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Reliability of sport fish consumption in the New York State Angler Cohort Study

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Abstract

This paper examines the reliability of sport fish consumption data from the New York State Angler Cohort Study (NYSACS). NYSACS is a prospective cohort study conducted among New York State registered sportsmen and fishermen. Sport fish consumption information for New York State waters including the Great Lakes between June 1990 and June 1991 were collected through self-administered questionnaires, Spouses of male anglers were asked to provide their husbands' fish consumption during the same time period. A short telephone interview after the cohort was ascertained was also conducted among about 100 study participants for the purpose of quality control. Percentage agreement, kappa, and weighted kappa were calculated to evaluate the reliability of the interview using spousal data and reinterview data. Overall, for the total fish consumption between June 1990 and June 1991, percentage agreement, kappa, and weighted kappa between spousal data and primary response were 67.28%, 0.5087, and 0.6157, respectively. For reinterview data, weighted kappa ranged from 0.4510 to 0.5285 for season-specific analysis and kappa ranged from 0.4615 to 0.7006 for fish species-specific analysis. Spouses may be a good source of proxy data for fish consumption. The reliability of sport fish consumption data for the NYSACS study is acceptable, suggesting that the food frequency measuring methods employed are a viable approach to obtain retrospective sport fish consumption data from sportsmen and subsistence anglers.

Keywords: Reliability; Sport fish; Proxy data; Kappa; Percent agreement

1. Introduction

The New York State Angler Cohort Study (NYSACS) is a prospective epidemiologic study conducted by the State University of New York at Buffalo (Buck et al., 2000). The goals of the New York State angler research are threefold: (1) to characterize exposure to persistent toxic contaminants through consumption of Lake Ontario sport fish, (2) to evaluate knowledge of fish consumption advisories and health risk perception, and (3) to conduct epidemiological studies of reproductive and developmental health. In this study, sport fish consumption frequency data were gathered through self-administered questionnaires from male and female anglers and spouses of male anglers. A subgroup of anglers was reinterviewed after the cohort was ascertained.

In epidemiologic studies, food frequency dietary methods are often used to assess the intake of nutrients or exposure to some chemicals from foods (Wise and Birrell, 2002; Freudenheim, 1993). Often the frequency of a specific food intake is divided into several categories. Subjects select a category that best represents average level of intake during a past time period. Compared with other dietary survey methods, it is inexpensive, convenient, and easy to conduct. However, sometimes the categories are so close that it is difficult for the subjects to choose between them. Recall bias and change of food intake pattern over time can also influence the results. Usually in these studies validity and reliability are two key issues. Reliability analysis is more widely used because it is hard to find a "gold standard" that is indispensable in validity analysis.

In previous studies, reliability analyses of the agreement between information from primary subjects and that from their proxy respondents are very common (Marshall et al., 1980; Whiteman and Green, 1997;

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Navarro, 1999; Cahalan, 1981; Barnett et al., 1997; Beltran et al., 1997; Hu et al., 1999; Shatensteinb et al., 1999; Hislop et al., 1992). The major concern among these studies is that when rapidly fatal diseases are studied, interviews with next-of-kin are often needed (Marshall et al., 1980). It has been suggested that the level of agreement between primary and proxy respondents depends on their relationship, ethnicity, and research subject matter. Spouses are major sources of proxy data in such studies. Some former studies suggested that the comparability of spousal data is satisfactory, especially when wives were asked about their husbands' dietary patterns (Marshall et al., 1980). Another approach to assess reliability is to interview study subjects repeatedly and compare the responses among different interviews.

For humans, fish consumption is a major dietary route of exposure to a variety of toxic chemicals which bioaccumulate in the food chain (DeVoto et al., 1998; Kostyniak et al., 1999; Grimvall et al., 1997). Among anglers in the Great Lakes basin, sport fish consumption is the largest dietary contributor to persistent compounds (Anderson et al., 1998). Fish consumption is reported to deliver a dose 4300 times higher than that from drinking water or inhalation (Humphrey, 1983).

Concern about consumption of fish from contaminated bodies of water has fostered research focusing on such consumption and a variety of health outcomes including adverse reproductive and developmental effects and cancer. To date, there has been limited systematic attention paid specifically to fish consumption dietary assessment methods especially to obtain detailed information on specific species that may differ in levels of contaminants. This gap may reflect the utilization of general and varied methods for the collection of information on fish consumption. Methods vary with regard to the validity and reliability of information generated but to our knowledge little work has been published specifically on the quality of fish consumption history data. We believe that this has hampered a more complete interpretation of findings with regard to the hazards of fish consumption in human health outcomes. The hazard reflects the persistent and lipophilic nature of contaminants and their ability to bioaccumulate within the aquatic food chain in complex ways. Consistent with this exposure scenario, we undertook a study to assess the quality of our questionnaire data on consumption of contaminated fish from New York State waters with a focus on Lake Ontario.

The main objective of this study was to examine the reliability of sport fish consumption history including total intake and consumption of specific species. Proxy data from spouses and data from a repeat interview were employed in this study. We did a Medline search and found only one paper on the specific topic of sport fish intake reliability. In that paper, the authors used whole-blood mercury, plasma DHA, and EPA as biomarkers to examine the reliability of fish consumption data. To our knowledge, this may be the first study using spousal data and reinterview data to assess the reliability of sport fish consumption data.

2. Materials and methods

2.1. Data sources

A detailed description of NYSACS can be found elsewhere (Buck et al., 2000). Briefly, NYSACS is a prospective epidemiologic study conducted by State University of New York at Buffalo. Started in 1991, approximately 18,000 anglers aged 18–40 years and their spouses completed self-administered questionnaires. Anglers were selected randomly from resident fishing license files after weighting by the proportion of licenses sold in 16 counties surrounding Lake Erie and Lake Ontario. The eight-page questionnaire contained sections on species-specific fish consumption in Lake Erie, Lake Ontario, and the Niagara River, knowledge of and compliance with fish consumption advisories, select lifestyle factors, medical history, and reproductive history for female cohort members. In the fish consumption section, there was a question asking the average number of fish meals that the subject ate from fish caught in New York waters, 1990–1991 by season. The fish eating frequency was divided into eight categories, i.e., none, 1 or less per month, 2 per month, 3 per month, 1 per week, 2 per week, 3 or 4 per week, 5 or more per week. Similar questions were asked for specific fish species including Chinook salmon, lake trout, Coho salmon (>21 in), rainbow trout (>25 in), and brown trout (>20 in). Spouses of male cohort members were also asked to provide the information of their male partners' average number of sport-caught fish meals from June 1990 to June 1991 (not species specific). The categories of eating frequency were the same as mentioned above.

After the cohort was ascertained, we conducted another short telephone survey for a randomly selected subgroup of participants. Study participants were asked to provide information on their total sport fish consumption and species-specific fish consumption caught in Lake Ontario from June 1990 to June 1991. Approximately 100 respondents and 100 nonrespondents of the initial baseline mailed questionnaire participated in the telephone survey. The telephone surveys were completed within 2–6 months after the mail surveys were returned.

Three kinds of fish consumption data are available in this study: original data from the baseline questionnaire, spousal data from the wives of male participants, and