Relationship between BMI, eating behaviors and attitudes toward food, its preparation and consumption in midlife women

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Abstract

This study used segmentation analyses to identify seven distinct subgroups of U.S. midlife women (n=1684) based on their attitudes toward food, its preparation and consumption. Statistical analysis was completed to determine the influence of attitude segments on body mass index (BMI) and food and nutrient intake. Women completed a mailed survey including a 24 hour food record and a questionnaire regarding physical activity, eating attitudes and weight history. Mean age of the women was ~50 years and they were mostly White (78%), currently married (71%) and employed (70%). Obesity was influenced by attitude segments (clusters of women sharing similar attitudes). Mean BMI was lower for 'Health Conscious', 'Creative Cooks' and 'Hate to Cook' attitude segments compared to 'Boredom Bingers' and 'Live to Eat' attitude segments. Overall, 'Health Conscious' and 'Creative Cook' attitude segments had generally better nutrition profiles while 'Boredom Bingers' and 'Live to Eat' attitude segments had poor nutrition profiles. Segmentation of women in this age group according to eating attitudes may be used to deliver tailored nutrition education which may prove to be effective in managing weight and improving diet quality.

Literature Review

Obesity and associated risk for chronic disease and conditions

Obesity has been a public health problem for several decades doubling in prevalence in American adults >20 yrs between 1980 and 2002 (Flegal, Carroll, Ogden and Johnson 2002; Hedley et al. 2004). For midlife women aged 40-59 years, the prevalence of overweight or obesity was 68% and 73% based on National Health and Nutrition Examination Survey (NHANES) data from 1999-2000 and 2003-2004, respectively (Ogden et al. 2006). Racial/ethnic group differences were observed in NHANES 2003-2004 data for midlife women with obesity prevalence rates at 48.4% for non-Hispanic black, 39.8% for Mexican-American and 36.7% for non-Hispanic white women. All midlife women (40-59 yrs) had a higher prevalence of obesity (36.8%) compared to those 20-39 yrs (28.5%) or 60 yrs and older (31%). More recent NHANES data (2005-2006) did not show an increase in the prevalence of obesity for women compared to data from 2003-2004 (Ogden, Carroll, McDowell and Flegal 2007).

Physical activity is a large component of the energy balance equation for midlife women. The National Center for Health Statistics reported survey results from adults from 2006 indicating that 37.5% and 42.6% of women aged 45-54 years and 55-64 years, respectively, were inactive based on reporting no sessions of light/moderate or vigorous physical activity per week (NCHS 2009). Older women were more likely to report being inactive while younger women were more likely to engage in regular leisure time activities.

Weight gain as women transition through the midlife age span has been observed in several longitudinal studies. Over a 3 year follow up period in women aged 41-68, a

weight gain of 3 kg was observed (Sternfeld et al. 2004). Brown, Williams, Ford, Ball and Dobson (2005) reported similar findings with women aged 45-55 yrs who had an average gain of 0.5 kg per year over 5 years. Women who had quit smoking, were less active and had transitioned through menopause had higher odds of weight gain. It is not clear whether women at midlife tend to gain weight due to aging or the transition through menopause (Crawford, Case, Avis and McKinlay 2000; Guthrie, Dennerstein and Dudley 1999; Wing, Matthews, Kuller, Meilahn and Plantinga 1991). However, it is clear that a higher fat deposition occurs in postmenopausal compared to premenopausal woman (Franklin, Ploutz-Snyder and Kanaley 2009; Reubinoff et al. 1995) and that fat deposition changes from subcutaneous to an abdominal visceral location during menopause (Hunter et al. 1996; Enzi et al. 1986; Kanaley et al. 2001).

Obesity is associated with increased risk of major chronic diseases including heart disease, cancer, and type-2 diabetes (Must et al. 1999). In an 8 year follow up study, women runners (mean age = 42 yrs) with a BMI > 27 kg/m^2 had a 5.3 fold increase in the odds ratio for developing hypercholesterolemia compared to women with a BMI of 20 kg/m^2 (Williams 2008). Both change in BMI and change in waist circumference were significantly associated with the probability of having high serum cholesterol levels. Murphy et al. (2005) reported that as BMI increased in women (45-64 yrs) the prevalence of death from a cardiovascular and/or coronary heart disease event increased as well. Additionally, Li et al (2006) found an 8% increase in coronary heart disease (CHD) with a one unit increase in BMI. Sedentary obese women also had the highest risk of developing CHD. The risk of developing prehypertension was related to weight gain in women aged 40-59 according to Yang et al. (2007). For every 1 kg increase in weight,

the odds ratio of developing prehypertension increased 5%. Weight gain before age 50 tended to have a greater effect on the relationship than weight gain after age 50.

The prevalence of type 2 diabetes has been steadily increasing over the past several decades (CDC 2008). This trend has been associated with weight gain and obesity in midlife women in longitudinal and prospective studies (Villegas et al. 2009; Krishnan, Rosenberg, Djousse, Cupples and Palmer 2007; Hwang, Chen and Lin 2007). Diabetes was one of the top 5 causes of death for middle aged women in 2004 (CDC 2004). By the year 2010, 41 million women 45-64 yrs of age are projected to have diabetes with nearly all being type 2 (CDC 2005). Nonwhite women are twice as likely to develop type-2 diabetes as white women (CDC 2005). According to the CDC in 2005, the prevalence rates for women aged 50-59 were 23% for blacks, 24% for Mexican Americans and 9.7% for whites.

Obesity has repeatedly been linked with mortality due to various types of cancer (World Cancer Research Fund 1997; Carroll 1998; Peto 2001). However, some studies produced inconsistent results which failed to support a relationship between obesity and incidence of cancer (Michaud et al. 2001; Wolk et al. 2001; Moller, Mellemgaard, Lindvig, and Olsen 1994). Results from a prospective cohort study (Reeves et al. 2007) showed an association between BMI and certain cancer incidence and death risk in women aged 50-64. Compared to women with a BMI < 22, women with a BMI of ≥30 had a 1.12 greater risk of developing any cancer. With the same BMI group comparisons, obese women had a higher risk of developing endometrial cancer, (2.89), adenocarcinoma of the esophagus (2.38), kidney cancer (1.53) and leukemia (1.5) compared to normal weight women. In a large prospective cohort study by Rapp et al.

(2005), similar associations were observed regarding incidence of certain cancers and overweight in women aged 35-54.

Obesity contributes to a higher risk of mortality from chronic disease, especially when BMI is examined at midlife. In a prospective study by Adams et al. (2006), increasing levels of overweight and obesity at midlife (50 yrs) increased relative risks of death at age 70. Morbidly obese (BMI $\geq$ 40) women had a 3.79 fold increased risk of mortality compared to normal weight women. These results confirm those of Taylor and Østbye (2001) involving a cross-sectional community-based study (n=2,725) and self-reported BMI of women at midlife (50 yrs) where BMI was positively associated with mortality. Mortality (deaths per 1000/yr) was lowest when BMI was <18.5 and highest when BMI was 30-34.9. Weight loss interventions resulting in as little as a 5-10% reduction in weight lowered mortality and disease risk significantly (NIH/NHLBI 1998).

Obesity is associated with cognitive decline over the lifespan in some studies. Whitmer, Gunderson, Barrett-Connor, Quesenberry and Yaffe (2005) showed that at midlife (40-45 years), women who were obese or overweight were 35% more likely to have dementia in later life compared to women who were normal weight at midlife. Women in the highest fifth percentile of subscapular skinfold thickness had a 50% increase in risk of developing dementia compared to women in the lowest fifth percentile. These findings were confirmed in later studies linking BMI at midlife to both Alzheimer disease and vascular dementia in later life (Whitmer, Gunderson, Quesenberry, Zhou and Yaffe 2007; Hassing et al. 2009).

Overweight and obesity in midlife increase the probability of immobility in late adulthood (Ferraro, Su, Gretebeck, Black and Badylak 2002; Daviglus et al. 2003).

Results from a prospective cohort study with a 26 yr follow up period showed that a positive relationship existed between overweight and obesity at middle and late adulthood and prevalence of immobility (Daviglus et al. 2003). In another prospective cohort study, Houston et al. (2009) examined the relationship between overweight and/or obesity at early, middle and late adulthood and mobility and the cumulative effect of overweight and/or obesity at these three time points. Women who reported being overweight/obese at all three time points were more likely to have incident mobility limitation compared to normal weight individuals. Women who were overweight/obese at young and middle adulthood but not late adulthood were also significantly more likely to have incident mobility limitation compared to those with a normal weight at all three time points. A cumulative effect was also observed. The longer an individual was overweight/obese, the higher the risk for incident mobility limitation. BMI at midlife also predicted risk of developing limitations in the ability to walk 22 yrs later according to Stenholm et al. (2007).

Overweight or obesity is common at midlife in women. These conditions have been linked to increased risk of chronic diseases, and dementia and limitations in mobility for women later in life. Weight reduction of 5-10% or prevention of further weight gain can reduce the likelihood of developing chronic disease and obesity-associated conditions in later life. Therefore, eating and physical activity behaviors at midlife should focus on weight control. From a theoretical perspective, the many influences on eating behavior can be categorized according to personal, behavioral and environmental factors (Baranowski, Perry and Parcell 2002). Attitudes are an important

personal factor that influences eating behavior (Aikman, Min and Graham 2006; Wang, Worsley and Cunningham 2008).

Attitudes about food, its preparation and consumption

Attitudes have been defined as relatively lasting clusters of feelings, beliefs, and behavioral tendencies (Crano and Prislin 2006). Ajzen (1991) described two types of attitudes within the attitudinal construct of the Theory of Planned Behavior (TPB). They include instrumental or cognitive attitudes (extent to which performing a behavior is judged to be good or beneficial) and affective attitudes (extent to which a behavior is judged to be enjoyable). When directed toward food, attitudes are salient behavioral beliefs considered when making decisions about food, its preparation and consumption (Aikman, Min and Graham 2006; Wang, Worsley and Cunningham 2008).

Early nutrition education research focused on the Knowledge-Attitude-Behavior model of behavior change (Axelson, Federline and Brinberg 1985), proposing that knowledge change leads to change in attitudes which drives behavior change. In recent years, the attitude construct has most often been operationalized within the Theory of Planned Behavior (TPB). The TPB proposes that behavior is preceded by intention which is based on three constructs, attitude toward the behavior, subjective norms and perceived behavioral control (Ajzen and Fishbein 1980). In general, the stronger the intention to engage in a behavior, the more likely the individual will perform the behavior. Attitudes toward behaviors are influenced by behavioral beliefs (Armitage and Conner 2001). The importance of attitudes in decision making is relative compared to the importance of subjective norms and perceived behavioral control (Ajzen 1991). In a review of studies applying the TPB to health-related behaviors, attitudes toward the action and perceived behavioral control were most often predictive of intention (Godin and Kok 1996). Conner, Kirk, Cade and Barrett (2003) used the TPB to understand the

reasons women used dietary supplements. Questionnaire responses indicated that intention to use supplements, the belief that health was important or that supplement use could protect against developing an illness, and social influence scores were higher among users. To understand fast food consumption, Dunn, Mohr, Wilson and Wittert (2008) applied the TPB among Australian adults through interview sessions. Positive affective reactions to fast food and its convenience were more important than knowledge of longer-term health risks associated with frequent fast-food consumption. Social influences tended to be more important than the influence of health care professionals while convenience and enjoyment of eating out were also seen as influences. Additionally, Brug, de Vet, Nooijer and Verplanken (2006) applied the TPB to fruit intake by Dutch adults (n=627). Along with attitudes, subjective norms and perceived behavioral control, the additional contributions of habits, self-efficacy constructs and outcome expectations were also used to predict fruit intake. The constructs of the TPB predicted fruit intake while habits and self-efficacy expectations were additional determinants of fruit intake.

Many situational or environmental as well as personal factors shape attitudes about food, its preparation and consumption. For example, women may consider food preparation negatively given constraints of time within a busy lifestyle and therefore value convenience or ease of preparation. Women may consider consumption of certain foods beneficial to their health, while consumption of others may be considered detrimental to health. Expectations and demands of family may influence attitudes about food preparation, while emotions toward eating may affect attitudes about food consumption. As women age, the social context for eating may change. Household

composition may change as children leave home and parents need care. Women may experience health-related changes which necessitate a change in diet. A review of environmental and personal factors will be helpful in understanding how these factors shape attitudes toward food, its preparation and consumption.

Habit is a strong predictor of food choice as individuals are inclined to consume similar foods within the same meal over a series of days (Khare and Inman 2006). Routines may be developed to help make food choices during various eating occasions (Zisberg, Young, Schepp and Zysberg 2007). Jastran, Bisogni, Sobal, Blake and Devine (2009) described eating routines as a multidimensional occurrence involving time, place, mental and physical state. During interviews, adults reported repetition in food and beverage consumption and also in eating context. Four main characteristics of eating routines were reported. Eating routines were 1) embedded in work and family schedules, 2) a reflection of personal food choice values, 3) adaptable and 4) individuals developed a sense of identity from eating routines through personal reflection. The 3 meal a day routine was acknowledged by participants though the meals were described differently based on the person. Since routines are adaptable to changes in the environment they can be used in more than one context yet still provide a sense of stability (Fiese 1995).

Attitudes about the social context in which meals are prepared and consumed and the social context itself affects the amount and quality of food consumed. Blake, Bisogni, Sobal, Jastran and Devine (2008) examined the role that social context played in how adults constructed evening meals based on schema theory. Schemas help explain how individuals store, retrieve, and use information (Wagner 2005; Nishida 1999). Blake et al. (2008) found that food choices were made according to goals and desired outcomes.

In this case, the main goal was to make meal time 'family time'. In a cross-sectional study, women were more likely to eat a greater number of serving of vegetables if they saw eating dinner together as a household as important (Crawford, Ball, Mishra, Salmon and Timperio 2007). Others have found that the social context of eating is important in how much or what is selected and consumed. For example, when eating with a group of people, de Castro (1994) found that the meal tended to be larger than when eating by oneself and that women also ate more in presence of a male figure.

The need for convenience and to obtain food quickly has become more common over time. Fast food is typically thought to be very convenient. Consumption of fast food was associated with the perception that it is convenient and consumed in a fun and a social setting, a dislike toward cooking, and the perceived healthfulness of the food (Dave, An, Jeffery and Ahluwalia 2009; Rydell et al. 2008). Studies have shown that those who are younger (French, Harnack and Jeffery 2000; Bowman and Vinyard 2004) and live in larger households (Paeratakul, Ferdinand, Champagne, Ryan and Bray 2003) generally eat more fast food and that women generally eat fast food because family and/or friends like it (Rydell et al. 2008). However, women who ate fast food or convenience food at least once per week tended to eat less than two servings of fruit and vegetables per day (Crawford et al. 2007). In addition, an eating occasion comprised of fast food and convenience foods instead of foods prepared at home had more calories (Nielsen, Siega-Riz and Popkin 2002). The positive relationship between BMI and frequency of restaurant and fast food visits has been documented in several studies (Putnam 1999; Nielsen et al. 2002; Pereira et al. 2005). An increase in caloric intake when eating fast food and convenience foods may be due to the larger portion sizes

served at these establishments compared to home cooked meals (Nielsen and Popkin 2003) People tend to eat more food when presented with more food (Levitsky and Youn 2004; Diliberti, Bordi, Conklin, Roe and Rolls 2004; Rolls, Roe and Meengs 2006).

Food preparation habits influence food choice in several ways. Women who prepare most meals at home are likely to have different eating habits than those who do not. Crawford et al. (2007) found that women who planned meals prior to shopping and preparation and who liked trying new recipes had higher intakes of fruits and vegetables when compared to women who never or rarely engaged in these behaviors. A younger age and being employed full time were factors associated with greater use of convenience foods and eating foods prepared away from home (Hunter and Worsley 2009). In addition to food intake, BMI is also affected by eating food prepared away from home. BMI was higher for those who ate more meals prepared out of the home compared to those who ate more meals prepared in the home (Binkley, Eales and Jekanowski 2000). Individuals who ate breakfast at home also tended to have a lower BMI than those who skipped breakfast or ate breakfast outside the home (Ma et al. 2003).

Eating in response to emotional cues (stress, moods) as a coping outlet can have a significant influence on dietary intake and weight (Ozier et al. 2008). Individuals who ate in response to emotional cues tended to lack suitable coping mechanisms which led to weight gain and higher BMI (Crowther, Sanftner, Bonifazi and Shepherd 2001). Participants classified as having a high level of disinhibition were likely to eat more after a restriction phase than those who were classified as having a low level of disinhibition when exposed to the same conditions (Soetens, Braet, Van Vlierberghe and Roets 2008). Response inhibition, the ability to effectively trigger inhibitory processes, has been

associated with an impulsive personality (Logan, Schachar and Tannock 1997). Individuals with an impulsive personality tend to exhibit an increased sensitivity to a reward and/or insufficient inhibitory control over a behavior (Doughterty et al. 2003). Nederkoorn, Guerrieri, Havermans, Roefs and Jansen (2009) found that highly impulsive people purchased more calories, specifically food of high energy density when hungry. Individuals with low response inhibition generally were less likely to have a healthy weight because calorie restriction influenced hunger (Nederkoorn, Braet, Van Eijs, Tanghe and Jansen 2006).

