CUT THE FAT—1% OR LESS CAMPAIGN

By

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ABSTRACT

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Cut the Fat—1% or Less Campaign conducted in Dunn and Pepin County in the State of Wisconsin.
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Introduction. Obesity is the leading contributor to the progression of chronic disease and cardiovascular disease is the number one killer of American men and women.

Objective. To evaluate the effectiveness of the a community-wide education campaign to encourage consumers to switch from high fat (2% and whole) milk to low fat (skim and 1%) milk as a way to reduce consumption of saturated fat.

Design. The campaign was advertised through poster displays, news releases, and newspaper ads. Taste-tests were conducted during weeks 3 and 4 of the campaign. Telephone surveys were conducted during the 3-week follow-up period. Milk sales were collected weekly. Time periods were the 1-week baseline, the 6-week intervention, and the 1-week follow-up.

Subject/Settings. The campaign was held in Dunn and Pepin County in Wisconsin. Milk sales were collected from 17 area supermarket and convenience stores participating in the

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campaign. During the campaign, 223 taste-tests were conducted at WIC clinics in Dunn and Pepin County and a supermarket and convenience store in Dunn County. During the follow-up week, 310 telephone surveys were conducted in the largest town in Dunn County.

Intervention. Campaign posters were displayed in supermarkets and convenience stores participating in the campaign and specialty stores' front windows. Newspaper ads were placed in local newspapers and news releases were aired on the public radio stations of Dunn and Pepin County. The nutrition message emphasized switching to low fat milk to decrease the consumption of saturated fat, therefore decreasing a person's risk for developing heart disease.

Main Outcome Measures. Weekly milk sales of whole, 2%, 1% and skim milk from participating stores.

Statistical Analyses Performed. A repeated-measures ANOVA was performed to compare the milk sales during weeks 1, 6, and 10.

Results. Of the 223 taste-tests participants 80% agreed to switch to or continue drinking low fat milk and 72% knew 2% milk was considered high fat milk. Of the 310 telephone survey participants, 45% reported drinking skim milk and 71% knew 2% milk was considered high fat milk. Market share of low fat milk did not change significantly from the beginning of the campaign to the end of the campaign or at follow-up. Market share of low fat milk was 43% at the beginning of the campaign, 44% during week four, 41% at the end of the campaign and 43% by follow-up. Market share of high fat milk was 57% at the beginning of the campaign, 56% during week four, 59% at the end of the campaign and 57% by follow-up. Overall milk sales were highest during weeks four and five.

Through the taste-tests and telephone surveys, 173 consumers were exposed to the campaign to switch to low fat milk.

Conclusion. Providing community-wide nutritional education programs needs the support of local, state, and federal funding to be successful, to provide wide media exposure and the involvement of an array of community groups from schools to hospitals to community organizations.

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Chapter 1

Introduction

Over the past twenty years, community-wide education programs have been
implemented to teach consumers nutritional information to decrease the risk of chronic
disease. Community-wide education programs are not a new concept. Dietitians and
health professionals have been trying to teach communities about nutrition and
implications it has on their health for a long time. As research has shown, some studies
have had great success but are difficult to replicate due to the financial restraints (see
Review of Literature—Nutrition Education and Community Programs for examples).
Some research studies have had only limited impact on changing consumers' nutritional
knowledge. While others have had no success at all in changing consumers' beliefs about
nutrition. For community-based nutrition education programs to work, they need the help
of public health policies and considerable funding from the communities and other health
conscious organizations (Nestle et al., 2000). One program that does seem to work and is
able to reach many consumers is the Special Supplemental Nutrition Program for
Women, Infants, and Children (WIC). It is a federally funded nutrition assistance
program administered by the U.S. Department of Agriculture (USDA) Food and
Nutrition Services (FNS) for women, infants and children meeting certain income
guidelines and nutritional risk criteria. Studies done on the WIC population (see Review
of Literature—WIC and Nutrition Education Programs) have shown that it is possible to
teach consumers to make a single dietary change by giving nutrition education that is
simple and easy to follow.

Obesity is the leading contributor in the progression of chronic disease and is reaching epidemic proportions. The most recent NHANES survey done from 1988-1994 revealed that over 50% of Americans are overweight with almost 25% classified as obese. (Flegal et al., 1998 and Must et al., 1999). Americans who are obese or overweight are at an increase risk of developing coronary heart disease, hypertension, and type 2 diabetes and other chronic diseases. Not only is the adult population becoming more and more overweight so are children and adolescents. The CDC's National Health and Nutrition Examination Survey stated that approximately 20% of Americans under the age of 19 are overweight or one in five children (CDC Press Release, 2001b). The same chronic diseases affecting adults who are overweight, are also affecting children and adolescents. Diagnosis of Type 2 diabetes in kids, under the age of 19, is becoming a new medical phenomenon.

Cardiovascular disease is the number one killer of American men and women. Cardiovascular disease develops due to the progression of atherosclerosis. Individuals with high levels of blood cholesterol, especially LDL-cholesterol, usually develop coronary artery disease (a type of cardiovascular disease) due to the development of lipid deposits within their vessel walls. The main dietary intervention to decrease levels of blood cholesterol is to decrease intake of saturated fat. In today's society fatty meats, and high fat dairy products provide the main sources of saturated fat in Americans' diet.

High fat dairy products consist mainly of whole and 2% milk or any product that is made with them. One cup of whole milk alone provides five grams of saturated fat or 7% of a person's total fat intake for the day (based on a 2,000 calorie diet). Two percent milk is not much better, it provides three grams of saturated fat per one cup serving or

almost 5% of a person's total fat intake for the day (based on a 2,000 calorie diet). Low fat milk, 1% and skim, provide the same amount of calcium and other nutrients as high fat milk but without all the saturated fat. *The Dietary Guidelines for Americans, 2000* recommends limiting saturated fat intake to less than 10% of total calories for the day. This is approximately 20 grams of saturated fat per day (based on a 2,000 calorie diet). Choosing low fat milk products may be the simplest and easiest dietary change to make to decrease consumption of saturated fat and aid in the prevention of obesity and heart disease.

Statement of Problem

The objective of this research study was to encourage consumers to switch to low fat milk, 1% or skim, to decrease the consumption of saturated fat. A community-wide nutrition education program was implemented to teach consumers the differences between high fat milk (2% and whole) and low fat milk. Consumers were encouraged to switch to low fat milk to decrease their intake of saturated fat and ultimately decrease their incidence of heart disease and obesity. The campaign lasted six weeks with 223 consumers participating in taste-tests and 310 consumers participated in a follow-up survey to determine extent of the exposure of the campaign. Milk sales data were collected from 17 area supermarkets and convenience stores to determine if there was a change in milk-drinking habits during the campaign or by follow-up.

Chapter 2

Review of Literature

The review of literature will cover four major sections. First, the obesity epidemic in terms of the impact it has on chronic diseases, medical costs to society and the role nutrition plays in the prevention of obesity will be discussed. Secondly, past research studies that have implemented community-wide nutritional education programs will be discussed in conjunction with the WIC program. Then the *Dietary Guidelines for Americans and Healthy People 2010* will be discussed in reference to current and past dietary intakes of total fat, saturated fat and cholesterol intakes. Lastly, the nutritional labeling of each type of milk will be explained along with the regulations for labeling the milk.

The Obesity Epidemic

The prevalence of obesity continues to grow in the United States. According to the Centers for Disease Control and Prevention (CDC) obesity among adults has increased by nearly 60% nationally, since 1991 (Mokdad et al., 2000). The NHANES III (1988-1994) survey found that 54.4% of Americans are overweight with 22.5% being obese (Flegal et al., 1998 and Must et al., 1999). In Wisconsin, 34% of adults were considered overweight in 1998 (Russell et al., 2000), with 17.9% being obese (Mokdad et al., 1999). Obesity is defined as having a BMI (body mass index) greater than or equal to 30 and overweight is defined as having a BMI between 26 and 29.9. As a persons' BMI increases it correlates with an increase risk of chronic diseases, especially when it reaches 30 and above. See appendix A for an example of a BMI table as well as how to calculate BMI (CDC, 2001).

Not only is the adult population becoming fatter so are children and adolescents (Troiano and Flegal, 1998). The CDC's National Health and Nutrition Examination Survey shows that 13% of children ages 6 to 11 years old and 14% of children ages 12 to 19 are overweight, or approximately 1 in 5 children are overweight (CDC Press Release, 2001b and Barlow et al., 1998). To calculate the BMI of a child, use the same calculations that are used for adults but then plot the result on a BMI growth chart. The reason that a child's BMI is not taken as the resulting number is that as children grow they accumulate different portions of fat and muscle at different times. This is why the BMI is plotted on a growth chart and then the physician or dietitian looks at the percentile that the child's BMI falls in. Children are not diagnosed as being overweight until their BMI is greater than the 95th percentile after the age of 2. Children who are at risk for being overweight have a BMI between the 85th and 95th percentile (Reinold, 2001 and Maynard et al., 2001). When overweight and/or obesity is achieved during childhood or adolescence it is more likely to continue into adulthood and increase the risk for chronic diseases later in life. As with adults, the higher the BMI percentile the stronger the correlation the child has for developing the secondary complications of obesity. These secondary complications include hypertension, hyperlipidemia, respiratory dysfunction, psychosocial disturbances and diabetes mellitus (Hansen et al., 2000). See appendix B for examples of the BMI growth charts for girls and boys aged 2-19 years (CDC, 2001).

Consequences of Obesity

The consequences of obesity include an increase risk of insulin resistance, type 2 diabetes mellitus, hypertriglyceridemia, hypertension, coronary heart disease, decreased levels of high-density lipoprotein (HDL) cholesterol, increased levels of low-density

lipoprotein (LDL) cholesterol, gallbladder disease and cancer of the breast, endometrial and colon as well as sleep apnea, chronic hypoxia and hypercapnia and osteoarthritis (Pi-Sunyer, 1993; Wolf and Colditz, 1998; Colditz, 1999). As a person's BMI increases, the average blood pressure and total cholesterol increase and average HDL levels decrease (U.S. Department of Health and Human Services, 2000). Annually 280,000 deaths are directly related to obesity due to the health conditions discussed above (Allsion et al., 1999). Besides the medical consequences of obesity there is also the total dollar (direct and indirect) cost attributed to obesity. The total cost of treating obesity was approximately $99.2 billion dollars in 1995 (Wolf and Colditz, 1998) with approximately $70 billion dollars (7% of total health care costs) in direct health care costs alone (Colditz, 1999). The direct costs of obesity include personal health care, hospital care, physician services, allied health services and medications where as indirect costs are physician visits, lost work days, loss of productivity, restricted activity days, and bed-days. Table 2-1 and Table 2-2 show the break down of the direct and indirect costs attributed to obesity.

Table 2-1
Direct and Indirect Costs Attributable to Obesity, 1995

Disease	Direct Cost (Billions)	Indirect Cost (Billions)
Type 2 Diabetes	$32.4	$30.74
Coronary Heart Disease	$6.99	$0[a]
Hypertension	$3.23	$0[a]
Gallbladder Disease	$2.59	$.151
Breast Cancer	$.840	$1.48
Endometrial Cancer	$.286	$.504
Colon Cancer	$1.01	$1.78
Osteoarthritis	$4.3	$12.9
Total	$51.64	$47.56

[a] Data not available
Adapted from Wolf and Colditz, 1998

Table 2-2
Indirect Costs Attributable to BMI

Indirect Cost	BMI ≥ 25	BMI ≥ 27	BMI ≥ 30
Physician Visits	80,852,894	81,171,498	62,652,050
Work Days Lost	49,147,290	58,456,780	39,256,085
Cost of Lost Productivity ($)	$2.77 billion	$5.66 billion	$3.93 billion
Restricted Activity Days	181,540,000	262,980,000	239,010,000
Bed Days	57,042,177	91,852,767	89,508,700

Adapted from Wolf and Colditz, 1998

Cardiovascular disease has decreased in prevalence since the 1960's but still is the leading cause of death in the United States (Berenson et al., 1998 and Colditz, 1999). Approximately 58 million people or 20% of the adult population have one or more types of cardiovascular disease (CVD) (Morbidity Mortality Weekly Report, 1998). In 1998 alone, over 700,000 people died due to diseases of the heart, with over 13,000 deaths occurring in Wisconsin (Murphy, 2000). Coronary heart disease (CHD) affects more people than any other type of heart disease. High blood cholesterol is one of the major risk factors for CHD and can be modified. Lifestyle changes to prevent or lower blood

cholesterol levels include eating a diet low in saturated fat and cholesterol, increasing physical activity and losing excess weight.

Hypertension or high blood pressure is another chronic disease directly correlated with obesity (Weinsier, et al., 1991). Hypertension is defined as having a systolic blood pressure ≥140 mm Hg and/or diastolic blood pressure ≥90 mm Hg on at least two separate occasions (Beers et al., 1999). Hypertension is common in the general population. From 1988-1991, approximately 24% of the United States adult population was diagnosed with hypertension (Burt and Whelton et al., 1995). The number of adults with hypertension has decreased from a peak of 36.3% in NHANES I survey (1971-1974) to 20.4% in NHANES III survey (1988-1994) (Burt and Cutler et al., 1995). Lifestyle factors to decrease risk of hypertension include decreasing body weight and increasing physical activity.

Type 2 diabetes mellitus may be the main consequence of obesity. The increase in the incidence of type 2 diabetes is strongly correlated with the increase in obesity (CDC Press Release, 2001a). From 1994 to 1996, 3.5 new cases of diabetes were diagnosed per 1,000 people (U.S. Department of Health and Human Services, 2000). In 1999 alone, 6.5% of U.S. adults were diagnosed with diabetes (CDC Press Release, 2001a). In 1999, Wisconsin had 330,000 people living with diabetes (type 1 and type 2) (Wisconsin Center for Health Statistics, 1999). Behavioral factors that may explain this increase in the incidence of diabetes include improper nutrition (i.e. increased fat consumption), decreased physical activity, and obesity as well as the relative weakness of interventions to change individual, community, or organizational behaviors.

In children and adolescents, the incidence of Type 2 diabetes is also on the rise and again highly correlated with obesity. Obesity is the hallmark of Type 2 diabetes in children, with up to 85% of affected children either overweight or obese at diagnosis (American Diabetes Association, 2000). It is difficult to get a clear picture of how many children have Type 2 diabetes because of its relatively new emergence in this age group. The NHANES III projected a national prevalence of 4.1 per 1,000 adolescents aged 12-19 years for all types of diabetes (American Diabetes Association, 2000). The age group at which Type 2 diabetes is most likely to develop in adolescents and be diagnosed is 12-19 years. Prevention of Type 2 diabetes in children needs to focus on proper nutrition (decrease total fat and saturated fat intake) and increasing physical activity.

Role of Fat and Kilocalories in Obesity

Obesity is defined as the excessive accumulation of body fat which is the result of expending less energy than is consumed. To decrease the incidence of obesity, society needs to focus on expending more energy then they consume. This can be done through increasing physical activity and/or replacing high calorie, high fat food items with lower fat, lower calorie items. A person that replaces high fat food items with low fat food items will decrease the amount of calories they eat but will still be able to eat the same serving size. Weight loss occurs when the body is in negative energy balance. For a person to lose one pound of body weight per week, they need to create a negative energy balance of 3500 calories.

Total calorie intake is usually higher in individuals who consume a high fat diet versus a low fat diet therefore increasing the risk for gaining weight. (Hill et al., 1998). Although the primary impact of high fat diets on obesity may be through affects on food

intake, body fat storage also occurs at a greater rate when excess energy comes from fat than when it comes from carbohydrate or protein (Linder, 1991 and Grundy, 1996). Saturated fat itself does not contribute to obesity. It is the total fat intake from excess calories that promotes obesity.

Role of Fat and Saturated Fat in Cardiovascular Disease

Progression of Atherosclerosis

Atherosclerosis is characterized by the thickening of the internal layer of the walls of major blood vessels, especially arteries, resulting in a constriction of the vessel lumen and a restriction of blood flow and vessel elasticity (Beers et al., 1999). The end result is a type of cardiovascular disease. For example, if there are atherosclerotic lesions in the coronary arteries, then coronary heart disease may develop. Numerous epidemiology studies along with pathologic observations and autopsies of children and adolescents have shown that coronary atherosclerosis begins at a very early age, usually by three years old (Berenson et al., 1998; Stary, 2000 and McGill et al., 2000). The progression of atherosclerosis is described very thoroughly in many medical and physiology books and will not be described in detail here (Beers et al. 1999; Lichtenstein, 1999; Sherwood, 1993). The main point is that atherosclerosis develops due to lipid deposits on the surface of the vessels walls. The deposition of the lipid deposits on these walls is due to many factors including the plasma levels of lipoproteins (Thomas, 1997). The plasma levels of these lipoproteins will be discussed in further detail and specifically the role nutrition plays in plasma lipoproteins.

