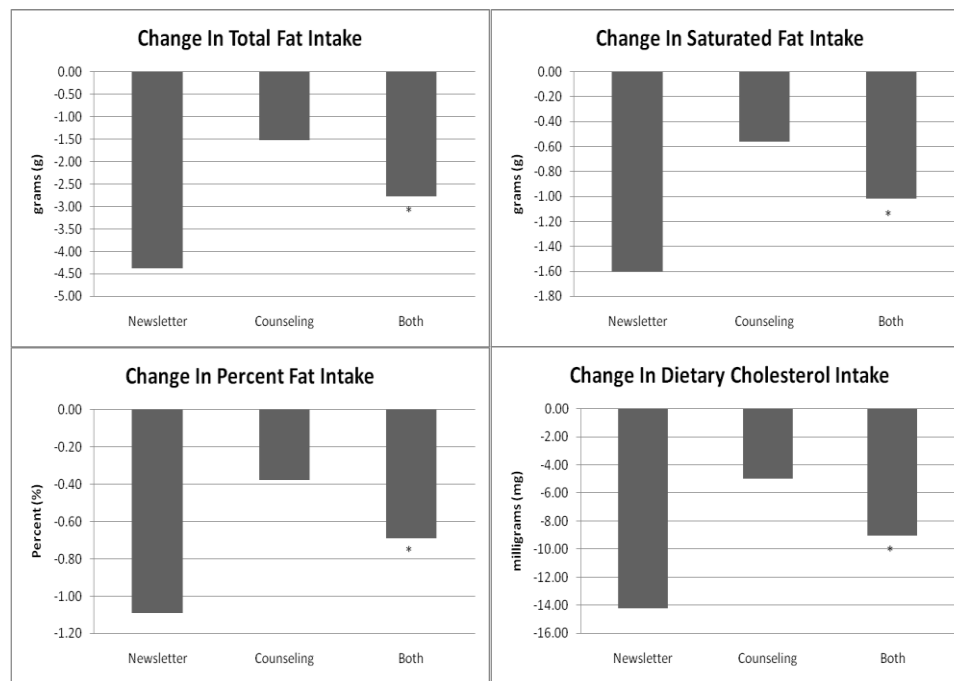
Covariates appearing in the model are evaluated at the following values: Age = 42.93

Figure 3. Change in nutrient intake by intervention

a) Change in vitamin C, magnesium, potassium, and dietary fiber by intervention (newsletters N=31; counseling N=43)



b) Change in total fat, saturated fat, percent fat, and dietary cholesterol by intervention (newsletters N=28; counseling N=36)



*significant change in nutrient (p-value<0.05)

CHAPTER 5: EVALUATION OF CD-ROM DELIVERY TO CHANGE WORKSITE VENDING

A paper to be submitted to *American Journal of Health Promotion*

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ABSTRACT

Purpose. To explore the usefulness of a worksite wellness toolkit encouraging improvement of vending.

Design. Qualitative. Participants were asked by their employer to participate. Pre-intervention focus groups were completed; Post-intervention interviews were completed after 20 weeks.

Setting. Four small hospitals in the Midwest.

Subjects. Employees of the worksites; 19 participants in the pre-intervention focus groups; four participants completed post-intervention interviews.

Intervention. Worksites were provided a toolkit via compact disc (CD) describing improvement in vending machine options and starting a worksite wellness program.

Measures. Kruger method was used for focus groups; seven pre-intervention focus groups questions; nine post-intervention interview questions.

Analysis. Focus group responses were transcribed verbatim and reviewed by the interviewer to categorize responses into themes.

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Results. Approximately half of participants used vending machines. Common items purchased were pop and candy/candy bars. One of four sites used the toolkit and made improvements in both vending and cafeteria choices.

Conclusions. Toolkit did not influence vending in majority of worksites due to lack of use; one site did exhibit changes to both vending and cafeteria options after utilizing the toolkit. Improvement of vending machines can be accomplished, but a different method may be more effective.

Key Words. Nutrition education, worksite wellness, vending machines, CD. Manuscript format: research; Research purpose: intervention testing/program education; Study design: quasi-experimental; Outcome measure: behavioral; Setting: workplace; Health focus: nutrition; Strategy: skill building/behavior change; Target population age: adults

INTRODUCTION

Obesity continues to be a health and economic concern in the United States.¹ The Surgeon General has declared the prevalence of obesity among adults in the United States an epidemic.² The prevalence of obesity doubled between 1980 and 2002 in adults age 20 years and older.³ Approximately 25.0 percent of normal weight or overweight middle-aged adults (30-59 years old) will become overweight or obese, respectively, within a four year period.⁴ One of the Healthy People 2010 objectives was to reduce the proportion of obese adults to 15.0 percent.⁵ By 2007, no state met this target and more than half of the states had 25.0 percent or more of their population classified as obese.⁶

Obesity increases the risk of developing coronary heart disease (CHD), type 2 diabetes, certain types of cancers (endometrial, breast, and colon), high blood pressure (HBP), cardiovascular disease (CVD), and dyslipidemia, to name a few.¹ Using Medical Expenditure Panel Survey (MEPS) and National Health Accounts (NHA), estimated total annual medical spending for adult medical expenses attributed to overweight and obesity, are \$51.5 billion and \$78.5 billion, respectively.⁷ An estimated 300,000 people per year die from obesity related diseases.¹

Dietary intake plays an important role in the control of body weight and the risk of developing many chronic diseases, such as CHD, HBP, or type 2 diabetes. Fruits and vegetable consumption increases the intake of potassium and dietary fiber, both shown to be beneficial in lowering blood pressure. Dietary potassium intake is inversely associated with risk of stroke⁸ and an inverse association between dietary fiber and CVD risk factors, have been shown.⁹ Overweight, obesity, HBP, dietary behaviors (i.e. fruit, vegetable, fat, and cholesterol intake), and physical activity (PA) interact synergistically. Maintaining a healthy body weight, consuming two and one-half cups of fruits and vegetables daily, exercising regularly, reducing stress, reducing/maintaining desirable HBP and blood cholesterol, have been identified as seven steps healthy adults can take to reduce their risk for CVD.¹⁰

Increased stress at the workplace, causing poor worksite food choices, can lead to chronic health problems such as obesity.¹¹ This increases employee absences, injury, and other chronic diseases.¹² In fact, work-related stress has been correlated with obesity among both men and women.¹¹ Obesity and associated chronic diseases are costly to employers due to increased health care costs and decreased employee productivity.¹³

The intention to purchase healthy foods does not ultimately lead to the behavior of purchasing healthy foods.¹⁴ Only 73.0 percent of employees who intended to choose a healthy snack followed through on their intention, whereas 92.0 percent who intended to choose an unhealthy snack did so. Nutrition and health are not the most important influences on an individual's food purchases; the most important influence of lunch food selection is convenience, followed by taste, cost, and health.¹⁵

Cost influences food purchasing whether from a cafeteria or a vending machine. As prices of low-fat snack items in vending machines decreased, purchasing increased.¹⁶ Pricing strategies have also been shown to increase purchases of fruits and vegetables.¹⁷ Decreasing the cost of fruits and vegetables by 50.0 percent and advertising increased fruit and vegetable purchases four-fold and two-fold, respectively. Labels and signage near or on a vending machine have also been used to promote healthier low-fat options and increased the purchase of low-fat items.¹⁶ Interestingly, neither price reduction nor promotion affected profits from vending, which is a common concern among worksites.

One of the worksite health-related goals for Healthy People 2010 was ≥ 75 percent of worksites to offer a comprehensive health promotion program.⁵ The Task Force for the Community Guide, a branch of the CDC, reported strong evidence for the effectiveness of worksite wellness programs improving dietary fat intake, blood pressure, cholesterol, and number of days lost from work due to illness or disability.¹⁸ Worksite wellness programs including modifications to the worksite environment to promote positive health behaviors among employees is a relatively new concept. Cafeterias and vending machines contribute to the worksite environment and impact the health of employees by offering healthy or less healthy choices.¹⁹ Nationally, food and beverage

vending machines are available in 79.6 percent of worksites; only 37.4 percent labeled healthy food choices and 5.6 percent promoted availability of healthy food.

PURPOSE

The purpose of this study was to explore the usefulness of a worksite wellness toolkit encouraging improvement of vending at the worksite. A pre-intervention focus group was conducted to elicit employees' views and opinions of the vending machines in their workplace. Views and opinions solicited included items purchased and recommended changes. A post-intervention interview with the employer was conducted to determine if and how the worksite wellness toolkit had been utilized.

