Research Review: Effects of Eating Out on Nutrition and Body Weight

Overall studies show:

- Eating out more frequently is associated with obesity, higher body fatness, or higher BMI (Kruger et al., 2008; Boutelle et al., 2007; Chung et al., 2007; Duffey et al., 2007; Schroder et al., 2007; Niemeier et al., 2006; Pereria et al., 2005; Taveras et al., 2005; Bowman et al., 2004a; Kant & Graubard, 2004; Manchino et al., 2004; Thompson et al., 2004; Ma et al., 2003; Binkley et al., 2000; Jeffery & French, 1998; Ma et al., 2003; McCrory et al., 2000; McCrory et al., 1999).
- Eating more fast-food meals is linked to eating more calories, fat, saturated fat, and sugary soft drinks and less fruits, vegetables, and milk (Beydoun et al., 2008; Boutelle et al., 2007; Crawford et al., 2007; Schroder et al., 2007; Befort et al., 2006; Wiecha et al., 2006; Taveras et al., 2005; Bowman et al., 2004; Ebbeling et al., 2004; Kant & Graubard, 2004; Satia et al., 2004; Schmidt et al., 2004; Paeratakul et al., 2003; Guthrie et al., 2002; French et al., 2001; Zoumas-Morse et al., 2001; French et al., 2000; Jeffery & French, 1998; McNutt et al., 1997; Lin et al., 1996).
 - For example, women who eat out more often (more than 5 times a week) consume about 290 more calories on average each day than women who eat out less often (Clemens et al., 1999).

The following is a brief annotated bibliography of sources regarding the association between away-from-home foods and overweight/obesity, as reviewed in a presentation by Dr. Alice Lichtenstein of Tufts University at the April 26-27, 2005 meeting for the Food and Drug Administration (FDA) for the Keystone Forum on Away-From-Home Foods: Opportunities for Preventing Weight Gain and Obesity. More recent studies were added by the Center for Science in the Public Interest.

- 1. Alter DA and Eny K. "The Relationship between the Supply of Fast-food Chains and Cardiovascular Outcomes." <u>Canadian Journal of Public Health</u> 2005;93:173-177. The number of outlets for the nine largest fast-food companies was determined for 380 regions in Ontario, Canada. After adjustment for risk, admissions and mortality for acute coronary symptoms were higher in regions with more fast-food outlets. No association was found between fast-food outlet concentration and rates of risk-adjusted head trauma hospitalizations.
- 2. Befort C, et al. "Fruit, Vegetable, and Fat Intake among Non-Hispanic Black and Non-Hispanic White Adolescents: Associations with Home Availability and Food Consumption Settings." <u>Journal of the American Dietetic Association</u> 2006;106:367-373. A cross-sectional survey of adolescents (144 black, 84 white) and their parents (n=228) found that eating at fast-food and buffet restaurants were among the strongest predictors of higher fat intake for youth. Fruit intake was positively associated with eating at sit-down restaurants for black youth and non-potato

- vegetable intake was positively associated with eating at buffet restaurants for both white and black youth.
- 3. Beydoun MA, et al. "Reduced Away-from-home Food Expenditure and Better Nutrition Knowledge and Belief Can Improve Quality of Dietary Intake among U.S. Adults." Public Health Nutrition 2008;10:1017:1-13. Dietary intake was assessed through the 1994-96 Continuing Survey of Food Intake by Individuals (CSFII), a cross-sectional survey of 7,119 individuals. Higher away-from-home food expenditures were associated with poor diet quality (as measured by the U.S. Department of Agriculture's Healthy Eating Index), higher intakes of fat and saturated fat, and lower intakes of fiber.
- 4. Binkley JK, et al. "The Relation between Dietary Change and Rising U.S. Obesity." International Journal of Obesity 2000;24:1032-1039. Using CSFII data from 1994 to 1996, the researchers found that source of food is a significant determinant of BMI. This association was shown for both restaurants generally and fast-food outlets specifically. For females, the correlation was significant for fast-food outlets only but for males, the correlation was significant for restaurants generally as well as fast-food outlets specifically.
- 5. Boutelle KN, et al. "Fast Food for Family Meals: Relationships with Parent and Adolescent Food Intake, Home Food Availability and Weight Status." <u>Public Health Nutrition</u> 2007;10:16-23. This cross-sectional survey of adolescents and parents found a positive association between adolescent fast-food intake and increased consumption of total and saturated fat. Mothers who purchased more fast-food meals had higher BMIs and were more likely to be overweight. No association between the frequency of fast-food meal purchases and BMI or weight status was observed for teens.
- 6. Bowman SA, et al. "Effects of Fast-Food Consumption on Energy Intake and Diet Quality among Children in a National Household Survey." Pediatrics 2004;113:112-132. Using CSFII data from 1994 to 1996 and the Supplemental Children's Survey from 1998, the researchers found for four to nineteen year olds, thirty percent (30%) of the sample population consumed fast food on a typical day. Those who ate fast food consumed more calories per gram of food and had poorer diet quality. Higher fast food consumption was associated with males, older children, higher household income, non-Hispanic Afro-Americans, and residence in the South.
- 7. Bowman SA, et al. "Fast-Food Consumption of U.S. Adults: Impact on Energy and Nutrient Intakes and Overweight Status." <u>American College of Nutrition</u> 2004a;23:163-168. Using CSFII data from 1994 to 1996, the researchers found that 25% of adults reported eating fast food. The study found that fast food provided greater than 33% of total calorie intake and found a positive association between fast-food consumption and overweight status.