Lipoproteins and Cholesterol in the Progression of Atherosclerosis

Total cholesterol is the measurement of all lipoproteins fractions in the blood. The lipoproteins found in the blood are VLDL's—very low-density lipoproteins, LDL's—low-density lipoproteins, IDL's—intermediate-density lipoproteins, HDL's—high-density lipoproteins. The most important lipoproteins when discussing the progression of atherosclerosis are LDL's and HDL's. There is a strong correlation between CHD and high total cholesterol levels (Cleeman et al., 1998). LDL-cholesterol is the major cholesterol carrying lipoprotein particles in the body's blood circulation and is the primary atherogenic lipoprotein. Numerous research studies have shown a strong correlation between increased levels of serum LDL-cholesterol and an increase risk for developing CHD (Expert Panel—NCEP, 1994). HDL-cholesterol is responsible for transporting cholesterol from the peripheral tissues to the liver where the cholesterol can be metabolized and excreted. HDL-cholesterol is considered the good cholesterol and high levels are a negative risk factor for heart disease. There are several ways in which high levels of serum HDL-cholesterol may protect against the progression of atherosclerosis. One concept was already mentioned above, is that HDL-cholesterol may promote reverse cholesterol transport (Von Eckardstein et al., 1994). If this concept is true, a high HDL-cholesterol could reduce the accumulation of cholesterol within arterial walls; on the other hand a low HDL-cholesterol may increase cholesterol accumulation within the arterial walls. HDL-cholesterol levels may also slow down the oxidation of LDL-cholesterol or prevent self-aggregation of LDL-cholesterol, both within the arterial wall therefore slowing the progression of atherosclerosis (Parthasarathy et al., 1990 and Khoo et al., 1990). Table 2-3, shown below, lists the levels at which total cholesterol,

LDL-cholesterol and HDL-cholesterol become a positive or negative risk factor for heart disease.

Table 2-3
Classification of Cholesterol, LDL-Cholesterol and HDL-Cholesterol Levels
(mg/dL)

Total Cholesterol	
<200	Desirable
200-239	Borderline High
≥240	High

LDL Cholesterol—Primary Target of Therapy	
<100	Optimal
100-129	Near Optimal/Above Optimal
130-159	Borderline High
160-189	High
≥190	Very High

HDL-Cholesterol	
<40	Low—positive risk factor
≥60	High—negative risk factor

Adapted from Expert Panel—NCEP, 2001

Role of Nutrition

Nutrition increases or decreases levels of LDL-cholesterol or HDL-cholesterol in the blood influencing the progression of atherosclerosis and ultimately the risk of CHD. Levels of LDL-cholesterol, HDL-cholesterol and total cholesterol are determined partly by genetics and partly by dietary intake of cholesterol, saturated and unsaturated fat (Leenen et al., 1993). High levels of total dietary fat intake (>30% of total caloric intake) may only be implicated in the progression of atherosclerosis if there is a high intake of saturated fat (>10% of total calories) within the total fat intake (Miller, 2000). Dietary intake of saturated fat is the main culprit that raises levels of serum cholesterol and promotes the progression of atherosclerosis (Grundy, 1996). In numerous research

studies, it has been shown that high levels of dietary saturated fat intake are correlated with high levels of serum cholesterol, even in children (Miller, 2000; Lauer et al., 2000; Kwiterovich, 1995; Williams and Bollella et al., 1998 and Hebert et al., 1999). As with saturated fat, high intakes of dietary cholesterol cause an increase in serum cholesterol levels. Most food items high in saturated fat are also high in dietary cholesterol; so in essence by decreasing saturated fat intake, intake of dietary cholesterol will also decrease. Lowering serum cholesterol is important for everyone no matter the age, gender or the number of risk factors a person may have. Therefore every American should consume food items that are low in dietary cholesterol and saturated fat. Food sources that contain low amounts of saturated fat and dietary cholesterol are discussed under the section—*Milk Facts and Nutrition Labeling.*

WIC and Nutrition Education Programs

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is a federally funded nutrition assistance program administered by the U.S. Department of Agriculture (USDA) Food and Nutrition Services (FNS). During fiscal year 2000, this program provided $3 billion for supplemental foods and $1.1 billion for nutrition services and administration to assist lower-income pregnant, breastfeeding, and postpartum women, infants, and children up to age 5 who are at nutritional risk (Robertson, 2001a). WIC clients are offered a variety of nutrition services including nutrition education, breastfeeding promotion and support and referrals to health and social services. The nutritional education that is available to WIC clients incorporates classes, counseling, and other activities to teach participants about proper nutrition, positive food habits, and the prevention of nutritionally related problems. The WIC

program serves a monthly average of 7.3 million individuals, including about 47% of all infants born in the United States (Robertson, 2001b).

There have been very few studies done pertaining to WIC clients and milk drinking habits. One of the few studies includes a recent research study done in New York State (Dennison et al., 2001), which examined the percentage of children who consumed low-fat milk and identified the parental characteristics associated with the use of whole or low-fat milk. In this particular study, the researchers found 61% of 2-4 year olds exclusively drank high fat milk where as only 10% of the same age group exclusively drank low-fat milk. The more highly educated the parents, the more likely their children consumed low-fat milk, except for those with Hispanic parents where high fat milk consumption did not decrease with increase in parental education.

The other studies pertaining to WIC clients and nutritional education relate to fruit and vegetable intake. The main objectives or goals of these studies were to increase fruit and vegetable intake among WIC clients (Havas et al., 1998 and Anderson et al., 2001). Maryland's 5-A-Day promotion (Havas et al., 1998) integrated the use of peer educators, most of whom were participants in the WIC program themselves, as primary nutrition educators along with printed materials to serve as visual reminders. This type of nutrition education led to a statistically significant outcome in terms of increase in fruit and vegetable intake among the intervention participants. The second study (Anderson et al., 2001) integrated the use of the Farmers' Market Nutrition Program in Michigan and nutrition education to increase the intake of fruits and vegetables among WIC and Community Action Agency clients. The four different types of interventions were 1) education about the use, storage, and nutritional value of fruits and vegetables, 2)

distribution of farmers' market coupons, 3) both education and coupons, and 4) no intervention (control). The results of this study were that both components of the intervention (education and coupons) were significantly related to changes in attitudes about fruits and vegetables and therefore increased intake of both fruits and vegetables.

Receiving in-depth and continual nutrition education can help increase intake of certain food items (i.e. fruits and vegetables, low-fat milk) by WIC clients, but brief interactions will not likely change dietary habits for these clients. They need visual reminders as well as peer support to incorporate the needed changes. The majority of WIC clients may not understand or correctly apply nutrition information provided to them in counseling sessions (Michel et al., 1994). For example, it is recommend that children from one to two years old drink whole milk but many parents will switch their child to the type of milk the family drinks because it is easier and less confusing.

Nutrition Education and Community Programs

Proposals to change dietary behaviors of entire communities, economically, remain weak. Although a number of community-based nutrition education programs have been effective in lowering the prevalence of cardiovascular disease risk factors in target communities, the cost and intricacy of such programs have made them difficult to replicate (Nestle et al., 2000). In addition, many of these community-based nutrition education programs have only had limited effects on the targeted health behaviors of community members. The most significant community-based nutrition education research studies in the past 20 years are shown below in table 2-4. For community-based nutrition education programs to work, they need the help of public health policies and

considerable funding from the communities and other health conscious organizations

(Nestle et al., 2000).

Table 2-4
Community-Based Nutrition Education Programs

Research Study	Type of Program	Objective	Methods	Results
Minnesota Heart Health Program[a]	Community Education Program	To reduce morbidity and mortality from coronary heart disease in whole communities	13-year study; 3 sets of communities, 1 control, 1 education	Many intervention components proved effective in targeted groups, but overall program effects were modest in size and duration and generally within chance levels
Project LEAN[b]	Social Marketing Campaign in the United States	To promote behavior change to reduce the nation's risk for heart disease and some cancers	Used public service advertising, publicity, and point-of-purchase programs in restaurants, supermarkets, and school and worksite cafeterias	Reached 50% of TV audience, and 35 million readers through print publicity. 300,000 calls were received on the toll-free hotline. 34 organizations joined the foundation. 13 states developed local campaigns
Pawtucket Heart Health Program[c]	Community Education Program	To change cardiovascular risk factors and disease risk through community-wide education	Surveys to assess risk factors. Promotion of low-fat foods, nutrition programs, restaurant menus highlight heart-healthy choices and exercise courses	Altering cardiovascular risk factors through community-based education was feasible but maintaining statistical significance was not.
The Bogalusa Heart Study[d]	Community Education Program for children and adolescents	Examined the relationship of overweight to cardiovascular risk factors	Examined adolescents age 5 yr to 17 yr from 1973-1994, measuring anthropometry and lab values	About 11% examined were overweight and were more likely to have elevated total cholesterol, which was statistically significant.
Healthy Start[e]	Comprehensive Health Education Program for Preschool Children	To reduce the risk for future coronary heart disease	Preschool food service intervention designed to reduce total fat (<30%) and saturated fat (<10%) and nutrition education curriculum	Results yet to be published
1% or Less[f]	Community-based Nutrition Campaign	To reduce consumption of saturated fat by switching from high-fat to low-fat milk	Milk sales data were collected, public service advertising and taste-tests were done to promote low-fat milk	Low-fat milk sales increased to 41% of overall milk sales from 18% and 38% reported switching to low-fat milk

Lifestyle 2000 Experience[g]	Nutrition Education in Supermarkets	Promote selection and purchase of low-fat foods, fresh fruits and vegetables, bread and cereal products	15-week intervention consisting of point-of-purchase materials displayed in supermarkets, taste-testing, cooking demonstrations and competitions	41% of shoppers indicated that the promotion changed their food choices
Supermarket Shelf-Labeling Program[h]	Nutrition Education in Supermarkets	Promote selection of heart healthy food choices	18 supermarkets used shelf-labeling, exit survey to assess awareness	Overall awareness was 28%. People who had been screened for cardiovascular disease in the previous year had greater awareness of the program

[a]Luepker et al., 1994
[b]Samuels, 1993
[c]Carleton et al., 1995
[d]Freedman et al., 1999
[e]Williams and Squillace et al., 1998
[f]Reger et al., 1998
[g]Scott et al., 1991
[h]Lang et al., 2000

"Nutrition education is not effective by itself, it must also have the goal of influencing behavior" (Sigman-Grant, 1996). "Nutrition education is a significant factor in improving dietary practices when behavioral change is set as the goal and the educational strategies are designed with that as a purpose" (Contento, 1995). Changing eating behaviors is very difficult because food is everywhere. It is not like smoking or alcoholism, where people can stop without serious consequences. People must eat to survive. For eating behaviors to change, people must be motivated to modify attitudes about food choices to improve health and decrease risk of disease. Nutrition education should begin in childhood and continue throughout adulthood to have the greatest impact on reducing risks of chronic diseases.

The most influential on shaping people's eating habits and lifestyles is the mass media (Finnegan et al., 1999). The media exposes large numbers of people to stories, messages, and information about health and has the ability to construct the public agenda for health-promoting policies. The media is also very beneficial in creating environments

for individuals to enhance health, but concurrently unhealthy products and lifestyles are promoted (i.e. fad diets).

Dietary Guidelines for Americans, 2000 and Healthy People 2010

The *Dietary Guidelines for Americans* recommends choosing a meal plan that is low in saturated fat and cholesterol and a moderate intake of total fat. The *Dietary Guidelines for Americans* also recommends an intake of total fat to be no more than 30% of total calories and saturated fat intake to be less than 10% of total calories as well as limiting cholesterol intake to less than 300 mg/day. The primary sources of saturated fat are meats and high fat dairy products. Thus, choosing low fat and fat-free dairy products is an effortless way to achieve the recommended guidelines.

Overall, Americans are consuming less saturated fat, total fat and cholesterol, but there still is room for improvement. Cholesterol intake has decreased significantly in the past twenty years, corresponding with a decrease in serum cholesterol levels from 213 mg/dL in 1980 to 203 mg/dL in1994 (Cleeman et al., 1998). Americans consume about 33% of their total calories from fat and 11% from saturated fat (U.S. Department of Health and Human Services, 2000). The 1994 Continuing Survey of Food Intakes by Individuals, states that 67% of persons aged 2 years and older consumed more than 30% of daily calories from total fat and 64% consumed more than 10% of daily calories from saturated fat (Crane et al., 1998). These percentages have since decreased from when the survey was done in 1989-1991. At that time 78% of people consumed more than the recommended intake for total fat and 79% exceeded the intake for saturated fat (Crane et al., 1998). New guidelines just released by the National Institute of Health (National Institute of Health, 2001) recommends an even more intense and effective eating plan

than previously mentioned by *The Dietary Guidelines for Americans*. These new dietary guidelines reflect changes in eating habits of Americans. The new Therapeutic Lifestyle Changes (TLC) diet recommends <7% of total calories from saturated fat and <200 mg of dietary cholesterol on a daily basis. The TLC diet also allows daily fat intake to be ≤35% of total calories, provided the majority comes from unsaturated fat, which does not raise serum cholesterol levels (National Institute of Health, 2001).

Dietary Guidelines for Specific Organizations

In the past ten years there has been more nutritional information available to consumers and health professionals, this is making it difficult to determine what information is reliable and what "diet" Americans should follow. In the United States there are many organizations providing nutritional information to health professionals as well as consumers. How likely is it that they all recommend the same dietary guidelines? It is very likely. Table 2-5 incorporates the major health organizations and their dietary guidelines for total fat, saturated fat, and dietary cholesterol intake.

Table 2-5
Dietary Guidelines from Various Organizations

Organization*	Age Group	Fat (% from energy)	Saturated Fat (% from energy)	Cholesterol (mg)
AHA[a]	Adults	≤ 30%	< 7-10%	< 300
	Children	≤ 30%	< 10%	< 300
ADA[b]	All	≤ 30%	< 10%	< 300
NIH[c]	All	≤ 35%	< 7%	< 200
ADA[d]	Adults	< 30%	< 10%	< 300
	Children	20-30%	< 10%	< 300
USDA & USDHHS[e]	Adults	≤ 30%	< 10%	< 300
	Children	≤ 30%	< 10%	< 300
AAP[f]	Children	≤ 30%	< 10%	< 300

[a] American Heart Association—http://www.americanheart.org
[b] American Diabetes Association—http://www.diabetes.org
[c] National Institute of Health, 2001
[d] American Dietetics Association—http://www.eatright.org
[e] US Department of Agriculture and US Department of Health and Human Services—Dietary Guidelines for Americans, 2000
[f] Thompson et al., 1994: AAP stands for American Academy of Pediatrics

Children and Dietary Intake

It is important to focus on children and their eating habits because what we eat as children greatly impacts what we eat as adults. The third National Health and Nutrition Examination Survey (NHANES III, 1988-1994) and Continuing Survey of Food Intakes by Individuals (1994-1996) provides data on current intake of total calories, percentage of calories from fat and dietary intake of cholesterol for children and adolescents, aged 2-19 years (Troiano et al., 2000 and Lin et al., 1999). Overall calorie intake has changed very little from the 1970's to the 1990's. Over this same time period, the percentage of calories from total fat and saturated fat has decreased, but is still above the recommended levels (Lin et al., 1999). This data also showed that only approximately 1 in 4 children met the recommended intakes for total fat and saturated fat, where as 3 in 4 met the recommended intakes for dietary cholesterol (Troiano et al., 2000). Table 2-6

summarizes the intake of total fat and saturated fat as a percent of energy as well as

cholesterol intake from NHANES I (1971-1974), NHANES II (1976-1980) and

NHANES III (1988-1994).

Table 2-6
Trends in Intakes of Total Fat, Saturated Fat and Cholesterol

Total Fat (% of Energy)			
Age	NHANES I 1971-1974	NHANES II 1976-1980	NHANES III 1988-1994
2-5 y	36.2 ± 0.22	35.3 ± 0.27	32.8 ± 0.23
6-11 y	36.3 ± 0.18	35.7 ± 0.20	33.7 ± 0.23
12-19 y	36.8 ± 0.21	36.4 ± 0.21	33.7 ± 0.23
Saturated Fat (% of Energy)			
Age	NHANES I 1971-1974	NHANES II 1976-1980	NHANES III 1988-1994
2-5 y	13.7 ± 0.15	13.0 ± 0.12	12.4 ± 0.10
6-11 y	13.9 ± 0.11	13.2 ± 0.11	12.5 ± 0.12
12-19 y	13.7 ± 0.14	13.4 ± 0.10	11.8 ± 0.14
Cholesterol (mg)			
Age	NHANES I 1971-1974	NHANES II 1976-1980	NHANES III 1988-1994
2-5 y	257 ± 7	218 ± 5	193 ± 5
6-11 y	282 ± 7	250 ± 6	231 ± 5
12-19 y	340 ± 8	309 ± 7	211 ± 6

Adapted from Troiano et al., 2000

Milk Consumption and Children

It is recommended by numerous organizations that children 1 to 2 years of age

should only consume whole milk (NIH, NCEP, AAP). The NHANES III data showed

that 2%, 1% and skim milk are consumed more frequently than whole milk in children

older than 5 years of age (US Department of Agriculture, Agricultural Research Service,

1994). But there still is room for improvement due to the fact that among youths, 6 years

and older, approximately 15% of saturated fat intake and approximately 7.5% of total fat

intake comes from whole and 2% milk products (Troiano et al., 2000). For these children,

2% milk was consumed the most. Switching from high fat milk to low fat milk will reduce caloric intake and total fat and saturated fat intakes to recommended levels and still contribute the vital nutrients milk has to offer to children.