Aging has been shown to bring about an interest in healthy eating (Kearney, Kelly and Bigney 1998) due to increased risk of chronic disease with age, death of close family members and/or friends and general lifestyle changes (Olsen 2003). According to a cross-sectional survey of Irish adults, Hearty, McCarthy, Kearney and Gibney (2007) found that 69% of the women studied had a positive attitude toward eating healthy. In accordance with findings by Kearney et al. (1998) this attitude became more important as age increased. Women with a positive attitude toward healthy eating were more likely to eat higher amounts of wholemeal bread, breakfast cereals, cream, ice-cream and desserts, yogurts, vegetables, fruit, fish, and fish dishes compared to women with a negative attitude. Biltoft-Jensen et al. (2009) found that women who valued health when making dinner generally emphasized a low fat meal as the most important component followed by including vegetables and having a home cooked meal. In another study, the consumption of fruits and vegetables was regulated significantly by an individual's affective attitudes compared to cognitive attitudes (Lawton, Conner and McEachan

2009). Health promoting activities (fruit and vegetable consumption, eating a low fat diet and engaging in physical exercise) were regarded as more beneficial than enjoyable.

Beliefs about healthful benefits attributed to consuming selected foods or from certain dietary patterns may affect nutrition-related behaviors and food intake. Schryver and Smith (2006) conducted focus groups with adults and found that participants were willing to consume soy to lower cholesterol and prevent cardiovascular disease. Among Nigerian mothers, Samuel and Cole (2002) found that attitudes about the nutritive value of cowpeas and soybeans affected their preference for feeding those foods to their children. In a national sample of adults, attitudes about the importance of nutrition and weight control were related to intake of fruits and vegetables and fast food (Glanz, Basil, Maibach, Goldberg and Snyder 1998). Finally, Satia, Galanko and Neuhouser (2005) conducted a population based cross-sectional study of African American adults with the intent of describing psychological determinants of nutrition label reading. They found that respondents were more likely to eat fruits and vegetables and read nutrition labels if they believed in the relationship between diet and cancer. While the evidence is fairly positive relating attitudes to eating behavior in the general population, a recent study did not support this association (Evans, McNeil, Laufman and Bowman 2009). In a group of midlife African American women, attitudes about health were not predictive of eating a low-fat diet. This may have been due in part to low scores on a health attitudes instrument and that health attitudes may not be predictive of health behaviors when considered along with other factors

Various personal, social and environmental factors shape attitudes about food, its preparation and consumption. They include eating habits or routine, a need for

convenience, family structure or household composition, emotions or lifestyle as well as food preparation habits. Attitudes (affective and instrumental) have been shown to affect food choice. Midlife women are transitioning through a unique life stage based on aging/physiological changes, changes in social influences and lifestyle. To help women make better food choices it is important to understand attitudes and factors that shape these attitudes. Segmentation analysis has been used in previous studies to form interventions tailored to knowledge, attitudes and behavior. However, based on a review of the literature, midlife women have not been segmented previously into groups based on attitudes toward food, its preparation and consumption. This approach may be useful to tailor nutrition education according to attitude, associated food intake and weight status.

Segmentation

Segmentation is a tool used by marketing practitioners and researchers to divide a large heterogeneous population into smaller groups with similar characteristics. A large population includes individuals with different demographic (age, gender, economic standing) and psychographic characteristics (attitudes and lifestyle choices). Segmentation analysis can help to better understand the differences and particular needs of small groups of people within an overall population (Weinstein 1987). Segmentation has been used to address health issues such as alcoholism (Slater, Basil and Maibach 1999) and overall health promotion and food choice (Glanz et al. 1998; Maibach, Maxfield, Ladin et al. 1996). The effectiveness of segmentation can be attributed to its use to tailor health communications. A tailored message to a specific group can be more relevant to the target audience than a generic message sent to a general population (Glanz et al. 1998, Maibach et al. 1996).

The segmentation approach has been applied in several nutrition and healthy lifestyles studies. Kolodinsky and Reynolds (2009) described 5 overweight populations based on food and lifestyle behaviors related to unhealthy weight. Almost all (99%) in the 'Highest Risk' group were overweight. This group had the most television viewing accompanied by the least amount of physical exercise. In contrast, the 'Doing OK' group was only comprised of 18% who were overweight. These individuals watched the least amount of television and 90% exercised to lose weight. They also ate out the least often and prepared 78% of their meals 'from scratch'. Byrd-Bredbenner, Abbot and Cussler (2008) identified 4 clusters of mothers based on multiple psychographic food decision influencers- convenience, health, stress and emotional factors. Mothers in the 'happy,

healthy, food involved' cluster tended to express the most enjoyment with food related activities, felt significantly more positive feelings towards eating healthy while expressing a negative attitude toward convenience foods. These mothers also were rarely influenced by lack of time or hunger when making food choices. Mothers comprising the 'stressed, emotional eating, time conscious' cluster were the most likely to exhibit characteristics manifested by disinhibited and emotional eaters. Though these women placed great importance on family meals, their diets tended to be lacking in important vitamins and minerals and they tended to have higher BMI compared to other clusters. In an effort to reevaluate the effectiveness of using the TPB to construct delivery methods for the 5-A-Day fruit and vegetable campaign, Della, DeJoy and Lance (2009) described 8 clusters according to TPB constructs - attitudes, subjective norms, perceived behavioral control and behavioral intention toward fruit and vegetable consumption. They concluded that the TPB was an effective means for teaching and that use of VALS, a segmentation tool, produced appropriate clusters within the US population for teaching about fruit and vegetable consumption. Glanz et al. (1998) used cluster analysis to describe the importance of taste, nutrition, cost, convenience and weight control on individual dietary selections. Two self-administered cross-sectional questionnaires were used with a nationally representative sample of adults. A total of 7 lifestyle clusters were described and the importance of nutrition and weight control varied significantly between clusters. Consumption of fruit and vegetables, fast food and breakfast cereals also differed by cluster while little differences were observed according to taste, cost and convenience. Demographic characteristics were a better predictor of the importance of taste, cost and convenience than nutrition and weight control. The importance of weight

control and nutrition were inversely related while fast food consumption was positively related to the value of convenience. Attitudes regarding food, its preparation and consumption in midlife women were described by Sudo et al (2009). Five clusters were identified: 'Concerned about Nutrition', 'Creative Cooks', 'Busy Cooking Avoiders', 'Guilt-Ridden Dieters' and 'Impulsive Eaters'. Women who were 'Concerned about Nutrition' tended to practice overall good eating habits by reading food labels, limiting energy and fat intake and choosing natural or organic foods when possible. The 'Creative Cooks' identified themselves as being the primary meal provider and valued meal time as family time while serving healthy meals which the family enjoyed. The 'Busy Cooking Avoiders' tended to live very busy lives with nutrition being less important than other priorities illustrated by skipping meals, eating out more and cooking less at home compared to women in the other groups. The 'Guilt-Ridden Dieters' were concerned about their weight demonstrated by their constant attempts at dieting. They were highly influenced by others and the temptation to eat and felt guilty for overeating. Finally, the 'Impulsive Eaters' reported eating to feel better and avoid boredom though they felt guilty for overeating. They tended to be swayed by the sight, smells and advertisements for food while eating was often done while watching television. BMI was related to attitude clusters. However, this study was conducted with a relatively small group of midlife women (n=200). Future studies with a larger sample size may have the potential to produce additional clusters addressing different aspects of attitudes regarding food.

Several large scale nutrition education programs are based on audience segment profiles. Some used segmentation analysis to target specific groups; others were

developed for unique target audiences. Miles, Papoport, Wardle, Afuape and Duman (2001) reported that the BBC's 'Fighting Fat, Fighting Fit' campaign could make a contribution to population-wide weight control but that certain subgroups should be targeted specifically to achieve similar results. The 7-week education program was aimed at obese adults and taught about lasting lifestyle changes through small diet and exercise changes. The program resulted in an average overall weight loss among the participants though almost half (52%) remained obese. An increase in the percentage of participants reporting satisfaction with their weight increased. All dietary and physical activity behaviors measured had overall improvements along with improved psychological wellbeing. Another study involved the Expanded Food and Nutrition Education Program (EFNEP) which focuses on educating low income families about important nutrition and food safety guidelines. Arnold and Sobal (2000) summarized the benefits of this program as reported by participants. Participation in EFNEP increased knowledge of nutrition and food management skills in low-income women which continued to some extent after completion of the program. Farquhar et al. (1990) studied whether a health education program in 4 cities could reduce risk of stroke and cardiovascular disease (CVD). After 30-64 months of education on risk factors, blood pressure, cholesterol, smoking, body weight and resting pulse rate, overall mortality risk in the treatment group decreased 15% and CVD risk decreased 16%. Overall knowledge of CVD risk factors increased at multiple follow-ups in the treatment and control groups though the treatment group had a significantly higher improvement at all follow-up time points. These studies indicate that nutrition education programs can be successfully implemented in various settings focusing on different populations and goals.

To address specific needs of certain populations, segmentation can be an effective tool. Segmentation has already been used in a variety of settings. Because segmentation allows for the ability to tailor messages to specific groups, the effectiveness of an intervention can be improved.

Summary and Purpose

As the prevalence of overweight and obesity affects the majority of middle aged women in the US (Ogden et al. 2006), the risk and occurrence of chronic diseases also continue to affect this population (Must et al. 1999). The effects of obesity in mid-life continue to manifest themselves through cognitive decline (Whitmer et al. 2005), limitations in mobility (Ferraro et al. 2002; Daviglus et al. 2003) and progression of certain diseases in later life (Adams et al. 2006). Therefore, weight control at midlife is important.

Many environmental factors influence food choices of middle aged women including social responsibilities of family and work. Women are also guided by personal attitudes toward food, its preparation and consumption (Aikman et al. 2006; Wang et al. 2008). Feelings toward cooking (Crawford et al. 2007), family meals (Blake et al. 2008; Rydell et al 2008) and healthful eating (Dave et al. 2009; Rydell et al. 2008; Kearney et al. 1998) in addition to restraint when faced with tempting situations (Ozier et al. 2008) can all play a part in food choice. A better understanding of attitudes driving food choices will allow for more effective interventions to improve eating patterns and weight.

The application of the segmentation approach to target specific audiences has been used effectively to define certain populations within large groups of people. The use of this tool can help researchers develop tailored messages for specific subgroups (Weinstein 1987). The purpose of this study was to segment women into different attitude clusters and to test whether eating patterns and BMI differed according to cluster. To accomplish this, mailed questionnaires were used to assess attitudes about food, its preparation and consumption, and usual physical activity. A mailed one-day food record

form was used to measure dietary intake. Midlife women in the study sample were divided into clusters based on attitudes about food, its preparation and consumption using segmentation analysis. This analysis was completed by a market research company (TNS™ Global, Marlborough, MA) as part of a contract for services. The interpretation of the clusters with descriptive detail was done by Dennis Degeneffe, Applied Economics, University of Minnesota. Analysis for differences between attitude clusters was done as part of the project reported in this thesis (Alisha Wood) using ANOVA to test the following hypotheses:

BMI will differ by attitude segment, and

Nutrient and food group intake will differ by attitude clusters.

It was expected that women with the highest BMI and lowest overall diet quality would not be as health conscious as those with the lowest BMI and higher diet quality. Diet quality was indicated by intake of fruits, vegetables, whole grain and low fat dairy foods, sodium, saturated and trans fatty acids, vitamins and minerals and percentage of energy from fat. It was also expected that women with a lower BMI would express more negative attitudes toward convenience foods resulting in fewer occasions per week where they utilized convenience options than those with a higher BMI.

Methods

Study design

In this cross-sectional study, attitudes about food held by a national sample of midlife women were characterized. Women were mailed a survey packet containing an instructional letter and four eating occasion questionnaires (EOQs) labeled breakfast, lunch, dinner or snack (these data are presented elsewhere). Additionally, a Food Record (FR) booklet with printed instructions and forms to complete a one-day food record and an instructional FR DVD video were included. The packet also contained a General Questionnaire focusing on information about attitudes, eating habits and physical activity.

Participants and Sampling

Survey packets were sent to women members (40-60 yrs) of a national mail panel maintained by TNS™ Global (Marlborough, MA), a custom research company. The mail panel consists of 500,000 households and 1.3 million individuals in the U.S. Magazine subscriptions, warranty registration cards, etc. provide names of potential respondents. Demographic and household member information is collected through an initial survey sent at least once a year to update this information.

TNS™ Global used differential quotas to ensure that the demographic characteristics of the women receiving surveys were balanced according to US census data (US Dept Commerce 2006) across the 9 geographic regions of the US, metropolitan and micropolitan statistical areas (OMB 2000), age, income, household size, race/ethnicity, and household composition. The University of Minnesota Institutional

Review Board approved the study prior to data collection. The women received $6 from TNS™ Global for completing the survey packet.

In May 2008, an initial recruitment letter and consent form were sent to 8,000 households known to include a woman 40-60 yrs of age. The letter asked the potential respondent to read an enclosed consent form and return a post card if she agreed to participate. About one-third (2,713 or 33.9%) were returned due to this type of recruitment. Survey packets were sent in five batches to women who returned the post cards in June and July. Of those packets, 1,634 (60.2%) completed packets were returned. An additional 1,200 recruitment letters, consent forms and survey packets were sent out in July to potentially enlarge the sample size. Based on this form of recruitment, 292 (24.3%) returned a completed packet by a specified cut-off date in August. A total of 1,926 women's responses were collected.

Data Collection

General Questionnaire

Women were asked to report current height (inches) and weight (pounds) and height and weight 3 and 5 years ago. These values were used to calculate BMI (weight (kg)/ height $(m)^2$) at the three points in time. A set of 13 items relating to eating habits were included in the General Questionnaire regarding added fat, type of added fat and restaurant use. Physical activity was assessed using The International Physical Activity Questionnaire (IPAQ long form). The IPAQ focused on 5 areas: 1) job-related, 2) transportation-related, 3) housework and family-related, 4) recreation and leisure time,

and 5) sedentary activity (Craig et al. 2003). Reliability and validity studies have previously been reported for the IPAQ (Mader, Martin, Schutz and Marti 2006). Additionally, the General Questionnaire included a variety of attitude items (n=66) regarding prevailing attitudes toward food, its preparation and consumption. Qualitative data were used to develop the attitude statements (Vue, Degeneffe and Reicks 2008), followed by pretesting for acceptable test-retest reliability before use in a previous segmentation study with 200 midlife women (Sudo, Perry and Reicks 2009). A Likert-style 6 point strongly disagree-strongly agree scale was used to rate agreement with attitude statements.

1-day Food Record (FR)

The FR booklet with detailed instructions enclosed in the survey packet asked women, immediately after eating, to describe all foods (including beverages) consumed, time eaten, type of occasion, amounts consumed, and preparation methods/recipes over a 1-day period. Reduced-scale photographs of representative selected foods from serving size materials developed and used by others were included in the booklet (Kolar et al. 2005). The FR booklet provided a detailed example of a completed day's record. An 11-minute tutorial DVD was included in the packet (and available on a website with the URL provided). The video reviewed the instructions according to the FR booklet and provided measuring and estimation procedures for example meals and snacks.

About half (57%) of the survey packets contained food records instructed to be completed on a weekday (M-Th) while 43% included instructions to complete the food

record on a weekend day (F-Su). The Nutrition Data System for Research software program (NDS-R) (version 2008, Nutrition Coordinating Center, University of Minnesota, Minneapolis, MN) was used to enter the completed FR data by University of Minnesota nutrition students trained in the use of NDS-R.

Data Analysis

TNS™ Global statistical staff completed the segmentation analysis according to methods previously described (Sudo et al. 2009). Prior to cluster analysis, data from 86 women with substantial missing or constantly rated attitude data were excluded and not used in subsequent analysis. Cluster analysis (n=1840) was completed as part of a contract for services in addition to the survey sampling and administration procedures. Dennis Degeneffe, Applied Economics, University of Minnesota interpreted the cluster data interpretation including naming and describing the clusters. Mr. Degeneffe has extensive experience in this regard having interpreted cluster analysis data for many food manufacturing companies in previous studies. Following cluster analysis, investigators collaboratively excluded data from 9 individuals as outliers based on implausible intakes recorded in the FR booklet. Food group and nutrient data from another 147 women were not available due to missing FRs, or exclusions because reported times that food was consumed did not match times reported on EOQs (used for larger study). Therefore, the final sample included 1684 women. ANOVA with a significance level set at $p<0.05$ was used to determine differences in demographic characteristics, BMI, food group and nutrient intake by cluster. Post hoc testing for differences in means was done using Duncan's Multiple Range Test. Tests for normality indicated some skewness for selected intake variable, however, according to Dawson, Trapp and Trapp (2004), a large number

of observations in a sample indicate that the results of the F-test may not be affected by moderate departures from normality. Based on advice from the Biostatistical Design and Analysis Center (University of Minnesota) it was judged that the F-test would remain robust with respect to violation of the assumption of normality in the current study. All statistical analyses were completed using SAS (SAS Institute, Cary NC, 2003-2007, Version 9.2).

Results

Segmentation analysis yielded 7 eating attitude clusters based on responses from 1840 women. Descriptions of the clusters are summarized in Table 1 according to interpretation of the cluster analysis by Dennis Degeneffe, Applied Economics, University of Minnesota. The 'Health Conscious' segment comprised 17% of the sample (n=303), 'Creative Cooks' accounted for 17% (n=308), 'Limited Time Cooks' for 12% (n=225), 'Hate to Cook' for 15% (n=282), 'Family Before Self' for 15% (n=273), 'Boredom Bingers' for 13% (n=237) and the 'Live to Eat' for 11% (n=212).