DESIGN

Extension Program Specialists identified a worksite in each of four communities previously involved in the CDC-funded Fit for Life project; worksites had previously expressed an interest in employee wellness programming. Each worksite was contacted and invited to participate in the study. This study design used the social-ecological model (Figure 1).²⁰ The social-ecological model has four levels 1. intrapersonal, 2. interpersonal, 3. community/institution, and 4. macro level/public policy. This study involved the community/institution level. The community/institution level involved changing the vending machine, which can impact dietary behaviors of an individual.

SETTING

The study took place at four small hospitals (49-275 beds) in a Midwestern state. The main contact in each site worked primarily with the food service department.

PARTICIPANTS

Each worksite identified four to six volunteers to participate in the pre-intervention focus group. Each focus group was scheduled for a 30 to 60 minute session at the worksite. Employment at the worksite was the only criteria to be eligible to participate in the focus group. Participants were provided and signed an informed consent document describing their rights as a research participant and the research project prior to participating in the focus group discussion.

Each worksite identified a contact person to receive the toolkit intervention; this contact also participated in a phone interview six months following receipt of the toolkit intervention. Interview participants were provided and signed an informed consent document describing their rights as a research participant and the research project prior to participating in the phone interview. All protocols followed during this study were approved by the University's Human Subjects Review Board.

INTERVENTION

Each worksite was provided a toolkit intervention on a compact disc (CD) describing how to improve vending machine options and information about starting a worksite wellness program. Worksites were encouraged to modify vending machine

options available, based on information from the toolkit, which included a vending machine assessment tool.

Worksite Wellness Toolkit

The worksite wellness program toolkit (WWPT) had three main parts – worksite wellness program implementation, improving vending machine choices, and a vending machine assessment tool. The WWPT was a 38-page CD based toolkit created using Microsoft Office Publisher 2007 (Redmond, WA). The WWP implementation section described six steps to starting a WWP at a company: 1. why a company should start a WWP, 2. how to get started, 3. assessing the worksite, 4. where efforts should be focused, 5. programming/activities for the worksite, and 6. evaluating the program.^{21, 22} The second portion of the toolkit discussed increasing the amount of ‘green’ and ‘yellow’ foods (described under vending machine assessment tool) in vending machines based on Institute of Medicine (IOM) guidelines,²³ contacting vendors, and promoting healthier vending machines. The third portion provided links to the five sections of the vending machine assessment tool. The WWPT also provided other resources the company could use to implement other parts of the WWP not described in detail within the toolkit.

Vending Machine Assessment Tool

The vending machine assessment tool, Nutrition Environment Measures Survey – Vending (NEMS-V), is similar to the NEMS tool created by Emory University.²⁴ NEMS tools focus on examining community and consumer nutrition environments. Type and location of food outlets, availability of healthful choices, pricing, promotion of foods, and

placement of healthier food products are documented using standardized observation forms.

An Extension Program Specialist and Department of Public Health/Fit for Life program staff member developed the NEMS-V tool in collaboration with Emory University faculty. The tool categorizes vending items into three categories – green, yellow, or red. Green represents healthiest, yellow healthier, and red least healthy food and beverage options. Categories were formulated using the IOM Nutrition Standards for Foods in Schools²³ with adaptations for adult consumers. Green (IOM Tier 1) foods, provide at least one serving of fruit, vegetable, whole grain, or non-fat/low-fat dairy products, and meet the 2005 Dietary Guidelines for Americans (DGA). Yellow (IOM Tier 2) food and beverages, do not provide a serving of fruit, vegetable, and/or whole grain, but do meet the 2005 DGA. Both green and yellow foods have less than 35 percent calories from fat, less than 10 percent of calories from saturated fat, zero trans fats, 35 percent or fewer calories from sugars, and 200 mg or less of sodium. Beverages in the green category include water without flavoring or additives, plain one percent and skim milk, and 100 percent juice. Beverages in the yellow category include sport drinks, tea, plain two percent milk, and flavored (skim, one percent, and two percent) milk. The IOM guidelines were adapted in this study conducted with an adult population to include fruit juice, flavored milk, sport drinks, diet pop with caffeine and tea with artificial sweeteners in the yellow category. Seltzer water and club soda were included in the green category.

NEMS-V includes five parts: 1. directions, 2. vending location cover page, 3. individual machine cover page, 4. food and beverage recording sheet, and 5. vending

machine picture. The vending location cover page assesses the environment of the vending machine using 11 questions. The individual machine cover pages uses 11 questions to obtain information related to the type of vending machine available, users, and promotion of healthy items. The recording sheet facilitated categorization of each product, such as beverage, fruit or vegetable, salty, etc., and then color code that particular product. The final component of the tool, the vending machine picture, facilitates coding of red, yellow, and green products available in the vending machine to provide a visual of the amount of each colored product. After completing the vending assessment using NEMS-V, improvements to vending options could be identified.

METHOD

Data collection

Pre –Intervention Focus Group

Pre-intervention focus group participation at each worksite ranged from four to six participants for a total of 19 focus group participants. The focus groups were conducted at the worksite in a group setting guided by a set of pre-determined questions developed by the research team (Table 1). Focus group questions probed participants' perceptions of the options available from the vending machines located at their workplace, food options they would include if stocking the vending machine, and products typically purchased.

Focus groups were held in either a conference room or closed cafeteria at the workplace over the lunch hour or afternoon hours. These included only the participants

and the researcher; the same researcher conducted all focus groups. As participants arrived they were asked to read and sign an informed consent. Focus group participants were arranged in a circle and an audio cassette player was placed in the center of the circle. To begin, the researcher explained the procedures of a focus group and then the audio recording began. The researcher spoke only to ask the next question, answer a question by a participant, and redirect the participants back to the original question. Participants were allowed to discuss the questions with one another. Each focus group lasted approximately 20 minutes and was audio recorded for transcription to ensure completeness and accuracy of focus group participants' perceptions. After all questions were asked and answered the participants were thanked for their time and allowed to leave the room.

Post-Intervention Interview

Prior to receiving the WWPT toolkit, the contact at each site signed an informed consent. Six months after the WWPT toolkit, the contact at each worksite was interviewed, via telephone, using a set of nine pre-determined questions (Table 2) regarding their experience using the toolkit and NEMS-V vending machine assessment tool.

Analysis strategies

Methods recommended by Kruger²⁵ were used for the focus group discussions; however the recommended 10 to 12 participants for each focus group was not achieved. The focus group members represented a homogeneous sample at each site to limit

censoring due to being in the presence of people who differ greatly from themselves. This helped increase comfort and sharing of focus group participants' opinion. Focus groups were kept small enough to allow each person the opportunity to share their opinions. Four focus groups were conducted to help understand perspectives of different worksites. Each of the focus groups and interviews were audio-taped and transcribed verbatim to ensure all questions and participant responses were documented. Transcripts were then reviewed by the research team to categorize participant responses into common themes.

RESULTS

Pre-Intervention Focus Group

A total of 19 participants representing four worksites completed the pre-intervention focus group. Approximately half of participants used a vending machine occasionally; two of the 19 used a vending machine daily and three of the 19 used the vending machine monthly. The most common items purchased from the vending machines by the participants were pop and candy/candy bars. Most focus group participants did not use vending machines because a cafeteria was near their office.

Food/Beverages available in vending machines

Food and beverages perceived as unhealthy by focus group participants, included candy bars, chips, and pop. Approximately half of participants believed everything found in vending machines were unhealthy. Food and beverages perceived as healthy included white/chocolate milk, fruit, animal crackers, water, and pretzels. If participants could

stock their vending machines at work, items they would most like to include were nuts/seeds, candy bars/candy, pretzels, fresh fruit, and diet pop.

- Unhealthy items

“My cookies for sure – I know it’s unhealthy.”

“Candy, pop, chocolate, everything in a vending machine really.”

- Healthy Items

“Not here there isn’t.”

“Did somebody say baked chips, because those are a better choice.”

- Stocking Vending Machine

“Definitely Diet Coke. A lot of the nurses are Diet Coke drinkers.”

“Pretzels, popcorn, yogurt, fresh vegetables like vegetable tray you know with a variety and a little low-fat dip or something.”

“If I go to a vending machine I’m usually after chips or candy bars and Doritos.”

Choosing healthier items

Most participants stated they would not select the healthier item from the vending machine if it was available. The majority of participants stated their mood would have an impact on their vending machine choice. However, approximately one-quarter of participants stated they would choose the healthier item about 50 percent of the time.

“Yeah, probably not as healthy for me. If I go to a vending machine I want pop or caffeine and I don’t like any of the diet pop so it has to be regular pop for me.”