Labeling of Milk

Many people do not understand the difference in fat content between high fat milk and low fat milk. This lack of knowledge may largely be due to the United States government and their labeling process for dairy products. Up until a few years ago, 2% milk was considered low fat milk by FDA standards. In 1996, FDA revoked many milk and dairy standards of identity and made other regulatory changes (Altman, 1998). Before these changes, FDA allowed manufactures of dairy products to use words such as "nonfat", "reduced fat" and "light" in conjunction with standardized terms such as "sour cream". This is where the major conflict arose. The use of these words with the standardized dairy product was inconsistent with the definitions for these same words under the nutrient content claims rules. These are the definitions that are used under the nutrient content claims—"fat-free" is defined as having <0.5 grams of fat per serving; "low-fat" is defined as having ≤3 grams of fat per serving; "reduced-fat" is defined as having at least 25% or less fat per serving than the reference food (Altman, 1998; Vetter, 1996). Using these definitions 2% milk would fall under the classification as a reduced-fat food item but it didn't fall under previous FDA standards, it was considered a low-fat food item. This is why in 1996 FDA revoked certain milk and dairy standards of identity. Now on milk labels, the level of fat is defined as fat-free for skim milk, low fat for 1% milk, and reduced-fat for 2% milk. Whole milk is still labeled as whole milk. For

clarification, only skim and 1% milk are considered low fat milk, where as 2% milk and whole milk are considered high fat milk.

Milk Facts and Nutrition Labeling

Milk is an important source of many essential vitamins and minerals in Americans' diet. As was discussed above, there are four different types of milk—skim, 1%, 2% and whole milk. Each type of milk is based on the amount of fat and calories it contains (see Table 2-7). Whole milk has the greatest amount of fat in it at 8 grams per 1 cup serving, 2% milk or reduced-fat milk has 5 grams of fat per 1 cup serving, 1% milk or low-fat milk has 2.5 grams of fat per 1 cup serving and skim milk or fat-free milk has 0 grams of fat per 1 cup of serving. Over a lifetime, the fat savings from drinking low fat milk could be substantial. By drinking skim milk instead of whole milk (after the age of two years), the average American could cut 400 pounds of fat from his/her diet for a lifetime.

The amount of total fat is not the only concern, the amount of saturated fat is equally important, if not more. Saturated fat is the major contributor to heart disease—the number one killer of American men and women. Saturated fats come mainly from animal foods, such as meat, poultry, butter and whole milk and from coconut, palm and palm kernel oils. Whole milk and 2% milk are the leading sources of saturated fat in the American diet. Whole milk has 5 grams of saturated fat per 1 cup serving which is equal to one hot dog, 5 slices of bacon, a Snickers candy bar or a hamburger at Burger King (Duyff, 1996). Where as 2% milk has 3 grams of saturated fat per 1 cup serving which is equal to 3 slices of bacon. Skim and 1% milk have 0 grams and 1.5 grams of saturated fat per 1 cup serving, respectively.

Besides the saturated fat in milk, dietary cholesterol is also a major concern. Only food items of animal sources contain dietary cholesterol, not food items of plant sources. Some sources of dietary cholesterol are eggs, meat, poultry, fish and dairy foods like milk. A diet high in dietary cholesterol is one factor that elevates serum cholesterol for some people. But a person's total fat, especially saturated fat, has a more significant effect on serum cholesterol levels than dietary cholesterol itself does. Whole milk and 2% milk have 35 milligrams (mg) and 20 mg per 1 cup serving, respectively. Where as skim and 1% milk have 0 mg and 5 mg per 1 cup serving, respectively (see Table 2-7). The cholesterol level in milk is relatively low when compared to other sources that contain cholesterol such as of beef or chicken with approximately 90 mg per 3 ounce serving (Duyff, 1996).

The calorie level of each type of milk is also significant (see Table 2-7). Skim milk contains more than 40% fewer calories than whole milk. If a person was to switch from whole milk to skim milk (drinking three servings per day), they could lose up to 22 pounds in body weight in one year. A person could lose up to 15 pounds in body weight in one year by switching to 1% milk. By making one simple dietary change such as switching to low fat milk, people can lose weight and significantly decrease their risk for heart disease, type 2 diabetes and other chronic diseases.

Milk is an excellent source of calcium, vitamins A & D, potassium, riboflavin and protein. Many people think that as the fat level decreases in the milk, the level of the other nutrients decrease also. This is partly true. As the fat level decreases, the levels of vitamins A and D decrease because they are fat-soluble vitamins but all dairy manufactures fortify the low-fat milks with vitamins A and D, to the same level that is

found in whole milk. Both 1% and skim milk have all the calcium, vitamins A and D,

riboflavin and protein found in whole milk and 2% milk, without all of the saturated fat.

Therefore, skim and 1% milk are more nutrient dense than whole or 2% milk.

Table 2-7
Nutrition Labels of Fluid Milk

	Whole Milk	2% Milk	1% Milk	Skim Milk
Nutrition Facts				
Serving size	1 cup	1 cup	1 cup	1 cup
Amount per serving				
Calories	160	130	110	90
Calories from fat	70	45	20	0
Total Fat *(grams)*	8	5	2.5	0
Saturated Fat *(grams)*	5	3	1.5	0
Cholesterol *(milligrams)*	35	20	5	<5
Sodium *(milligrams)*	125	125	130	130
Total Carbohydrate *(grams)*	13	13	13	13
Dietary Fiber *(grams)*	0	0	0	0
Sugars *(grams)*	12	12	12	12
Protein *(grams)*	8	8	9	9
Vitamin A *(%)*	6	10	10	10
Vitamin D *(%)*	30	30	30	30
Vitamin C *(%)*	25	25	25	25
Calcium *(%)*	4	4	4	4

(Adapted from food labels of the milk products)

Milk Sales

The dairy industry spends about $225 million each year endorsing its products,

but historically, it has resisted marketing low fat milk (Pelletier et al., 1999). It is

believed that the dairy industry has inadequately promoted low-fat versions of diary

products, citing concerns about product image, price incentives, and labeling definitions.

Before 1970, the United States only recorded the sales of whole milk and skim milk.

Beginning in 1970, the sales of all four types of milk were documented and have been

since that time. This yearly data allows researchers to track the consumption of the four

types of milk. Since 1970, whole milk consumption has decreased 68%, where as low-fat

(1% and skim) milk consumption has increased 76% (Putnam, 2000). This data alone would lead many people to believe that Americans drink more low fat vs. high fat milk. This is not true. High fat milk sales still dominate the market. Together whole milk and 2% milk comprise 70% of the total fluid milk consumption in the United States, in 1998 (Putnam, 2000).

Overview

The consumption of high fat milk appears to be an issue in increasing fat intake, which is associated with obesity and many chronic health problems. Therefore, a community wide intervention might increase awareness and foster change in the pattern of milk consumption.

Chapter 3

Methodology

The "Cut the Fat—1% or Less Campaign" was developed and executed in

collaboration with the Director of the Women, Infants, Children (WIC) serving Dunn and

Pepin Counties. The methods were similar to a research project conducted in West

Virginia (Reger, 1998). Preceding the beginning of the campaign, the Committee on the

Protection of Human Subjects in Graduate Student Research at University of Wisconsin-

Stout approved each survey tool that was subsequently used to collect the data. The

intervention campaign, 6 weeks in duration, was conducted March 19, 2001 through

April 30, 2001. Taste-tests were conducted during weeks three and four. Milk sales data

were collected throughout the campaign. The follow-up milk sales data were collected

and telephone surveys were conducted May 20-26, 2001, three weeks after the end of the

campaign. The sequence of the campaign intervention and collection of data are shown in

Table 3-1.

Table 3-1
"Cut the Fat—1% or Less Campaign" Intervention and Data Collection
Sequence of Activities

Activity	Date Begun	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10
Letter to stores seeking participation	03/09										
Display of posters in area businesses	03/19	X	X	X	X	X	X				
Supermarket milk sales during campaign	03/19	X	X	X	X	X	X				
Newspaper releases	03/19	X	X								
Radio ads	04/01			X	X						
Announcement of taste-tests in newspapers	04/04			X	X						
Taste-Test Supermarkets	04/05			X	X						
Taste-Test WIC Clinics	04/05			X	X						
Newspaper ads	04/19					X	X				
Supermarket milk sales follow-up after campaign	05/20										X

Intervention

Campaign activities described below included educational displays at WIC clinics in Dunn and Pepin counties, newspaper and radio ads strategically planned to reach the clientele served by the two WIC clinics and community members as well as a poster display in area businesses and businesses that sell milk in Dunn and Pepin counties.

Display of Posters:

Posters were hung in area supermarkets, convenience stores/gas stations, window fronts of specialty stores and other area businesses in Dunn and Pepin counties. The posters graphically displayed the different levels of fat in whole, 2%, 1% and skim milk. They recommended people switch to low-fat milk. The posters were displayed at the beginning of the campaign March 19th, 2001 to April 30, 2001. See appendix C for an example of the poster utilized for the campaign.

Paid Advertisements:

The WIC director for Dunn and Pepin County, developed newspaper ads and news releases announcing the campaign. The newspaper ad was advertised in four local papers serving Dunn and Pepin county starting on April 19, 2001 and ran for one week, with the exception of one of the newspapers that ran the ad for two weeks. The ad contained the same information as the posters that were displayed around town. The news releases were also placed in the same four local papers at the beginning of the campaign, March 18-31, 2001 (weeks one and two of the intervention). The news releases explained the difference between the high-fat milk and the low-fat milk in terms of fat content and nutrient content. The news releases explained the positive impact that drinking the low-fat milk can have on chronic diseases. Radio ads, 30 seconds long, were aired on two

local radio stations during April 1-14, 2001 (weeks three and four of the intervention).

The radio ads contained essentially the same information as the news releases in the

newspapers. Due to the radio ads being placed as free community information the exact

number of aired times is unavailable. The taste-tests at the local supermarket and

convenience store were also announced in the local Dunn county newspaper on April 4th,

and April 8th, challenging people to come in and see if they can taste the difference

between the high-fat and low-fat milks. See appendix D for examples of the newspaper

ad and news releases/radio ads.

Supermarket/Convenience Store Programs:

Dunn and Pepin County have many small communities (population <1000

people) that do not have their own supermarkets. In these communities, people rely on

the convenience stores to buy their milk. For this reason, convenience stores along with

supermarkets were included in this study. A letter explaining the campaign was sent to all

area supermarkets and convenience stores in Dunn and Pepin County asking them to

participate in the study. See appendix E for an example of this introductory letter. A

follow-up telephone call was then placed to determine if the business would agree to

participate. Seventeen area supermarkets and convenience stores agreed to participate.

These businesses provided milk sales or milk-ordering data, displayed signs in their dairy

case encouraging customers to choose 1% or skim milk, and displayed posters on their

front display windows.

WIC Clinic Programs:

Women, Infant, Children (WIC) clinics are a supplemental nutrition program

developed to improve the nutritional needs of women (pregnant, breastfeeding, and post-

partum), infants, and children (<5 years of age) who meet the income guidelines and have a nutritional risk factor. Taste-tests were conducted in three clinics in Dunn and Pepin counties during April 1-14, 2001. Nutritional education was also provided to these participants in the form of a poster board display, showing the different levels of fat in each type of milk as well as nutrition counseling.

Taste-Tests

Taste-tests were conducted during April 1-14, 2001 (weeks 4 and 5 of the campaign). Trained campaign volunteers conducted blind taste-tests at a local supermarket, a convenience store, three WIC clinics and the University of Wisconsin-Stout, involving 223 community members. Campaign volunteers were University of Wisconsin-Stout, dietetics students. The volunteers received a one-hour training session explaining the details of the campaign and how to conduct the taste-tests. At the taste-tests sites there were at least two volunteers (volunteer A and volunteer B) conducting the taste-tests. Volunteer A was responsible for conducting the taste-test survey and volunteer B was responsible for assembling the taste-test materials. Both volunteers also recruited potential community members for the taste-test. The taste-test survey for each participating community member was conducted as follows:

1. Volunteer A asked the community member or WIC client for their consent to participate in the study. To be able to participate in the study the community member could not be allergic to milk products or be lactose-intolerant due to health risks associated with these medical conditions when milk is consumed.

2. If the community members or WIC client consented to participating, the participant was then handed a consent form explaining the risks and the benefits of participating in the study. See appendix F for an example of the consent form.

3. The community member or WIC client was then asked a series of demographic questions regarding age, gender, and milk drinking habits (type of milk and frequency of use). See appendix G to view the entire taste-test survey.

4. The next question on the survey was a knowledge-based question regarding the fat content of each type of milk. The community member or WIC client had to tell volunteer A if whole, 2%, 1% and skim milk was either low in fat or high in fat.

5. During this time Volunteer B set up the taste-test materials. Each community member or WIC client, who participated in the study, was given a randomly selected combination of the four different types of milk, marked A, B, C, and D. Within each combination, there was exactly one of each different type of milk. There were no duplicates regarding the type of milk in the combination. Random selection of the combination of milk was developed statistically. See appendix H for an example of the random sampling of milk types. The cups of milk were set up in a muffin tin for ease of use during the taste-test. Four slots in the muffin tin were used and were labeled A, B, C, and D to ensure accuracy and consistency through out the taste-test.

6. Volunteer A then asked the community member or WIC client to close their eyes. This was done so that the taste-test is based on the taste of the milk and not the appearance of the milk. This taste-test was not a comparison test of the different types of milk.

7. The community member or WIC client was then handed cup A and was asked to taste it, guess which type of milk it was in cup A and whether they liked the milk in cup A. The community member or WIC client could not go on to the next cup until each of these questions was answered. The same questions then were repeated for cups B, C, and D. For accurate results the cups were always presented in the same order, A-D, but each set A-D contained a different combination of milks. After the taste-test, volunteer A reviewed the results with the community member or WIC client. When reviewing the results, volunteer A used this time to talk to the community member or WIC client about the differences between the various types of milk and the importance of switching to low-fat milk. The volunteers were trained to discuss the nutritional differences and similarities between the types of milk. Appendix I provides examples of the types of nutritional counseling given.

8. Next, the community member or WIC client were asked if they would pledge to switch to (or continue drinking) either 1% or skim milk.

9. After answering the pledge question, the community member or WIC client then was asked the same knowledge-based question as before. This question was asked again to see if the community member or WIC client had learned anything from the nutrition education given by volunteer A.

10. The next question asked the community member or WIC client if the type of milk they drank had changed within the past five years and if they had, how long ago.

11. Finally, the community member or WIC client was asked if they had heard about the "1% or Less—Cut the Fat Campaign" and if they had, where did they hear about it (newspaper, radio, poster, etc).

12. Volunteer A recorded each answer on the survey form.

13. Magnets were then handed out to each participating community member or WIC client. See appendix J for a representative example of the magnet used to reward the participants.

Supermarket Milk Sales

Milk sales data were collected from two supermarkets and milk ordering data were collected from the other 15 convenience stores and supermarkets. Milk ordering data were collected from these stores because their sales data were not separated out into individual grocery items. The milk ordering data were then converted into sales by taking the amount ordered times the price of that type and size of milk. The milk sales data were collected from March 19, 2001 through April 30, 2001. Follow-up milk sales data were also collected on May 20-26, 2001, three weeks after the intervention campaign ended. Data were collected for whole, 2%, 1% and skim milk. Data on sales of flavored, buttermilk, and lactose-free were not included. See appendix K for an example of the instrument used to collect milk sales data.

Telephone Survey

Trained volunteers conducted telephone surveys in Menomonie, WI (the largest community in Dunn and Pepin County, population ~16,000), during the follow-up week of May 20-26, involving 310 community members. The telephone surveys were conducted during this time to determine the effectiveness of the intervention campaign.

Training materials and telephone protocols were developed to standardize the surveying

process for the volunteer interviewers (Weisberg et al., 1996). Telephone numbers were

randomly selected from an area telephone directory. The sampling procedure restricted

the telephone survey to households having telephones with listed telephone numbers in

the Menomonie area. The five-question telephone survey was conducted as follows:

1. The person who answered the telephone was asked their age. If they were 15

    years or older, they were asked the survey questions. If they were younger then

    15, then they were asked to call to the phone the person in the family who

    normally buys the milk for the household. The gender of the person completing

    the telephone survey was also recorded.

2. The volunteer then asked the household representative the questions on the

    survey. See appendix L to view the questions utilized for the telephone survey.

    The questions focused on the individual's knowledge of the fat content of whole,

    2%, 1% and skim milk, their milk drinking habits, and the exposure of the

    interviewee to the "Cut the Fat—1% or Less Campaign".