Table 1. Attitude cluster descriptions (from Dennis Degeneffe)

Cluster	Description
Health Conscious	Health and nutrition motivated; exercise willpower; confident in ability to resist temptations to eat suggestively, emotionally or socially; eat balanced diet; consider themselves to have above average nutrition knowledge; read nutrition labels and watch fat intake; make an effort to eat organically/naturally; willing to pay more for healthier foods but are price savvy by shopping for foods on sale and using coupons.
Creative Cooks	Cooking is a creative outlet; take pride in skills; receive appreciation for specialties and meals served; cooking may be a connection to mother, grandmother, cultural heritage or past; pay more for better quality food; looking to make cooking interesting and varied by experimenting or trying new recipes; possess adventurous tastes; view themselves as gatekeeper and nurturer so meal time is family time; prepare good, nutritious meals most nights of the week; put effort into balanced meals with fresh, natural or even organic food; view themselves as more knowledgeable than most people about nutrition; able to resist eating for emotional or social reasons; feel they are able to eat what they want and not gain weight.
Limited Time Cooks	Lead busy lives so cooking and meals have less priority than other activities; career oriented; less responsible for providing meals for others; may dislike cooking or enjoy it but only cook on weekends; less time to plan meals; more likely to eat out 3+ times per week; may skip meals or fast to prevent weight gain; somewhat more likely to be vegetarians; however, recognize importance of good nutrition and appreciate good food; interested in eating organic/natural; read food labels and watch fat intake; have adventurous palates; seek authenticity in restaurant food and tend to buy the best.

Table 1. Continued

Cluster	Description
Hate to Cook	View cooking and meal planning as a chore; tend to have children at home which can make meal times stressful and fragmented; find it difficult to decide what to serve and may serve different foods to certain individuals; have busy schedules so feel like have no time to plan meals; avoid cooking if eating alone and force themselves to eat if busy; nutrition is of low importance so eat what is desired; tired of hearing what is and isn't healthy.
Family Before Self	Put needs of others before own; disregard selves as individuals during meals and eating by taking care of family; try to make meal time family time though planning meals that meet the needs of all family members is stressful; would eat differently if didn't have the influence of others; acknowledge a compromise of nutrition for family harmony; feel guilty when they overeat; find it harder to maintain or lose weight; lack confidence in social setting to resist eating and tempted to eat for emotional reasons; favor brands over others due to value; put a lot of effort into using coupons and/or finding products on sale.
Boredom Bingers	Food is a constant temptation or compulsion when feeling bored; have difficulty resisting advertising or food aromas and eating for emotional or social reasons; tend to use food as emotional gratification or medication; may reward themselves with treat after stressful day; routinely eat in front of television or before bed; exhibit frustration and guilt toward nutrition; feel like always trying to lose weight but find it harder and harder to lose weight; tired of hearing what is and isn't good for them; may have tried quick fixes to prevent weight gain; view cooking as a chore and meals as stressful times so avoid cooking whenever possible.
Live to Eat	Find great pleasure from food eaten; describe themselves as real food lovers; food is an area of high involvement; consider themselves adventurous eaters and receptive to authentic cuisine; food is an emotional release; indulgent food provides relaxation; eating allows them to deal with stress and feel better in times of anger and stress; reward themselves with a treat after a stressful day; find comfort in eating favorite foods regularly and eat when engaging in other activities like watching television; tempted to eat when exposed to sensory cues; link food to past memories while certain foods may connect them to cultural heritage; tend to eat when bored; view themselves as creative cooks and find connection to mother or grandmother through cooking; try new recipes and food products; have specialty dishes and enjoy seeing others take pleasure in eating food they prepare; feel guilty about eating so may be trying to always lose weight but find it harder and harder to lose weight; express low levels of confidence in resisting eating for emotional or social reasons; tired of hearing what is and isn't good for them.

Information about demographic characteristics of the entire sample (n=1684) is summarized in Tables 2 and 3 (where n does not equal 1684, demographic data are missing). The majority were in the age range of 40-60 yrs while approximately 5% were outside the range. The mean age was 49.6 years with a mean of 3 individuals living in the household. Mean BMI was >25 indicating overweight status. A mean gain of approximately 2 BMI units occurred over a 5 year span. The mean level of physical activity was 4975 MET min/day. Almost half of the women had annual incomes >$75,000 per year and the majority were married. Most of the women were white and about 13% indicated they were of Hispanic origin. A majority of the women had at least some college education and were employed part or full-time. Approximately 49% were pre-menopausal (had a period in the last 12 months and not taking hormone replacement therapy.

Table 2. Demographic and physical information for the entire sample

Characteristic	**n**	**Mean**	**SD**
Age	1667	49.6	6.6
BMI			
Now	1651	28.9	8.1
2 years ago	1671	28.5	9.6
5 years ago	1671	27	10.2
Household size	1684	3	1.4
Total MET min/wk	1272	4975	4537
Where n does not equal 1684, data are missing for the particular characteristic.			

Table 3. Demographic characteristics for the entire sample

Characteristic	n	%
Income		
<$20,000	165	9.8
$20,000-<$35,000	229	13.6
$35,000-<$75,000	518	30.8
>$75,000	772	45.8
Marital		
Now Married	1202	71.4
Never Married	205	12.2
Divorced, Widowed, Separated	277	16.5
Household size		
1	185	11.0
2	545	32.4
3	364	21.6
4	346	20.6
5	171	10.2
6	46	2.7
7	27	1.6
Race		
White	1319	78.3
Black/African-American	254	15.1
Asian or Pacific Islander	87	5.2
American Indian, Aleut Eskimo	13	0.8
Other	11	0.7
Hispanic- Yes	221	13.1
No	1463	86.9
Education		
No Answer	40	2.4
Graduated HS or less	348	21.2
Some College - no degree	389	23.7
Associate's degree (2 yr)	210	12.8
Bachelor's degree (4 yr)	442	26.9
Post Graduate Degree	255	15.5
Employment		
No Answer	136	8.1
Full-Time	859	51.5
Part-Time	311	18.7
Retired	82	4.9
Not Employed	296	17.8
Menopausal- Pre	808	48.8
Post	849	51.2
Where n does not equal 1684, data are missing for the particular characteristic.		

Tables 4 and 5 summarize demographic information by cluster. 'Limited Time Cooks' were significantly older than women in the 'Family Before Self' cluster (50.7 vs. 48.6 years, respectively). Women in the 'Boredom Bingers' and 'Live to Eat' clusters had a significantly higher current BMI (33.5 and 32.3, respectively) and BMI 2 years ago compared to women in all other clusters. Women in the 'Health Conscious', 'Creative Cooks' and 'Hate to Cook' groups had current BMIs which were the lowest (~26-27) but still in the overweight category. Women in the 'Hate to Cook', 'Creative Cooks' and 'Health Conscious' groups also had the lowest BMI 2 years ago which was fairly consistent with their current BMI. Women in the 'Boredom Bingers' and 'Live to Eat' groups had the highest BMI 5 years ago and reported gaining >3 BMI units over the 5 year time period.

Women in the 'Family Before Self' group had the largest households while women in the 'Boredom Bingers' and 'Limited Time Cooks' groups had the smallest. Women in the 'Creative Cooks', 'Health Conscious' and 'Live to Eat' groups had the highest level of physical activity although the level for women in the 'Health Conscious' and 'Live to Eat' groups were not significantly different from women in the other clusters. Physical activity was not closely tied to BMI in the 'Live to Eat' group.

Table 4. Demographic characteristics by cluster

	Health Conscious		**Creative Cooks**		**Limited Time Cooks**		**Hate to Cook**		**Family Before Self**		**Boredom Bingers**		**Live to Eat**	
	n=281		n=276		n=191		n=252		n=253		n=224		n=190	
	Mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD
Characteristic														
Age p<.019	49.5	7.8^{abc}	49.9	6.5^{abc}	50.7	6.7^{a}	49	6.6^{bc}	48.6	5.9^{c}	50	6.1^{ab}	49.9	6.1^{abc}
BMI														
Current p<.0001	26.8	6.8^{c}	25.7	6.3^{c}	29.3	7.8^{b}	26.8	7.8^{c}	30.1	7.9^{b}	33.5	8.2^{a}	32.3	8.8^{a}
2 years ago p<.0001	27.5	8.2^{cd}	25.7	8.2^{d}	29.5	9.7^{b}	26.5	8.4^{d}	28.4	10.3^{bc}	32.1	10.8^{a}	31.3	10^{a}
5 years ago p<.0001	25.9	9.3^{cd}	25.4	8.7^{cd}	28.6	9.8^{ab}	24.8	9.1^{d}	27	11^{bc}	30.1	11.9^{a}	28.9	11^{ab}
Household Size p<.0001	3	1.3^{bc}	3	1.3^{bc}	2	1.4^{d}	3	1.3^{b}	4	1.3^{a}	3	1.3^{d}	3	1.4^{c}
MET min/wk p<.004	5161	4170^{ab}	5997	5041^{a}	4701	4686^{b}	4832	4429^{b}	4650	4388^{b}	4098	4410^{b}	5101	4394^{ab}
Where total n does not equal 1684, data are missing for a particular characteristic.														

The ‘Boredom Bingers’ and ‘Limited Time Cooks’ clusters had the largest percentages of women (~12%) considered lower income compared to the other clusters while ‘Health Conscious’ women had the highest percentage of women (~50%) with income >$75,000. This was a fairly affluent sample of midlife women given that between 41% and 50% of the women in each cluster reported an annual income >$75,000. The majority of women in each group were married. The ‘Family Before Self’ cluster women had the highest percentage of married women (~83%) while the ‘Limited Time Cooks’ cluster had the highest percentage of never married women (~24%). The majority of women in each group were white. The ‘Family Before Self’ group had the highest percentage of white women (88%) while the ‘Limited Time Cooks’ group had the largest percentage of black (29%) and Hispanic women (~19%). While this was a fairly well-educated sample of midlife women, some clusters had higher levels of education than others. The ‘Live to Eat’, ‘Creative Cooks’ and ‘Limited Time Cooks’ clusters had the highest percentage of women with a 4 year college degree or post-graduate degree (~47%), while the ‘Hate to Cook’ and ‘Family Before Self’ clusters had the highest percentage of women who had graduated high school or less (~27%). About half of the women in each group were employed full time. The ‘Limited Time Cooks’ cluster had the highest percentage of women who were employed full time (~63%) followed by the ‘Boredom Bingers’ (~59%) and ‘Health Conscious’ (~51%) groups. The ‘Creative Cooks’ group had the highest percentage of retired women (~9%) compared to the other groups. In general, about half of the sample of women were pre-menopausal except for the ‘Limited Time Cooks’ group which had a lower percentage (~41%) and

the ‘Family Before Self’ group which had a higher percentage (54%) and who were also the youngest.

Table 5. Demographic characteristics by attitude cluster

	Health Conscious		Creative Cooks		Limited Time Cooks		Hate to Cook		Family Before Self		Boredom Bingers		Live to Eat	
Characteristic	n	%	n	%	n	%	n	%	N	%	N	%	n	%
Income p<.1431														
<$20,000	28	9.9	31	11.1	25	12.8	21	8.3	17	6.6	28	12.4	15	7.8
$20,000-<$35,000	28	9.9	40	14.3	27	13.8	43	17.1	31	12.1	34	15.1	26	13.5
$35,000-<$75,000	84	29.8	70	25.0	63	32.1	84	33.3	89	34.8	70	31.1	58	30.1
>$75,000	142	50.4	139	49.6	81	41.3	104	41.3	119	46.5	93	41.3	94	48.7
Marital p<.0001														
Now married	222	78.7	209	74.6	94	48.0	196	77.8	212	82.8	134	59.6	135	70.0
Never married	30	10.6	26	9.3	46	23.5	19	7.5	17	6.6	40	17.8	27	14.0
Divorced/widowed/ separated	30	10.6	45	16.1	56	28.6	37	14.7	27	10.6	51	22.7	31	16.1
Race p<.0001														
White	223	79.1	211	75.4	114	58.2	203	80.6	227	88.7	190	84.4	151	78.2
Black/African-American	46	16.3	44	15.7	57	29.1	36	14.3	19	7.4	24	10.7	28	14.5
Asian or Pacific Islander	12	4.3	22	7.9	17	8.7	12	4.8	6	2.3	10	4.4	8	4.2
American Indian	0	0	1	0.4	5	2.6	0	0	3	1.2	0	0	4	2.1
Other	1	0.4	2	0.7	3	1.5	1	0.4	1	0.4	1	0.4	2	1.0
Hispanic p<.0548														
Yes	27	9.6	42	15.0	38	19.4	34	13.5	28	10.9	30	13.3	22	11.4
No	255	90.4	238	85.0	158	80.6	218	86.5	228	89.1	195	86.7	171	88.6

Table 5. Demographic characteristics by attitude cluster (Continued)

Characteristic	Health Conscious		Creative Cooks		Limited Time Cooks		Hate to Cook		Family Before Self		Boredom Bingers		Live to Eat	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Education p<.0095														
Graduated HS or less	53	19.1	60	21.9	25	13.5	66	26.8	67	26.7	53	23.8	24	12.8
Some college – no degree	65	23.5	58	21.2	50	27.0	29	24.0	58	23.1	52	23.3	47	25.0
Associate's degree (2 yr)	37	13.4	27	9.9	24	13.0	33	13.4	31	12.4	30	13.5	28	14.9
Bachelor's degree (4 yr)	84	30.3	77	28.1	46	24.9	50	20.3	64	25.5	63	28.3	58	30.9
Post Graduate Degree -	38	13.7	52	19.0	40	21.6	38	15.5	31	12.4	25	11.2	31	16.5
Employment p<.0009														
Full-Time	143	50.9	129	46.7	120	62.8	123	48.8	124	49.0	133	59.4	87	45.8
Part-Time	53	18.9	49	17.8	25	13.1	52	20.6	59	23.3	30	13.4	43	22.6
Retired	20	7.1	24	8.7	5	2.6	10	4.0	6	2.4	7	3.1	10	5.3
Not Employed	52	18.5	49	17.8	23	12.0	50	19.8	46	18.2	37	16.5	39	20.5
Menopause status p<.085														
Pre	143	51.4	125	45.5	77	40.5	129	51.8	136	54.0	109	48.9	89	46.8
Post	135	48.6	150	54.6	113	59.5	120	48.2	116	46.0	114	51.1	101	53.2
Where total n does not equal 1684, data are missing for a particular characteristic.														

Table 6 summarizes food group intake according to attitude cluster. In general, intake of fruits and vegetables was below recommendations for midlife women (Guenther, Dodd, Reedy and Krebs-Smith 2006) with some groups coming closer to meeting recommendations than others. Women in the 'Creative Cooks' and "Health Conscious' groups had higher intakes of fruit (~2 cups/day), compared to women in the 'Hate to Cook' group with the lowest fruit intake (1.3 cups). Women in the 'Creative Cooks' and 'Health Conscious' groups also had the highest intake of vegetables (~3.2-3.5 cups/day) along with the "Live to Eat' compared to the 'Hate to Cook' group (2.2 cups/day). Total intake of fruits and vegetables reflected intake of fruits and vegetables separately. Intake again was higher for women in the 'Creative Cooks' and 'Health Conscious' groups (>5 cups/day) compared to women in the 'Hate to Cook' group with the lowest overall intake of total fruits and vegetables (3.5 cups/day) compared to women in all other groups.

Intake of whole (whole grain listed as the first ingredient on the ingredient list) and some whole grains (whole grain listed on the ingredient list but not the first ingredient) was not different between any attitude clusters. In general, intake of whole grains was about one-third of recommended intake according to Dietary Guidelines for Americans, 2005 (USDHHS/USDA 2005). While whole grain intake was lower than recommended for all groups, intake of refined grains was also fairly low (~3-4 ounce equivalents/day). Women in the 'Boredom Bingers' group had the highest intake of refined grains (4.4 ounce equivalents/day) though not significantly different compared to women in the 'Creative Cooks', 'Hate to Cook' and 'Live to Eat' groups. There were no significant differences between attitude clusters regarding regular meat intake and little

differences between the groups for lean meat intake. Results for intake of high and low fat dairy food were similar where few differences were noted between groups. There were few differences between attitude clusters regarding fish consumption and no differences between groups regarding shellfish consumption.

The 'Creative Cooks' group had the highest intake of high or full fat intake per day (3.8 servings/day) though not significantly different from the 'Family Before Self' and the 'Live to Eat' groups. The foods in this group included butter/animal fats/margarine, oil and salad dressing. The 'Health Conscious' group had the lowest high/full fat consumption (2.3 servings/day), however it was not significantly different compared to intake by several other groups. There were no differences regarding low/reduced fat consumption between attitude clusters.

Few differences were observed between attitude clusters regarding unsweetened beverage intake and no differences regarding sweetened beverages. The 'Hate to Cook', 'Boredom Bingers' and 'Live to Eat' groups had the highest intake of regular pop (~0.5-0.6 8-ounce serving/day) while the 'Health Conscious' group had the lowest intake of regular pop though intake was fairly similar among all groups. 'Boredom Bingers' had the highest intake of diet pop (0.9 8-ounce serving/day) while the 'Creative Cooks' group had the lowest intake although these differences were not significant compared to intake of women in the 'Health Conscious' group. There were no differences in water intake between the 7 attitude clusters.