“I’m not doing so good now so I probably wouldn’t do any better later.”

Other responses

Focus group participants stated it would be nice if vending machines could include sandwiches and meal like items (bagels, frozen dinners, frozen breakfast sandwiches, etc.) before and after cafeteria hours. Others also stated it would be helpful if there was more communication about who or what company stocks the machines, as well as the date and list ingredients on the packages of in-house items. The participants stated the date and ingredients would be a good idea for food safety issues as well as for those individuals with allergies.

“Well, I’d like to see vending machines, when the cafeteria’s not open that they could get a sandwich and stuff out of.”

“Maybe more communication about them. You know because I’m not even aware who stocks them now.”

“...maybe some breakfast type foods, you know bagels or I don’t know, something you could eat on the way.”

“If they could make (breakfast sandwiches) healthier – turkey sausage and low fat cheese and they could still taste good, but that’s not traditionally what comes out of vendo land.”

Post-Intervention Interview

Five months after receiving the worksite wellness toolkit, the contact at each site was contacted to respond to a nine question interview (Table 2) via telephone. Only one of four sites examined the toolkit or made any changes to the vending machine(s). One site stated they do not have control over the vending and another stated they just did not

have time to look at it, but plan to in the future. The third site's contact person left employment; their replacement was not aware the toolkit existed.

The fourth site, which utilized the toolkit shared the most helpful part of the toolkit was the downloadable PDFs and the criteria and examples for red, yellow, and green foods. After reviewing the toolkit, the site added a new refrigerated vending machine with deli sandwiches and vegetable juices. The information also initiated dialogue with the vendor to provide baked chips and Special K® bars to the existing vending machines. In addition to using the WWPT toolkit information for vending machines, the information also instigated changes in the on-site cafeteria. The contact stated only the WWPT was used, not the NEMS-V tool.

CONCLUSION

The purpose of this study was to explore the usefulness of a worksite wellness toolkit emphasizing improvement of vending machines. Results suggest that a toolkit provided via CD-ROM may not be the best method for educating workplaces on healthy vending machine changes; however the one worksite that utilized the toolkit was able to make changes in both vending and cafeteria food options. Previous research suggests a print version of the toolkit may have been more effective.²⁶

Improving vending machine options can impact the health of employees; 50 percent of the focus group participants stated they purchase food from the vending machine. Those not purchasing food from the vending machine were using the worksite cafeteria. Thus, all employees were consuming foods under the control of the employer. As part of worksite initiatives, cafeterias and vending could offer portion sizes reflecting

the Dietary Guidelines for Americans (DGA) and healthier options priced competitively or lower than less healthy options. Cafeterias and vending machines have an impact on the health of employees by offering healthy or less healthy choices.¹⁹

Previous research has found that the intention to purchase healthy foods does not ultimately lead to the behavior of purchasing healthy foods.¹⁴ Results of this study indicated that nearly half of all focus group participants would not choose the healthier item even if it was available. Participants shared that selection of healthier items depended primarily on their mood, but most stated they would probably not select the healthy choice.

Since poor employee health has been linked to higher direct health care costs, disability rates, absenteeism, workers' compensation, and rates of injury as well as lower work output,²⁷ worksite wellness programs focusing on improving lifestyle choices would benefit both the employees and employer. Improving vending machine choices can help improve the quality of foods employees consume throughout the day, ultimately impacting employee health. Although the CD toolkit did not influence vending in the majority of the worksites, one site did exhibit noteworthy changes to both vending and cafeteria options. This demonstrates improvement of vending machines can be accomplished, but possibly a different method to educate workplaces on vending machine choices would have more of an effect.

SO WHAT?

Results of this study suggest a toolkit focusing on improvement of vending machine food and beverage options can have a positive effect; however, distribution of

the toolkit via CD-ROM may not be the best distribution method. Because intention to purchase healthy foods does not always lead to the behavior of purchasing healthy foods, sale of healthier options can be achieved by also reducing the cost of these items.

Promotional signage near and on the vending machine has also been shown to improve sales of those items. Given the relationship between overweight/obese people and increased health care costs it would benefit worksites to improve the amount of healthier items available in their vending machines. While this study does not show an improvement in the amount of worksites improving their vending, it does suggest that worksites using the information provided were able to make positive changes. Further, future research is needed to look at different methods that could be more effective in educating worksites on improvement of vending machine choices. The workplace is a good place to educate adults on the importance of healthy eating and one way to do this is to show it through healthy vending machine choices.

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Tables and Figures

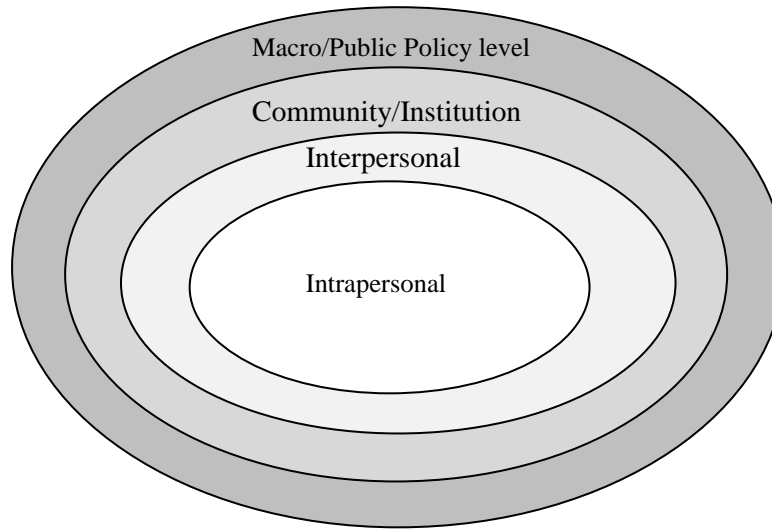


Figure 1. Ecological model of factors influencing dietary intake.²⁰ Adapted from Fitzgerald, N and Spaccarotella, K, 2009.

Table 1. Pre-Intervention Focus Group Questions

Pre-Intervention Employee Questions
1. Do you purchase food from the vending machines near your office? If so, how many times per week?
2. If you don't purchase items from the vending machines, why not?
3. What are some typical items that you currently purchase?
4. Give some examples of unhealthy choices in a vending machine; some healthy choices.
5. If your vending machine was empty and you could stock it, what items would you include in the machine?
6. If there are healthy and not as healthy items available, what percent of the time would you select the healthier choice?
7. Would you participate in a test panel to taste healthy foods?

Table 2. Post-Intervention Toolkit User Questions

Post-Intervention Toolkit User Questions
1. Did you use the toolkit? If yes, how many times did you look at it?
2. What was most/least helpful about the toolkit?
3. What did you like most/least about the toolkit?
4. What would you add to the toolkit?
5. Did you take any steps to make changes in your vending? If yes, what?
6. Did you take any steps to make changes in your vending? If yes, what?
7. How do you plan to continue to use the information?
8. Did it help you make changes in your vending machines?
9. What would you add/change about the vending machine assessment tool?

CONCLUSIONS

Individual Interventions

This research project sought to determine the effectiveness of worksite wellness programs at promoting nutrient intake and physical activity changes as well as weight status and blood pressure changes between pre- and post-intervention. Quantitative research showed that both newsletters and individual counseling with a RD can significantly improve nutrient intakes. This is consistent with previous studies, where printed materials and counseling have both shown to be effective in improving nutritional intakes (Abood, et al., 2003; Kroeze, et al., 2008a, 2008b).

In the current study, total fat and saturated fat intakes significantly decreased among participants (average age 40.4 years; 61.4 percent females) receiving the newsletters. In a previous study, participants receiving print-tailored material (participants average age 43.4 years; 55.3 percent females) also showed significant decreases in total fat, saturated fat, and energy intake among participants at one-month and six-month follow-ups (Kroeze, et al., 2008b). In contrast, participants receiving generic print information (participants average age 44.1 years; 56.0 percent females) did not show a significant improvement in total fat, saturated fat, or energy intake. Kroeze and colleagues (2008a) also reported that print-delivered nutrition education was perceived by participants as being more personal and individualized than material delivered by CD-ROM.

RDs have been shown to influence behavior change as well. In this study, participants (average age 49.3; 87.8 percent female) in the individual counseling

intervention decreased total fat, saturated fat, and dietary cholesterol, but not significantly. A previous study (participants average age 34.3 years; 96 percent female) in a university worksite wellness program consisting of eight one-hour weekly educational sessions with a RD, significantly decreased their energy intake, total fat intake, saturated fat intake, and cholesterol (Abood, et al., 2003). The difference between the two studies may be due to the time the participants spent with the RD. In this study, the participants spent a total of two hours over a 16 week period with the RD, whereas in the university study by Abood and colleagues (2003) the participants spent eight one-hour sessions with the RD over eight weeks.