3. Each telephone survey required approximately 2-3 minutes to complete.

Statistical Analysis

Taste-test surveys, telephone surveys and milk sales data were analyzed using

SPSS. For the milk sales data, a repeated-measures ANOVA was performed with the

three time periods (week 1, week 6 and week 10) as the within-group factor and milk

type (each milk type and high versus low fat) to determine statistically significance. For

the taste-tests and telephone surveys, data was calculated using frequencies, means and

percentages.

Chapter 4

Results

Taste Tests

The results were analyzed for overall participation and then distinguished between the taste-tests at the WIC clinics and other taste-test sites. Other taste-test sites include a supermarket, a gas station and UW-Stout. The WIC population was compared to the general population to determine if there was a difference in milk drinking habits and knowledge of the fat content of milk. In total there were 223 completed taste-tests with 62 taste-tests at the WIC clinics and 161 at the other taste-test sites (see Table 4-1). The overall mean age of taste-tests participants was 33 years. The mean age of the taste-tests participants from the WIC clinics was 29 years and the general population was 34 years. The results of the surveys from the taste-tests show that there was an over sampling of the female population. This was due to the fact that almost 94% of participants from the WIC clinics were female. Overall, skim milk was consumed 38.6% of the time, followed closely by 2% milk at 32.7% of the time. The general population reported drinking skim milk 42.9% of the time where as the participants from the WIC clinics only reported drinking skim milk 27.4% of the time. The consumption of 2% milk was the exact opposite. The WIC clinic participants reported drinking 2% milk 45.2% of the time and the general population only 28% of the time. Only 10.8% of the overall population reported drinking whole milk. The overall population consumed 1% milk 13.9% of the time. The general population was more likely to consume 1% milk than were the WIC clinic participants. Whole milk was consumed more often by WIC clinic participants than by the general population. Overall, 82.1% of participants reported drinking milk on a

daily basis. Of this, 85.5% of WIC participants and 80.7% of the general population reported drinking milk on a daily basis.

The taste-test survey (see Table 4-1) showed that only 31.4% of the participants reported that they have changed the type of milk they have drank within the past five years and the average length of change was 2.08 years. This percent of participants who reported a change was only slightly higher in the WIC clinic population (35.5%) than in the general population (29.8%). The average change of time was still about two years.

Table 4-1
Demographics of Taste-Test Participants

Characteristic	Overall	WIC Clinic	Other[a]
Number of Participants	223	62	161
Mean Age (in years)	32.94	28.93	34.48
Gender (percent of participants)			
Male	28.7	6.5	37.3
Female	71.3	93.5	62.7
Type of Milk Usually Drank (percent of participants)			
Skim	38.6	27.4	42.9
1%	13.9	8.1	16.1
2%	32.7	45.2	28
Whole	10.8	16.1	8.7
Never	4.0	3.2	4.3
Frequency of Use (percent of participants)			
Daily	82.1	85.5	80.7
Weekly	12.1	11.5	12.4
Monthly	2.2	0.0	3.7
Never	3.6	3.3	3.7
Habit Changed[b] (percent of participants)			
No	68.6	65.5	70.2
Yes	31.4	35.5	29.8
Mean Time (in years)	2.08	2.00	2.12

[a] Other includes grocery stores, convenience stores and schools
[b] yes=≤5 years ago; no=>5 years ago

The pre-test question, regarding the knowledge of the fat content in the different types of milk, was answered correctly by 71% of all participants (see Table 4-2). Thus

71% of 223 participants correctly identified the fat content of each of the four milks. The overall population correctly identified the fat content of skim milk 99.6% of the time, 1% milk 98.2% of the time, 2% milk 71.7% of the time and whole milk 99.6% of the time. The WIC clinic participants knew the correct fat content of skim, 1% and whole milk 100% of the time. Where as the general population could only correctly identify the fat content 99.4%, 97.5%, and 99.4% of the time for skim, 1% and whole milk, respectively. Determining the fat content of 2% milk showed the most deviation from the correct answer. The WIC clinic participants thought that 2% milk was high in fat 77.4% of the time where as the general population thought it was 69.6% of the time.

The post-test question results were different. After the nutrition education on the fat content of the different types of milks, 85% of the overall population correctly identified the fat content of 2% milk (versus 71% in the pre-test). Both the general population and the WIC clinic participants showed an increase in knowledge of the fat content of 2% milk. The WIC clinics increased to 87.1% post-test from 77.4% in the pre-test and the general population increased to 85.1% post-test from 69.6% pre-test. Also, 100% of the overall participants knew after the nutrition education that whole milk was considered high fat milk. The percentage of participants who knew that skim and 1% milk were considered low fat did not change drastically from the pre-test.

Table 4-2
Knowledge of the Fat Content of Skim, 1%, 2% and Whole Milk

	Low Fat Milk			High Fat Milk		
	Overall	WIC Clinic	Other[a]	Overall	WIC Clinic	Other[a]
Pre-Test						
Skim	99.6[b]	100.0	99.4	0.4	0.0	0.6
1%	98.2	100.0	97.5	1.8	0.0	2.5
2%	28.3	22.6	30.4	71.7	77.4	69.6
Whole	0.4	0.0	0.6	99.6	100.0	99.4
Post-Test						
Skim	99.6	98.4	100.0	0.4	1.6	0.0
1%	97.3	96.8	97.3	2.7	3.2	2.5
2%	14.3	12.9	14.9	85.7	87.1	85.1
Whole	0.0	0.0	0.0	100.0	100.0	100.0

[a] Other includes grocery stores, convenience stores and schools
[b] The percentage who correctly identified the fat content as low fat or high fat

Overall, 177 of the 223 participants pledged to continue drinking low fat milk (1% or skim) or switch to low fat milk (see Table 4-3). Of the 97 participants who drink high fat milk (2% or whole), 61.9% agreed to switch to low fat milk. That is 51 participants who drank 2% milk and 9 participants who drank whole milk agreed to switch to 1% or skim milk. Of the WIC clinic participants, 47 (77.4%) agreed to switch to or continue drinking skim or 1% milk. In the general population, 130 (80.7%) agreed to switch to or continue drinking low fat milk. Of the 223 taste-test participants 72% reported liking the taste of skim milk and 87% reported liking the taste of either skim or 1% milk.

Table 4-3
Pledged YES to Low Fat Milk

Type of Milk Drank	Overall Participants		WIC Clinic		Other	
	%	Number	%	Number	%	Number
Overall	79.8	177	77.4	47	80.7	130
Skim	100.0	86	100.0	17	100.0	69
1%	100.0	31	100.0	5	100.0	26
2%	69.9	51	82.1	23	62.1	28
Whole	37.5	9	40.0	4	35.7	5

Overall, 24.2% of the 223 participants had heard about the "Cut the Fat—1% or Less" campaign encouraging people to drink low fat milk (see Table 4-4). Almost half of these participants were exposed to the campaign through the poster displays where as the newspaper ads generated the least exposure. The participants who heard about the campaign at the grocery stores or gas stations stated they saw the poster displays or the "1% or Less" advertisements on the dairy displays/coolers. The participants who answered "other" as to how they heard about the campaign stated they heard it through word of mouth or at the educational displays at the WIC clinics.

Table 4-4
Exposure to Campaign

Where	Overall Participants	
	%	Number
Overall	24.2	54
Poster	44.4	24
Other	18.5	10
Radio	14.8	8
Grocery Store	11.1	6
Gas Station	7.4	3
Newspaper	7.4	3

Telephone Surveys

A total of 310 telephone surveys were completed during the follow-up week of the campaign (see Table 4-5). The mean age of the telephone survey participants was 46 years. Also more females (59.7%) answered the surveys versus males (40.3%). The main purpose of the telephone surveys was to determine the extent of campaign exposure. Of the 310 participants, 38% (119 participants) had heard about the "Cut the Fat—1% of Less Campaign". Of the 119 participants almost 31% were exposed through the news releases and ads in the newspapers. Another 27.6 % were exposed to the campaign by the poster displays. Skim milk was consumed more often than any of the other types of milk, with 45% of the participants reportedly drinking skim milk. The second most consumed milk was 2% milk with 26.5% of the participants reported drinking this type. Whole milk and 1% milk were consumed 3.5% and 18.7% of the time, respectively, as reported by the participants. Over 70% stated that they have not changed their milk-drinking habits in the past five years and those that stated they have changed their milk drinking habits was on the average 2.44 years ago.

Table 4-5
Demographics of Telephone Survey Participants

Characteristics	Overall	
Mean Age (in years)	46.29	
	%	Number
Gender		
Male	40.3	125
Female	59.7	185
Type of Milk Drank		
Skim	46.5	144
1%	18.7	58
2%	26.5	82
Whole	3.5	11
Never	4.8	15
Habit Changed[a]		
No	73.9	229
Yes	26.1	81
Mean Time (in years)	2.44	
Exposure of Campaign		
No	61.6	191
Yes	38.4	119
Where?		
Newspaper	30.9	37
Poster	27.6	33
Radio	23.6	28
Other	11.4	13
Grocery Store	6.5	8
Gas Station	0.0	0

[a]yes=<5 years ago; no=≥5 years ago

Overall, 67% or 207 of the telephone participants were able to correctly identify the fat content of all four types of milk—skim, 1%, 2% and whole milk (see Table 4-6). Almost all of the participants were able to identify the fat content of skim, 1% and whole milk, with 99.7%, 97.1%, and 99.0%, respectively, answering correctly. However, only 71% of participants were able to identify 2% milk as high fat milk.

Table 4-6

Knowledge of the Fat Content of Skim, 1%, 2% and Whole Milk

Type of Milk	Low Fat		High Fat	
	% [a]	Number	% [a]	Number
Skim	99.7	309	0.3	1
1%	97.1	301	2.9	9
2%	29.0	90	71.0	220
Whole	1.0	3	99.0	307

[a] The percentage who correctly identified the fat content as low fat or high fat

Supermarket and Convenience Stores Milk Sales

Milk sales were calculated as the mean total sales of milk per participating supermarket or convenience store per week and as market share. The market share was calculated by taking the milk sales for a specific type of milk for a specific week at each location divided by the overall milk sales at that location. Then the overall market share for each type of milk was averaged from all participating locations for each week. Baseline data were collected to use this time as a pilot testing period and to ensure that all stores who wanted to participate had ample time to set up an accurate system to collect data. As this was the pilot testing period the baseline data were not used in any of calculations discussed below. The weeks of the campaign discussed below are as follows: week 1, beginning of the campaign, week 3, first week of the taste-tests, week 4, second week of the taste-tests, week 5, the week following the taste-tests, week 6, the end of the campaign, and week 10, the follow-up week.

Overall Milk Sales

Overall milk sales ranged from approximately $25,000 to $29,000 during the campaign (see Table 4-7). Overall milk sales were the highest during the second week of the taste-tests (week four) and the week immediately following the taste-tests (week five). The totals were $28,632 and $28,729 respectively. At the beginning of the

campaign overall milk sales were $26,857, but by the end of the campaign, it had

decreased by over $4,000 (week 6=$24,662). This was the lowest total seen during the

entire campaign and by follow-up (week 10) overall milk sales had only increased $700

for a total of $25,397, the second lowest total seen during the entire campaign.

Table 4-7
Overall Milk Sales for the Campaign

Week of Campaign	Total Milk Sales (in dollars)
Week 1	$26856.99
Week 2	$26970.16
Week 3	$26949.78
Week 4	$28647.50
Week 5	$28738.73
Week 6	$24684.93
Week 10	$25413.46

Market Share by Type of Milk

Weeks 1, 6 and 10 were separated out because of their importance in determining

when and if milk-drinking habits changed during the campaign. The average sales of

skim milk decreased from $468 per participating store during week one to $363 per

participating store during week six, and then increased again to $385 per participating

store during week 10 (see Table 4-8). This was an almost two percent decrease in market

share of skim milk from week one to week 6 (see figure 4-1 and figure 4-2). The market

share of skim milk was 23.6% at the beginning of the campaign and 21.8% at the end of

the campaign. By the follow-up week, the market share of skim milk had increased by

roughly 2.5%, from the end of the campaign, or was 24.4%. During the second week of

the taste-tests (week four) and the week immediately following (week five), the milk

sales of skim milk were the highest, with exception of week one's milk sales. The

average sales of skim milk per participating store during weeks 4 and 5 were $437 and

$446 respectively. The market share during these two weeks were 23.3% and 23.7%,

respectively.

At the beginning of the campaign the average sale of 1% milk was $316 per

participating store, at the end of the campaign it was $302 per participating store and at

follow-up was $290 per participating store (see Table 4-8). The market share of 1% milk

was 19.21% during week 1 of the campaign, then decreased slightly to 18.97% during

week 6 and at week 10 was 18.76% (see Figure 4-1 and 4-2). Even during weeks four and

five (period when overall sales were the highest), the average sales of 1% milk had only

increased by $15, and the market share stayed relatively the same as during the rest of the

campaign.

At the beginning of the campaign the average sale of 2% milk were $676 per

participating store, at the end of the campaign they were on average $618 per

participating store, and by follow-up were on average $650 per participating store (see

Table 4.8). The average sales per participating store of 2% milk were the highest during

weeks four and five, $718 and $706 respectively. During week 1, the market share of 2%

milk was 43.5%, during week 6 it was 47.7% and by week 10, it was 44.7% (see Figure

4-1 and 4-2).

At the beginning of the campaign the average sale of whole milk were $218 per

participating store, at the end of the campaign they were on average $167 per

participating store and by follow-up were $168 per participating store (see Table 4.8).

During week 1, the market share of whole milk was 13.7% and then decreased by over 2

percent to 11.5% during week 6 and by week 10, had only increased to 12.2%, which is

still over 1 percent lower than at the beginning of the campaign (see Figure 4-1 and 4-2).

Table 4-8
Average Sales Per Week Per Participating Store by Type of Milk

Week of Campaign	Average Sales (in dollars)			
	Skim Milk	1% Milk	2% Milk	Whole Milk
Week 1	468.25	315.88	676.45	217.98
Week 2	397.77	320.31	663.98	204.42
Week 3	427.02	321.92	643.69	192.65
Week 4	436.80	333.87	718.23	196.25
Week 5	446.49	330.29	705.77	207.97
Week 6	363.77	302.76	618.45	167.07
Week 10	385.18	290.64	650.87	168.22

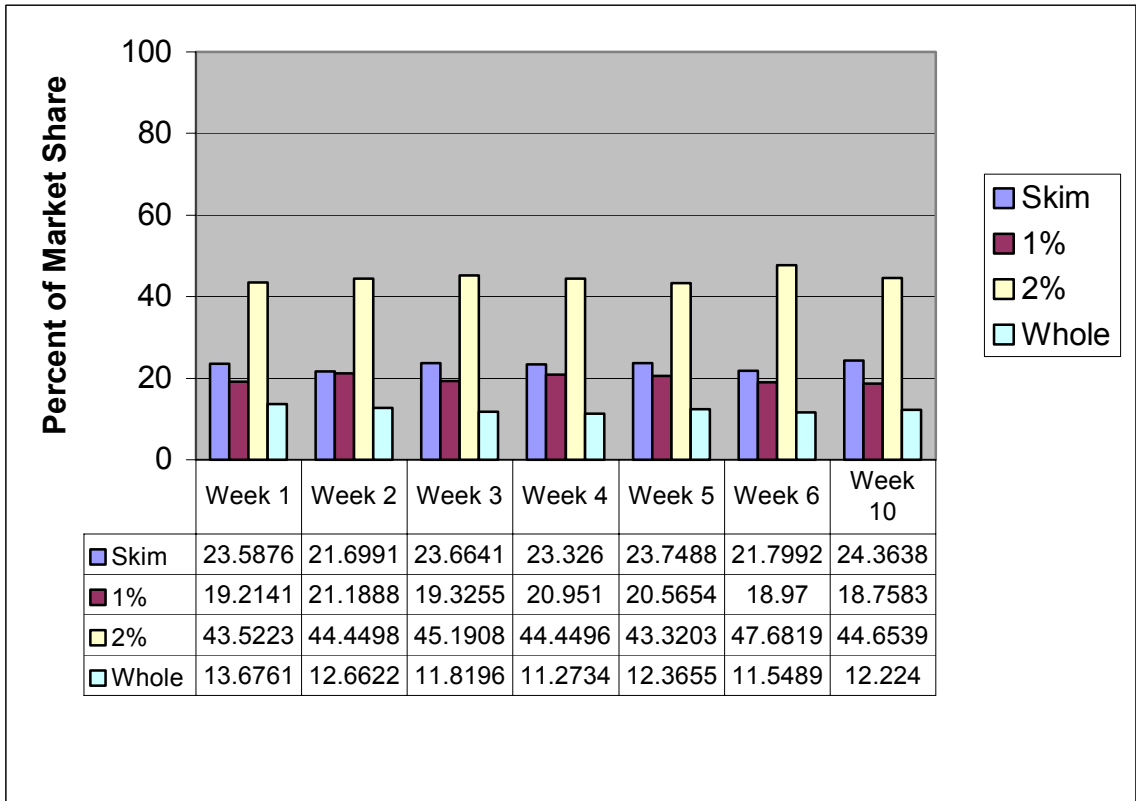|	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 10
Skim	23.5876	21.6991	23.6641	23.326	23.7488	21.7992	24.3638
1%	19.2141	21.1888	19.3255	20.951	20.5654	18.97	18.7583
2%	43.5223	44.4498	45.1908	44.4496	43.3203	47.6819	44.6539
Whole	13.6761	12.6622	11.8196	11.2734	12.3655	11.5489	12.224

Figure 4-1. Market share of the four types of milk during each week of the campaign
and at follow-up. The market share was calculated by taking milk sales for a specific type
for a specific week at each location divided by the overall milk sales at that location.
Numbers shown in the chart are the averages from all participating locations.