- 8. Chou SY, et al. "An Economic Analysis of Adult Obesity: Results from the Behavioral Risk Factor Surveillance System." <u>Journal of Health Economics</u> 2004;23:565-587. The authors used the 1984 to 1999 Behavioral Risk Factor Surveillance System and state-level measures of the number of fast-food and full-service restaurants. They found that per capita number of restaurants per state was associated with higher probability of people in the state being obese. Compared to other factors, the authors concluded that "the increase in per capita number of restaurants makes the largest contribution to trends in weight outcomes, accounting for 61% of the actual growth in BMI and 65% of the rise in the percentage obese."
- 9. Chung S, et al. "Effect of Retirement on Eating Out and Weight Change: An Analysis of Gender Differences." <u>Obesity</u> 2007;15:1053-1060. Longitudinal regression analysis of five waves of the Health and Retirement Study (1992 to 2002) found that within individual reductions in spending on eating out decreased BMI (though the magnitude of the effect was modest).
- 10. Clemens LH, et al. "The Effect of Eating Out on Quality of Diet in Premenopausal Women." <u>Journal of the American Dietetic Association</u> 1999;99:422-444. The study group was composed of premenopausal women. Groups were categorized as "low eating out" for meals consumed out five times or less per week and "high eating out" for meals consumed out six to thirteen times per week. The researchers found eating out frequency associated with higher intakes of calories, fat, and sodium.
- 11. Crawford D, et al. "Which Food-related Behaviors Are Associated with Healthier Intakes of Fruits and Vegetables among Women?" Public Health Nutrition 2007;10:256-265. A cross-sectional survey found that Australian women who ate meals from fast-food restaurants were less likely to eat two or more servings of vegetables and two or more servings of fruit a day.
- 12. Duffey KJ, et al. "Differential Associations of Fast-Food and Restaurant Food Consumption with 3-y Change in Body Mass Index: the Coronary Artery Risk Development in Young Adults (CARDIA) Study. American Journal of Clinical Nutrition 2007;85:201-208. This study found cross-sectional associations between fast-food intake and higher BMIs at year 7 and 10. Prospectively, the study also found increased consumption of fast food associated with increases in BMI. Increased consumption of other restaurant food was not associated with higher BMIs.
- 13. Ebbeling CB, et al. "Compensation for Energy Intake from Fast Food among Overweight and Lean Adolescents." <u>JAMA</u> 2004;291:2828-2833. In the first part of this study, the participants were instructed to eat as much or little as they desired in a one-hour period in a food-court setting. The participants, thirteen to seventeen years olds, had large caloric intakes (1652 calories) and overweight participants ate more than leaner counterparts in both absolute terms, as well as in estimated daily calorie requirements. In the second part of this study, caloric intake was determined for participants under "free-living" conditions for two days when fast food was eaten

- and not eaten. The researchers found that overweight adolescents consumed significantly more total calories on fast-food days (almost 18% more). Lean adolescents had no significance difference in total calorie intake between fast-food and non-fast food days.
- 14. French SA, et al. "Fast-Food Restaurant Use among Adolescents: Associations with Nutrient Intake, Food Choices and Behavioral and Psychosocial Variables."

