Appendix E-4: NHANES Data Used in DGAC Data Analyses

Most of the DGAC data analyses used the National Health and Nutrition Examination (NHANES) data and its dietary component, What We Eat in America (WWEIA), NHANES (Zipf et al., 2013). These data were used to answer questions about food and nutrient intakes because they provide national and group level estimates of dietary intakes of the U.S. population on a given day as well as usual intake distributions. These data contributed substantially to questions answered using data analyses. This appendix describes the NHANES data in greater detail.

NHANES

NHANES consists of ongoing, comprehensive, cross-sectional, population-based surveys designed to collect data on health, nutritional status, and health behaviors of the non-institutionalized civilian population living in households in the United States. It is conducted by the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC). NHANES has had a long history starting in the early 1960s (Zipf et al., 2013); it has been monitoring food and nutrient intake and nutritional status of the U.S. population since 1971, starting with NHANES I. Since then, several cycles of NHANES have been conducted as a series of cross-sectional surveys focusing on different population groups in terms of age and race/ethnicity, or health topics. In 1999, NHANES became a continuous survey, sampling U.S. residents of all ages, with a changing focus on a variety of health and nutrition measurements to meet emerging needs. The goals of the continuous NHANES are to provide prevalence data on selected diseases and risk factors for the U.S. population; to monitor trends in selected diseases, behaviors, and environmental exposures; to explore emerging public health needs; and to maintain a national probability sample of baseline information on health and nutritional status of the U.S. household population (Zipf et al., 2013).

NHANES has a complex, multi-stage, probability sampling design and examines a nationally representative sample of about 5,000 persons each year. In NHANES, certain subgroups have been periodically oversampled. These include low income, older Americans, infants and children, pregnant women and certain race/ethnic groups (e.g., Hispanics, including Mexican Americans, African Americans, and more recently, Asian Americans). The NHANES survey is unique because it combines personal interviews with standardized physical examinations and laboratory tests administered by a specially trained staff that travels with the Mobile Examination Center (MEC) to survey sites selected to represent the U.S. population (Zipf et al., 2013).

In the continuous NHANES, dietary intake is assessed through two 24-hr recalls, administered by trained dietary interviewers using the USDA's Automated Multiple Pass Method (AMPM) (Blanton et al., 2006) through What We Eat in America (WWEIA). The first 24-hr recall (day 1) is collected in-person at the MEC and a subsequent 24-hr recall (day 2) is obtained 7 to 10 days later over the telephone. Information on dietary supplements consumed during the 24-hour recall period is also collected. The strengths of the WWEIA, NHANES dietary data include that because two 24-hour recalls are available in WWEIA, NHANES (from 2003 onwards), usual intake distributions can be estimated based on statistical techniques that reduce the effect of intra-individual variation in food and nutrient intakes in 24-hour recalls (Nusser et al. 1996; Tooze et al. 2006; Dodd et al. 2006).

The WWEIA, NHANES dietary data are one of the few sources that can provide national estimates of total nutrient intake from diet and dietary supplements for the U.S. population. Moreover, dietary intakes can be described by specific socio-demographic groups including race/ethnic groups, income status, and participation in Federal nutrition assistance programs (e.g., Supplemental Nutrition Assistance Program). Dietary data from WWEIA, NHANES can be linked to thorough anthropometric, laboratory, and clinical evaluation data as well health outcomes to examine cross-sectional associations at the national and large subgroup levels. It must be recognized that WWEIA, NHANES dietary data are not designed for individual-level assessment. These data can be useful to inform nutrition policy, but not sufficient by themselves to form policy recommendations.

No single perfect method for assessing dietary intake information is available in surveys (Willett 1998; Gibson 2005; Berdainer et al., 2008) and different methods may be indicated for specific purposes (Willett 1998; Beaton et al., 1983; Berdainer et al., 2008). NCHS has been actively involved in researching and reviewing its data collection methods, including dietary data, over the years internally and in consultation with expert groups (Wright et al., 1994; Briefel & Sempos, 1992). The methods used in NHANES are adapted in light of its large sample size and complex design, cost and feasibility, and respondent burden to ensure a high response rate to derive nationally representative estimates. Some examples of adaptations in methods include the transition to USDA's standardized automated multi-pass method for collection of dietary recalls by trained interviewers that has been evaluated and associated with reduced measurement error (Moshfegh et al., 2008). Other examples include collection of an additional 24-hour dietary recall in NHANES since 2003 (for a total of two 24-hour recalls), coupled with targeted food frequency questionnaires over various NHANES cycles.

The strengths and shortcomings of these dietary assessment methods have been discussed over time in various meetings (e.g., International Conference on Diet and Activity Methods and American Society for Nutrition/Experimental Biology), workshops, and expert groups. This has also been discussed for several years in the scientific literature (Beaton 1994; Berdainer et al.,

2008) and in recent articles (Archer et al., 2013; Hébert et al., 2014; Webb, 2013). No assessment method is perfect and the choice of dietary method is based on the purpose for which it is intended. For NHANES, repeated 24-hour recalls remain the backbone of dietary assessment and monitoring. These data are useful in providing national- and group-level estimates of dietary intakes of the U.S. population, on a given day as well as in describing usual intake distributions using appropriate statistical approaches, to inform nutrition policy.

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