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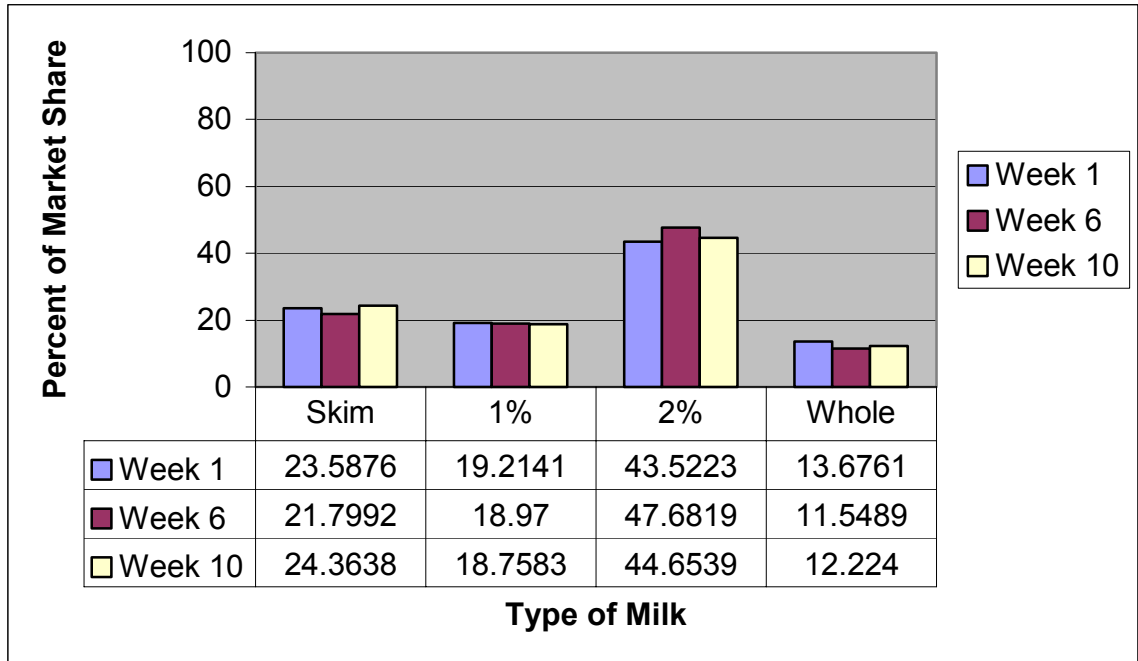
Figure 4-2. Market share of each type of milk for weeks 1, 6, and 10. The market share was calculated by taking milk sales for a specific type for a specific week at each location divided by the overall milk sales at that location. Numbers shown in the chart are the averages from all participating locations. These weeks were selected to determine if the milk-drinking habits changed significantly over the course of the campaign.

Market Share of Low Fat vs. High Fat Milk

Percent market share was calculated for low fat milk (skim and 1%) and for high fat milk (2% and whole) to determine if the milk drinking habits changed during the campaign. There was not a statistically significant change from week one to week six or from week one to week ten (see figure 4-3). The market share of low fat milk at week one was 42.8%; where as high fat milk was 57.2%. During week six there was a four percent change in the market share of low fat milk and high fat milk. Low fat milk decreased to 40.8% and high fat milk increased to 59.2%. By week ten, the market share of low fat and high fat milk was similar to what it was during week one, 43.1% and 56.9% respectively. Weeks four and five of the campaign showed the most significant changes, but not statistically significant, in the market share of the low fat and high fat milks (see

figure 4-4). During this time period the average market share of low fat milk was 44.3%

and high fat milk was 55.7%, which is a four percent turnaround from the market share

during week one.
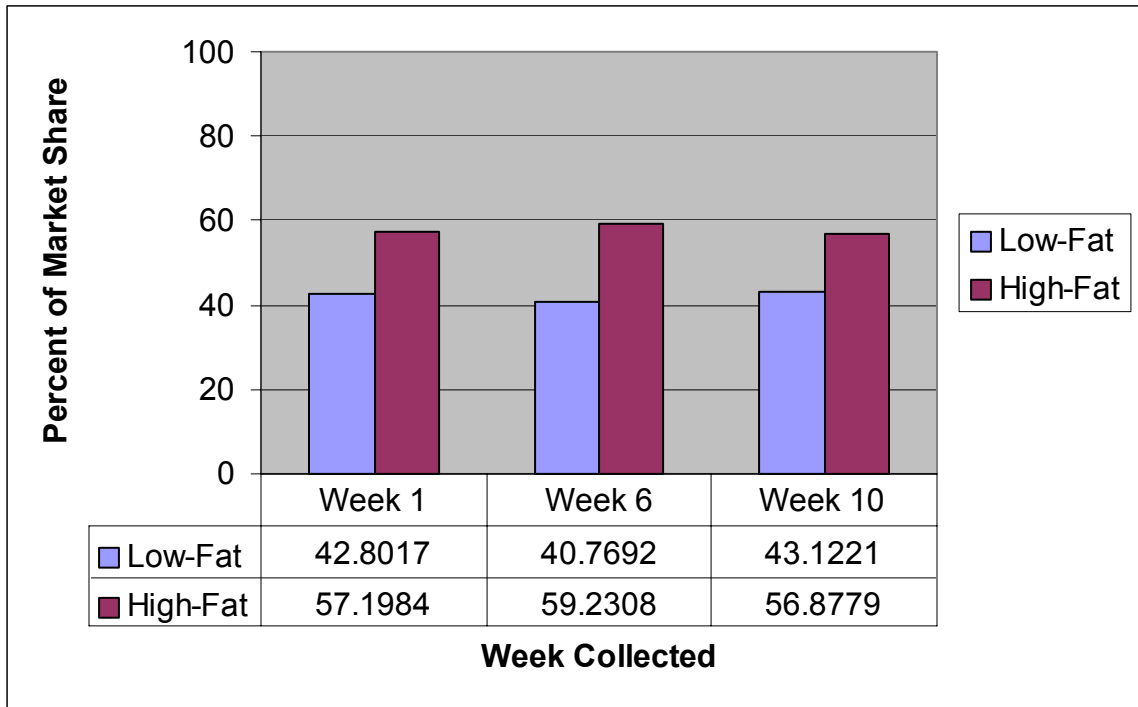
Figure 4-3. Market Share of low fat and high fat milk during weeks 1, 6, and 10. Low fat milk is defined as skim and 1% milk and high fat milk is defined as 2% and whole milk. The market share of each type of milk was calculated by taking milk sales for a specific type for a specific week at each location divided by the overall milk sales at that location. Numbers shown in the chart are the averages from all participating locations. Market share of low fat milk was then calculated by adding the market share of skim and 1% milk together for each week. Market share of high fat milk was then calculated by adding the market share of 2% and whole milk together for each week.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 10
Low-Fat	42.8017	42.8879	42.9896	44.277	44.3142	40.7692	43.1221
High-Fat	57.1983	57.1121	57.0104	55.723	55.6858	59.2308	56.8779

Week Collected

Figure 4-4. Market share of low fat and high fat milk during each week of the campaign. Low fat milk is defined as skim and 1% milk and high fat milk is defined as 2% and whole milk. The market share of each type of milk was calculated by taking milk sales for a specific type for a specific week at each location divided by the overall milk sales at that location. Numbers shown in the chart are the averages from all participating locations. Market share of low fat milk was then calculated by adding the market share of skim and 1% milk together for each week. Market share of high fat milk was then calculated by adding the market share of 2% and whole milk together for each week.

Chapter 5

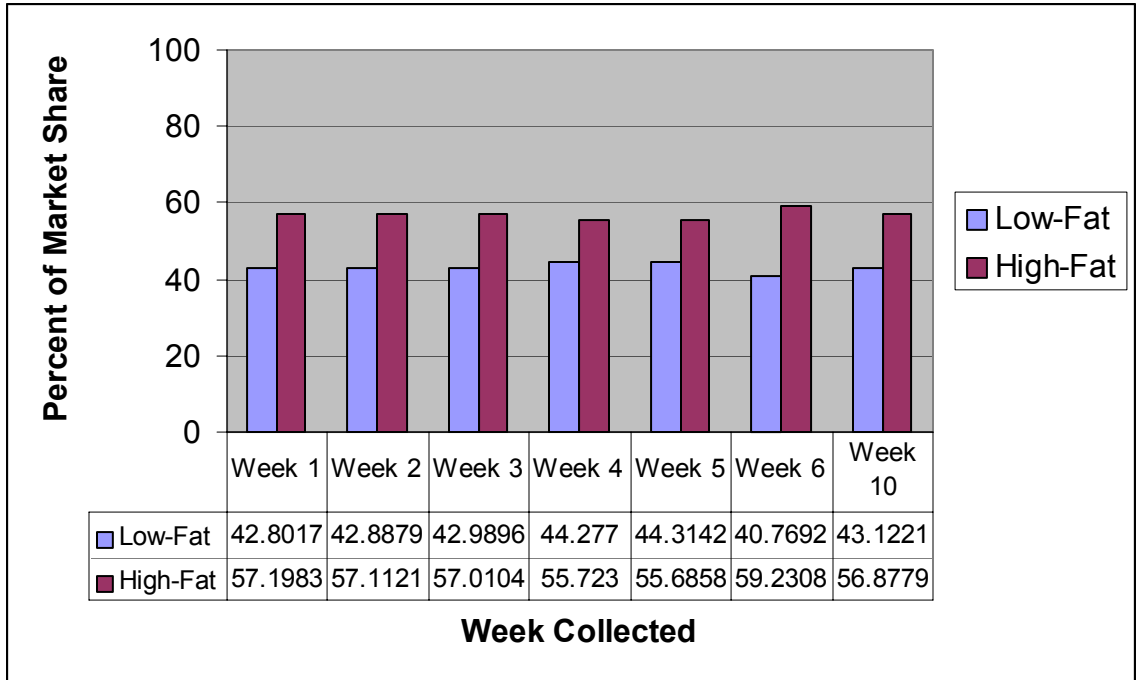Discussion

The "1% or Less—Cut the Fat" campaign differs from many nutrition education programs in that a whole community was targeted to make a single dietary change. Many of the previous nutrition education programs conducted have focused on changing the total diet by increasing or decreasing consumption of a certain food group. The nutrition education is usually promoted to decrease the risk of certain chronic diseases, most often coronary artery disease. Even though consumers could cut their saturated fat intake through a multitude of dietary changes, teaching healthy eating, one message at a time may be more realistic for both dietitians and consumers.

Market Share and Sales of Milk

The "1% or Less—Cut the Fat" campaign informed consumers about the fat content of each type of milk and the benefits of decreasing overall fat and saturated fat intake. This nutritional information was presented in anticipation that consumers would switch to low fat milk. This did not occur as the researchers were expecting. The market share of low fat milk was the highest during weeks 4 and 5 (during the second week of taste-tests and the week immediately following the taste-tests). This could possible mean that people were willing to try it once or even twice but not willing to continue drinking low fat milk for some reason. As stated before it takes a person on average 8-10 times of trying something new before they begin to include it in their meal plan on a regular basis.

 The market share of skim milk was the highest at follow-up, showing that if the campaign did make a difference it took people longer to make the switch then what the researchers anticipated. In other words, the switching to skim milk did not occur during

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the campaign. This was also seen with market share and average sales of 1% milk. The average sales of 1% milk stayed relatively stable during the duration of the campaign. The market share only changed a half of a percentage during the entire campaign and during follow-up was even lower than when the campaign began. This data shows that if people did try low fat milk they did not continue to drink low fat milk during the campaign and that the campaign message did not significantly change the milk-drinking habits of consumers in these communities.

The biggest surprise was that the market share of 2% milk increased by over four percent from the beginning of the campaign to the end of the campaign, but by follow-up had decreased to virtually the same level seen at the beginning of the campaign. The best occurrence that came out of this campaign was the fact that the market share and average sales of whole milk decreased throughout the entire campaign and only slightly increased at follow-up. It is difficult to determine if this is from consumers switching to lower fat milk or if consumers are still drinking whole milk but just less of it during the campaign. This may also be why the market share of 2% milk increased during the campaign. Many consumers may not have been willing to switch all the way to low fat but were willing to switch to 2% milk, which is lower in fat and saturated fat than whole milk. If this was the case, than it was a positive effect for the campaign.

Another interesting result is that overall milk sales decreased at the end of campaign and only slightly increased by follow-up. It is difficult to determine if this was normal for this time of year without having overall milk sales from other communities to compare. One reason why it may have appeared that sales decreased greatly was that one of the large supermarkets had a sale on all four types of milk at the beginning of the

campaign, causing a large increase in overall sales for week 1. Another possible explanation is that during the month of April, a dairy plant in Green Bay, which supplies milk to three of the convenience stores participating in the campaign, was hit by an airplane causing them to shut down the dairy plant. This caused the convenience stores to have a shortage of milk for at least two weeks. Because milk sales were collected for convenience stores by the amount of milk ordered each week it may, have made it look like the convenience stores never sold any milk, when in fact they did.

Taste-Tests and Telephone Surveys

The taste-tests and telephone surveys show that the majority of consumers reported drinking skim milk and not 2% milk. This contradicts what the overall milk sales show, that 2% milk is the most purchased type of milk. These results may mean that people who volunteered to do the taste-tests were already drinking low fat milk and didn't need to change their habits. Even though the telephone surveys were chosen randomly, we still excluded people who did not have telephones or listed numbers, possibly excluding consumers who drank high fat milk.

The biggest difficulty for all participants regardless of where they participated in the taste-tests or in the telephone survey was determining the fat content of 2% milk as either high or low in fat. The majority of participants (71.7% of taste-tests participants pre-test, 85.7% of taste-test participants post-test and 71% of telephone survey participants) knew that 2% milk was high in fat but almost 30% did not know without the nutrition education during the taste-tests. The participants who received nutrition counseling during the taste-tests improved on their knowledge of the fat content of 2% milk because after the post-test 85% of participants knew 2% milk was considered high

fat. The difficulty knowing whether 2% milk is high or low in fat may stem from how 2% milk was required to be labeled for so many years by the FDA. Up until a few years ago, 2% milk was considered low fat milk by FDA standards but since 1996, 2% milk has been labeled as reduced-fat milk according to new standards set by the FDA in collaboration with the nutrient-content claims. It is no longer labeled as low fat milk. This may be the main reason why it was difficult for participants to distinguish 2% milk as high or low fat.

It was reasoned that people might switch to low fat milk if they knew the health benefits but this was not the case. The majority people reported they do not drink low fat milk because of the taste and appearance of it. Even though during the taste-tests, the majority of participants stated they liked the taste of low fat milk (87%), many were still not willing to switch because of other barriers, mainly other family members' preferences. During the telephone surveys, many participants remarked that they knew they should drink low fat milk for health reasons but didn't mainly because of the perceived notion that drinking low fat milk tastes awful. It may take more than one simple taste-test and several weeks of campaign exposure to persuade consumers to change their milk drinking habits to improve their health. As other research studies have shown (Lang et al, 2000; Freedman et al, 1999; Luepker et al, 1994; Samuels, 1993; Carleton et al, 1995) consumers may only make a behavioral change after they have developed the chronic disease instead of trying to prevent it as this campaign was trying to promote.

Taste-Tests: WIC clients vs. the General Population

The main differences between the WIC clinic participants and the general population in the taste-tests were the gender of a person and the type of milk usually drank. The WIC clinic participants, who were surveyed, drink on average a higher percentage (61%) of high fat milk (2% and whole) versus the general population (37%). The majority (59%) of the general population stated they drank low fat milk versus the WIC clinic participants at 35%. The reason why the WIC population may drink more high fat milk may be due to several factors. First, the average education level of WIC clients is generally lower than that of the general population (Robertson, 2001 a and b). When a person's education level is low, more than likely their nutrition knowledge is also low (Michel, 1994). Over 20% of the WIC participants in the taste-tests did not know that 2% milk is considered high in fat. This group of consumers may also learn nutrition information from relatives and/or friends, who may also have a low education level. Secondly, many WIC clients do not clearly understand the nutritional food label information, especially regarding dietary fat (Michel, 1994). Lastly even though WIC clients receive nutrition education, the brief interactions are not always enough to change dietary habits for these clients in the long term. As the overall milk sales results show, a single taste-test may not change the milk drinking habits of both populations. For children it takes 8 to 10 times of tasting a new item before they will eat it on a regular basis. It may take adults even longer because of their perceived notion of how a certain food item looks or tastes.