Table 6. Food group intake by attitude cluster

	Health Conscious n=282	Creative Cooks n=196	Limited Time Cooks n=225	Hate to Cook n=280	Family Before Self n=252	Boredom Bingers n=193	Live to Eat n=256
Fruit and Vegetables (cups)							
Total fruit p<0.0029	1.9 ± 2.1^{ab}	2.0 ± 2.4^{a}	1.7 ± 2.3^{abc}	1.3 ± 1.8^{c}	1.6 ± 2.0^{bc}	1.6 ± 2.1^{bc}	1.6 ± 2.1^{abc}
Total vegetables p<.0001	3.2 ± 2.2^{ab}	3.5 ± 2.7^{a}	2.8 ± 2.2^{b}	2.2 ± 1.9^{c}	2.9 ± 2.2^{b}	2.9 ± 2.3^{b}	3.2 ± 2.2^{ab}
Total fruit/vegetable p<.0001	5.1 ± 3.2^{ab}	5.5 ± 3.9^{a}	4.5 ± 3.3^{bc}	3.5 ± 2.7^{d}	4.4 ± 3.0^{c}	4.5 ± 3.2^{bc}	4.9 ± 3.4^{bc}
Grains[1] (ounce equivalents)							
Whole p<0.696	1.3 ± 1.7^{a}	1.2 ± 1.7^{a}	1.2 ± 1.6^{a}	1.1 ± 1.5^{a}	1.3 ± 1.8^{a}	1.2 ± 1.7^{a}	1.3 ± 1.9^{a}
Some whole p<0.299	0.6 ± 1.3^{a}	0.4 ± 1.2^{a}	$0.5 \pm .9^{a}$	0.6 ± 1.2^{a}	0.5 ± 1.0^{a}	0.6 ± 1.3^{a}	0.6 ± 1.0^{a}
Refined p<.0001	3.2 ± 2.7^{d}	4.0 ± 3.0^{abc}	3.5 ± 2.7^{cd}	4.0 ± 2.8^{abc}	3.7 ± 2.7^{bc}	4.4 ± 3.5^{a}	4.2 ± 3.0^{ab}
Meat[2] (ounce equivalents)							
Regular p<0.546	1.4 ± 2.2^{a}	1.4 ± 1.9^{a}	1.5 ± 2.4^{a}	1.5 ± 1.9^{a}	1.6 ± 2.5^{a}	1.3 ± 2.3^{a}	1.7 ± 2.8^{a}
Lean p<0.039	0.9 ± 1.5^{ab}	1.0 ± 1.8^{a}	0.6 ± 1.2^{b}	0.6 ± 1.4^{b}	0.8 ± 1.5^{ab}	0.8 ± 1.5^{ab}	0.9 ± 1.6^{ab}
Dairy[3] (cups)							
High fat p<0.017	0.4 ± 0.6^{bc}	0.5 ± 0.8^{a}	0.3 ± 0.5^{c}	0.5 ± 0.7^{abc}	0.4 ± 0.6^{abc}	0.5 ± 0.7^{abc}	0.5 ± 0.8^{a}
Low fat p<0.158	0.9 ± 1.0^{ab}	0.9 ± 1.1^{ab}	0.7 ± 0.8^{b}	0.8 ± 1.0^{ab}	0.9 ± 1.0^{a}	1.0 ± 1.1^{a}	0.9 ± 1.2^{a}
Seafood (ounce equivalents)							
Fish p<0.240	0.5 ± 1.4^{ab}	0.5 ± 1.6^{ab}	0.6 ± 1.4^{ab}	0.4 ± 1.4^{ab}	0.5 ± 1.5^{ab}	0.3 ± 1.0^{b}	0.7 ± 2.0^{a}
Shellfish p<0.283	0.2 ± 0.9^{a}	0.2 ± 1.0^{a}	0.2 ± 0.7^{a}	0.1 ± 0.5^{a}	0.1 ± 0.5^{a}	0.1 ± 0.5^{a}	0.2 ± 1.1^{a}
Fats[4] (tsp/g)							
High p<.0001	2.3 ± 2.6^{d}	3.8 ± 3.9^{a}	2.9 ± 4.7^{bcd}	2.8 ± 2.9^{cd}	3.3 ± 3.6^{abc}	2.9 ± 3.1^{bcd}	3.6 ± 3.8^{ab}
Low p<0.339	0.5 ± 1.1^{a}	0.3 ± 1.2^{a}	0.4 ± 2.0^{a}	0.2 ± 0.8^{a}	0.4 ± 1.2^{a}	0.4 ± 1.4^{a}	0.3 ± 1.0^{a}

Table 6. Food group intake by attitude cluster (Continued)

	Health Conscious n=282	Creative Cooks n=196	Limited Time Cooks n=225	Hate to Cook n=280	Family Before Self n=252	Boredom Bingers n=193	Live to Eat n=256
Beverages (8 ounces)							
Unsweetened p<0.056	1.6 ± 1.9[ab]	1.8 ± 2.4[a]	1.3 ± 1.9[b]	1.4 ± 2.0[b]	1.6 ± 2.2[ab]	1.4 ± 1.8[b]	1.5 ± 1.8[ab]
Sweetened p<0.798	0.3 ± 0.8[a]	0.3 ± 0.7[a]	0.4 ± 1.6[a]	0.4 ± 0.9[a]	0.4 ± 0.9[a]	0.3 ± 1.1[a]	0.3 ± 0.8[a]
Regular pop p<0.0016	0.2 ± 0.7[c]	0.4 ± 1.0[abc]	0.3 ± 0.9[bc]	0.5 ± 1.1[a]	0.4 ± 1.0[ab]	0.6 ± 1.4[a]	0.5 ± 1.1[ab]
Diet pop p<0.0003	0.5 ± 1.1[bc]	0.3 ± 1.0[c]	0.6 ± 2.3[ab]	0.6 ± 1.6[b]	0.6 ± 1.5[ab]	0.9 ± 1.8[a]	0.7 ± 1.6[ab]
Plain water p<0.443	2.7 ± 2.9[a]	2.3 ± 2.7[a]	2.4 ± 2.7[a]	2.2 ± 3.0[a]	2.3 ± 2.6[a]	2.4 ± 2.8[a]	2.4 ± 2.8[a]

[1]Whole grains have a whole grain ingredient as the first ingredient on the ingredient list while some whole grain foods have a whole grain ingredient on the ingredient list, but not the first ingredient listed.
[2]Meat includes: beef, fresh pork, lamb, veal and poultry while lean meat (≤10% fat) includes lean beef, lean fresh pork, lean lamb, lean veal and lean poultry
[3]Dairy foods include milk, cheese and yogurt, while low fat dairy foods include 2%, 1% or skim milk and lowfat cheese and yogurt.
[4]Fats (high or full fat) include butter/animal fat, margarine, oil, shortening and salad dressings, while low/reduced fats include reduced fat butter/animal fat, reduced fat margarine and reduced fat salad dressings. Serving sizes for butter, margarine, oil and shortening were in tsp while poured salad dressings were 30g and mayonnaise types dressings were 15g

The ‘Hate to Cook’ group had a somewhat lower intake of water compared to the other groups while the ‘Health Conscious’, Creative Cooks’ and ‘Live to Eat’ groups had higher alcohol intakes compared to most other groups (Table 7). Women in the ‘Health Conscious’ cluster had the lowest energy density compared to all other clusters. Energy intake was highest within the ‘Live to Eat’ and ‘Boredom Bingers’ groups (which were also classified as obese according to BMI category) while the ‘Health Conscious’ women had the lowest energy intake followed by ‘Limited Time Cooks’ and ‘Hate to Cook’ groups. Energy intake was unexpectedly low for all groups indicating a potential problem with underreporting food and beverage intake.

Table 7. Intake of energy, water and alcohol

	Health Conscious n=282	Creative Cooks n=196	Limited Time Cooks n=225	Hate to Cook n=280	Family Before Self n=252	Boredom Bingers n=193	Live to Eat n=256
Water (g) p<.0063	2170 ± 948[a]	2198 ± 1036[a]	2029 ± 1089[ab]	1916 ± 1001[b]	2129 ± 853[a]	2194 ± 1076[a]	2224 ± 965[a]
Alcohol (g) p<.0194	4.1 ± 18.4[abc]	4.6 ± 13.4[ab]	3.4 ± 13.1[abc]	1.8 ± 7.4[c]	2.7 ± 10.1[bc]	2.0 ± 8.5[bc]	5.6 ± 18.2[a]
Energy (kcal) p<.0001	1676 ± 634[c]	1883 ± 749[b]	1700 ± 719[c]	1741 ± 713[c]	1814 ± 617[bc]	1943 ± 769[ab]	2031 ± 1011[a]
Energy density[1] p<.0013	0.73 ± 0.30[b]	0.81 ± 0.36[a]	0.83 ± 0.40[a]	0.85 ± 0.38[a]	0.80 ± 0.34[a]	0.85 ± 0.40[a]	0.83 ± 0.35[a]

[1]Energy density = energy in kcalories/grams of food and beverages consumed

Table 8 summarizes macronutrient intakes by attitude cluster in grams and also as percent of energy. The 'Live to Eat' group had the highest fat intake in grams and as percent of kcalorie though intake in grams was not significantly different from the 'Boredom Bingers' group and as percent of kcalories only different from the 'Health Conscious' group. Percent of kcalories as fat for all groups was well over 30% as recommended by the Dietary Guidelines for Americans, 2005 (USDHHS/USDA 2005).

Total carbohydrate intakes were fairly similar among the 7 groups except that the 'Boredom Bingers' and 'Live to Eat' group consumed slightly more carbohydrates in grams compared to several groups. The 'Live to Eat' group had the highest total protein intake however not significantly different from the 'Boredom Bingers' and 'Creative Cooks' groups. The 'Live to Eat' group had the highest intake of protein originating from an animal source and plant sources consistent with the highest energy content of any group.

Table 8. Intake of macronutrients by attitude cluster

	Health Conscious n=282	Creative Cooks n=196	Limited Time Cooks n=225	Hate to Cook n=280	Family Before Self n=252	Boredom Bingers n=193	Live to Eat n=256
Total fat (g) p<.0001	65 ± 35^{e}	77 ± 41^{bc}	68 ± 43de	71 ± 38^{cde}	76 ± 34^{bcd}	81 ± 42^{ab}	85 ± 56^{a}
Total CHO (g) p<.0008	206 ± 86^{b}	225 ± 102^{ab}	210 ± 97^{b}	216 ± 102^{b}	219 ± 84^{ab}	239 ± 112^{a}	239 ± 121^{a}
Total protein (g) p<.0001	69 ± 28^{bc}	73 ± 30^{ab}	66 ± 26^{c}	65 ± 26^{c}	69 ± 26^{bc}	73 ± 28^{ab}	77 ± 32^{a}
Animal protein (g) p<.007	45 ± 24^{bc}	47 ± 24^{ab}	42 ± 24^{c}	43 ± 22^{c}	46 ± 23^{abc}	46 ± 23^{abc}	50 ± 28^{a}
Vegetable protein (g) p<.0001	24 ± 12^{bcd}	26 ± 14^{abc}	24 ± 11^{cd}	22 ± 12^{d}	23 ± 11^{d}	26 ± 14^{ab}	27 ± 13^{a}
Fat - % energy p<.1950	34 ± 13^{b}	35 ± 12^{ab}	36 ± 22^{ab}	36 ± 12^{ab}	36 ± 11^{ab}	36 ± 15^{ab}	37 ± 12^{a}
CHO - % energy p<.403	49 ± 18^{a}	46 ± 14^{a}	51 ± 23^{a}	50 ± 22^{a}	48 ± 21^{a}	48 ± 22^{a}	48 ± 22^{a}
Protein - % energy p<.081	17 ± 9^{a}	16 ± 5^{ab}	17 ± 9^{ab}	16 ± 6^{b}	16 ± 7^{b}	16 ± 7^{ab}	16 ± 6^{ab}
Alcohol - % energy p<.008	1.6 ± 5.6^{a}	1.7 ± 4.9^{a}	1.3 ± 5.0^{ab}	0.6 ± 2.5^{b}	1.0 ± 3.3^{ab}	0.7 ± 2.9^{b}	1.7 ± 5.1^{a}

Fat and cholesterol intakes are presented in Table 9. Saturated fatty acid (SFA) intake was lower in the 'Health Conscious' group compared to the 'Creative Cooks, 'Boredom Bingers' and 'Live to Eat' groups, while cholesterol intake was lower in the 'Health Conscious' group compared to the 'Creative Cooks' and 'Boredom Bingers'. However, SFA as percentage of kcalories exceeded recommendations of 10% of kcalories in all groups while cholesterol intake was within the recommended range for all groups (USDHHS/USDA 2005). Monounsaturated fatty acid intake was lowest in the 'Health Conscious' group compared to the 'Live to Eat', 'Boredom Bingers' and 'Creative Cooks' groups. Intake of polyunsaturated fatty acid (PUFA) was fairly similar among attitude groups. As expected, the highest trans fat intake was in the 'Boredom Bingers' and 'Live to Eat' groups which was significantly higher than the 'Health Conscious' and 'Creative Cooks' groups. 'Creative Cooks' had a significantly higher intake of omega 3 fatty acids compared to the 'Hate to Cook', 'Limited Time Cooks' and 'Health Conscious' groups.

Table 9. Intake of fats according to attitude cluster

	Health Conscious n=282	**Creative Cooks n=196**	**Limited Time Cooks n=225**	**Hate to Cook n=280**	**Family Before Self n=252**	**Boredom Bingers n=193**	**Live to Eat n=256**
SFA (g) p<.0001	21.2 ± 12.8[d]	25.8 ± 15.3[b]	22.4 ± 16.2[cd]	24.4 ± 13.9[bc]	25.3 ± 13.3[b]	26.9 ± 14.7[ab]	29.3 ± 19.1[a]
MUFA (g) p<.0001	24.4 ± 13.7[d]	28.8 ± 16.8[abc]	25.0 ± 17.3[d]	26.1 ± 15.6[cd]	27.5 ± 12.8[bcd]	29.8 ± 16.0[ab]	31.4 ± 18.7[a]
PUFA (g) p<.0080	14.7 ± 10.7[b]	16.9 ± 11.5[ab]	15.2 ± 11.5[b]	15.3 ± 10.6[b]	16.9 ± 11.0[ab]	18.1 ± 13.5[a]	18.4 ± 21.1[a]
Trans (g) p<.0008	3.3 ± 3.1[c]	3.7 ± 2.9[bc]	3.8 ± 5.7[abc]	4.3 ± 3.4[ab]	4.3 ± 3.3[ab]	4.5 ± 3.9[a]	4.5 ± 4.0[a]
Omega 3 (g) p<.0015	1.6 ± 1.4[cd]	1.9 ± 1.6[a]	1.6 ± 1.4[bcd]	1.5 ± 1.1[d]	1.7 ± 1.4[abc]	1.7 ± 1.2[abcd]	1.8 ± 1.4[ab]
Cholesterol (mg) p<.0004	214 ± 176[bc]	266 ± 202[a]	230 ± 204[abc]	204 ± 156[c]	227 ± 162[bc]	265 ± 227[a]	244 ± 184[ab]
SFA - % energy p<.063	10.9 ± 5.5[b]	11.7 ± 4.6[ab]	11.8 ± 9.7[ab]	12.3 ± 5.2[a]	12.0 ± 4.5[ab]	12.2 ± 6.2[a]	12.5 ± 4.4[a]
MUFA - % energy p<.381	12.6 ± 5.1[b]	13.1 ± 5.1[ab]	13.1 ± 7.6[ab]	13.1 ± 5.1[ab]	13.2 ± 4.5[ab]	13.5 ± 5.7[ab]	13.8 ± 6.0[a]
PUFA - % energy p<.810	7.5 ± 4.2[a]	7.6 ± 4.3[a]	8.0 ± 5.4[a]	7.6 ± 4.2[a]	7.9 ± 4.0[a]	8.0 ± 4.4[a]	7.8 ± 4.3[a]

Intake of sucrose, added and total sugars was higher in the 'Boredom Binger's and "Live to Eat' groups compared to the 'Health Conscious' group (Table 10), similar to some other negative nutrients such as trans fat. Fiber intake was fairly similar among all groups while the 'Hate to Cook' group had a somewhat lower intake (Table 10). While statistically significant, few practically significant differences were observed among the groups regarding soluble and insoluble fiber intake.

Table 10. Intake of sugars and fiber by attitude cluster

	Health Conscious n=282	Creative Cooks n=196	Limited Time Cooks n=225	Hate to Cook n=280	Family Before Self n=252	Boredom Bingers n=193	Live to Eat n=256
Sucrose (g) p<.0285	36 ± 29[b]	38 ± 32[ab]	40 ± 45[ab]	44 ± 41[a]	40 ± 29[ab]	45 ± 38[a]	45 ± 45[a]
Fiber (g) p<.0001	18.7 ± 9.9[ab]	18.9 ± 10.3[ab]	17.7 ± 9.6[ab]	15.4 ± 9.1[c]	17.2 ± 8.8[bc]	18.8 ± 11.1[ab]	19.3 ± 11.1[a]
Soluble p<.05	6.0 ± 3.2[a]	6.0 ± 3.6[a]	5.6 ± 3.1[ab]	5.1 ± 3.3[b]	5.8 ± 3.6[a]	5.8 ± 3.2[a]	5.8 ± 3.3[a]
Insoluble p<.0001	12.7 ± 7.6[ab]	12.6 ± 7.5[ab]	12.0 ± 7.5[ab]	10.1 ± 6.9[c]	11.2 ± 6.4[bc]	12.9 ± 9.2[a]	13.2 ± 8.0[a]
Total sugars (g) p<.0275	90 ± 50[b]	99 ± 59[ab]	91 ± 63[b]	100 ± 68[ab]	100 ± 54[ab]	106 ± 69[a]	106 ± 74[a]
Added sugars (g) p<.0003	53 ± 41[d]	61 ± 51[bcd]	60 ± 56[cd]	70 ± 64[abc]	66 ± 48[abc]	73 ± 60[a]	72 ± 68[ab]

Table 11 presents data regarding intake of important minerals according to attitude cluster. Calcium intake was below the recommended level for all women (Institute of Medicine 1997) similar to dairy product consumption (milk, cheese, yogurt). While highest among women in the 'Live to Eat' group (866 mg/day), calcium intake was not significantly different from women in the 'Health Conscious', 'Creative Cooks' and 'Boredom Bingers' groups. Intake of iron and zinc was fairly similar among the 7 attitude clusters. Iron intake recommendations (18 mg/day for <50 yrs and 8 mg/day for >50 yrs) were generally met by all the groups as well as zinc recommendations (8 mg/day).