 International Journal of Obesity 2001;25:1823-1833. A cross-sectional survey of 4,746 adolescents found that fast-food intake was associated with higher calorie, total fat, and saturated fat intake and lower fruit, vegetable, and milk consumption. No association was found with overweight status.
- 15. French SA, et al. "Fast-Food Restaurant Use among Women in the Pound of Prevention Study: Dietary, Behavioral and Demographic Correlates." <u>International Journal of Obesity</u> 2000;24:1353-1359. This three year prospective intervention study found that frequency of fast-food restaurant use was associated with higher caloric intakes and higher fat intake (as percent of calories) and lower consumption of fiber and fruit. The frequency of fast-food restaurant use also was positively associated with younger women, those with lower income, and those with non-White ethnicity.
- 16. Guthrie JF, et al. "Role of Food Prepared Away from Home in the American Diet, 1977-78 Versus 1994-96: Changes and Consequences." <u>Journal of Nutrition Education and Behavior</u> 2002;34:140-150. Using data from 1977-78 NFCS and 1994 to 1996 CSFII data, the researchers found changes in source of calories consumed over time. Food prepared away from home (restaurants, schools, daycare, or other) increased from 18% to 34% of total calories. Meals and snacks prepared away from home contained more calories per eating occasion and those meals and snacks were higher in fat and saturated fat and lower in fiber, calcium and iron per calorie consumed.
- 17. Jeffery RW and French SA. "Epidemic Obesity in the United States: Are Fast Foods and Television Viewing Contributing?" <u>American Journal Public Health</u> 1998; 88:277-280. The study considered the correlation between fast-food intake and energy intake and body mass (the study also looked at TV, VCR, and cable TV watching). Recruitment was done via the USDA Women, Infants, and Children program (WIC) for those not pregnant one year prior to or following WIC enrollment. Total calorie intake and BMI were positively associated with fast-food consumption.
- 18. Kant AK & Graubard BI. "Eating out in America, 1987-2000: Trends and Nutritional Correlates." Preventive Medicine 2004;38:243-249. Analysis of data from the 1987 and 1992 National Health Interview Surveys (NHIS) and the 1999-2000 National Health and Nutrition Examination Survey (NHANES) found that the number of meals eaten out was associated with eating more calories, total fat and saturated fat. Eating out also was associated with higher BMIs in women (but not men).

- 19. Kruger J, et al. "Dietary Practices, Dining Out Behavior and Physical Activity Correlates of Weight Loss Maintenance." Preventing Chronic Disease: Public Health Research, Practice, and Policy 2008;5:1-14. A survey of adults found that people who did not eat at fast-food restaurants were more successful at maintaining their weight loss than people who ate at fast-food restaurants two or more times a week.
- 20. Lin BH, et al. <u>Diets of America's Children: Influence of Dining Out, Household Characteristics, and Nutrition Knowledge</u>. Washington, DC: USDA, 1996. Ag Economic Report No. 726. Using data from USDA's 1989-91 Continuing Survey of Food Intakes by Individuals and the Diet and Health Knowledge Survey, USDA researchers found that the foods that children eat from fast-food and other restaurants are higher in fat and saturated fat and lower in fiber, iron, calcium, and cholesterol than foods from home.
- 21. Ma Y, et al. "Association between Eating Patterns and Obesity in a Free-living US Adult Population." <u>American Journal of Epidemiology</u> 2003;158:85-92. Crosssectional data from the Seasonal Variation of Blood Cholesterol Study (1994-1998) found a higher risk of obesity in people who more frequently ate breakfast or dinner (but not lunch) out.
- 22. Maddock J. "The Relationship between Obesity and the Prevalence of Fast-Food Restaurants: State-Level Analysis." American Journal of Health Promotion 2004; 19:137-143. The researchers considered state-level data on percent of population which is obese, fast-food restaurants per square mile, and self-reported behaviors from physical activity to fruit and vegetable consumption. The study found state levels of obesity inversely related to the number of residents per fast-food restaurant density and the number of square miles per fast food establishment. Other factors associated with obesity were income, fruit and vegetable intake, and percentage population of African-Americans.
- 23. Manchino L, et al. "The Role of Economics in Eating Choices and Weight Outcomes." USDA, Economic Research Service, Washington, D.C., 2004. Ag Info Bulletin No. 791. The researchers used data from USDA's 1994-96 Continuing Survey of Food Intakes by Individuals and the 1994-96 Diet and Health Knowledge Survey. They found that overweight and obese women go significantly longer intervals between meals than healthy-weight women, and receive more of their daily calories from fast-food restaurants.
- 24. McCrory MA, et al. "Overeating in America: Association between Restaurant Food Consumption and Body Fatness in Healthy Adult Men and Women Ages 19 to 80."

 Obesity Research 1999;7:564-571. The study group was comprised of "healthy" men and women. Restaurant consumption averaged 7.5 times per month. After controlling for age and gender, frequency of restaurant consumption was associated positively with body fatness (as measured by underwater weights). The association