Limitations

The main limitation to this campaign was that we did not use a comparison city to determine if the effects seen by the campaign were due to the campaign alone or for other reasons. The reasons a comparison city were not used are first there was a shortage of personnel working on the campaign due to funding, secondly funding was limited for the campaign due to availability of grants in the community, and lastly in this state the same mass media is exposed to many communities within a 100 mile radius so to find a community that was not exposed to the same mass media and had relatively the same demographics as the campaign community would have been difficult.

Another limitation was that the communities selected for the campaign were mainly rural farming communities where dairy farming is very prominent. Many participants stated during the taste-tests that they would not switch because they were farming themselves, they grew up on a farm or their significant other would never switch because of dairy farming. Throughout the campaign, concerned citizens voiced their opinion stating that this campaign hurt the diary farmers because it would cause people to drink less milk. An additional limitation with using small communities is that consumers do not just buy their milk at a supermarket. They may buy it from convenience stores or gas stations where milk sales are not collected individually making it difficult to get an accurate picture of true milk sales from those stores.

The third limitation of the campaign was the duration. The campaign may not have been long enough to give consumers the opportunity to make the behavioral change and then see the outcome in terms of an increase in low fat milk sales. Consumers may need a longer period of time to make the change as well as continual exposure of the

health message for them to make the change. For instance the nutrition education material for WIC clients' changes every two months and all clients are either on a two or three-month rotation depending on their location, so approximately a third of the clients were never exposed to the campaign through the nutrition education material at the WIC clinics. Also with the shorter duration of the campaign, the weekly milk sales collected may have been more variable then if they were collected weekly for 3 months or monthly for 6 months. It would be difficult to determine this with out repeating the campaign for a longer duration.

To see an increase in the market share of low fat milk, a significant number of consumers would have to make the switch from high fat to low fat milk. This campaign may not have reached enough people who drank high fat milk to have a significant impact on their milk-drinking habits. The taste-tests were given to 223 consumers and only 25% of them (52 consumers) had heard about the campaign. Of these 52 consumers only 16 stated they drank high fat milk. The telephone surveys showed that only 38.4% of the 310 participants had heard about the campaign, of these 120 consumers, only 32 stated they drank high fat milk. Every single one of these 48 people would have had to switch to low fat milk to have an impact on the market share of low fat milk. Part of the problem was the duration of the campaign. If the campaign had been longer, we could have held more taste-tests and continued with the nutrition education message. With more taste-tests, we could have reached more consumers, given more nutrition education on the health benefits of drinking low fat milk and possible exposing some consumers to multiple taste-tests increasing their chance to switch to low fat milk.

Paid Advertising

Advertising and promotion are crucial to the marketing of the American food supply. Paid advertising was a key component of this "1% or Less—Cut the Fat" campaign. The U.S. food marketing system is one of the largest advertisers in the American economy, using networks, cable television, newspapers, magazines, billboards and commercial radio to do it. The food industry spent $11 billion in advertising in 1997, a 10% increase since 1995 (Gallo, 1999). Likewise mass media, specifically television, provides a way to reach and influence large audiences with health and nutrition messages (Gallo, 1999; Finnegan et al., 1999; Samuels, 1999).

Limited funding for community nutrition education programs has diminished the ability of these programs to use paid advertising as a way to promote behavioral changes, thus lessening the impact of the campaign on behavioral changes. For a campaign to be successful, without adequate funding, they may need to rely on news releases or public service announcements (PSAs), through the radio or television, to communicate the nutrition information through the media. However, news releases may not spread the information, as the campaign would like. News releases tend to be aired infrequently, at nonpeak hours and reaching target audiences is more difficult when the ads are placed at the discretion of the radio announcers and broadcasters (Robinson, 1995).

Future Suggestions of Research

If we had to do this campaign all over, knowing the information we know now, there would be a couple of changes. Probably the most important change would be the using a comparison city to determine if the milk sales of the campaign were normal and if the effects seen from the campaign were because of the campaign and not for other

reasons. The next most important change would be the duration of the campaign. By making the campaign longer, 3 or 6 months in length, we would be able to reach more consumers through taste-tests, mass media and nutrition education programs. Also with the longer duration we might have seen a stable overall increase or decrease in the milk sales instead of the variable sales seen in this campaign. Another change would be further exposure using the mass media. This study was limited by the funding to use mass media effectively to expose consumers to the nutrition message. The main source of advertising is television, which was not used in this campaign. Advertising through television can either be by public service announcements or by public relation strategies developed by the campaign personnel. By using the television, the nutrition message may be heard more extensively. Another way for people to learn about the nutrition message could be from their children. By going into the schools and teaching the importance of drinking low fat milk, along with taste-tests, to the students; the students may in turn teach the message to their parents creating a positive behavioral change. Lastly, by holding community nutrition education programs at local hospitals or schools, aimed at adults, may also increase awareness of the nutrition message and the campaign. The main problem with each of these suggestions though is the amount of funding needed to incorporate them into the campaign. Given the restraints of funding in this particular campaign it would take the help of federal funding along with grants from the state and county department of public health and local community organizations. Given the slow or non-existent reports of community nutrition intervention, it appears that federal and state support of these interventions has not been forthcoming.

Conclusion

Our study showed that it is difficult to have a successful community-wide nutrition education program without significant help from the community, state and federal funding. Even though our campaign only reached a small portion of people, we believe that if we were able to change one or two consumers' milk-drinking habits, we have started on the road to success of improving the nutritional well-being of all consumers in Dunn and Pepin County.

References:

Allison DB, Fontaine KR, Manson JE, Stevens J, VanItallie TB. 1999. Annual deaths attributable to obesity in the United States. *Journal of the American Medical Association*. 282(16):1530-1538.

Altman TA. 1998. *FDA and USDA Nutrition Labeling Guide.* Lancaster, PA: Technomic Publication Co, Inc.

American Diabetes Association. 2000. Consensus Statement: Type 2 diabetes in children and adolescents. *Pediatrics*. 105(3):671-680.

American Diabetes Association. Dietary Guidelines. http://www.diabetes.org. (Accessed March 15, 2001)

American Dietetics Association. Dietary Guidelines. http://www.eatright.org. (Accessed March 15, 2001).

American Heart Association. Dietary Guidelines. http://www.americanheart.org. (Accessed March 15, 2001)

Anderson JV, Bybee DI, Brown RM, McLean DF, Garcia EM, Breer ML, Schillo BA. 2001. 5-A-Day fruit and vegetable intake intervention improves consumption in a low income population. *Journal of the American Dietetic Association.* 101(2):195-202.

Barlow SE, Dietz WH. 1998. Obesity Evaluation and Treatment: Expert Committee Recommendations. *Pediatrics*. 102(3). http://www.pediatrics.org/cgi/content/full/102/3/e29. (Accessed on May 15, 2001).

Beers MH, Berkow R, eds. 1999. The Merck Manual of Diagnosis and Therapy. 17th ed. Whitehouse Station, NJ: Merck Research Laboratories.

Berenson GS, Srinivasan SR, Nicklas TA. 1998. Atherosclerosis: A nutritional disease of childhood. The *American Journal of Cardiology.* 82(10B):22T-29T.

Burt VL, Cutler JA, Higgins M, Horan MJ, Labarthe D, Whelton P, Brown C, Roccella EJ. 1995. Trends in the prevalence, awareness, treatment, and control of hypertension in the adult US population. *Hypertension*. 26:60-69.

Burt VL, Whelton P, Roccella EJ, Brown C, Cutler JA, Higgins M, Horan MJ, Labarthe D. 1995. Prevalence of hypertension in the US adult population. *Hypertension*. 25:305-313.

Carleton RA, Lasater TM, Assaf AR, Feldman HA, McKinlay S, the Pawtucket Heart
Health Program Writing Group. 1995. The Pawtucket Heart Health Program:
Community changes in cardiovascular risk factors and projected disease risk.
American Journal of Public Health. 85(6):777-785.

CDC. BMI Growth Charts and BMI Calculator.
http://www.cdc.gov.nccdphp/dnpa/bmi/bmi-for-age.htm. (Accessed on June 1,
2001)

CDC Press Release. 2001a. Diabetes rates rise another 6 Percent in 1999.
http://www.cdc.gov. January 26, 2001. (Accessed on June 1, 2001)

CDC Press Release. 2001b. More American children and teens are overweight.
http://www.cdc.gov. March 12, 2001. (Accessed on June 1, 2001).

Cleeman JI, Lenfant C. 1998. The National Cholesterol Education Program: Progress and
prospects. *Journal of the American Medical Association*. 280(24):2099-2104

Colditz GA. 1999. Economic costs of obesity and inactivity. *Medicine and Science in
Sports and Exercsie*. 31(11):S663-S667.

Contento I. 1995. The effectiveness of nutrition education and implications for nutrition
education policy, programs and research: A review of research. Journal of
Nutrition Education. 27(suppl):277-422

Crane NT, Hubbard VS, Lewis CJ. 1998. National nutrition objectives and the dietary
guidelines for Americans. *Nutrition Today*. 33(2):49-58.

Dennison BA, Rockwell HL, Nichols MJ. 2001. Use of low-fat milk by children in New
York State WIC varies with parental characteristics. *Journal of the American
Dietetic Association.* 101(4):464-466.

Duyff, RL. 1996. *The American Dietetic Association's Complete Food and Nutrition
Guide.* Minneapolis, MN: Chronimed Publishing.

Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in
Adults. 1994. National Cholesterol Education Program: Second report of the
expert panel on detection, evaluation and treatment of high blood cholesterol in
adults (Adult Treatment Panel II). *Circulation*. 89:1329-1445.

Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in
Adults. 2001. National Cholesterol Education Program: Third report of the expert
panel on detection, evaluation and treatment of high blood cholesterol in adults
(Adult Treatment Panel III). NIH Publication No. 01-3290.
http://www.nhlbi.nih.gov/guidelines/cholesterol/atglance.htm. (Accessed on May
23, 2001).

Finnegan JR, Viswanath K, Hertog J. 1999. Mass media, secular trends and the future of cardiovascular disease and health promotion: An interpretive analysis. *Preventive Medicine*. 29:S50-S58.

Flegal KM, Carroll MD, Kuczmarksi RJ, Johnson CL. 1998. Overweight and obesity in the United States: prevalence and trends, 1960-1994. *International Journal of Obesity.* 22:39-47.

Freedman DS, Dietz WH, Srinivasan SR, Berenson GS. 1999. The relation of overweight to cardiovascular risk factors among children and adolescents: The Bogalusa Heart Study. *Pediatrics.* 103(6):1175-1182.

Gallo AE. 1999. Food Advertising in the United States. In: Food Advertising. AIB-750. Product of USDA/ERS. p173-180. URL: http://www.ers.usda.gov/publications/aib750/aib750i.pdf. (Accessed July 23, 2001).

Grundy SM. Dietary Fat in *Present Knowledge in Nutrition.* Ziegler, EE and Filer LJ, eds. 1996. 7th ed. Washington, DC: ILSI Press. p.44-57.

Hansen JR, Fulop MJ. 2000. Type 2 diabetes mellitus in youth: A growing challenge. *Clinical Diabetes*. 18(2):52-56.

Havas S, Anliker J, Damron D, Langenberg, P, Ballesteros, M, Feldman R. 1998. Final results of the Maryland WIC 5-A-day promotion program. *American Journal of Public Health.* 88(9):1161-1167.

Hebert JR, Ebbeling CB, Ockene IS, Ma Y, Rider L, Merriam PA, Ockene JK, Saperia GM. 1999. A dietitian-delivered group nutrition program leads to reductions in dietary fat, serum cholesterol, and body weight: The Worcester Area Trial for Counseling in Hyperlipidemia (WATCH). *Journal of the American Dietetics Association*. 99(5):544-552.

Hill JO, Peters JC. 1998. Environmental contributions to the obesity epidemic. *Science*. 280(May 29):1371-1374.

Khoo JC, Miller E, McLoughlin P, Steinberg D. 1990. Prevention of low density lipoprotein aggregation by high density lipoprotein or apolipoprotein A-I. *Journal of Lipid Research*. 31:645-658.

Kwiterovich Jr PO.1995. Detection and treatment of elevated blood lipids and other risk factors for coronary heart disease in youth. *Annals New York Academy of Sciences*.748:313-330

Lang JE, Mercer N, Tran D, Mosca L. 2000. Use of a supermarket shelf-labeling program to educate a predominately minority community about foods that promote heart health. *Journal of the American Dietetics Association.* 100(7):804-809.

Lauer RM, Obarzanek E, Hunsberger SA, Van Horn L, Hartmuller VW, Barton BA, Stevens VJ, Kwiterovich Jr PO, Franklin Jr FA, Kimm SY, Lasser NL, Simons-Morton DG. 2000. Efficacy and safety of lowering dietary intake of total fat, saturated fat and cholesterol in children with elevated LDL cholesterol: The Dietary Intervention Study in Children. *American Journal of Clinical Nutrition.* 72(suppl):1332S-1342S.

Leenen R, van der Kooy K, Meyboom S, Seidell JC, Deurenberg P, Weststrate JA. 1993. Relative effects of weight loss and dietary fat modification on serum lipid levels in the dietary treatment of obesity. *Journal of Lipid Research.* 34:2183-2191.

Lichtenstein AH. Atherosclerosis in *Present Knowledge in Nutrition.* Ziegler, EE and Filer LJ, eds. 1996. 7th ed. Washington, DC: ILSI Press. p430-437.

Lin BH, Guthrie J, Frazao E. 1999. Quality of children's diets at and away from home: 1994-1996. *Food Review.* January-April:2-10.

Linder MC, ed. 1991. *Nutritional Biochemistry and Metabolism with Clinical Applications.* 2nd ed. NewYork: Elsevier Science Publishing Company, Inc. p51-85 and 449-474.

Luepker RV, Murray DM, Jacobs DR, Mittelmark MB, Bracht N, Carlaw R, Crow R, Elmer P, Finnegan J, Folsom AR, Grimm R, Hannan PJ, Jeffrey R, Lando H, McGovern P, Mullis R, Perry CL, Pechacek T, Pirie P, Sprafka JM, Weisbrod R, Blackburn H. 1994. Community education for cardiovascular disease prevention: Risk factor changes in Minnesota Heart Health Program. *American Journal of Public Health.* 84(9):1383-1393.

Maynard LM, Wisemandle W, Roche AF, Chumlea WC, Guo SS, Siervogel RM. 2001. Childhood body composition in relation to body mass index. *Pediatrics.* 107(2):344-350.

McGill Jr HC, McMahan CA, Herderick EE, Malcom GT, Tracy RE, Strong JP. 2000. Origin of atherosclerosis in childhood and adolescence. *American Journal of Clinical Nutrition.* 72(suppl):1307S-1315S.

Michel PM, Korslund MK, Finan A, Johnson J. 1994. Food label reading habits of WIC clients. *Journal of Nutrition EducationI.* 26(3):146-148.

Miller M. 2000. Current perspectives on the management of hypertriglyceridemia. *American Heart Journal.* 140(2):232-240.

Mokdad Aj, Serdula Mk, Dietz WH, Bowman BA, Marks JS, Koplan JP. The spread of the obesity epidemic in the United States, 1991-1998. *Journal of the American Medical Association*. 282(16):1519-1522.

Morbidity Mortality Weekly Report. 1998. Missed opportunities in preventive counseling for cardiovascular disease. *Morbidity Mortality Weekly Reports*. 47.

Murphy SL. 2000. Deaths: Final data for 1998. *National Vital Statistics Report*. 48(11):1-105 (used p83-84).

Must A, Spadano J, Coakly EH, Field AE, Colditz G, Dietz WH. 1999. The disease burden associated with overweight and obesity. *Journal of the American Medical Association*. 282(16):1523-1529.

National Institute of Health. 2001. NCEP issues major new cholesterol guidelines. NIH News Release. World Wide Web: http://www.nhlbi.nih.gov/new/press/01-05-15.htm (Accessed May 15, 2001).

Nestle M, Jacobson MF. 2000. Halting the obesity epidemic: A public health policy approach. *Public Health Reports*. 115:12-24.

Parthasarathy S, Barnett J, Fong LG. 1990. High density lipoprotein inhibits the oxidative modification of low density lipoprotein. *Biochem Biophys Acta*. 1044:275-283.

Pelletier DL, Kendall A. 1999. Nutrition and dairy industry benefits associated with promoting lowfat milk: evidence from the 1989 CSFII. *Family Economics & Nutrition Review*. 12(1):3-13.

Pi-Sunyer X. 1993. Medical hazards of obesity. *Annals of Internal Medicine*. 119(7 pt2):655-660.