Sodium intake was above the recommended limit (2400 mg/day) in all attitude clusters (USDHHS/USDA 2005). Women in the 'Health Conscious' group had the lowest intake of sodium (2876 mg/day). However, this was not significantly different compared to sodium intake by 'Limited Time Cooks', 'Hate to Cook' and 'Family Before Self' groups. Potassium intake in all attitude clusters was low. The 'Creative Cooks' group had the highest intake of potassium (2565 mg/day) though this was not significantly different from intake by women in the 'Health Conscious' and 'Live to Eat' groups. The 'Hate to Cook' group had the lowest intake of potassium (2044 mg/day) though not significantly different from the 'Limited Time Cooks' group.

Table 11. Intake of selected minerals by attitude cluster

	Health Conscious n=282	Creative Cooks n=196	Limited Time Cooks n=225	Hate to Cook n=280	Family Before Self n=252	Boredom Bingers n=193	Live to Eat n=256
Calcium (mg) p<.0108	784 ± 425^{abc}	835 ± 475^{ab}	724 ± 407^{c}	769 ± 424^{bc}	769 ± 392^{bc}	842 ± 459^{ab}	866 ± 500^{a}
Iron (mg) p<.0205	14.0 ± 8.0^{b}	14.1 ± 8.0^{b}	13.7 ± 7.1^{b}	13.6 ± 8.3^{b}	14.1 ± 6.7^{b}	15.0 ± 8.0^{ab}	16.1 ± 9.7^{a}
Zinc (mg) p<.1220	10.0 ± 5.5^{ab}	10.2 ± 5.2^{ab}	9.3 ± 4.9^{b}	10.1 ± 6.6^{ab}	10.7 ± 10.7^{a}	10.3 ± 4.9^{ab}	11.3 ± 6.4^{a}
Sodium (mg) p<.0001	2876 ± 1358^{c}	3289 ± 1700^{ab}	2894 ± 1356^{c}	3005 ± 2009^{bc}	2996 ± 1207^{bc}	3346 ± 1571^{a}	3532 ± 1931^{a}
Potassium (mg) p<.0001	2398 ± 930^{ab}	2565 ± 1173^{a}	2222 ± 977^{bc}	2044 ± 924^{c}	2344 ± 909^{b}	2385 ± 985^{ab}	2548 ± 1154^{a}

In general, intake of selected vitamins were adequate according to recommendations (Table 12) for all groups. The 'Creative Cooks' group had the highest intakes for several vitamins indicating somewhat better diet quality as observed for other positive nutrients. This group had the highest vitamin A intake (as retinol activity equivalents) although it was not significantly different compared to intake by women in most other groups. Vitamin D and E (as alpha tocopherol equivalents) intakes were similar among groups. The 'Creative Cooks' had the highest vitamin K intake among the 7 clusters although it was not significantly different compared to intake by women in the 'Health Conscious' and 'Live to Eat' groups. Vitamin C intake was highest in the 'Creative Cooks' group (143 mg/day) though not significantly different compared to three other groups. Intakes for thiamin, riboflavin, niacin were all over the recommended levels according to the Dietary Reference Intake values (Institute of Medicine 1998) and did not differ much between groups. Pantothenic acid intake was slightly below the Adequate Intake level or AI which has been set at 5 mg/day for adults (Institute of Medicine 1998) and was highest for the 'Live to Eat' group though not significantly different compared to several other groups. Few differences were observed in intake of vitamins B_6 and B_{12} between clusters. Total folate intake was not different among groups however, natural folate intake was highest in the 'Creative Cooks' and 'Live to Eat' groups.

Table 12. Intake of vitamins by attitude cluster

	Health Conscious n=282	Creative Cooks n=196	Limited Time Cooks n=225	Hate to Cook n=280	Family Before Self n=252	Boredom Bingers n=193	Live to Eat n=256
Vitamin A (retinol activity equivalents mcg**)** p<.0035	709 ± 501^{ab}	778 ± 849^{a}	625 ± 461^{bc}	593 ± 443^{c}	721 ± 610^{ab}	671 ± 459^{abc}	761 ± 624^{a}
Vitamin D (mcg) p<.1103	3.8 ± 3.4^{b}	4.3 ± 4.5^{ab}	4.1 ± 5.8^{ab}	3.9 ± 3.6^{b}	4.8 ± 5.4^{a}	3.8 ± 3.0^{b}	4.5 ± 4.6^{ab}
Vitamin E (alpha toc equivalents mg**)** p<.3853	10.5 ± 9.2^{ab}	11.0 ± 9.3^{ab}	10.7 ± 10.0^{ab}	9.3 ± 8.6^{b}	10.5 ± 8.9^{ab}	10.9 ± 8.9^{ab}	11.4 ± 13.7^{a}
Vitamin K (mcg) p<.0001	124 ± 133^{ab}	143 ± 181^{a}	111 ± 179^{b}	80 ± 132^{c}	100 ± 103^{bc}	102 ± 133^{bc}	123 ± 150^{ab}
Vitamin C (mg) p<.0004	91 ± 119^{ab}	94 ± 88^{a}	77 ± 66^{bcd}	63 ± 69^{d}	78 ± 64^{abcd}	74 ± 77^{cd}	83 ± 72^{abc}
Thiamin (mg) p<.0012	1.5 ± 0.7^{bcd}	1.5 ± 0.7^{bcd}	1.4 ± 0.6^{bcd}	1.4 ± 0.6^{d}	1.6 ± 0.7^{abc}	1.6 ± 0.8^{ab}	1.7 ± 1.0^{a}
Riboflavin (mg) p<.0004	1.9 ± 0.9^{bc}	2.0 ± 1.0^{ab}	1.8 ± 0.8^{c}	1.8 ± 0.8^{c}	2.0 ± 0.8^{ab}	2.1 ± 0.9^{ab}	2.1 ± 1.2^{a}
Niacin (mg) p<.0003	20.2 ± 8.8^{bc}	20.4 ± 8.9^{bc}	19.1 ± 8.8^{c}	18.5 ± 8.7^{c}	20.1 ± 8.1^{abc}	21.2 ± 9.8^{ab}	22.6 ± 13.5^{a}
Pantothenic Acid (mg) p<.0087	4.9 ± 2.5^{ab}	5.1 ± 2.9^{a}	4.5 ± 2.6^{bc}	4.3 ± 2.4^{c}	4.7 ± 2.5^{abc}	4.9 ± 2.4^{ab}	5.2 ± 5.4^{a}
Vitamin B_6 (mg)p<.0299	1.7 ± 1.0^{b}	1.8 ± 1.0^{b}	1.7 ± .9^{b}	1.6 ± 1.2^{b}	1.7 ± .9^{a}	1.7 ± 0.9^{b}	2.0 ± 1.8^{a}

Table 12. Intake of vitamins by attitude cluster (Continued)

	Health Conscious n=282	Creative Cooks n=196	Limited Time Cooks n=225	Hate to Cook n=280	Family Before Self n=252	Boredom Bingers n=193	Live to Eat n=256
Total folate (mcg) p<.0960	393 ± 236^{ab}	410 ± 233^{ab}	364 ± 210^{b}	365 ± 249^{b}	383 ± 219^{ab}	399 ± 226^{ab}	417 ± 225^{a}
Natural p<.0001	208 ± 106^{bc}	234 ± 138^{a}	189 ± 107^{cd}	162 ± 108^{e}	184 ± 108^{d}	195 ± 114^{bcd}	217 ± 118^{ab}
Synthetic p<.3542	184 ± 192^{a}	176 ± 188^{a}	174 ± 158^{a}	203 ± 225^{a}	198 ± 184^{a}	203 ± 181^{a}	200 ± 186^{a}
Vitamin B_{12} (mcg) p<.0056	4.4 ± 3.5^{b}	5.8 ± 9.3^{ab}	4.2 ± 3.1^{b}	4.6 ± 3.6^{b}	4.7 ± 3.6^{b}	4.7 ± 4.6^{b}	7.3 ± 22.0^{a}

Frequency of restaurant use is illustrated in Figure 1 as the percentage of women in each group who used a restaurant greater than three times per week. The 'Boredom Bingers' group reported the highest use with 35% eating out more than three time a week while the 'Health Conscious' and 'Creative Cook' groups had the lowest use at only 10%. Women in the 'Limited Time Cooks' and 'Hate to Cook' groups reported eating out of the home fairly often (about one-fourth eating out more than three times per week).

The General Questionnaire included a series of six questions regarding the use of practices to add fat to foods while cooking or eating. They included 1) use of butter or margarine on bread or rolls, adding fat when 2) cooking or 3) eating vegetables or 4) potatoes, 5) adding milk or cream to coffee or tea, and 6) eating the skin after cooking poultry. Respondents were asked to indicate how often they practiced these behaviors by indicating 'usually/always', 'sometimes' or 'rarely/never'. A score was calculated by summing across items with the highest score for rarely/never practicing these behaviors (low fat practice score ranging from 0-6 points). Results are summarized in Figure 2. The 'Health Conscious' group scored significantly higher than all other groups.

Figure 1. Restaurant use

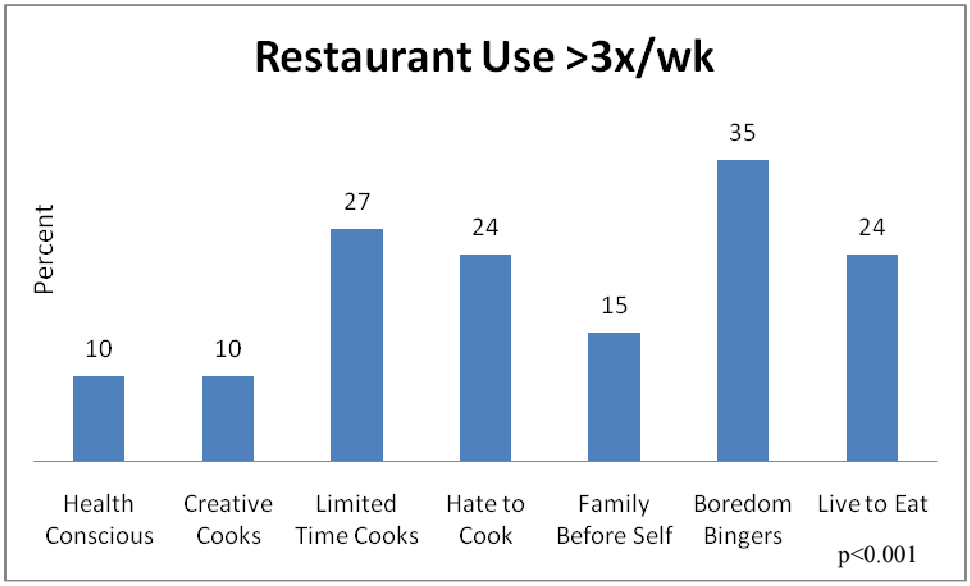
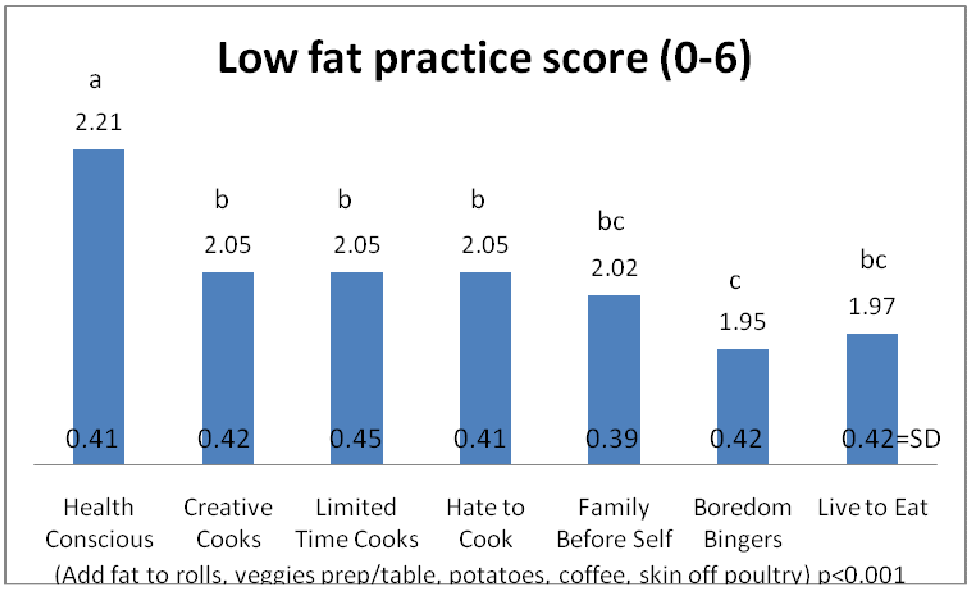


Figure 2. Low fat practice score



Summary of major findings

- Fruit and vegetable consumption was below the recommended intake for all groups. 'Creative Cooks' and 'Health Conscious' groups had the highest intake while 'Hate to Cook' had the lowest.
- Whole grain intake was below the recommended levels for all groups. The 'Health Conscious' group had the lowest intake of refine grains.
- Dairy consumption was below the recommended levels for all groups.
- The 'Creative Cook' and 'Live to Eat' groups had the highest full fat servings while the 'Health Conscious' group had the lowest.
- The 'Boredom Bingers' had the highest regular and overall pop consumption compared to the 'Health Conscious' group which had the lowest regular pop consumption.
- Energy density was the lowest in the 'Health Conscious' group
- Percentage of calories from fat was above the recommended intake for all groups but highest in the 'Live to Eat' group and lowest in the 'Health Conscious' group.
- The 'Boredom Bingers' and 'Live to Eat' groups had the highest trans fat consumption while the 'Health Conscious' group had the lowest.
- Omega 3 fatty acid consumption was highest in the 'Creative Cook' group and lowest in the 'Hate to Cook' group.
- The 'Hate to Cook' group had the lowest consumption of fiber per day.
- The 'Live to Eat', 'Boredom Bingers' and 'Hate to Cook' groups had the highest added sugar intake while the 'Health Conscious' group had the lowest.

- Calcium intake was below recommended levels for all groups while sodium was above the recommended limit.
- The ‘Boredom Bingers’ group had the highest percentage of women eating out >3x/week while the ‘Health Conscious’ and ‘Creative Cook’ groups had the lowest.
- The ‘Health Conscious’ group had the lowest fat practice score compared to all other groups.

Discussion

Based on a review of the literature, this is the first study to use segmentation analysis to divide a large national sample of midlife women into smaller more homogeneous groups according to attitudes toward food, its preparation and consumption. The results indicated that women can be divided into seven distinct eating attitude clusters with fairly even distribution based on general tendencies to value health ('Health Conscious') or mealtime as 'family time' ('Family before Self'), to eat for emotional reasons ('Boredom Bingers') and/or for enjoyment ('Live to Eat'), and to embrace food preparation ('Creative Cooks') or avoid food preparation ('Limited Time Cooks' and 'Hate to Cook').

BMI differed among the attitude clusters supporting the first hypothesis. While the mean BMI for every cluster was >25 indicating overweight status, BMI units differed by about 8 units between the range of attitude clusters. BMI was lowest in the 'Creative Cooks' group (~26) followed by the 'Hate to Cook' and 'Health Conscious' group (~27) and highest in the 'Boredom Bingers' (~34) and 'Live to Eat' (~32) groups. Women in the latter two groups tended to have a larger emotional component shaping their attitudes. Their eating was influenced in social settings; they ate in response to stress, to make themselves feel better, or as a reward. They were not confident in their ability to resist eating in tempting situations. These findings are consistent with results of a recent study reported by Ouwehand and de Ridder (2008). In this study, temptation was more influential in making overweight women want a food compared to normal weight women. Normal weight women tended to decrease their motivation to eat a palatable food in response to temptation while overweight women did not. The authors suggested

that normal weight women may have a stronger sensory-specific satiety system than overweight women. Additionally, Patel and Schlundt (2001) found women not only ate more during a social setting than when at home but also when in a positive or negative mood compared to a neutral mood. However, the percentage of calories from macronutrients was related more to social context than mood. Mood and social setting did not seem to interact with each other.

Women in the 'Family Before Self' group also had a BMI categorized as obese (>30). They were the youngest and had the largest number of family members living in their household. This was consistent with their willingness to compromise their own desires regarding food for family harmony and the tendency to eat differently if not for the presence of others. The influence of others was also important in a study by McMunn, Bartley, Hardy and Kuh (2006). Women who were considered homemakers (married with children) were more likely to be obese by age 53 compared to those who were childless or were never or previously married mothers. Devine et al. (2009) found mothers who worked long and/or nonstandard hours used less healthy coping mechanisms to feed their family. They tended to opt for restaurant meals, skipping breakfast and using prepared entrees which may contribute to overweight or obesity over time.