While previous research has shown improvement in health behavior change among participants receiving print-materials or individualized counseling, the current study compared the impact of the two interventions. Both worksite interventions significantly increased fruit and vegetable servings, as well as vitamin C, potassium, magnesium, and dietary fiber between pre- and post-intervention; total fat, saturated fat, percent fat, and dietary cholesterol significantly decreased between pre- and post-intervention. Unfortunately there were limitations to this comparison of interventions including lack of demographic information such as income and educational level of participants. Despite these limitations, results suggest both interventions were effective in improving nutrient intakes, but one was not more effective than the other.

Neither method, newsletter or individual counseling, showed a significant improvement in the percentage of employees meeting physical activity guidelines. However, this does not mean promotion of physical activity in worksite wellness programs should not be done.

In the newsletter intervention, limitations on data collection for anthropometrics (height, weight, and blood pressure) prevented reporting of this data. Anthropometric data was not measured properly and measurement methods differed between pre- and post-intervention. Despite previous staff training related to data collection of anthropometrics, an important lesson learned is the need to train and retrain them to follow appropriate guidelines for measuring height, weight, and blood pressure. Interestingly, preliminary analysis of anthropometrics from the counseling intervention did result in a significant improvement/change in blood pressure status and weight status.

Other limitations also existed within the current study. This study included participants who self-selected, which usually indicates heightened awareness and predisposition to making behavior change. Results may have differed had participants been randomly selected. Also, all surveys were self-reported which has inherent limitations. Survey responses can be skewed by the respondent anticipating the desirable responses expected. Salt intake comparisons are also difficult to compare between the two groups since the newsletters discussed the DASH diet, which emphasizes lowering salt consumption and the RD's did not directly discuss salt intake with all participants. Additionally, a six month follow up was originally planned; however due the depressed economy many participants either left employment or took advantage of early retirement options, therefore a six month follow up could not be conducted. When analyzing the subgroup of newsletters and individual counseling the education level of the participants was not available; however, this issue was addressed by comparing two worksites with similar distribution of education levels between employees. Second, income was not determined; however, using 2008 U.S. Census information, the income levels of the

counties where the worksites were located were similar (U.S. Census Bureau, 2008). Finally, even though this study did not include control groups for comparison, previous studies have shown participants in control groups are not as effective in changing behavior as participants receiving the intervention (Mills, Kessler, Cooper, & Sullivan, 2007; Sorensen et al., 1998; Sternfeld et al., 2009).

Environmental Intervention

Qualitative research showed that approximately half of employees at selected worksites use vending machines. Improving vending machine choices would be a way to impact the health of employees. However, previous research has found that the intention to purchase healthy foods does not ultimately lead to the behavior of purchasing healthy foods (Weijzen, et al., 2008). Only 73.0 percent of employees who intended to choose a healthy snack followed through on their intention, whereas 92.0 percent who intended to choose an unhealthy snack did so.

Nutrition and health are not the most important influences on an individual's food purchases (Blanck, et al., 2007; Glanz, et al., 1998). This coincides with this study's findings as well. Selection of healthier items by the participants would mainly depend on their mood, but most stated they would probably not select the healthier choice.

Results indicated that a toolkit via CD-ROM may not be the best method to encourage worksites to make healthy changes to vending machines; however, the one site that used the toolkit was able to make changes to both vending and cafeteria food options. A print version of the toolkit may have been more effective. Kroeze and colleagues

(2008a) found print-delivered nutrition education was read and saved more often among participants than CD-ROM delivered material.

Since poor employee health has been linked to higher direct health care costs, disability rates, absenteeism, workers' compensation, and rates of injury as well as lower work output (Partnership for Prevention, 2005), worksite wellness programs focusing on improving lifestyle choices would benefit both the employees and employer. Improving vending machine choices can help improve the quality of foods employees consume throughout the day, ultimately impacting employee health. Although the CD toolkit did not influence vending in the majority of the worksites, one site did exhibit noteworthy changes to both vending and cafeteria options. This demonstrates improvement of vending machines can be accomplished, but possibly a different method to educate workplaces on vending machine choices would have more of an effect.

APPENDIX A. NEWSLETTER INFORMED CONSENT

ISU IRB # 1	08-297
Approved Date:	13 August 2008
Expiration Date:	12 August 2009
Initial by:	js

INFORMED CONSENT DOCUMENT

Title of Study: Worksite Wellness Pilot

Investigators: Ruth Litchfield, PhD, RD, LD
Extension Specialist/Assistant Professor
Iowa State University

Kristi Chipman, RD, LD
Graduate Student
Iowa State University

Your voluntary participation in this worksite wellness program offered by your employer makes you eligible to participate in a research study on worksite wellness. Your signature on this consent form verifies your voluntary participation in completion of a pre- and post- screening and survey. None of your individual information will be shared with your employer. Any information shared with the employer will only be in aggregate such that individual information cannot be identified.

We ask that you read this document and contact us with any questions you may have before agreeing to participate. This project is being conducted by Iowa State University Extension.

PURPOSE OF THE STUDY

This study will be examining the effectiveness of two different types of worksite wellness programs. One program focuses on individual (employee) education, the other focuses on environmental change at the workplace. The information gained from this study will benefit society by providing valuable information about the impact of these two different programs on behavior change among employees.

DESCRIPTION OF PROCEDURES

You are asked to complete a questionnaire about the types and amounts of foods you eat and your physical activity. Your height, weight, and blood pressure will also be measured as a part of this research study. Completion of the surveys and onsite screening will take approximately 15 minutes.

If you agree to participate, you are asked to:

1. Sign this consent form
2. Complete the attached survey
3. Return the consent and survey to the designated individual at your worksite
4. Complete an onsite screening including height, weight, and blood pressure

RISKS

Participating in this project does not have any foreseeable risks; however, you may feel uncomfortable being weighed, measured, and answering questions about your physical activity and eating habits.

ISU IRB # 1	08-297
Approved Date:	13 August 2008
Expiration Date:	12 August 2009
Initial by:	J.C.

BENEFITS

If you decide to participate in this project there will be no direct benefit to you. It is hoped that the information gained from this study will benefit society by providing valuable information about behavior change among employees in worksite wellness programs.

COSTS AND COMPENSATION

You will not have any costs from participating in this study thus you will not be compensated for your participation.

PARTICIPATION RIGHTS

Your participation in this study is completely voluntary and you may refuse to participate. If you decide to not participate in the study it will not result in any penalty or loss of benefits to which you are otherwise entitled or will it affect your participation in the worksite wellness program.

CONFIDENTIALITY

Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis.

To ensure confidentiality to the extent permitted by law, the following measures will be taken: Your name will be removed from your information and replaced with a five digit code for all hard copies and electronic files. All hard copies data collected from the survey will be stored in a locked file cabinet accessible only by those conducting the research. All electronic files will be stored on a password-protected computer accessible only by those conducting the research.

QUESTIONS OR PROBLEMS

You are encouraged to ask any questions you may have about this study. For further information about the study contact Ruth Litchfield 515-294-9484 or Kristi Chipman 309-781-2023.

If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office of Research Assurances, Iowa State University, Ames, Iowa 50011.

ISU IRB # 1	08-257
Approved Date:	13 August 2008
Expiration Date:	12 August 2009
Initial by:	JG

PARTICIPANT SIGNATURE

If you so wish, you may request a copy of this consent form for your records.

Your signature indicates that you voluntarily agree to participate in this study, that the study has been explained to you, that you have been given the time to read the document and that your questions have been satisfactorily answered.

Participant's Name (printed) _____

(Participant's Signature)

(Date)

INVESTIGATOR STATEMENT

I certify that the participant has been given adequate time to read and learn about the study and all of their questions have been answered. It is my opinion that the participant understands the purpose, risks, benefits and the procedures that will be followed in this study and has voluntarily agreed to participate.