Putnam JJ, Allshouse JE. 2000. Food consumption, prices, and expenditures, 1970-97. Food and Rural Economics Division, Economic Research Service, U.S. Department of Agriculture. Washington: USDA. Statistical Bulletin No. 965.

Reger B, Wootan MG, Booth-Butterfield S, Smith H. 1998. 1% or Less: A community-based nutrition campaign. *Public Health Reports*. 113(Sept/Oct):410-419.

Reinold C. 2001. CDC Growth Charts 2000. Powerpoint presentation sponsored by Centers for Disease Control and Prevention. Seen at WDA Annual Conference, April 19, 2001.

Robertson RE. 2001a. Food assistance-performance measures for assessing three WIC services. *FDCH Government Account Reports*. 02/28/2001.

Robertson RE. 2001b. Research provides limited information on the effectiveness of specific WIC nutrition services. *FDCH Government Account Reports*. 03/30/2001

Robinson TN. 1995. Television advertising for health. *Pediatric Annuals*. 24:73-78.

Russell A, Remington P, Rumm P, Haase R. 2000. Increasing prevalence of overweight among Wisconsin adults, 1989-1998. *Wisconsin Medical Journal.* June:53-56.

Samuels SE. 1993. Project LEAN—Lessons learned from a national social marketing campaign. *Public Health Reports.* 108(1):45-53.

Scott JA, Begley AM, Miller MR, Binns CW. 1991. Nutrition education in supermarkets: the lifestyle 2000 experience. *Australian Journal of Public Health*. 15(1):49-55.

Sigman-Grant M. 1996. Stages of change: A framework for nutrition interventions. *Nutrition Today.* 31(4):162-170.

Sherwood L. 1993. *Human Physiology: From Cells to Systems*. 2nd ed. Minneapolis/St. Paul, MN: West Publishing Company. p290-293.

Stary HC. 2000. Lipid and macrophage accumulations in arteries of children and the development of atherosclerosis. *American Journal of Clinical Nutrition.* 72(suppl):1297S-1306S.

Thomas CL, ed. 1997. *Taber's Cyclopedic Medical Dictionary*. 18th ed. Philadelphia: F.A. Davis Company. p168, 446-447.

Thompson FE, Dennison BA. 1994. Dietary sources of fats and cholesterol in US children aged 2 through 5 years. *American Journal of Public Health.* 84(5):799-806.

Troiano RP, Briefel RR, Carroll MD, Bialostosky K. 2000. Energy and fat intakes of children and adolescents in the United States: data from the National Health and Nutrition Examination Surveys. *American Journal of Clinical Nutrition.* 72(suppl):1343S-53S.

Troiano RP, Flegal KM. 1998. Overweight children and adolescents: Description, epidemiology, and demographics. *Pediatrics*. 101(3):497-504.

U.S. Department of Agriculture and U.S. Department of Health and Human Services. 2000. Dietary Guidelines for Americans. 5th ed. http://www.usda.gov/cnpp/DietGd.pdf. (Accessed March 1, 2001)

U.S. Department of Agriculture, Agricultural Research Service. 1994. What and where our children eat—1994 nationwide survey results. Research news press release. World Wide Web: http://www.barc.usda.gov/bhnrc/foodsurvey/kidspr.html (Accessed May 1, 2001)

U.S. Department of Health and Human Services. 2000. *Healthy People 2010: Understanding and Improving Health*. 2nd ed. Washington, DC: U.S. Government Printing Office, November: Chapters 5, 12, and 19.

Vetter, JL. 1996. *Food Laws and Regulations*. Manhattan, KS: American Institute of Baking.

Von Eckardstein A, Hyong Y, Assman G. 1994. Physiological role and chemical revelance of high-density lipoprotein subclasses. *Curr Opin Lipidol* 5:404-416.

Weinsier RL, James LD, Darnell BE, Dustan HP, Birch R, Hunter GR. 1991. Obesity-related hypertension: Evaluation of the separate effects of energy restriction and weight reduction on hemodynamic and neuroendocrine status. *The American Journal of Medicine.* 90:460-468.

Weisberg HF, Krosnick JA, Bowen BD. 1996. *Introduction to survey research, polling, and data analysis.* Thousand Oaks, CA: Sage Publications.

Williams CL, Bollella M, Boccia L, Spark A. 1998. Dietary fat and children's health. *Nutrition Today.* 33(4):144-155.

Williams CL, Squillace MM, Bollella MC, Brotanek J, Campanaro L, D'Agostino C, Pfau J, Sprance L, Strobino BA, Spark A, Boccio L. 1998. Healthy start: A comprehensive health education program for preschool children. *Preventive Medicine*. 27:216-223.

Wisconsin Center for Health Statistics. 1999. The 1999 disease burden of diabetes in Wisconsin. Wisconsin Family Health Survey.

Wolf AM, Colditz GA. 1998. Current estimates of the economic cost of obesity in the United States. *Obesity Research*. 6(2):97-106.

Appendix A

Body Mass Index (BMI) Table

BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Height						Weight (in pounds)											
4'10"	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167
4'11"	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173
5'	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179
5'1"	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185
5'2"	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191
5'3"	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197
5'4"	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204
5'5"	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210
5'6"	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216
5'7"	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223
5'8"	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230
5'9"	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236
5'10"	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243
5'11"	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250
6'	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258
6'1"	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265
6'2"	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272
6'3"	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279

BMI Calculations

English Formula
BMI =
[Weight in pounds ÷ Height in inches ÷ Height in inches] x 703

Metric Formula
BMI =
Weight in kilograms ÷ [Height in meters]^2
or
BMI =
[Weight in kilograms ÷ Height in cm ÷ Height in cm] x 10,000

Adapted from http://www.cdc.gov/nccdphp/dnpa/bmi/bmi-adult-formula.htm

BMI Growth Charts for Boys

CDC Growth Charts: United States
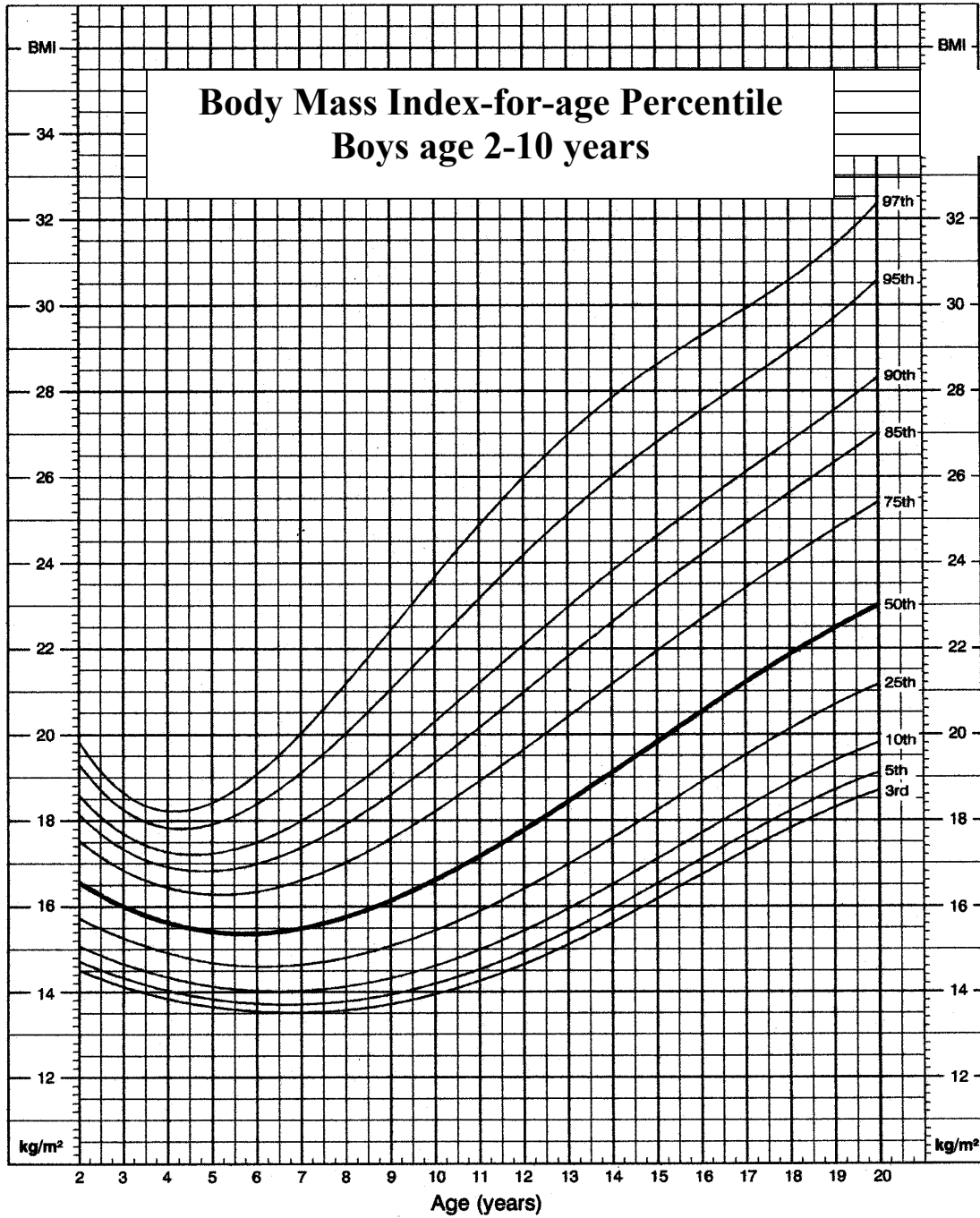
Body Mass Index-for-age Percentile Boys age 2-10 years

Age (years)

SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).

CDC

CDC Growth Charts: United States

Body Mass Index-for-age Percentile Girls age 2-20 years
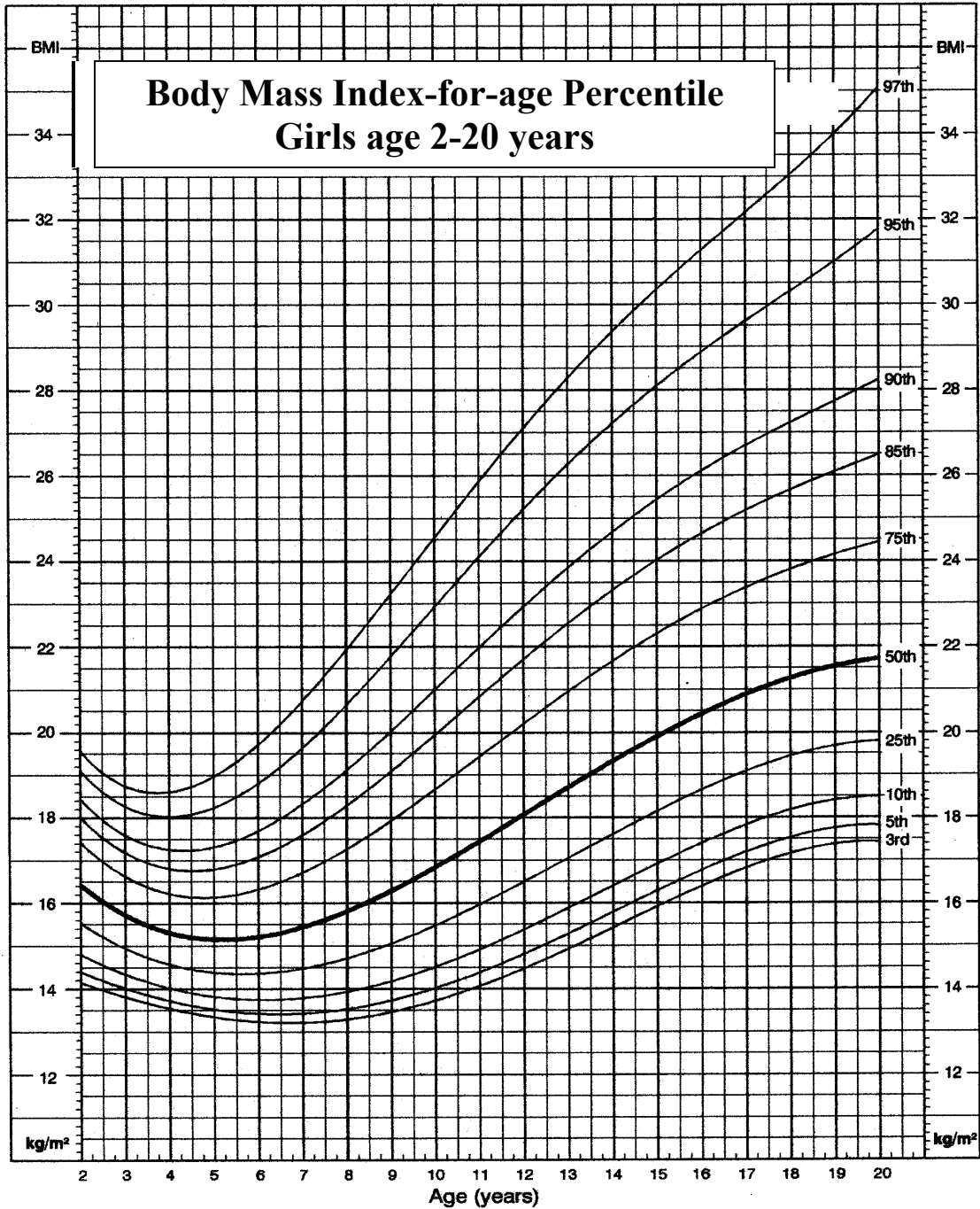
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).

Campaign Poster

Move to 1% or Skim Milk

How much fat do you add to your diet?

Whole milk   8 g

2% milk   5 g

1% milk   3 g

Skim milk   0 g

Fat grams per 8-ounce glass of milk
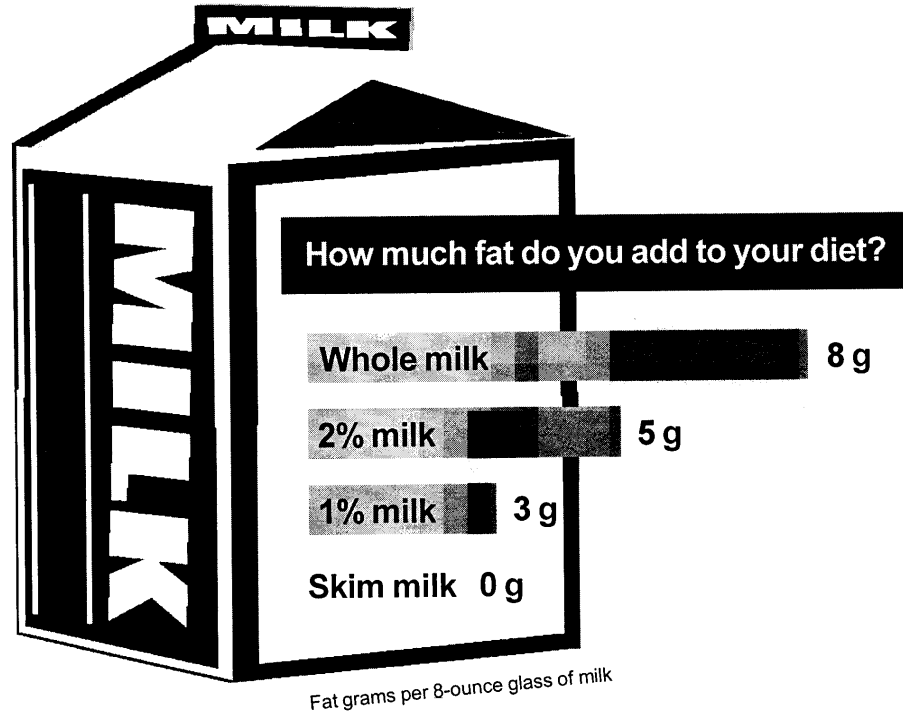
Cut the Fat ... 1% or Less

For more tips on cutting fat
from your diet call:
Dunn County Nutrition Services
715-232-2498
1-800-332-5768
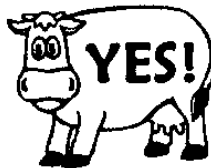
NEWS RELEASE

For More information:

Run dates: March 18-31, 2001

Ellen Blumer: 715-232-2498

CUT THE FAT – 1% or LESS

Do you know which milk is the healthiest to drink? If you are over the age of two, the answer is 1% or skim milk. Low fat and fat-free milk have as many nutrients with little or no fat. If a parent selects low fat milk for their child starting at age 2, that child will consume 400 less pounds of fat throughout their lifetime. That is equal to about 820 sticks of butter or margarine and could have a significant impact on cardiovascular health, type 2 diabetes, and obesity, just to name a few.

Most often it is heard that the switch to lower fat milk can't be made because of the taste. The Dunn County Health Department and the Pepin-Dunn WIC Program are planning taste challenges to test the accuracy of that statement. Look for taste tests to occur in some of the local stores in the month of April and be sure to stop by and take the challenge.