The second hypothesis, that nutrient and food group intake would differ between clusters, was also supported by results of the current study. Generally, 'Health Conscious' and 'Creative Cooks' groups had an overall healthy profile regarding food group intake while 'Boredom Bingers', 'Live to Eat' and 'Hate to Cook' groups had poorer profiles. 'Limited Time Cooks' had an intake profile in between the two extremes

along with women in the 'Family Before Self' group who tended to compromise their own nutrition for family harmony. Total fruit and vegetable intake was highest among the 'Creative Cooks' and 'Health Conscious' groups with 5.5 and 5.1 cups per day, respectively. Their intake was at least 1.5 cups higher than the group with the lowest intake, 'Hate to Cook'. While whole and partially whole grain intake differed little among groups, the 'Health Conscious' group had the lowest intake of refined grain foods while the emotional eaters, women in the 'Boredom Bingers' and 'Live to Eat' groups had the highest intakes. An interesting finding was that 'Creative Cooks' group had the highest intake of full fat butter, margarine, oil and salad dressing and cholesterol intake but had the lowest BMI among the groups. It is possible that these women use full fat ingredient in their cooking to reflect quality ingredients. In another study with young adult women, Larson, Perry, Story and Neumark-Sztainer (2006) found that those who reported a high involvement or participation in meal preparation were more likely to meet recommendations for calcium, fat, fruit, vegetables, and whole grains than those who reported little participation in meal preparation. However, younger women may have household composition, income and employment conditions that differ from midlife women which could affect food choice. Finally, diet and regular pop intake was highest in the 'Boredom Bingers' and 'Live to Eat' groups. Given the relationship between soft drink consumption and weight gain in adults (Mattes 2006), it was expected that these two groups would have higher soft drink consumption. The 'Boredom Bingers' and 'Live to Eat' groups were also characterized by emotion-driven eating. In another study, three dimensions of eating behavior were associated with soft drink intake- restrained eating, emotional eating and external eating (Elfhag, Tynelius and Rasmussen 2007). In

adult Swedish women after adjusting for BMI, regular (sugar-sweetened) pop intake was negatively associated with restrained eating while light (diet or artificially sweetened) pop intake was positively associated with restrained eating. Soft drink consumption was also related to lower education in adult women (Elfhag et al. 2007), lower levels of physical activity and high sugar intake (Kvaavik, Andersen and Klepp 2005). Goulet et al. (2008) also found that women with low restraint and low disinhibition consumed higher amounts of pop compared to women with low restraint/high disinhibition, high restraint/low disinhibition and high restraint/high disinhibition. Finally, diets containing of high-energy beverage were generally consumed by adults with less healthy diets (Duffey & Popkin 2006).

In general, vitamin and mineral intakes were the highest in the 'Health Conscious' and 'Creative Cook' groups. However, 'Boredom Bingers' and the 'Live to Eat' groups also tended to have fairly high vitamin and mineral intakes. This may be because women in these groups had higher energy consumption which would allow for higher vitamin and mineral intakes. In addition to high energy intake, other factors may also explain higher intake of some vitamins and minerals by these groups. For example, taste preferences for sodium or need for convenience foods could explain higher intake of sodium the 'Creative Cooks', 'Boredom Bingers' and 'Live to Eat' groups. In a study conducted by Kanarek, Ryu and Przypek (1995) women who were regarded as high restrained eaters rated popcorn as significantly more salty than unrestrained eaters. Furthermore, Van der Veen (1999) found that use of salt in cooked meals in the Netherlands was related more to taste attitudes than health while convenience was also perceived as a reason for consuming foods with high sodium content.

In the current study, fat intakes among the 7 attitude groups varied markedly. A 20 gram difference in intake was seen between the 'Health Conscious' group which had the lowest and the 'Live to Eat' group which had the highest fat intake. It was expected that women in the 'Live to Eat' and 'Boredom Bingers' groups would have the highest fat intakes since they tend to use food as a means to reward themselves, are tempted by sensory cues and derive a great deal of pleasure from food. The fat content of foods establishes the sensory components, usually increasing its flavor and improving the texture and smell which determines its appeal (Drewnowski 1987 & 1992). Saturated fat intake was lowest among the 'Health Conscious' group consistent with their tendency to value nutrition and health. Additionally, 'Boredom Bingers' and 'Live to Eat' women had higher amounts of all types of fats, including monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA) and omega 3 fatty acids which was likely due to their overall high energy and fat consumption.

Women in the 'Hate to Cook' group had the lowest intake of vegetables, vegetable protein and fiber. Consistent with these findings, Crawford et al. (2007) examined intake of vegetables in women and found that those who were more involved in planning and preparing meals had higher intakes of vegetables compared to women who never or rarely engaged in these behaviors. In the current study, women in the 'Limited Time Cooks' group also had a fairly low intake of vegetables. Vegetable preparation can be seen as too time consuming thus decreasing its consumption (Heimendinger and Van Duyn 1995).

Intake of added sugars was highest among the 2 emotional eating groups who are also influenced by stress, 'Boredom Bingers' and 'Live to Eat'. Sugar makes food more

palatable which could contribute to the higher intakes by the 'Boredom Bingers' and 'Live to Eat' groups. In laboratory studies, women in a high stress condition ate more sweet foods compared to women in a low stress condition (Grunberg and Straub 1992; Zellner et al. 2006). Others have suggested that these foods may act to reduce stress by enhancing the function of the serotonergic system (Gibson 2006).

As expected in women who valued health and nutrition, the 'Health Conscious' group had the lowest energy intake per day (~1700 kcal) and the lowest dietary energy density. Women in the 'Hate to Cook' and 'Limited Time Cooks' groups also had a fairly low energy intake (~1700 kcals) which was somewhat unexpected. It was thought that if women avoided cooking or had limited time to cook, they would eat out more often. Frequency of eating out is associated with higher energy intake (Nielsen, Siega-Riz and Popkin 2002). Women in two of these three groups ('Creative Cooks' and 'Health Conscious') also had relatively lower BMIs. In general, mean energy intake for all groups may indicate that some underreporting of intake occurred especially for the most overweight/obese groups. In previous studies, the ratio of energy intake to estimated basal metabolic rate (EI/BMR) is used along with cut-off points to classify women as low energy reporters (Caan et al. 2004; Yannakoulia et al. 2007). The percentage of low energy reporters varies in different studies (~12%-47%) due to demographic characteristics as low energy reporters are more likely to be women and overweight (Caan et al. 2004; Yannakoulia et al. 2007). The potential for underreporting energy intake in the current study represents an area for future investigation. It is possible that energy, food groups and nutrient intake would differ in a sample where low energy reporters were excluded from analysis.

Restaurant use >3x/wk was highest among the 'Boredom Bingers' and 'Live to Eat' groups which was in accordance with cluster descriptions for these groups in terms of eating for social reasons or to reward/treat themselves. Restaurant use was also expected to be highest for these two groups with the highest BMI given that restaurant use was positively associated with BMI in other studies (Binkley, Eales and Jekanowski 2000; Putnam 1999; Nielsen, Seiga-Riz and Popkin, 2002; Pereira, Kartashov, Ebbeling et al. 2005). As expected, the 'Health Conscious' and 'Creative Cooks' groups reported the lowest restaurant use since cluster descriptions for these groups indicate they normally resist eating for emotional reasons and generally like to prepare their own meals. Similarly, Candel (2001) found that use of convenience foods was negatively associated with enjoyment of cooking. Low fat practices scores were patterned in a somewhat similar manner to restaurant use with the 'Health Conscious' group having the score while 'Boredom Bingers' and 'Live to Eat' groups having lower scores.

Study Limitations

Limitations of this study include self reported height and weight. Recently, Merrill and Richardson (2009) reported that on average women tend to over report their height by 0.68 cm and underreport their weight by 1.39 kg. This leads to inaccurate BMI calculations. Secondly, in the current study dietary intake was based on a self-reported mailed food record. Taran et al. (1999) found that after training women how to report food intake accurately, intake was still underestimated by 12%. Furthermore, obese adults have been shown to underreport energy intake by as much as 59% (Buhl, Gallagher, Hoy, Matthews and Heymsfield 1995). Finally, menopausal status was

identified as another potential predictor of BMI. MET min/wk was not predictive of BMI, however, physical activity data were only available for 1275 women out of the 1684 due to missing data.

Implications for Nutrition Education

Nutrition education efforts should focus on 1) improving intake and practices in groups with poorer diet quality profiles and 2) helping groups with healthier profiles maintain their healthy eating attitudes and habits. Portion control is typically an important consideration for all women. In this case, it would be especially important to include information about portion sizes in education for women in the 'Boredom Bingers' and 'Live to Eat' groups. Since they can be highly influenced by social cues, education about the appropriate amount of food (portion size) to consume in social settings such as restaurants could be useful. In addition, it may be important to help women in these groups understand what 'triggers' them to eat. This may allow them to acknowledge that the situation may be driven by an emotional versus physical state of hunger so they can modify their frequency of eating.

Education about healthier substitutes for the foods they generally turn to for emotional gratification could help improve diet quality for women in the 'Boredom Bingers' and 'Live to Eat' groups. Since their eating attitudes are based on a large emotional component, being able to identify healthier substitutes before eating is important.

Women in the 'Family Before Self' group generally reported compromising their own nutrition for the sake of family harmony. In this case, involving the family in meal choices may be beneficial. If family members know they have input regarding foods offered for meals, they may be more receptive to different and possibly healthier meals. In addition, meal planning beforehand could provide other benefits for this attitude group. Meal planning can reduce stress at meal time if women know that nutritional needs of others are met.

Education for women in the 'Hate to Cook' group could focus on enhancing simple cooking skills. Enhanced skills may allow them to feel that cooking does not have to be difficult or perceived as a chore. This group should be encouraged to set aside a certain time of the day or week for meal planning since they view meal planning as time consuming and a hassle. Also, finding a few staple recipes and foods which everyone enjoys could decrease the hassle of meal planning.

Implications for Future Research

Data on physical activity were limited in the current study in this sample of midlife women. The long form of the IPAC allowed for multiple occasions where women did not provide complete data. It is important to consider how an important influence on BMI such as physical activity affects the relationship between attitudes and BMI. In future research, the short form of the IPAC could be used to ensure that most women would provide complete data so physical activity could be considered along with attitudes for their influence on BMI.

Because the sample of midlife women in the current study was balanced to match national demographics, it was not possible to stratify results by minority, income or age group. Therefore, future studies could be conducted based on methods used in the current study to focus on specific groups to gain further understanding of their attitudes toward food, its preparation and consumption.

In the current study, obese groups ('Boredom Bingers' and 'Live to Eat') had energy intakes between 1800 and 2000 kcal/day. It is possible that food intake was under reported by women in these groups. Further analysis should be done to exclude low energy reporters and determine whether differences in BMI and eating behaviors are similar to the results of the current study.

Using the information about the attitude clusters obtained in the current study, a nutrition education intervention tailored to attitude group could be developed to improve dietary intake and control weight in midlife women. A typing algorithm can be developed from the cluster analysis results to screen women into attitude groups for a pilot intervention program. The effectiveness of different intervention delivery channels could be evaluated to determine the best intervention approach.

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Appendix A

P.O. Box 474 Toledo, OH 43654
Toll-Free Number: **1-800-537-4097**
Mon – Fri, 8:00 AM to 11:00 PM EST
Sat, 10:00 AM to 6:00 PM EST
Contact Us: http://mysurvey.com/contactus.cfm
Privacy: http://mysurvey.com/privacy.cfm

Shaping the Future with Your Opinions

174075*

Dear MySurvey Member,

We are looking for women volunteers to participate in a University of Minnesota research study about needs that drive food choices in various food and/or beverage consumption situations. Eligible women need to be between the ages of 40 to 60 years.

To participate, you will need to do the following:

1) Record food and beverage intake for all meals and snacks for one 24 hour period of time
2) Answer questions that describe needs surrounding three meals and one snack
3) Answer questions about the three meals and one snack such as where you were eating and with whom
4) Answer general questions about your physical characteristics such as age and weight and type and frequency of physical activities.

It will take about 10 minutes to complete the survey questions for each meal/snack throughout the 24 hour period.

If you are interested in participating, please read the consent form on the opposite side of this letter. If you agree to participate, please read the 'General Information' letter and follow the instructions.

To show our appreciation for your help on this very important study we have enclosed $1. We will mail you an additional $5 when you return your completed survey packet.

Thank you for your help on this study.

Sincerely,

Carol Adams

Please turn over to review Consent Form

CONSENT FORM

Preventing age-related weight gain in midlife women

You are invited to be in a research study of needs driving food choice within eating occasions. You were selected as a possible participant because you are a member of MySurvey's national mail panel. We ask that you read this form and ask any questions you may have before agreeing to be in the study. This study is being conducted by: Marla Reicks, Department of Food Science and Nutrition, University of Minnesota. The study is funded by the US Department of Agriculture.

Background Information

The purpose of this study is to identify needs that drive food choice within eating occasions by women between the ages of 40 and 60 years. This information will be used to develop educational sessions regarding food choice.

Procedures:

If you agree to be in this study, we would ask you to do the following things:
For one 24 hour period, complete a survey recording all foods and beverages consumed, answer questions that describe the needs surrounding 3 meals and 1 snack, and answer situational questions about the meals/snack such as where you were eating and with whom. We will also ask you general questions about your physical characteristics such as age and weight and type and frequency of physical activities. It will take about 10 minutes to complete the survey questions for each eating occasion throughout the 24 hour period.

Risks and Benefits of being in the Study

The study has the following risks: We will be asking you personal questions about the foods and beverages you consume and the reasons for your food choice. There are no benefits to participation.

Compensation:

You will receive payment of $1 when you receive the survey packet and an additional $5 from MySurvey when you return the completed survey packet.

Confidentiality:

The records of this study will be kept private. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only researchers will have access to the records.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota or with MySurvey. If you decide to participate, you are free to not answer any question or withdraw at any time with out affecting those relationships.

Contacts and Questions:

This survey is unique because it is being conducted on behalf of the University of Minnesota and certain questions should be directed specifically to the researchers. If you have questions about survey processing, incentives or any other aspect of your MySurvey membership, please contact Carol Adams at 800-537-4097.

Additionally, if you have specific questions about the content or subject of this particular survey, feel free to contact the researchers conducting this study (Marla Reicks, Jean Kinsey and Courtney Perry). You may ask any questions you have at any time. If you have questions, you are encouraged to contact Marla Reicks at the University of Minnesota, at 612-624-4735 or via email at mreicks@umn.edu or Courtney Perry at 612-600-2445 or via email at perry244@umn.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

Statement of Consent:
I have read the above information. I have asked questions and have received answers. I consent to participate in the study. I understand that completing the mailed survey packet implies consent.
You can keep this copy of this information for your records.

Appendix B

General Instructions

Dear MySurvey Member,

Thank you for agreeing to participate in this study.

To the 40 to 60 year old women helping with this study:

This packet contains the following documents you need to complete for this study:

One (1) Food Record Booklet (white booklet) and One (1) Food Record Booklet Instructional DVD

Four (4) Meal/Snack Questionnaires (Breakfast - yellow booklet, Lunch – pink booklet, Dinner – blue booklet, Snack – tan booklet)

One (1) General Questionnaire (green booklet)

One (1) Return envelope

For this study, we would like you to record everything you eat and drink in the Food Record Booklet for an assigned 24-hour period of time, fill out four questionnaires about meals and a snack, and fill out one general questionnaire.

Your assigned 24-hour time period:
Begins at 4 AM on a weekday
(This could be a Monday, Tuesday, Wednesday, or a Thursday).

For your assigned 24-hour period:

Record everything you eat and drink on the **Food Record Form** in the **Food Record Booklet** (white booklet). Carefully describe all foods and beverages and amounts consumed. To do this accurately, please follow the directions in the Food Record Booklet and watch the instructional video on the enclosed DVD or access the video on the website http://courses.cfans.umn.edu/CFANSVideo/FoodRecordManual/. The video lasts about 12 minutes. The success of this study depends on accurate food records, so please eat as you normally do and record all that you eat and drink immediately after eating or drinking.

Fill out the following four questionnaires throughout your assigned 24-hour period:

1) Fill out the yellow **Breakfast Questionnaire** after eating your morning meal.
2) Fill out the pink **Lunch Questionnaire** after eating your noon meal.
3) Fill out the blue **Dinner Questionnaire** after eating your evening meal.
4) Fill out the tan **Snack Questionnaire** after eating a snack. If you usually have more than one snack, fill out the form after eating a larger snack, for example chips and juice versus juice only.

You should keep the white Food Record Booklet and yellow, pink, blue and tan questionnaires with you throughout the day.

At the end of your assigned 24 hour period:

Fill out the green **General Questionnaire**.

Once you have completed the following items, please return them in the envelope provided.

- ☐ Food Record Booklet (white booklet)
- ☐ Breakfast Questionnaire (yellow booklet)
- ☐ Lunch Questionnaire (pink booklet)
- ☐ Dinner Questionnaire (blue booklet)
- ☐ Snack Questionnaire (tan booklet)
- ☐ General Questionnaire (green booklet)

It would be greatly appreciated if you could do this as soon as possible after you complete them. You do not need to mail back this letter.

Thank you for your help on this study.

Sincerely,

Carol Adams

FOOD RECORD BOOKLET

FOR ONE DAY

Please keep this booklet with you to record everything you eat and drink for your assigned 24-hour period.