(Signature of Person Obtaining
Informed Consent)

(Date)

APPENDIX B. INDIVIDUAL COUNSELING INFORMED CONSENT

IRB #	06-287
Approved Date:	7 November 2006
Expiration Date:	12 August 2008
Initial by:	jc

INFORMED CONSENT DOCUMENT

Title of Study: Worksite Wellness Pilot

Investigators: Ruth Litchfield, PhD, RD, LD
Extension Specialists/Assistant Professor
Iowa State University

Kristi Chipman, RD, LD
Graduate Student
Iowa State University

Your voluntary participation in free nutrition counseling sessions offered by your employer makes you eligible to participate in a research study on worksite wellness. Your signature on this consent form verifies your voluntary participation to complete a pre- and post- screening and survey. The only information from your counseling sessions that will be collected and used for research purposes will be your height, weight, and blood pressure. None of your individual information will be shared with your employer. Any information shared with the employer will only be in aggregate such that individual information cannot be identified.

We ask that you read this document and contact us with any questions you may have before agreeing to participate. This project is being conducted by Iowa State University Extension.

PURPOSE OF THIS STUDY

This study will be examining the effectiveness of three different types of worksite wellness programs. One program focuses on individual (employee) change via newsletters, the second focuses on environmental change at the workplace, and the third focuses on individual change via one-on-one counseling. The information gained from this study will benefit society by providing valuable information about the impact of these three different programs on behavior change among employees.

DESCRIPTION OF PROCEDURES

You are asked to complete a questionnaire about the types and amounts of foods you eat and your physical activity. Your height, weight, and blood pressure will also be measured as part of this research study. Completion of the surveys and onsite screening will take approximately 15 minutes. Each one-on-one counseling session will range from 30-60 minutes based on individual need.

If you agree to participate, you are asked to:

1. Sign the informed consent
2. Complete the attached survey

ISU IRB # 1	08-297
Approved Date:	7 November 2008
Expiration Date:	12 August 2009
Initial by:	JG

3. Return the consent and survey at the first counseling session
4. Complete the onsite pre-screening including height, weight, and blood pressure
5. Attend all three counseling sessions
6. Complete the onsite post-screening including height, weight, and blood pressure

RISKS

Participating in this project does not have any foreseeable risks; however, you may feel uncomfortable being weighed, measured, and answering questions about your physical activity and eating habits.

BENEFITS

If you decide to participate in this project there will be no direct benefit to you. It is hoped the information gained from this study will benefit society by providing valuable information about behavior change among employees in worksite wellness programs. You will receive a pedometer, exercise band and "Healthy Meals in a Hurry" cookbook as an incentive at each of the counseling sessions. After completing all three sessions you will be able to attend a healthy cooking demo for free.

COSTS AND COMPENSATION

You will not have any costs from participating in this study, thus you will not be compensated for your participation.

PARTICIPATION RIGHTS

Your participation in this study is completely voluntary and you may refuse to participate. If you decide to not participate in the study it will not result in any penalty or loss of benefits to which you are otherwise entitled or will it affect your participation in the worksite wellness program.

CONFIDENTIALITY

Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis.

ISU IRB # 1	08-297
Approved Date:	7 November 2008
Expiration Date:	12 August 2009
Initial by:	JC

To ensure confidentiality to the extent permitted by law, the following measures will be taken:
Your name will be removed from your information and replaced with a five digit code for all hard copies and electronic files. All hard copies data collected from the survey will be stored in a locked file cabinet accessible only by those conducting the research. All electronic files will be stored on a password-protected computer accessible only by those conducting the research.

QUESTIONS OR PROBLEMS

You are encouraged to ask any questions you may have about this study. For further information about the study contact Ruth Litchfield 515-294-9484 or Kristi Chipman 515-294-6507.

If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, 515-294-4566, IRB@iastate.edu, or Director, 515-294-3115, Office of Research Assurance, Iowa State University, Ames, Iowa 50011.

PARTICIPANT SIGNATURE

If you so wish, you may request a copy of this consent form for your records.

Your signature indicated that you voluntarily agree to participate in this study, that the study has been explained to you, that you have been given the time to read the document and that your questions have been satisfactorily answered.

Participant's Name (printed) _____

(Participant's Signature)

(Date)


INVESTIGATOR STATEMENT

I certify that the participant has been given adequate time to read and learn about the study and all of their questions have been answered. It is my opinion that the participant understands the purpose, risks, benefits, and procedures that will be followed in this study and has voluntarily agreed to participate.

(Signature of person obtaining
Informed Consent)

(Date)

APPENDIX C. NEWSLETTER PRE/POST SURVEY



Eating Well — Moving More
for healthier blood pressure,
blood cholesterol, and weight


Name _____

Worksite _____ Month - Day - Year _____

Male _____	Female _____	Age _____
Height: _____ feet _____ inches	Weight _____	BMI: _____
Underweight Normal Overweight	Blood Pressure Medication _____ yes _____ no	
Eat, smoke, or exercise in last 30 minutes? _____ yes _____ no		
Blood Pressure: _____	Systolic _____	Diastolic _____

Share how you did on your “Eating Well–Moving More” goals

1	Did you work on losing?	<input type="checkbox"/> This was not a goal for me	<input type="checkbox"/> I was not successful	<input type="checkbox"/> I made progress
2	Did you work on doing regular physical activity? <small>Regular physical activity is defined as at least 30 minutes of moderate intensity physical activity (such as walking) 5 days of the week or 20 minutes of vigorous intensity physical activity (such as jogging) 3 days of the week.</small>	<input type="checkbox"/> This was not a goal for me	<input type="checkbox"/> I was not successful	<input type="checkbox"/> I made progress
3	Did you work on eating a healthy diet? <small>A healthy diet includes fruits, vegetables, whole grains, and low-fat dairy foods. It is low in total fat, saturated fat, and cholesterol. Serving sizes are controlled to monitor calories.</small>	<input type="checkbox"/> This was not a goal for me	<input type="checkbox"/> I was not successful	<input type="checkbox"/> I made progress
4	Did you work on eating a lower sodium diet? <small>Eating a diet lower in sodium can be a two-step process. Step 1: Reduce sodium intake to 2,400 mg a day. Step 2: Reduce sodium intake to 1,500 mg per day.</small>	<input type="checkbox"/> This was not a goal for me	<input type="checkbox"/> I was not successful	<input type="checkbox"/> I made progress
5	Did you work on limiting alcohol intake? <small>Limiting alcohol means drinking no more than: 2 drinks per day for men 1 drink per day for women</small>	<input type="checkbox"/> This was not a goal for me	<input type="checkbox"/> I was not successful	<input type="checkbox"/> I made progress



... and justice for all

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Many materials can be made available in alternative formats for ADA clients. To file a complaint of discrimination, write USDA, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964. Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914 in cooperation with the U.S. Department of Agriculture. Jack M. Payne, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa. N 3500c. December 2007

Multiple Choice Questions

- 1) Using a hand to measure portions, a fist is approximately the size of a:
a) cup b) 3 ounces c) $\frac{1}{2}$ cup d) tablespoon
- 2) What is the only liquid that can be labeled "juice"?
a) juice drink b) juice cocktail c) fruit punch d) 100% juice
- 3) What is the one problem with canned vegetables?
a) low in nutrients b) high in sodium c) expensive d) high in fat
- 4) Foods that contain at least _____ percent of calcium per serving contribute high amounts of calcium.
a) 10 b) 20 c) 50 d) 85
- 5) Dietary fiber may
a) increase the risk of type 2 diabetes
b) increase weight
c) help with weight control
d) all of the above
- 6) What are some meat alternatives?
a) dried beans b) soy products c) eggs d) all of the above
- 7) A well rounded fitness program includes
a) aerobic exercise b) strength training c) stretching d) all of the above
- 8) What is the recommended amount of sodium per day?
a) 1500 mg b) 1800 mg c) 2000 mg d) 2400 mg

True/False

- T F 1) A portion and serving of food are defined as the same.
- T F 2) Fresh fruit is more nutritious than frozen fruit.
- T F 3) Frozen vegetables should be purchased without added sauces to keep sodium and fat low.
- T F 4) Processed cheese contains more sodium than natural cheese.
- T F 5) Half of the grains eaten per day should be whole grains.
- T F 6) The DASH eating plan recommends decreasing the amount of saturated fat in your diet.
- T F 7) Polyunsaturated and monounsaturated fats are the fats that should be limited in the diet.
- T F 8) Walking needs to be done for at least 30 minutes if your body is to achieve the "training effect".

Think about your eating habits over the past year or so. About how often do you eat each of the following foods? Remember breakfast, lunch, dinner, snacks, and eating out. Check one button for each food.