MAKE THE SWITCH: MOVE TO 1% or SKIM MILK

DUNN COUNTY HEALTH DEPARTMENT

800 WILSON AVENUE • MENOMONIE, WI 54751 • 715-232-2388 • FAX: 715-232-1324

March 8, 2001

To Whom It May Concern:

The Pepin-Dunn WIC Program and the Dunn County Health Department are planning a community awareness campaign for the month of April and are requesting your assistance.

Cut The Fat – 1% or Less is a community awareness campaign to promote low fat eating and ultimately decrease the rate of obesity. The campaign is designed to promote the selection of low fat or fat free milk. The goal of the media presentation to increase the community awareness of the fact that 1% and skim milk are the healthiest choices for people age 2 years and older. Low fat and fat-free milk have as many nutrients with little or no fat. If a parent selects low fat milk for their child starting at age 2, that child will consume 400 less pounds of fat throughout their lifetime. That is equal to about 800 sticks of butter or margarine. This could have a significant impact on cardiovascular health, type 2 diabetes, and obesity to name a few.

Volunteers will be in selected stores conducting taste tests for a period of 2 weeks. Most often it is heard that the switch to lower fat milk can't be made because of the taste. (The participants will wear sunglasses to disguise the differences in milk color.) As part of the taste tests, participants will be asked their perception of low-fat milk. Education of the benefits of selecting low-fat or fat free milk will take place at this time. Pre- and post- taste test, participants will be asked their milk selection choices to assess any change in milk selection because of tasting.

What we are asking of you is this:

1. We would like to obtain milk sales data from your store before the campaign begins, during the campaign, immediately following the campaign and one-month post campaign. We would like to know the type of milk (i.e. whole, 2%, 1% or skim) and the amount sold in your store. The data would be taken one time per week and we have volunteers to collect the information.

2. We would like stores to volunteer to be a taste test site. We will be announcing the taste test sites in our media campaign.

3. We would like to use shelf talkers in the dairy case promoting the purchase of low fat and skim milk.

You will be contacted to confirm you participation with the milk sales data collection and the use of the shelf talkers during the week of March 12-16th. If you would like to volunteer to be a taste test site contact Ellen Blumer at 232-2498 or 1-888-332-5768. Thank you in advance.

Sincerely,

Ellen Blumer, RD
Public Health Nutrition Coordinator

Appendix F

CONSENT FORM: Cut the Fat—1% or Less Campaign

This taste-test is part of a research project examining the <u>reactions</u> and <u>behaviors</u> towards the drinking of milk. The goal of this study is to evaluate a questionnaire and a taste-test to measure for these. Before starting the taste-test, we would like you to read the consent form, indicating that you understand the potential risks and benefits of this participation and that you understand your rights as a participant. If you have any questions, please contact Ellen Blumer, WIC director of Dunn-Pepin County at (715) 232-2498, or Amanda Schmidt, UW-Stout, Food and Nutrition Department.

RISKS: There is little or no risk to you in doing this taste test. Your responses are completely confidential. If you are allergic to milk or are lactose intolerant we ask that you do not participate in this study due to the potential adverse effects.

BENEFITS: The results of this study will allow you the chance to enhance your nutritional knowledge of milk products to make healthier changes.

CONFIDENTIALITY OF RESPONSES: Your answers are strictly confidential. Only the primary researchers will have access to the confidential raw data. No names or other identifying markers will be used in the results of the research study.

RIGHT TO WITHDRAW OR DECLINE TO PARTICIPATE: Your participation in this study is strictly voluntary. Should you choose to participate and later wish to withdraw from the study, you may discontinue your participation at that time without incurring adverse consequences.

<u>By consuming the milk in this taste-test, I am giving my permission to participate. Also by participating, I claim not to have a milk allergy or be lactose intolerant.</u>

NOTE: Questions or concerns about participation in the research or subsequent complaints should be addressed first to the researcher or research advisor and second to Dr. Ted Knous, Chair, UW-Stout Institutional Review Board for the Protection of Human Subjects in Research, 11 HH, UW-Stout, Menomonie, WI, 54751, phone (715) 232-1126.

Taste-Test Survey

Subject #	Gender	Age	Usually Use[1]	How Often?[2]	Comments
	F M		S 1 2 W N	D W M N	

- Ask the taster: **What is your age**?
- Ask the taster: **What type of milk do you usually use?** (Circle response)

S=Skim, 1=1% milk, 2=2% milk, W=whole milk, N=never drinks milk

- Ask the taster: **How often do you use milk?** (ask as an open-ended question and circle response)

D=uses milk daily, W=uses milk weekly, M=uses milk monthly, N=never uses milk

I am going to give you a list of different types of milk, tell me if they are low in fat or high in fat? Check off the answer they give you

	High Fat	Low Fat
Skim Milk	☐	☐
1% Milk	☐	☐
2% Milk	☐	☐
Whole Milk	☐	☐

Subject #	Sample A O G L	Sample B O G L	Sample C O G L	Sample D O G L	Lowest Liked	Comments	Pledge*
							Y N

- Present to the taster the type of milk in CUP A.
- Under G (guess) mark which type the taster guessed (S=skim, 1=1%, 2=2%, W=Whole).
- Under L (like) ask the taster if they liked that sample (Y (yes) or N (no))
- Continue on with CUP B through CUP D.
- Box O (offered) will be filled in by researcher

*Pledge Question: Are you willing to switch to or continue drinking either 1% or skim milk? (read after educating the person on drinking milk).

1. **I am going to give you a list of different types of milk, tell me if they are low in fat or high in fat?** Check off the answer they give you

	High Fat	Low Fat
Skim Milk	☐	☐
1% Milk	☐	☐
2% Milk	☐	☐
Whole Milk	☐	☐

2. **Earlier you talked about what kind of milk you drank and how often. Which of these statements best describes you?**

☐ I've had these milk-drinking habits for a long time (at least 5 years)
☐ My milk-drinking habits changed within the last five years.

If this answer was checked, how long ago was this change?
Years   Months

3. **In the past few weeks, have you heard about the "Cut the Fat—1% or Less Campaign" encouraging people to drink low-fat or nonfat milk?**

☐   Yes   ☐   No

If yes, where did you hear about it?

☐ Newspapers   ☐ Radio   ☐ Grocery Store   ☐ Poster

☐ Other _____

Appendix H

Random Sampling of Milk

	Sample A	Sample B	Sample C	Sample D
1	S	1	2	W
2	1	2	W	S
3	2	1	S	W
4	W	S	1	2
5	1	W	S	2
6	2	1	W	S
7	W	S	2	1
8	S	1	W	2
9	2	S	W	1
10	W	2	1	S
11	S	W	2	1
12	1	S	W	2
13	W	2	S	1
14	S	W	1	2
15	1	S	2	W
16	2	W	1	S
17	S	2	W	1
18	1	W	2	S
19	2	S	1	W
20	W	1	S	2
21	1	2	S	W
22	2	W	S	1
23	W	1	2	S
24	S	2	1	W

S= Skim milk
1= 1% milk
2= 2% milk
W= Whole milk

Nutrition Counseling

If the taster could not tell the difference between the milks or said they liked the taste of skim:
- Suggest that they switch to skim milk. It has all the vitamins and calcium of whole or 2% milk without all the artery-clogging saturated fat. If it is the appearance of skim milk that bothers them, point out that getting past the appearance would allow them to make this simple change that would significantly improve their health.

If the tasters liked the taste of 1% milk:
- Suggest they switch to 1% milk. It is much lower in fat and cholesterol than whole or 2% milk. NOTE: Skim milk is even better. 1% milk still gets 20% of its calories from fat, while skim milk has no fat.

For those who are concerned about their weight or their child's weight:
- Point out that whole milk is one of the TOP 5 sources of calories for adults. Skim milk has 40% fewer calories than whole milk. (Whole milk has 150 calories per cup and skim milk has only 90)

If the tasters only like 2% or whole milk:
- Use the food label to point out that one cup of whole milk has one quarter of their day's budget for artery-clogging saturated fat and that saturated fat is a major contributor to heart disease.
- Recommend that they gradually work their way down by 1st switching to 2% milk for 2-3 weeks. Then once they become use to 2% milk, then they should switch to 1%. Or they can try drinking half and half in one glass (half whole or 2% and half 1% or skim).

If the tasters already drink skim milk:
- Congratulate them for doing their heart a favor and encourage them to keep up the good work.
- Suggest that they try to get other family members to try skim milk if they are not already drinking it.

Magnet

Move to 1% or skim milk
232-2498 ● 1-888-332-5768

1% OR LESS
YES

PEPIN-DUNN
WIC
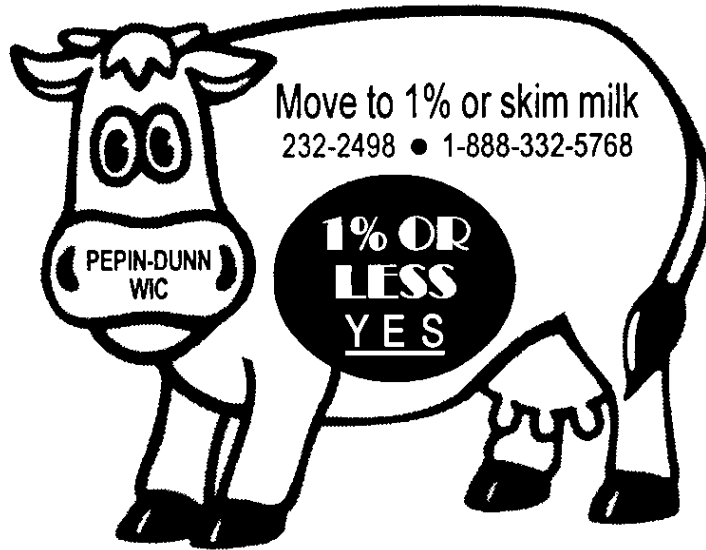
Appendix K

Milk Sales Data Worksheet

Store Name	Type of Milk	Week 1		Week 2		Week 3		Week 4	
		Gallons Sold	Milk Sales	Gallons Sold	Milk Sales	Gallons Sold	Milk Sales	Gallons Sold	Milk Sales
	Whole								
	2%								
	1%								
	Skim								
	Whole								
	2%								
	1%								
	Skim								
	Whole								
	2%								
	1%								
	Skim								
	Whole								
	2%								
	1%								
	Skim								

Telephone Survey

Hi my name is _____, I am conducting a research study about milk consumption in Menomonie and surrounding areas. It will only take about two or three minutes for you to answer this survey. Are you willing to participate in this research study? *(If yes continue on, if no tell them thank you for their time and continue on with the next number on the list)* Your answers are strictly confidential. No names or identifying markers will be used in the results of this research study.

- Ask the age of the individual who answered the phone. *If the person is 15 years or older, record this and continue on with the survey. If the person is younger than 15 ask for the person who buys the milk for the family. Once this person is on the phone ask them their age.*
- Record the gender of the person on the phone.
- State that there is no risk to them by answering these questions.
- State that they have the right to refuse or withdraw from the survey at any time without any consequences to them. *If they do withdraw at any time during the survey, the survey will be nullified.*
- At this point begin to ask them the survey questions below.

Age_____   **Gender** ___M____F____

1. **Please tell me if the following milk products are high or low in fat?**

	High Fat	Low Fat
Skim Milk	☐	☐
1% Milk	☐	☐
2% Milk	☐	☐
Whole Milk	☐	☐

2. **Which of the following statements best describes you?**

☐ I've had the same milk-drinking habits for a long time (at least 5 years).
   What type of milk do they drink_____
☐ My milk-drinking habits have changed within the past five years.

If this answer was checked, how long ago was the change? _____

3. In the last month, have you heard about the "Cut the Fat—1% or Less Campaign" encouraging people to drink low-fat or nonfat milk?
☐   Yes   ☐   No
If yes, where did you hear about it?

☐ Newspapers   ☐ Radio   ☐ Grocery Store   ☐ Poster

☐ Other _____   ☐ Gas Station

- At the end of the survey thank them for their time and tell them if they have any questions or concerns they can contact Dr. Ted Knous, Chair Review for Human Subject Committee at UW-Stout, (715) 232-1126.

Appendix M

Tables of Statistical Significance

Table M-1
Week 1 vs. Week 6 for Each Type of Milk
For Figure 4-2

Repeated Measures Test	Mean	Standard Deviation	df	F-Value	Probability
Differences between Types of Milk Sold					
Skim	22.8	9.156	3,60	82.15	.000
1%	18.9305	5.6405			
2%	45.652	8.97			
Whole	12.6175	6.0785			
Differences between Weeks					
Week 1	25.000	13.694	1,60	.000	1.000
Week 6	25.000	15.599			
Differences between Types of Milk Sold by Week					
S-1	23.588	9.953	3,60	1.84	.150
S-6	22.012	8.359			
1-1	19.214	6.471			
1-6	18.647	4.810			
2-1	43.522	8.145			
2-6	47.782	9.795			
W-1	13.676	6.310			
W-6	11.559	5.847			

f= 4.00 p<.05 for 1,60 df
f= 2.76 p<.05 for 3,60 df

Table M-2

Week 1 vs. Week 10 for Each Type of Milk

See Figure 4-2

Repeated Measures Test	Mean	Standard Deviation	df	F-Value	Probability
Differences between Types of Milk Sold					
Skim	24.08	8.352	3,60	73.73	.000
1%	18.9265	6.537			
2%	43.9665	7.778			
Whole	13.027	6.0485			
Differences between Weeks					
Week 1	25.000	13.694	1,60	.000	1.000
Week 10	25.000	13.739			
Differences between Types of Milk Sold by Week					
S-1	23.588	9.953	3,60	.36	.782
S-10	24.572	6.751			
1-1	19.214	6.471			
1-10	18.639	6.603			
2-1	43.522	8.145			
2-10	44.411	7.411			
W-1	13.676	6.310			
W-10	12.378	5.787			

f= 4.00 p<.05 for 1,60 df
f= 2.76 p<.05 for 3,60 df

Table M-3

Week 6 vs. Week 10 for Each Type of Milk

See Figure 4-2

Repeated Measures Test	Mean	Standard Deviation	df	F-Value	Probability
Differences between Types of Milk Sold					
Skim	23.0815	7.3665	3,64	105.93	.000
1%	18.774	5.6285			
2%	46.168	8.369			
Whole	11.8865	5.65			
Differences between Weeks					
Week 6	25.000	15.456	1,64	.000	1.000
Week 10	25.000	13.775			
Differences between Types of Milk Sold by Week					
S-6	21.799	8.141	3,64	1.88	.141
S-10	24.364	6.592			
1-6	18.970	4.845			
1-10	18.758	6.412			
2-6	47.682	9.493			
2-10	44.654	7.245			
W-6	11.549	5.661			
W-10	12.224	5.639			

f= 4.00 p<.05 for 1,64 df
f= 2.00 p<.05 for 3,64 df

Table M-4

Week 1 vs. Week 6: Low Fat vs. High Fat Milk

See Figure 4-3

Repeated Measures Test	Mean	Standard Deviation	df	F-Value	Probability
Differences Between Low Fat and High Fat Milk Sold					
Low Fat	41.7305	15.4745	1,62	6.02	.017
High Fat	58.2695	36.8095			
Differences Between Weeks					
Week 1	50.000	27.389	1,62	.000	1.000
Week 6	50.000	31.199			
Differences Between High Fat and Low Fat Milk by Week					
Low Fat-1	42.802	17.103	1,62	.96	.331
Low Fat-6	40.659	13.846			
High Fat-1	57.198	33.541			
High Fat-6	59.341	40.078			

f= 4.00 p<.05 for 1,62 df

Table M-5

Week 1 vs. Week 10: Low Fat vs. High Fat Milk

See Figure 4-3

Repeated Measures Test	Mean	Standard Deviation	df	F-Value	Probability
Differences Between Low Fat and High Fat Milk Sold					
Low Fat	43.0065	15.7785	1,62	4.75	.033
High Fat	56.9935	34.3085			
Differences Between Weeks					
Week 1	50.000	27.389	1,62	.000	1.000
Week 10	50.000	27.478			
Differences Between High Fat and Low Fat Milk by Week					
Low Fat-1	42.802	17.103	1,62	5.36	.826
Low Fat-10	43.211	14.454			
High Fat-1	57.198	33.541			
High Fat-10	56.789	35.076			

f= 4.00 p<.05 for 1,62 df

Table M-6

Week 6 vs. Week 10: Low Fat vs. High Fat Milk

See Figure 4-3

Repeated Measures Test	Mean	Standard Deviation	df	F-Value	Probability
Differences Between Low Fat and High Fat Milk Sold					
Low Fat	41.945	13.758	1,66	5.87	.018
High Fat	58.054	37.544			
Differences Between Weeks					
Week 6	50.000	30.911	1,62	.000	1.000
Week 10	50.000	27.549			
Differences Between High Fat and Low Fat Milk by Week					
Low Fat-6	40.769	13.502	1,62	1.88	.175
Low Fat-10	43.122	14.014			
High Fat-6	59.231	39.775			
High Fat-10	56.878	35.313			

f= 4.00 p<.05 for 1,66 df