We prepared a 12 minute video to help you describe the foods and beverages and the amounts you consume. Before completing the food record form, please watch the instructional video on the enclosed DVD or access the video on the website http://courses.cfans.umn.edu/CFANSVideo/FoodRecordManual/.

Note: The success of this study depends on the accuracy of your food record. We realize that it will be time consuming to keep detailed records and appreciate your help.

TABLE OF CONTENTS

GENERAL INSTRUCTIONS

- **Record everything you eat and drink for your assigned 24-hour period on the Food Record Form (Find the form beginning on page 13 toward the end of this booklet).**
- **Print clearly with only one food or beverage item on each line.**
- **Record each meal/snack immediately after it is eaten.**
- **Leave one blank line between each meal/snack.**

DETAILED INSTRUCTIONS BY COLUMN **(See examples on pages 4-5)**

Column 1 – Type of Occasion

1. Write what type of meal/snack this was (breakfast, lunch, dinner, or snack).

Column 2 – Time Eaten

2. Write the time of day that you ate or drank in the "Time Eaten" column.

Column 3 – Foods and Beverages

3. Fully describe all foods and beverages including water. Include details such as how a food was prepared and whether condiments or spreads were added. For example, if you ate a chicken thigh, write if you ate the skin. If you drank coffee, was it caffeinated or decaffeinated? Was your salad dressing low fat or regular?

INCLUDE	FOR EXAMPLE
How prepared	Fried, broiled, breaded, etc.
Added fats	Fried in butter
Brand name	Stouffer's Frozen Lasagna

4. Include things that you added to the food or beverage at the table. Example: 1 Tbsp butter to a baked potato; 1 tsp sugar to coffee. Write what you added on separate lines.

Column 4 – Amount Eaten

5. Record exact amounts in the "Amount Eaten" column.

- The number of pieces or slices
- Weight: ounces or grams
- Volume: cup, tsp (teaspoon), Tbsp (tablespoon), fluid ounce (fl oz), liters
- Dimensions: inches or centimeters
- Use pictures and guides on pages 7-12 to estimate amounts

Example

(3) FOODS AND BEVERAGES (preparation method, added fat, brand name, source of food)	(4) AMOUNT EATEN
Chicken Caesar Salad	
Romaine lettuce	*3 cups*
chicken breast, (no skin) grilled	*1 medium*
Caesar dressing	*¼ cup*
parmesan cheese	*2 Tbsp.*
Croutons	*6 large*
Spaghetti & Meat Balls	
cooked spaghetti	*1½ cups*
Meatballs	*4 (1" diameter)*
Ragu meatless spaghetti sauce	*½ cup*
parmesan cheese	*1 Tbsp*
Soft Shell Chicken Tacos	
flour tortilla	*1 (8" diameter)*
Roasted, cubed chicken dark meat (no skin)	*½ cup*
Chopped lettuce	*½ cup*
Tomato salsa (chopped tomato, onion, jalapenos)	*2 Tbsp.*

5. Describe each ingredient in a mixed dish or write recipes on pages 16-17. An example of a completed recipe is on page 6.

6. When you have finished recording what you ate and drank for each meal or snack, go back and review your list to see if you forgot any foods or beverages or anything you added at the table.

Example of Food Record Form for 24-hours

(Remember: Leave one blank line between each meal/snack.)

(1) TYPE OF OCCASION (breakfast, lunch, dinner, snack)	(2) TIME EATEN (Hour: Minute AM/ PM)	(3) FOODS AND BEVERAGES (preparation method, added fat, brand name, source of food)	(4) AMOUNT EATEN
Snack	*7:30 AM*	*Werther's original hard candy*	1 piece (5 g)
Breakfast	*8:00 AM*	*Denny's buttermilk pancakes*	*2 pieces 5 in. diameter*
		Butter, whipped	*2 tsp*
		Maple syrup	*¼ cup*
		Bacon	*2 strips 6" long*
		Coffee, decaffeinated	*2 cups*
		Half & half	*2 Tbsp*
Snack	*9:30 AM*	*Brownie (made at home from a mix with vegetable oil and real eggs)*	*2 pieces (2 in. wide x 2 in. long Thickness 5)*
Snack	*11:00 AM*	*Tall latte made with 2% milk*	*12 oz.*
Snack	*11:30 AM*	*Chips Ahoy chocolate chip Cookies*	*2 cookies 3 in. diameter*

Amount or size

How many?

How many?

How long?

How big?

Example of Food Record Form for 24-hours (continued)

(Remember: Leave one blank line between each meal/snack.)

(1) TYPE OF OCCASION (breakfast, lunch, dinner, snack)	(2) TIME EATEN (Hour: Minute AM/ PM)	(3) FOODS AND BEVERAGES (preparation method, added fat, brand name, source of food)	(4) AMOUNT EATEN
Lunch	*12:00 Noon*	*Ham sandwich*	
		Rye bread	*2 slices*
		Ham (from Albertson's deli)	*3 slices*
		Kraft American cheese slice	*1 slice* *Thickness 1*
		Best Foods low fat mayonnaise	*2 tsp*
		Doritos regular tortilla chips	*12 chips*
		Senor Felix Salsa	*¼ cup*
		Minute Maid lemonade	*10 oz.*
Dinner	*6:00 PM*	*Beef Stew*	*1 cup* *(1 serving)*
		Salad:	
		Romaine lettuce	*1 cup*
		Tomato	*¼ medium*
		Kraft Italian fat free salad Dressing	*1 Tbsp*
		French bread	*2 slices* *(1 slice = 3 in. length x 2 in. width x ¾ in. thick)*
		Butter, regular stick	*2 tsp*
		Water	*12 oz.*

Source of food

How thick? See guide on p.12

See recipe on p. 6

Snack	*8:30 PM*	*Dreyers Grand Chocolate ice cream*	*1 cup*

Recipe 1: (Write In) Beef Stew

Number of servings made: **(Write In #)** 6 Number of servings you ate: **(Write In #)** 1

Serving Size 1 cup

INGREDIENTS	AMOUNT
Stew beef, boneless chuck roast, trimmed	2 lbs (pkg weight)
Browned in oil	¼ cup
White flour	1 ½ Tbsp
Onion	1 large
Beef broth, canned	2 cups
Tomato sauce, canned	1 cup
Potatoes, medium sized, white, peeled	6
Carrots, fresh (each about 6 inches long)	6
Celery	1 stalk
Fresh parsley	¼ cup

PREPARATION
Beef browned in oil, not drained
All ingredients added raw to same pan
Simmered 2-3 hours

P.O. Box 474 Toledo, OH 43654
Toll-Free Number: **1-800-537-4097**
Mon – Fri, 8:00 AM to 11:00 PM EST
Sat, 10:00 AM to 6:00 PM EST
Contact Us: http://mysurvey.com/contactus.cfm
Privacy: http://mysurvey.com/privacy.cfm

Shaping the Future with Your Opinions

Vegetables such as Green Beans, Corn and Potatoes

1/4 cup

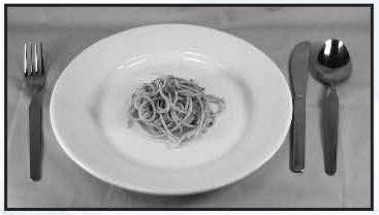
1/2 cup

1 cup

1-1/2 cups

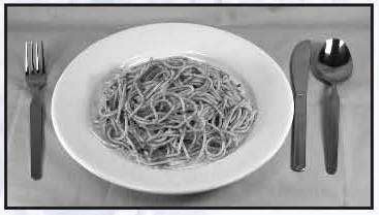
Spaghetti and Casseroles

1/2 cup



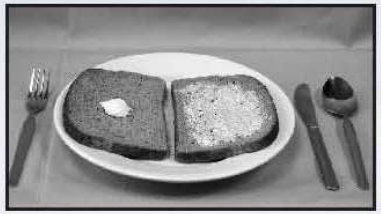
1 cup

2 cups

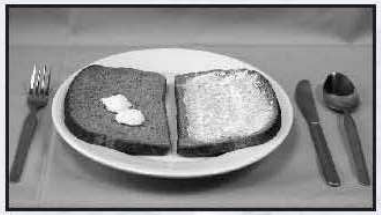


3 cups

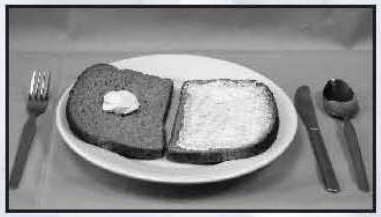
Spreads such as Butter, Margarine, Mayonnaise, or Peanut Butter



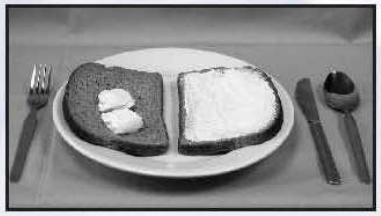
1 teaspoon (tsp)



2 teaspoons



3 teaspoons
= 1 Tablespoon



2 Tablespoons

Salad Dressing

1 Tablespoon (Tbsp)

2 Tablespoons

3 Tablespoons

4 Tablespoons
= 1/4 cup

Salads

1/2 cup

1 cup

1-1/2 cups

2 cups

Ice Cream, Mashed Potatoes, or Cottage Cheese

1/2 cup

1 cup

1-1/2 cups

2 cups

Five Ways to Size Up Your Servings

1 **3 ounces** of meat is about the size and thickness of a deck of playing cards or an audiotape cassette.

2 **1 ounce** of cheese is about the size of 4 stacked dice.

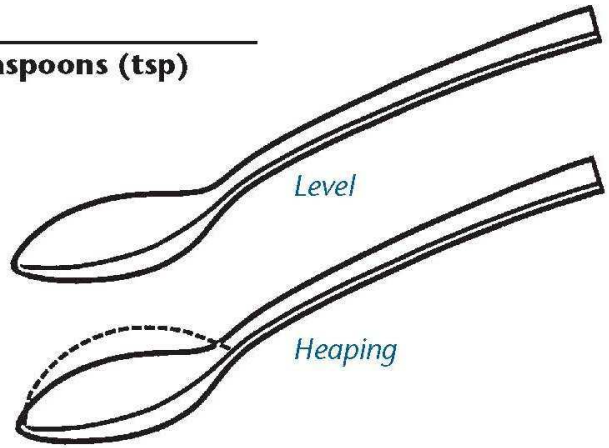
3 **1/2 cup** of ice cream is about the size of a racquetball or tennis ball.

4 **1 cup** of mashed potatoes or broccoli is about the size of your fist.

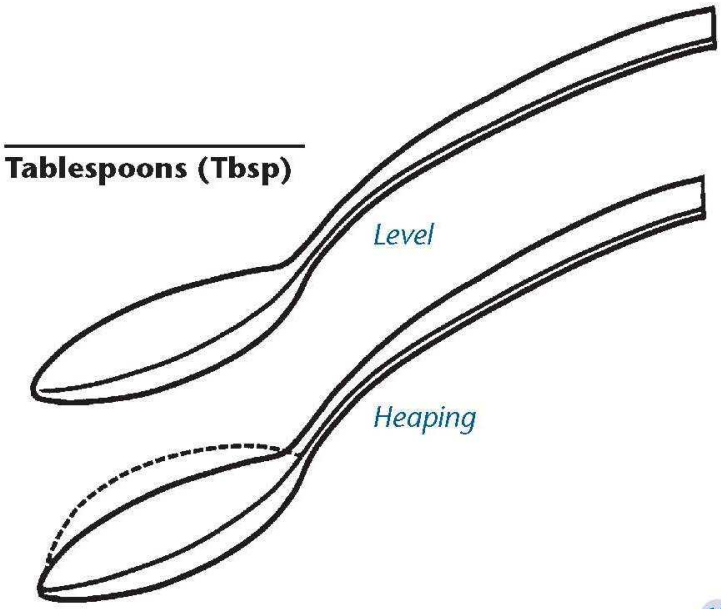
5 **1 teaspoon** of butter or peanut butter is about the size of the tip of your thumb.

Eating and Serving Spoons

teaspoons (tsp)



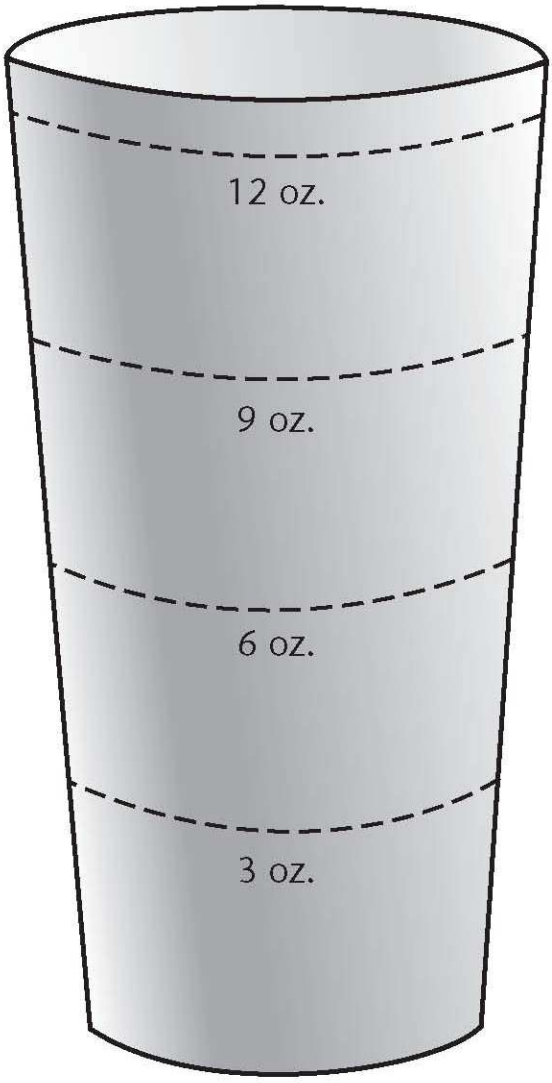
Tablespoons (Tbsp)

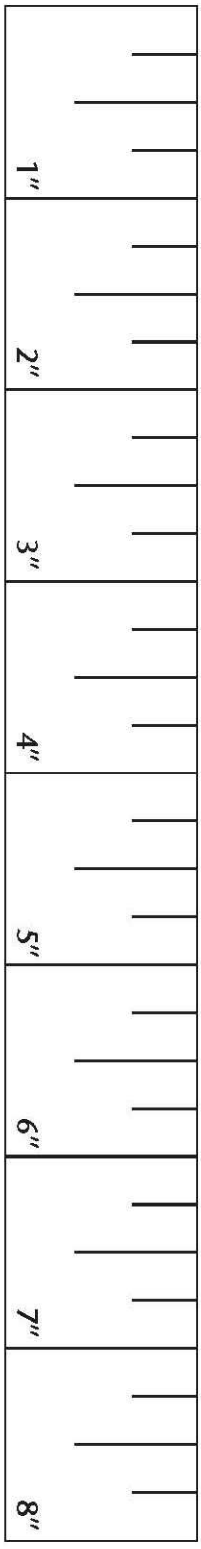


Thickness

1
2
3
4
5

12 fluid ounces





1. Did you watch the Food Record Booklet instructional video? **(X ONE Box For EACH)**

	Yes	No
Video on enclosed DVD.....	1 ☐	2 ☐
Video on website	1 ☐	2 ☐

Use this record form for your assigned 24-hour period.

Food Record Form (24-hours)

Leave one blank line between each meal/snack.

(1) TYPE OF OCCASION (Breakfast, Lunch, Dinner, Snack)	(2) TIME EATEN (Hour: Minute AM/ PM)	(3) FOODS AND BEVERAGES (preparation method, added fat, brand name, source of food)	(4) AMOUNT EATEN

1. Did you watch the Food Record Booklet instructional video? **(X ONE Box For EACH)**

	Yes	No
Video on enclosed DVD.....	1 ☐	2 ☐
Video on website	1 ☐	2 ☐

Food Record Form (24-hours) (continued)

Leave one blank line between each meal/snack.

(1) TYPE OF OCCASION (Breakfast, Lunch, Dinner, Snack)	(2) TIME EATEN (Hour: Minute AM/ PM)	(3) FOODS AND BEVERAGES (preparation method, added fat, brand name, source of food)	(4) AMOUNT EATEN

1. Did you watch the Food Record Booklet instructional video? **(X ONE Box For EACH)**

	Yes	No
Video on enclosed DVD.....	1 ☐	2 ☐
Video on website	1 ☐	2 ☐

Food Record Form (24-hours) (continued)

Leave one blank line between each meal/snack.

(1) TYPE OF OCCASION (Breakfast, Lunch, Dinner, Snack)	(2) TIME EATEN (Hour: Minute AM/ PM)	(3) FOODS AND BEVERAGES (preparation method, added fat, brand name, source of food)	(4) AMOUNT EATEN

Recipe 1: (Write In)
_____
___

Number of servings made: **(Write In #)** _____ Number of servings you ate: **(Write In #)** _____

Serving size_____

INGREDIENTS	AMOUNT

PREPARATION

Recipe 2: (Write In)

_____
___

Number of servings made: **(Write In #)** _____ Number of servings you ate: **(Write In #)** _____

Serving size_____

INGREDIENTS	AMOUNT

PREPARATION

General Questionnaire

Please complete the following questionnaire after you have completed the Breakfast, Lunch, Dinner and Snack Questionnaires and the Food Record Form over your assigned 24 hour period.