Fruits, Vegetables, and Grains	Less than 1/week	Once a week	2-3 times a week	4-6 times a week	Once a day	2+ a day
Fruit, juice, like orange, apple, grape, fresh, frozen, or canned. (Not sodas or other drinks)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often do you eat any fruit, fresh, or canned (not counting juice?)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vegetable juice, like tomato juice, V-8, carrot	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Green Salad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Potatoes, any kind, including baked, mashed, or French fried	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vegetable soup, or stew with vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Any other vegetables, including string beans, peas, corn, broccoli, or any other kind	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fiber cereals like Raisin Bran, Shredded Wheat, or Fruit-n-Fiber	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beans such as baked beans, pinto, kidney, or lentils (not green beans)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dark bread such as whole wheat or rye	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Meats and Snacks	1/month	2-3 times a month	1-2 times a week	3-4 times a week	5+ times a week
Hamburgers, ground beef, meat burritos, tacos	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beef or pork, such as steaks, roasts, ribs, or in sandwiches	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fried chicken	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hot dogs, or Polish or Italian sausage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cold cuts, lunch meats, ham (not low fat)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bacon or breakfast sausage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

BLS Form # 1
 Approved Date: 13 August 2008
 Expiration Date: 12 August 2009
 Initial By: [Signature]

Meats and Snacks (cont.)

	1/month	2-3 times a month	1-2 times a week	3-4 times a week	5+ times a week
Salad dressings (not low-fat)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Margarine, butter, or oil in cooking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eggs (not Egg Beaters or just egg whites)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pizza	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cheese, cheese spread (not low-fat)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
French fries, fried potatoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Corn chips, potato chips, popcorn, crackers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Doughnuts, pastries, cake, cookies (not low fat)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ice cream (not sherbet or non-fat)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Salt

	Rarely or Never	1-2 times per week	3-4 times per week	Daily
How frequently to you add salt to your food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How many times to you eat at a "fast food" restaurant?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often to you eat any of the following foods: hot dogs, bologna, luncheon meat, bacon, ham, sausage?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
While preparing meals or when eating how, how frequently do you add any or all of the following items to your food? Mustard, pickles, relish, soy sauce, ketchup, meat tenderizer (ex - Accent)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Fresh	Frozen or canned without salt	Canned without sauces	Canned, frozen, or dry with sauces and/or seasonings
In what form do you most frequently purchase food items?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ISU IRB # 1
Approved Date: 13 August 2008
Expiration Date: 12 August 2009
Initial By: _____

Think about your physical activity habits over the past year or so. About how often do you do each of the following activities?

Physical Activity

1) How many times per day, per week, per month, or per year do you do vigorous leisure-time physical activities for at least 10 minutes that cause heavy sweating or large increases in breathing or heart rate?

_____/day, week, month, year (circle one)

2) About how long do you do these vigorous leisure-time physical activities each time?

____ minutes, hours (circle one)

3) How many times per day, per week, per month, or per year do you do light or moderate leisure-time physical activities for at least 10 minutes that cause only light sweating or a slight to moderate increase in breathing or heart rate?

_____/day, week, month, year (circle one)

4) About how long do you do these light or moderate leisure-time physical activities each time?

____ minutes, hours (circle one)

5) How many times per day, per week, per month, or per year do you do leisure-time physical activities specifically designed to strengthen your muscles such as lifting weights or doing calisthenics? (Include all activities even if you have mentioned them before.)

_____/day, week, month, year (circle one)

Name _____ Worksite _____ Date _____

Male _____ Female _____ Age _____ Height _____ Weight _____ Blood Pressure _____ BP Med? Y N

Think about your eating habits over the past year or so. About how often do you eat each of the following foods? Remember breakfast, lunch, dinner, snacks, and eating out. Check one button for each food.

Fruits, Vegetables, and Grains	Less than 1/week	Once a week	2-3 times a week	4-6 times a week	Once a day	2+ a day
Fruit, juice, like orange, apple, grape, fresh, frozen, or canned. (Not sodas or other drinks)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often do you eat any fruit, fresh, or canned (not counting juice?)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vegetable juice, like tomato juice, V-8, carrot	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Green Salad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Potatoes, any kind, including baked, mashed, or French fried	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vegetable soup, or stew with vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Any other vegetables, including string beans, peas, corn, broccoli, or any other kind	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fiber cereals like Raisin Bran, Shredded Wheat, or Fruit-n-Fiber	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beans such as baked beans, pinto, kidney, or lentils (not green beans)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dark bread such as whole wheat or rye	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Meats and Snacks	1/month	2-3 times a month	1-2 times a week	3-4 times a week	5+ times a week
Hamburgers, ground beef, meat burritos, tacos	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beef or pork, such as steaks, roasts, ribs, or in sandwiches	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fried chicken	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hot dogs, or Polish or Italian sausage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cold cuts, lunch meats, ham (not low fat)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bacon or breakfast sausage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

BLS 1000-1
 Approved Date: 7 November 2009
 Expiration Date: 12 August 2009
 Model No. 10

APPENDIX D. INDIVIDUAL COUNSELING INFORMED CONSENT

Meats and Snacks (cont.)	1/month	2-3 times a month	1-2 times a week	3-4 times a week	5+ times a week
Salad dressings (not low-fat)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Margarine, butter, or oil in cooking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eggs (not Egg Beaters or just egg whites)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pizza	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cheese, cheese spread (not low-fat)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
French fries, fried potatoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Corn chips, potato chips, popcorn, crackers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Doughnuts, pastries, cake, cookies (not low fat)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ice cream (not sherbet or non-fat)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Salt	Rarely or Never	1-2 times per week	3-4 times per week	Daily
How frequently to you add salt to your food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How many times to you eat at a "fast food" restaurant?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often to you eat any of the following foods: hot dogs, bologna, luncheon meat, bacon, ham, sausage?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
While preparing meals or when eating how, how frequently do you add any or all of the following items to your food? Mustard, pickles, relish, soy sauce, ketchup, meat tenderizer (ex - Accent)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Fresh	Frozen or canned without salt	Canned without sauces	Canned, frozen, or dry with sauces and/or seasonings
In what form do you most frequently purchase food items?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

GDU 303 # 1
 Approved Date: 7 September 2008
 Expiration Date: 12 August 2009
 Item ID: 15

ISU #15 #1	55-257
Approved Date:	7 November 2008
Expiration Date:	12 August 2009
Initial by:	Jc

Think about your physical activity habits over the past year or so. About how often do you do each of the following activities?

Physical Activity

1) How many times per day, per week, per month, or per year do you do vigorous leisure-time physical activities for at least 10 minutes that cause heavy sweating or large increases in breathing or heart rate?

_____/day, week, month, year (circle one)

2) About how long do you do these vigorous leisure-time physical activities each time?

_____ minutes, hours (circle one)

3) How many times per day, per week, per month, or per year do you do light or moderate leisure-time physical activities for at least 10 minutes that cause only light sweating or a slight to moderate increase in breathing or heart rate?

_____/day, week, month, year (circle one)

4) About how long do you do these light or moderate leisure-time physical activities each time?

_____ minutes, hours (circle one)

5) How many times per day, per week, per month, or per year do you do leisure-time physical activities specifically designed to strengthen your muscles such as lifting weights or doing calisthenics? (Include all activities even if you have mentioned them before.)

_____/day, week, month, year (circle one)

ISU IRB # 1	08-207
Approved Date:	7 November 2008
Expiration Date:	12 August 2009
Initial by:	JG

Multiple Choice Questions

- 1) Using a hand to measure portions, a fist is approximately the size of a:
 - a) cup
 - b) 3 ounces
 - c) $\frac{1}{2}$ cup
 - d) tablespoon
- 2) What is the only liquid that can be labeled "juice"?
 - a) juice drink
 - b) juice cocktail
 - c) fruit punch
 - d) 100% juice
- 3) What is the one problem with canned vegetables?
 - a) low in nutrients
 - b) high in sodium
 - c) expensive
 - d) high in fat
- 4) Foods that contain at least _____ percent of calcium per serving contribute high amounts of calcium.
 - a) 10
 - b) 20
 - c) 50
 - d) 85
- 5) Dietary fiber may
 - a) increase the risk of type 2 diabetes
 - b) increase weight
 - c) help with weight control
 - d) all of the above
- 6) What are some meat alternatives?
 - a) dried beans
 - b) soy products
 - c) eggs
 - d) all of the above
- 7) A well rounded fitness program includes
 - a) aerobic exercise
 - b) strength training
 - c) stretching
 - d) all of the above
- 8) What is the recommended amount of sodium per day?
 - a) 1500 mg
 - b) 1800 mg
 - c) 2000 mg
 - d) 2400 mg

True/False

- T F 1) A portion and serving of food are defined as the same.
- T F 2) Fresh fruit is more nutritious than frozen fruit.
- T F 3) Frozen vegetables should be purchased without added sauces to keep sodium and fat low.
- T F 4) Processed cheese contains more sodium than natural cheese.
- T F 5) Half of the grains eaten per day should be whole grains.
- T F 6) The DASH eating plan recommends decreasing the amount of saturated fat in your diet.
- T F 7) Polyunsaturated and monounsaturated fats are the fats that should be limited in the diet.
- T F 8) Walking needs to be done for at least 30 minutes if your body is to achieve the "training effect".