- was unaltered after controlling for education, smoking status, and alcohol intake. The association increased after controlling for physical activity.
- 25. Niemeier HM, et al. "Fast-Food Consumption and Breakfast Skipping: Predictors of Weight Gain from Adolescence to Adulthood in a Nationally Representative Sample." <u>Journal of Adolescent Health</u> 2006;39:842-849. A large prospective study, the National Longitudinal Study of Adolescent Health, found that greater intake of fast food in adolescence was associated with increased body weight in young adulthood.
- 26. Paeratakul S, et al. "Fast-food Consumption among U.S. Adults and Children: Dietary and Nutrient Intake Profile." <u>Journal of the American Dietetic Association</u> 2003;103:1332-1338. Using data CSFII from 1994 to 1996 and 1998, the researchers found that 37% of adults and 42% of children reported eating in fast-food establishments. On the basis of two non-consecutive twenty-four hour diet recalls, adults and children who reported eating fast foods had higher intakes of calories, fat, saturated fat, sodium, and soft drinks and lower intakes of vitamins A and C, milk, fruits, and vegetables than people who did not eat fast food.
- 27. Pereira MA, et al. "Fast-Food Habits, Weight Gain, and Insulin Resistance (The CARDIA Study): 15-year Prospective Analysis." Lancet 2005;365:36-42. This study used data from the Coronary Artery Risk Development in Young Adults (CARDIA) study. The CARDIA study included 3031 females and males from eighteen to thirty years of age in 1985/86, and included a follow-up fifteen years later. The analysis found that change in fast-food frequency was positively associated with changes in body weight. Those who frequented fast-food restaurants more than two times per week at baseline and follow-up gained an additional 4.5 kg (about 10 pounds) over the fifteen years and had a two-fold greater increase in insulin resistance.
- 28. Satia JA, et al. "Eating at Fast-Food Restaurants is Associated with Dietary Intake, Demographic, Psychosocial, and Behavioral Factors among African Americans in North Carolina." Public Health Nutrition 2004;7:1089-1096. This study considered a cross-sectional sample of 658 African-Americans from twenty to seventy years of age in North Carolina. The study found eating in fast-food restaurants to be associated with higher total fat intake, saturated fat intake, and lower vegetable intake. Frequent eaters in such establishments were more likely to be younger, never married, obese, and/or physically inactive.
- 29. Schmidt M, et al. "Fast-Food Intake and Diet Quality in Black and White Girls."

 <u>Archives of Pediatric and Adolescent Medicine</u> 2004;159:626-631. In a longitudinal multicenter cohort study of 2379 girls (ages 9 to 19 years), increased fast-food intake was associated with increased intake of energy and percent of calories from fat and saturated fat.
- 30. Schroder H, et al. "Association of Fast-Food Consumption with Energy Intake, Diet Quality, Body Mass Index and the Risk of Obesity in a Representative

Mediterranean Population." <u>British Journal of Nutrition</u> 2007; 98:1274-1280. In this cross-sectional study in Spain of 1,491 men and 1,563 women, eating fast food was associated with higher calorie intakes and higher energy density. Multivariate logistic regression analysis adjusting for lifestyle and educational factors found that eating fast food was associated with poor diet quality and higher BMIs. The risk of being obese increased by 129% in people who ate fast food more than once a week compared to people who ate no fast food.

- 31. Taveras EM, et al. "Association of Consumption of Fried Food Away from Home with Body Mass Index and Diet Quality in Older Children and Adolescents."

 <u>Pediatrics</u> 2005;116:e518-524. Longitudinal multivariate models showed eating fried foods away from home (a proxy for fast-food intake) 4-7 times a week was associated with higher BMIs compared with low consumption at baseline and one year later. Eating more fried foods away from home also was associated with higher consumption of calories, sugar-sweetened beverages, and trans fat and lower intakes of fruits, vegetables, and lower fat dairy foods.
- 32. Thompson OM, et al. "Food Purchased Away from Home as a Predictor of Change in BMI z-score among Girls." International Journal of Obesity 2004;28:282-289. The researchers conducted a longitudinal growth study with girls eight to twelve years of age as the baseline with a follow-up when they were eleven to nineteen years of age. The study showed that at baseline, eating at quick-service restaurants more often was associated with increases in BMI. This was most evident when quick-service frequency was two times a week or greater.
- 33. Wiecha JL, et al. "School Vending Machine Use and Fast-Food Restaurant Use Are Associated with Sugar-Sweetened Beverage Intake in Youth." <u>Journal of the American Dietetic Association</u> 2006;106:1624-1630. A cross-sectional study found that eating at fast-food restaurants is associated with greater sugar-sweetened soft drink intake in middle-school-aged children. BMI was not associated with intake.
- 34. Zoumas-Morse C, et al. "Children's Patterns of Macronutrient Intake and Associations with Restaurant and Home Eating." <u>Journal of the American Dietetic Association</u> 2001;101:923-925. This study combined data from two populations: 1) 376 children, seven to eleven years old; and 2) 435 adolescents, twelve to seventeen years old. It found that the largest consumption of calories took place in restaurants. The study found that children typically eat almost twice as many calories when they eat a meal at a restaurant (765 calories) compared to an average meal at home (425 calories). Children and adolescents also ate more energy from fat and saturated fat when eating at a restaurant compared to at home.