Please X one box for questions 1 through 7. **(X ONE BOX FOR EACH)**

	Usually / Always	Sometimes	Rarely / Never
1. When you eat bread or rolls, how often do you add butter or margarine?	1 ☐	2 ☐	3 ☐
2. When you cook vegetables, how often do you add oil, margarine or butter?	1 ☐	2 ☐	3 ☐
3. When you eat vegetables, how often do you add oil, butter or margarine at the table?	1 ☐	2 ☐	3 ☐
4. When you eat potatoes, how often do you use butter, margarine, or sour cream?	1 ☐	2 ☐	3 ☐
5. How often do you use milk or cream in coffee or tea?	1 ☐	2 ☐	3 ☐
6. When you eat chicken or turkey, how often do you eat the skin?	1 ☐	2 ☐	3 ☐

	Yes	No
7. Do you eat in restaurants and/or purchase take-out food more than three times per week?	1 ☐	2 ☐

What type of milk, spreads and cooking oils do you usually use?

Please specify only the type you use most often.

8. Milk: (X ONE Box)

1 ☐ Whole cow's milk 2 ☐ 2 % cow's milk 3 ☐ 1 % cow's milk 4 ☐ Skim cow's milk
5 ☐ Do not use 6 ☐ Another type of milk **(Write In)** _____

9. Margarine: (X ONE Box)

1 ☐ Regular 2 ☐ Diet/low-fat 3 ☐ Fat-free 4 ☐ Spray
5 ☐ Do not use 6 ☐ Brand name **(Write In)**_____

10. Real Butter: (X ONE Box)

1 ☐ Regular 2 ☐ Whipped 3 ☐ Light 4 ☐ Do not use

11. Salad Dressing (X ONE Box)

1 ☐ Regular 2 ☐ Diet/low-fat 3 ☐ Fat-free 4 ☐ Do not use
5 ☐ Brand name **(Write In)**_____

12. Oil: (X ONE Box)

1 ☐ Canola oil 2 ☐ Corn oil 3 ☐ Olive oil 4 ☐ Safflower oil
5 ☐ Soybean oil 6 ☐ Other oil 7 ☐ Do not use

13. Mayonnaise: (X ONE Box)

1 ☐ Regular 2 ☐ Diet/low-fat 3 ☐ Fat-free 4 ☐ Do not use
5 ☐ Brand name **(Write In)**_____

14. Have you used the following practices to prevent weight gain? **(X ONE Box For EACH)**

	Yes, in the last 12 months	Yes, more than 12 months ago	No, never
Commercial weight loss programs (e.g. Weight Watchers, Jenny Craig)	1 ☐	2 ☐	3 ☐
Meal replacements or slimming products (e.g. Herbalife)	1 ☐	2 ☐	3 ☐
Exercise	1 ☐	2 ☐	3 ☐
Cutting down on size of meals or between meal snacks	1 ☐	2 ☐	3 ☐
Cutting down on fats and/or sugars	1 ☐	2 ☐	3 ☐
Laxatives or diuretics	1 ☐	2 ☐	3 ☐
Supplements to burn fat or boost metabolism	1 ☐	2 ☐	3 ☐
Supplements to feel full	1 ☐	2 ☐	3 ☐
Fasting	1 ☐	2 ☐	3 ☐
Vegetarian diet	1 ☐	2 ☐	3 ☐
Smoking	1 ☐	2 ☐	3 ☐
Skipping meals	1 ☐	2 ☐	3 ☐
Eating more protein	1 ☐	2 ☐	3 ☐

15. How tall are you? **(Write In #)** _____ feet _____ inches

16. How much do you weigh now? **(Write In #)** _____ lbs

17. What did you weigh 2 years ago? **(Write in #)** _____ lbs

18. What did you weigh 5 years ago? **(Write in #)** _____ lbs

19. Have you had a menstrual period during the previous 12 months? **(X ONE Box)**

1 ☐ Yes 2 ☐ No

20. Are you currently taking hormone replacement therapy? **(X ONE Box)**

1 ☐ Yes 2 ☐ No

21. Did you take a vitamin and mineral supplement, such as Centrum® or One-A-Day®, today? **(X ONE Box)**

1 ☐ Yes 2 ☐ No

22. Please select a number from 0 to 9 where 0 is not confident and 9 is very confident. **(X ONE Box For EACH)**

	Not Confident								**Very Confident**	
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
I can resist eating when I am anxious (nervous)	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can control my eating on the weekends	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating even when I have to say “no” to others	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating when I feel physically run down	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating when I am watching TV	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating when I am depressed (or down)	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating when there are many different kinds of food available	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating even when I feel it’s impolite to refuse a second helping	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating even when I have a headache	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating when I am reading	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating when I am angry (or irritable)	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating even when I am at a party	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

I can resist eating even when others are pressuring me to eat	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating when I am in pain	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating just before going to bed	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating when I have experienced failure	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating even when high-calorie foods are available	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating when I think others will be upset if I don't eat	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating when I feel uncomfortable	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐
I can resist eating when I am happy	0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

23. Which type(s) of foods do you think are good sources of **protein**? **(X ALL That APPLY)**

1 ☐ Beef, chicken, fish, pork, lamb
2 ☐ Milk, yogurt, cheese, eggs
3 ☐ Margarine, olive oil, canola oil, corn oil, butter
4 ☐ Wheat bread, corn meal, oatmeal, pasta, rice
5 ☐ Baked beans, lentils, peanuts, walnuts, chickpeas
6 ☐ Lettuce, cabbage, broccoli, carrots, greens
7 ☐ Apples, oranges, bananas, grapes, prunes
8 ☐ Soy powder, whey powder, Ensure, Boost

24. How often do you choose each type(s) of food as a **protein** source? **(X ONE Box For EACH)**

	Usually / Always	**Sometimes**	**Rarely / Never**
Beef, chicken, fish, pork, lamb	1 ☐	2 ☐	3 ☐
Milk, yogurt, cheese, eggs	1 ☐	2 ☐	3 ☐
Margarine, olive oil, canola oil, corn oil, butter	1 ☐	2 ☐	3 ☐
Wheat bread, corn meal, oatmeal, pasta, rice	1 ☐	2 ☐	3 ☐
Baked beans, lentils, peanuts, walnuts, chickpeas	1 ☐	2 ☐	3 ☐
Lettuce, cabbage, broccoli, carrots, greens	1 ☐	2 ☐	3 ☐
Apples, oranges, bananas, grapes, prunes	1 ☐	2 ☐	3 ☐
Soy powder, whey powder, Ensure, Boost	1 ☐	2 ☐	3 ☐

25. How much of the calories you eat each day should come from **protein**? **(X ONE Box)**

1 ☐ 5% – 10%
2 ☐ 12% – 15%
3 ☐ 20% - 25%
4 ☐ 30% - 40%
5 ☐ I don't know

26. **Protein** is helpful for weight loss because _____.
(X ALL That APPLY)

1 ☐ protein builds muscle, not fat.
2 ☐ extra protein is not stored in the body.
3 ☐ protein provides more energy than carbs or fat.
4 ☐ protein helps you feel full.
5 ☐ I don't know

27. Which of the following protein supplement products have you seen in stores or in advertisements?
(X ALL That APPLY)

1 ☐ Protein water (such as Special K_20, Stacker 2)
2 ☐ Whey protein beverage (such as Naked Juices)
3 ☐ Soy protein beverage (such as Odwalla, Bolthouse Farms, Silk)

4 ☐ Protein bars (such as Genisoy, Detour)
5 ☐ Soy protein powder mix (such as Genisoy, Soytein)
6 ☐ Whey protein powder mix (such as Designer Whey)
7 ☐ Amino acid tablets (such as Lysine, Carnitine, Arginine)

28. How often do you buy the following **protein** supplement products? **(X ONE Box For EACH)**

	Never	Once A Year	Once A Month	Once A Week	Every Day
Protein water (such as Special K_20, Stacker 2)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Whey protein beverage (such as Naked Juices)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Soy protein beverage (such as Odwalla, Bolthouse Farms, Silk).....	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Protein bars (such as Genisoy, Detour)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Soy protein powder mix (such as Genisoy, Soytein) ...	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Whey protein powder mix (such as Designer Whey) ..	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Amino acid tablets (such as Lysine, Carnitine, Arginine)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

29. Have you ever eaten more protein than you usually eat to help you lose weight? **(X ONE Box)**

1 ☐ Yes 2 ☐ No

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The following questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** and **moderate** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

JOB-RELATED PHYSICAL ACTIVITY

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home. Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

30. Do you currently have a job or do any unpaid work outside your home? **(X ONE Box)**

1 ☐ Yes → **(Continue)** 2 Y No **(Skip To TRANSPORTATION PHYSICAL ACTIVITY)**

The next questions are about all the physical activity you did in the **last 7 days** as part of your paid or unpaid work. This does not include traveling to and from work.

31. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, heavy construction, or climbing up stairs **as part of your work**? Think about only those physical activities that you did for at least 10 minutes at a time.

(Write In #) _____ days per week → **(Continue)**

1 ☐ No vigorous job-related physical activity → **(Skip To Qu. 33)**

32. How much time did you usually spend on one of those days doing **vigorous** physical activities as part of your work? **(Write in # of hours and/or minutes)**

_____ hours per day _____ minutes per day

33. Again, think about only those physical activities that you did for at least 10 minutes at a

time. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads **as part of your work**? Please do not include walking.

(Write In #) _____ days per week → **(Continue)**

1 ☐ No moderate job-related physical activity → **(Skip To Qu. 35)**

34. How much time did you usually spend on one of those days doing **moderate** physical activities as part of your work? **(Write in # of hours and/or minutes)**

_____ hours per day _____ minutes per day

35. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **as part of your work**? Please do not count any walking you did to travel to or from work.

(Write In #) _____ days per week → **(Continue)**

1 ☐ No job-related walking → (**Skip To TRANSPORTATION PHYSICAL ACTIVITY)**

36. How much time did you usually spend on one of those days **walking** as part of your work?
(Write in # of hours and/or minutes)

_____ hours per day _____ minutes per day

TRANSPORTATION PHYSICAL ACTIVITY

These questions are about how you traveled from place to place, including to places like work, stores, movies, and so on.

37. During the **last 7 days**, on how many days did you **travel in a motor vehicle** like a train, bus, car, or tram?

(Write In #) _____ days per week → **(Continue)**

1 ☐ No traveling in a motor vehicle → **(Skip To Qu. 39)**

38. How much time did you usually spend on one of those days **traveling** in a train, bus, car, tram, or other kind of motor vehicle? **(Write in # of hours and/or minutes)**

_____ hours per day _____ minutes per day

Now think only about the **bicycling** and **walking** you might have done to travel to and from work, to do errands, or to go from place to place.

39. During the **last 7 days**, on how many days did you **bicycle** for at least 10 minutes at a time to go **from place to place**?

(Write In #) _____ days per week → **(Continue)**

1 ☐ No bicycling from place to place → **(Skip To Qu. 41)**

40. How much time did you usually spend on one of those days to **bicycle** from place to place?
(Write in # of hours and/or minutes)

_____ hours per day _____ minutes per day

41. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time to go **from place to place**?

(Write In #) _____ days per week → **(Continue)**

1 ☐ No walking from place to place → **(Skip To HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY)**

42. How much time did you usually spend on one of those days **walking** from place to place? **(Write in # of hours and/or minutes)**

_____ hours per day _____ minutes per day

HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY

This section is about some of the physical activities you might have done in the **last 7 days** in and around your home, like housework, gardening, yard work, general maintenance work, and caring for your family.

43. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, chopping wood, shoveling snow, or digging **in the garden or yard**?

(Write In #) _____ days per week → **(Continue)**

1 ☐ No vigorous activity in garden or yard → **(Skip To Qu. 45)**

44. How much time did you usually spend on one of those days doing **vigorous** physical activities in the garden or yard? **(Write in # of hours and/or minutes)**

_____ hours per day _____ minutes per day

45. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, sweeping, washing windows, and raking **in the garden or yard**?

(Write In #) _____ days per week → **(Continue)**

1 ☐ No moderate activity in garden or yard → **(Skip To Qu. 47)**

46. How much time did you usually spend on one of those days doing **moderate** physical activities in the garden or yard? **(Write in # of hours and/or minutes)**

_____ hours per day _____ minutes per day

47. Once again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, washing windows, scrubbing floors and sweeping **inside your home**?

(Write In #) _____ days per week → **(Continue)**

1 ☐ No moderate activity inside home → **(Skip To RECREATION, SPORT AND LEISURE-TIME PHYSICAL ACTIVITY)**

48. How much time did you usually spend on one of those days doing **moderate** physical activities inside your home? **(Write in # of hours and/or minutes)**

_____ hours per day _____ minutes per day

RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY

This section is about all the physical activities that you did in the **last 7 days** solely for recreation, sport, exercise or leisure. Please do not include any activities you have already mentioned.

49. Not counting any walking you have already mentioned, during the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **in your leisure time**?

(Write In #) _____ days per week → **(Continue)**

1 ☐ No walking in leisure time → **(Skip To Qu. 51)**

50. How much time did you usually spend on one of those days **walking** in your leisure time? **(Write in # of hours and/or minutes)**

_____ hours per day _____ minutes per day

51. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like aerobics, running, fast bicycling, or fast swimming **in your leisure time**?

(Write In #) _____ days per week → **(Continue)**

1 ☐ No vigorous activity in leisure time → **(Skip To Qu. 53)**

52. How much time did you usually spend on one of those days doing **vigorous** physical activities in your leisure time? **(Write in # of hours and/or minutes)**

_____ hours per day _____ minutes per day

53. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis **in your leisure time**?

(Write In #) _____ days per week → **(Continue)**

1 ☐ No moderate activity in leisure time → **(Skip To TIME SPENT SITTING)**

54. How much time did you usually spend on one of those days doing **moderate** physical activities in your leisure time? **(Write in # of hours and/or minutes)**

_____ hours per day _____ minutes per day

TIME SPENT SITTING

These questions are about the time you spend sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television. Do not include any time spent sitting in a motor vehicle that you have already told me about.

55. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekday**? **(Write in # of hours and/or minutes)**

_____ hours per day _____ minutes per day

56. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekend day**?
(Write in # of hours and/or minutes)

_____ hours per day _____ minutes per day

57. Below are a number of statements about food. Using a 6 point scale, where **"1" means "Strongly Disagree"** and **"6" means "Strongly Agree,"** please indicate how much you agree or disagree with each statement. If the statement does not apply to you, please select Strongly Disagree.
(X ONE Box For EACH Statement)

Statements	Strongly Disagree 1	2	3	4	5	Strongly Agree 6
Deciding what to serve for dinner is stressful	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I can usually eat what I want, and I never seem to gain weight	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I am always looking for ways to make meals more interesting and varied	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Meals are family time in my household	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I put a lot of effort in looking for coupons and/or finding products on sale	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Having to plan meals is a hassle	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I really feel guilty when I overeat	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Meals in my household can be very stressful times	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Eating something indulgent helps me relax	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I am a real food lover	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I will pay more for higher quality products	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
On most days food takes a back seat to other activities/responsibilities	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I avoid cooking as much as possible	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
When I am feeling bored I usually have something to eat	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
The more authentic an ethnic restaurant the better	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I can't watch television without having a snack	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐

I try to eat well, but it doesn't usually work out	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I'm tired of hearing what is and isn't healthy	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Others show their appreciation for the foods I serve	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Having something to eat helps me deal with stress	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Even when we eat together, people in my household frequently eat different foods	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I make a point to eat foods that are natural/organic	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I get a lot of satisfaction in seeing others enjoy foods I have made	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I only buy foods I know people in my household will eat	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
If it is just me eating, I never bother to cook	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I always compare prices on the foods I buy	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Frequently I eat just to have something to do	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I am finding it harder and harder to maintain my weight	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I consider myself to be an adventurous eater	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Taking care of others usually comes before my meal needs	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I will always buy one brand over another if it is on sale	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I would eat differently if it weren't for the influence of others I eat with	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I frequently eat certain foods because they remind me of the past	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I tend to take comfort in eating the same foods regularly	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Seeing advertisements for food makes me hungry	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I carefully read nutrition/ingredient labels on the foods I buy	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
On most days I am so busy that I need to force myself to eat	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I will pay more for foods that are more healthful	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I like to cook, but never get around to it.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I am careful to balance the foods/calories I eat throughout the day	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I usually don't have time to plan meals	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
It always seems that I am being tempted to eat	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Cooking is a real chore	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I take the time to prepare good meals most nights of the week	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I watch my fat intake carefully	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I have to admit I live to eat	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I know more about nutrition than most people	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
It is hard not to eat when I smell food	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I prepare special dishes that I am known for	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐

If I have a disappointing meal, I will make up for it the next time I eat	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
It is important to use food up before it goes bad	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Certain foods I eat connect me with my cultural heritage	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I cook certain dishes because they remind me of my mother/grandmother	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I can't go to bed without having something to eat	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
When it comes to food, I tend to buy the best	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I really only have time to cook on weekends	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I always reward myself with a treat when I have had a stressful day	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I love to try new recipes and new food products	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
It seems I am always trying to lose or maintain weight	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
When it comes to eating, I never just let myself go	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I am a very creative cook	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I derive a great deal of pleasure from the food I eat	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
Each meal I serve is well balanced across all food groups	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I eat certain foods when I am angry or sad	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
I really wish I had more time to cook for my household	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
It seems that I am always feeling guilty about what I ate	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐

Thank you for your help with this study. Please return your completed questionnaires in the enclosed postage-paid envelope as soon as possible.