APPENDIX E. VENDING FOCUS GROUP INFORMED CONSENT

ISU IRB # 1	08-297
Approved Date:	7 August 2009
Expiration Date:	12 August 2010
Initial by:	Jc.

INFORMED CONSENT DOCUMENT

Title of Study: Worksite Wellness Pilot

Investigators: Ruth Litchfield, PhD, RD, LD
Extension Specialist/Assistant Professor
Iowa State University

Kristi Chipman, RD, LD
Graduate Student
Iowa State University

Your employer's participation in a worksite wellness program makes you eligible to participate in a research study on worksite wellness. You are asked to participate in a pre- and post-focus group, where you will be asked a series of questions. Your signature on this consent form verifies your voluntary participation in a pre- and post- focus group. None of your individual information will be shared with your employer. Any information shared with the employer will only be in aggregate such that individual information cannot be identified.

We ask that you read this document and contact us with any questions you may have before agreeing to participate. This project is being conducted by Iowa State University Extension.

DESCRIPTION OF PROCEDURES

If you agree to participate, you are asked to:

1. Sign this consent form
2. Complete the pre- and post-focus group

RISKS

Participating in this project does not have any foreseeable risks; however, you may feel uncomfortable answering questions about your eating habits and foods available at your workplace.

BENEFITS

If you decide to participate in this project there will be no direct benefit to you. It is hoped that you may learn about nutrition in vending machines and the information gained from this study will benefit society by providing valuable information about behavior change.

COSTS AND COMPENSATION

You will not have any costs from participating in this study thus you will not be compensated for your participation.

ISU IRB # 1	08-297
Approved Date:	7 August 2008
Expiration Date:	12 August 2010
Initial by:	Jc

PARTICIPATION RIGHTS

Your participation in this study is completely voluntary and you may refuse to participate. If you decide to not participate in the study it will not result in any penalty or loss of benefits to which you are otherwise entitled or will it affect your participation in the worksite wellness program.

CONFIDENTIALITY

Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis.

To ensure confidentiality to the extent permitted by law, the following measures will be taken: Your name will be removed from your information and replaced with a five digit code for all hard copies and electronic files. All data collected from the survey will be stored in a locked file cabinet.

QUESTIONS OR PROBLEMS

You are encouraged to ask any questions you may have about this study. For further information about the study contact Ruth Litchfield 515-294-9484 or Kristi Chipman 309-781-2023.

If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office of Research Assurances, Iowa State University, Ames, Iowa 50011.

PARTICIPANT SIGNATURE

If you so wish, you may request a copy of this consent form for your records.

Your signature indicates that you voluntarily agree to participate in this study, that the study has been explained to you, that you have been given the time to read the document and that your questions have been satisfactorily answered.

Participant's Name (printed) _____

(Participant's Signature)

(Date)

ISU IRB # 1	08-287
Approved Date:	7 August 2009
Expiration Date:	12 August 2010
Initial by:	Jc

INVESTIGATOR STATEMENT

I certify that the participant has been given adequate time to read and learn about the study and all of their questions have been answered. It is my opinion that the participant understands the purpose, risks, benefits and the procedures that will be followed in this study and has voluntarily agreed to participate.

(Signature of Person Obtaining
Informed Consent)

(Date)

APPENDIX F. VENDING POST-INTERVENTION INTERVIEW INFORMED CONSENT

ISU IRB # 1	08-297
Approved Date:	7 August 2009
Expiration Date:	12 August 2010
Initial by:	Jc

INFORMED CONSENT DOCUMENT

Title of Study: Worksite Wellness Pilot

Investigators: Ruth Litchfield, PhD, RD, LD
Extension Specialist/Assistant Professor
Iowa State University

Kristi Chipman, RD, LD
Graduate Student
Iowa State University

Your company's voluntary participation in this worksite wellness program makes you eligible to participate in a research study on worksite wellness. You are asked to review a toolkit provided and use the vending machine tool to assess the vending machines at your workplace. You will also be asked to participate in an interview following use of the toolkit. None of your individual information will be shared. Any information shared will only be in aggregate such that individual information cannot be identified.

We ask that you read this document and contact us with any questions you may have before agreeing to participate. This project is being conducted by Iowa State University Extension.

DESCRIPTION OF PROCEDURES

If you agree to participate, you are asked to:

1. Sign this consent form
2. Review the toolkit provided
3. Use the vending machine tool provided
2. Complete an interview following use of the toolkit

RISKS

Participating in this project does not have any foreseeable risks; however, you may feel uncomfortable answering questions about available foods at your workplace.

BENEFITS

If you decide to participate in this project there will be no direct benefit to you. It is hoped that you may learn about nutrition in vending machines and the information gained from this study will benefit society by providing valuable information about behavior change.

COSTS AND COMPENSATION

You will not have any costs from participating in this study thus you will not be compensated for your participation.

ISU IRB # 1	06-297
Approved Date:	7 August 2009
Expiration Date:	12 August 2010
Initial by:	jc

PARTICIPATION RIGHTS

Your participation in this study is completely voluntary and you may refuse to participate. If you decide to not participate in the study it will not result in any penalty or loss of benefits to which you are otherwise entitled or will it affect your participation in the worksite wellness program.

CONFIDENTIALITY

Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis.

To ensure confidentiality to the extent permitted by law, the following measures will be taken: Your name will be removed from your information and replaced with a five digit code for all hard copies and electronic files. All data collected from the survey will be stored in a locked file cabinet.

QUESTIONS OR PROBLEMS

You are encouraged to ask any questions you may have about this study. For further information about the study contact Ruth Litchfield 515-294-9484 or Kristi Chipman 309-781-2023.

If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office of Research Assurances, Iowa State University, Ames, Iowa 50011.

PARTICIPANT SIGNATURE

If you so wish, you may request a copy of this consent form for your records.

Your signature indicates that you voluntarily agree to participate in this study, that the study has been explained to you, that you have been given the time to read the document and that your questions have been satisfactorily answered.

Participant's Name (printed) _____

(Participant's Signature)

(Date)

FORM 1000-1	08-001
Approved Date:	7 August 2009
Expiration Date:	12 August 2010
Initial by:	J/c

INVESTIGATOR STATEMENT

I certify that the participant has been given adequate time to read and learn about the study and all of their questions have been answered. It is my opinion that the participant understands the purpose, risks, benefits and the procedures that will be followed in this study and has voluntarily agreed to participate.

(Signature of Person Obtaining
Informed Consent)

(Date)

APPENDIX G. NEMS-V

Directions

Vending Location Cover Page Directions (Dotted border around title)

Please complete only one cover page per business. The Vending Machine Cover page is the summary of all vending machine available in one business. Many of the questions will need to be answered by a person-in-charge at the business.

1. **Date-** date information is gathered
2. **Number of vending machines-** Total of all vending machines in the building even if they are in different locations within the building.
3. **Vending machine sole source of food in business-** Are there any sources of food such as a cafeteria
4. **Number of Employees-** Total number of employees including those that are part-time
5. **Site Location-** Type of business
6. **Food Sources outside of Business-** type of food businesses near this business and the closeness to the business.
7. **Type of Machines-** Indicate the types of machines available and the number of each type. Include all types of machines at this business
8. **Stocking Machines-** who is responsible.
9. **Access to profits-** who receives profits/revenues from this vending machine?
10. **Vending Sales-** approximate income from vending each month

Individual Vending Machine Questions (Page 1) (Solid border around title)

You will complete this form for each vending machine you evaluate. Staple this form to the front of the food recording form for this same vending machine.

1. **Date-** date you are gathering the information; create an identifying number for each machine
2. **Machine presently working-** is food accessible?
3. **Hours available-** for this specific vending machine, when can people access it? Remember that not all machines may be accessible at all times.
4. **Length of placement for this machine-** How long has this machine been in the building or location.
5. **Type of Machine-** what type of food is sold in this machine.
6. **Who can use machine-** mark all that apply
7. **Cleanliness-** is the machine kept tidy
8. **Location in Building-** for this one machine
9. **Promotion of healthy or non-healthy food items-** any signs, small or large to promote healthy choices. Please add notes about the promotion.

