



ORIGINAL ARTICLE

Under-reporting of Energy Intake from 24-hour Dietary Recalls in the Korean National Health and Nutrition Examination Survey

Seunghee Kye^{a,1}, Sung-Ok Kwon^{b,1}, Soon-Young Lee^a, Jiyeon Lee^c,
Bok Hee Kim^d, Hee-Jae Suh^e, Hyun-Kyung Moon^{f,*}

^aDepartment of Preventive Medicine and Public Health, School of Medicine, Ajou University, Suwon, Korea.

^bDepartment of Food and Nutrition, Kyunghee University, Seoul, Korea.

^cSchool of Journalism and Mass Communication, University of Minnesota, MN, USA.

^dDepartment of Food and Nutrition, Chosun University, Gwangju, Korea.

^eDepartment of Food Science, Sunmoon University, Asan, Korea.

^fDepartment of Food and Nutrition, Dankook University, Yongin, Korea.

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Abstract

Objectives: Chronic degenerative diseases are closely related to daily eating habits, nutritional status, and, in particular, energy intake. In clarifying these relationships it is very important for dietary surveys to report accurate information about energy intake. This study attempted to identify the prevalence of the under-reporting of energy intake and its related characteristics based on the Korean National Health and Nutrition Examination Survey conducted in the years 2007–2009.

Methods: The present study analyzed dietary intake data from 15,133 adults aged ≥ 19 years using 24-hour dietary recalls. Basal metabolic rates were calculated from the age- and gender-specific equations of Schofield and under-reporting was defined as an energy intake < 0.9 , represented by the ratio of energy intake to estimated basal metabolic rate.

Results: Under-reporters (URs) accounted for 14.4% of men and 23.0% of women and the under-reporting rate was higher in the age group 30–49 years for both men and women. The results from an analysis of the age-specific socioeconomic characteristics of participants classified as URs showed that under-reporting was high in women living alone and in women with only elementary school education or no education. The results from an analysis of the health-specific characteristics of URs showed that a large proportion of URs had poor self-rated health or were obese, or both, compared with non-URs. The proportion of participants who

*Corresponding author.

E-mail: moonhk52@dankook.ac.kr

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¹These authors contributed equally to this work.

consumed less than the estimated average requirements for nutrients was significantly higher in URs compared with non-URs.

Conclusion: The under-reporting of energy intake was associated with age, gender, education level, income level, household status (single-person or multi-person), self-rated health, physical activity, and obesity.

1. Introduction

It is very important to assess dietary intake accurately in nutrition surveys. Many studies have pointed out the under-reporting of energy intake from dietary surveys [1–8]. As the importance of a proper calorie intake has recently been emphasized, especially in association with chronic diseases, it has become very important to assess energy intake accurately. Overweight and obesity have been reported as major factors influencing under-reporting [3–7]. There have been reports demonstrating that under-reporting is common in elderly people and women [2–4,6] and that it is associated with socioeconomic and psychological characteristics [3–7]. However, no clear conclusion has yet been reached. Most nutrition surveys or epidemiological studies investigating dietary intake have methodological limitations related to misreporting and measurement errors [8–11].

In general, under-reporting is less likely in 24-hour dietary recalls than in self-reporting surveys in which participants are asked to record their own food intake [12,13]. However, it is difficult to determine whether under-reporting is a result of the misreporting of the kinds and amounts of food consumed, or from other factors influencing the participants' actual food intake. The National Health and Nutrition Examination Survey (NHANES), which is conducted in Korea based on the National Health Promotion Act, provides critical data for monitoring the health and nutritional status of Korean populations. These data can be used to aid in selecting populations vulnerable to health problems. These populations should be given priority consideration in related policies and in developing new policies by evaluating whether the current health nutrition policies and programs are being effectively implemented.

Based on data from NHANES, this study attempted to analyze the prevalence of under-reporting of energy intake by age and to identify the socioeconomic characteristics and risk factors relating to health that influence such under-reporting.

2. Materials and methods

2.1. Study population and data sets

In Korea, NHANES is conducted nationwide to assess the health status, disease prevalence, and nutrient intake of Korean people and consists of questionnaires,

physical examinations, and health interviews. This study attempted to identify the prevalence of under-reporting and its related characteristics based on the NHANESs carried out in the period 2007–2009. This study analyzed daily dietary intake data from 15,133 men and women aged ≥ 19 years using 24-hour dietary recalls. The study referred to basic interviews for socioeconomic information on the participants and health questionnaires for their age, smoking status, alcohol consumption, health, and physical activity. Physical examinations were used to determine anthropometric data. Participants were classified into four levels of education: elementary school or no education; middle school graduate; high school graduate; and college graduate or higher. They were also stratified into quartiles according to household income level: lowest; medium–low; medium–high; and highest. On the basis of their body mass index, their weight was classified as underweight ($< 18.5 \text{ kg/m}^2$), normal ($18.5\text{--}25.0 \text{ kg/m}^2$), and obese ($\geq 25.0 \text{ kg/m}^2$). Walking exercise was defined as walking for ≥ 30 minutes at a time at least five times per week, either indoors or outdoors. Physical activity was defined as moderate exercise for ≥ 30 minutes at a time at least five times per week, or as vigorous exercise for ≥ 20 minutes at a time at least three times per week.

2.2. Estimation of energy requirements

The under-reporting of energy intake was evaluated by determining the ratio of reported energy intake to estimated basal metabolic rate, or EI:BMRest. The basal metabolic rate was estimated from the age- and gender-specific equations proposed by Schofield [14]. A cutoff value of 0.9 was used to define the under-reporting of energy intake in terms of the EI:BMRest ratio [15]. The participants were divided between under-reporters (URs) (< 0.9) and non-under-reporters (non-URs) (≥ 0.9).

2.3. Statistical analysis

All statistical analyses were conducted using SAS version 9.2 (SAS Institute, Cary, NC, USA). The statistics presented included the distributions (%) of sociodemographic and health-related variables for URs and non-URs and the means and standard deviations of nutrient and food group intakes. A Chi-square test was used to verify the differences in distributions of categorical variables by UR status (i.e., sociodemographic and health-related variables) and a *t* test was used to test for the difference in means of a continuous variable (i.e., food group intake).

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