Turn page over to Page 2

Individual Vending Machine Questions (Page 2)

(Picture of vending machine)

You will complete this form for each vending machine you evaluate.

1. **This section requires many steps.**
 - a. Place an "X" in the slots that do not have products or are sold out. Also place an "X" for the slots that are filled with gum or mints.
 - b. Number the remaining slots starting with the first number in the upper left hand corner moving left to right. Then proceed down the rows. Each slot will have one number assigned.
 - c. Complete the recording sheet information as directed below.
 - d. Using the information gathered from the recording sheet mark the corresponding slot on the vending machine picture with a green, yellow, or red marker. This will give you a snap shot of the availability of healthy food choices.

Recording Page Directions

You will complete this form for each vending machine you evaluate. It is likely that you will complete more than one page for each individual machine. Please continuing numbering on additional pages to correspond with assigned numbers on vending machine graphic.

1. **Slot Number-** Enter the number you have assigned to the slot for this item.
2. **Item-** name of food item in corresponding slot
3. **Package size-** the size of the package in this slot in ounces or grams. You do not need to buy the package. If you can not see the sizes write not visible.
4. **Price-** cost of this food product
5. **Category-** check the category this food would fit in using the chart on the recording sheet. Check just one.
6. **Color code-** check the color you have marked on the picture of the vending machine. You will need to consult the Color Code for Beverages and Color Code for Foods on the Website or CD to determine the color code.
7. **Comments-** Notes that you find necessary for evaluation

Food and Beverage Recording Page

Slot #	Item	Pkg. size (oz or g)	Price	Category*								Color Code			Comments
				Bev.	F/V	R/F	Salty	Sweet	E/S	?		Green	Yellow	Red	
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															

* Category Description

Bev. All beverages/drinks
 F/V Fruits and vegetables
 R/F Refrigerated/frozen (ie. yogurt/ ice cream)
 Salty Salty snack (ie: chips, nuts)
 Swt Sweet snacks/pastries/candy
 E/S Entrees and sandwiches
 ? Cannot be determined

Nutrition Environment Measures Survey (NEMS)
Individual Machine
Cover Page

1. Date _____ City _____ ZIP Code _____
 Rater ID ☐ ☐

2. Is machine in working order?

- ☐ Yes
☐ No

3. Hours Available? (Check all that apply)

- ☐ 24 Hours
☐ Work Hours
☐ Before School
☐ After School
☐ Other _____

4. When Was Machine Placed in Site?

- ☐ Less than 1 year
☐ 1-2 years
☐ 3-5 years
☐ 5+ years
☐ Don't Know

5. Type of Machine (Check all that apply)

- ☐ Milk Only
☐ Hot Beverage
☐ Cold Beverage
☐ Ice Cream
☐ Snack
☐ Combination Refrigerated

6. Who Can Use Machine? Check all that apply.

- ☐ Public
☐ Employees
☐ Students
☐ Other _____

7. Cleanliness of machine

- ☐ Acceptable
☐ Not Acceptable

8. Location in building

- ☐ Break room
☐ Hallway within office/factory
☐ Cafeteria
☐ Other _____

9. Do employees have to leave their work area to access vending machine?

- ☐ Yes
☐ No

10. Promotion of healthy or unhealthy vending item(s)

- ☐ Healthy
☐ Unhealthy
☐ Both

Explain _____

Nutrition Environment Measures Survey (NEMS)

Vending Location

Cover Page

1. Date _____ Business _____ City _____ Vending Machine # _____
Rater ID ☐ ☐

2. Number of Vending Machines

- ☐ 1
☐ 2
☐ 3
☐ _____

3. Is the vending the only food source in the establishment

- ☐ Yes
☐ No

4. Number of Employees

- ☐ <50
☐ 50 – 100
☐ 100+

5. Site Location

- ☐ Factory
☐ School
☐ Worksite
☐ Truck Stop/Gas Station
☐ Non-work Public (example public buildings, airports, courthouse, etc.)

Other _____

6. Proximity of business to:
(complete all that apply)

- ☐ Restaurant
☐ <½ mile ☐ ½-1 mile ☐ > 1 mile
☐ Convenience Store
☐ <½ mile ☐ ½-1 mile ☐ > 1 mile
☐ Grocery Store
☐ <½ mile ☐ ½-1 mile ☐ > 1 mile

7. How many types of machines are in your business?

	Number
Hot Beverage	
Cold Beverage	
Combination Refrigerated	
Snack	
Ice Cream	
Milk Only	

8. Who Stocks Machine?

- ☐ Cafeteria
☐ Contract
☐ Employee

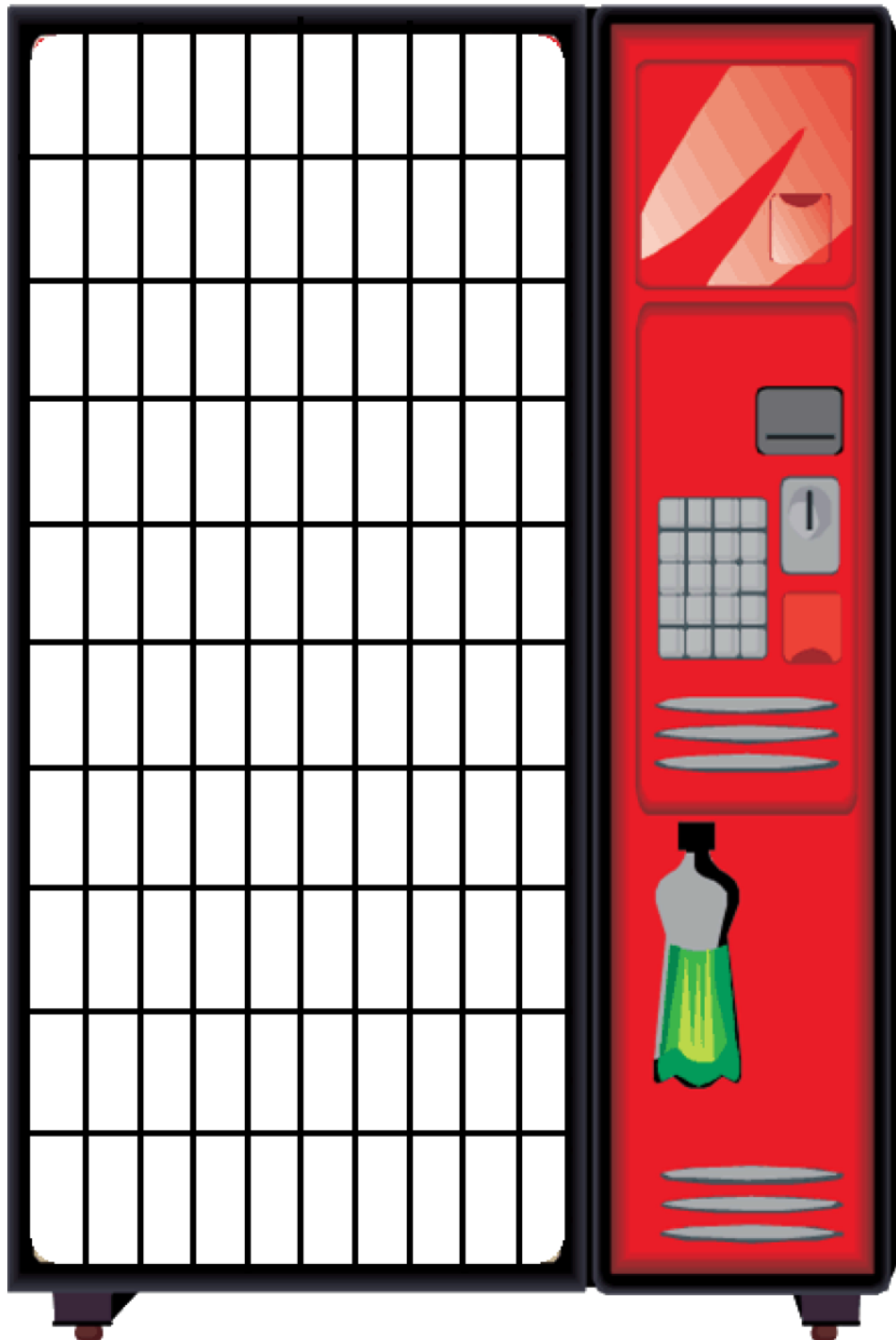
Other _____

9. Who receives profits? (Check all that apply)

- ☐ Employee Fund
☐ Worksite
☐ Vending Business
☐ Student Group
☐ Other _____

COVER PAGE INDIVIDUAL MACHINE

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