USING WEB BASED RESOURCES LIKE THE INTERNET FOR DIETARY INTAKE SURVEYS

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ABSTRACT

Internet has become a part of our everyday life today and with the advent of smartphones its usage has increased many folds. 24-hour diet recall method is relatively simple but results greatly depend upon the respondent's memory and the trained interviewer, the diet record method is regarded as providing most accurate dietary information but quite time consuming and burdensome to the participants. Both under and over reporting of foods are seen in dietary assessment methods. The collection of reliable food portion sizes estimates from subjects presents a major difficulty in dietary intake survey *(Venter et al., 2000).* Actual food containers are cumbersome and often impractical to use, food models are expensive and not always appropriate and existing pictures do not include local foods in appropriate portion sizes. Having a means of better estimating portion sizes from visual images that are linked to a nutrient database makes obtaining accurate dietary assessment more practical and useful. *(Beverly, 2010).* Many internet based systems are also available for menu planning, nutrition analysis, nutrition education and counselling. **Nutrisonic,** an internet based food, menu and meal management expert system for nutrition management and nutrition counselling with e-food exchange, nutrient analysis and data transformation was also developed by *Hong & Cho et al.,(2008).* Such kind of systems are not available for the Indian setting.

KEYWORDS: Internet, Portion SIZE, Dietary Assessment, Nutrition Analysis

INTRODUCTION

Nutrient intake analysis provides some of the most valuable insights for mounting intervention programs for the prevention of chronic diseases. Dietary intake measurement has been fraught with difficulty over the years. Six general methods of dietary assessment have been identified as being most frequently used and these methods include: *(Fowles et al., 2007)*

- Direct Observation with Weighed food records.
- Estimated food records (e.g prospective dietary intake recording)
- 24-hour dietary recall.
- In-depth diet histories.
- Food- frequency questionnaire (FFQ)
- Biomarker measurement of targeted nutrients (e.g urinary excretion assays)

24-hour recall method is relatively simple but results greatly depend upon the respondent's memory and the trained interviewer, the diet record method is regarded as providing most accurate dietary information but quite time consuming and burdensome to the participants, the FFQ method is easier for participants and inexpensive, nevertheless, it is unable to supply precise information of diet intake. *(Willet, 1998).*

Both under and over reporting of foods are seen in dietary assessment methods, including FFQ, 24 hour diet recall, written food records and diet histories mainly stemming from the subjects inability to correctly quantify the food eaten. *(Livingstone et al., 2004)*

Accurate and reliable methods for assessing dietary intake of a free living population are desirable to answer important questions regarding association between processes involved in the aetiology of disease *(Beaton et al., 1983).* The food frequency method is being increasingly recognised as a suitable tool in epidemiological studies where evidence is sought for an association of diet in general, rather than with specific nutrient *(Morgan et al., 1978).* In developed countries, the food frequency questionnaires have been utilised for identifying dietary risk factors associated with chronic diseases like coronary artery disease and various cancers *(Graham et al., 1967; Bjelke, 1975).*

Having a means of better estimating portion sizes from visual images that are linked to a nutrient database makes obtaining accurate dietary assessment more practical and useful. *(Beverly, 2010)*

Actual foods and containers are cumbersome and often impractical to use, food models are expensive and not always appropriate and existing pictures do not include local foods in appropriate portion sizes. *(Lucas et al., 1995)*

A photographic food reference, specific to a cultural or ethnic group would assist researchers in identifying foods that they may not be familiar with and provide associated portion or dietary exchange information. Such references are urgently needed to ensure accurate assessment of calorie and nutritional dietary intake of individuals of different cultural or ethnic backgrounds. *(Small et al., 2009)*

Visual aids usually used to assist respondents in describing portion sizes are actual foods and containers, food models of various kinds and pictures and photographs. (*Thompson et al., 1994*)

Internet could be a useful route to assess nutrient intake and provide nutrition information to the general public.

EXISTING SYSTEMS

Venter et al developed a food portion photograph book (FPPB) for use in an African population, it was tested by presenting subjects with weighed portions of real foods and photographs at the same time and comparing the subjects portion size estimation (using the photographs) with the weights of same portions. *(Venter et al., 2000)*

The photographic method of diet evaluation was first described by Elawood and Bird is a prospective method of documenting dietary intake. In their initial study, 25 participants were asked to use a high quality, high speed camera to take pre and post meal photographs of all the consumed food items (e.g food and drinks). The researchers estimated weights of consumed food by comparing the pre and postmeal photos with the standard meal photos. Elawood and Bird found this to be a cost effective method of gaining dietary intake information from study participants. *(Elawood and Bird, 1983)*

Boushey and colleagues (2009) described the development of a method using a camera-equipped, mobile computing device that works in conjunction with a remote server to automatically identify and quantify foods. *Higgins and colleagues (2009)* validated the use of an image based food record in free living adolescents (aged 10-16 years) by comparing analyses of food images recorded by adolescent participants to records of pre-weighed foods prepared in a research laboratory.

Many nutrient calculation software packages are available which have same basic features and functions, including intake analysis, recipe creation and analysis, client data tracking and report generation. (*Prestwood, 2005)*

Some software is designed to meet the food labelling regulations and create food labels, whereas some software is primarily for nutrients analysis of consumer's food intake. For example, ESHA Research's food Processor is primarily for nutrition and fitness but includes a recipe analysis component, whereas Genesis R&d, also from ESHA Research, is used for product development and menu labelling. Computrition (*Chasworth, CA)* is an example of a program with applications for health care settings, whereas ChefTec *(Boulder, CO)* is used for restaurants and food service systems for food costing, pricing, purchasing, inventory control etc. *(Stein K., 2011)*

Nutrition related programs based in the internet were developed such as the analysis of food intake (*Han, 2000),* nutritional counselling and diet management of Diabetes Mellitus (*Han & Jeong, 2004; Hong & Kim2004),* food exchange database construction and search system *(Hong et al., 2003; Hong et al., 2004),* menu planning and searching system: MenuGen, National Rural Living Institute *(Hong et al., 2004)* and meal planning and evaluation system: NutriEval *(Hong, 2007).* But the developed programs are insufficient. Users have trouble to input food or meals and cannot have nutrient and e-food exchange analysis, storing and modifying the data.

Seth U.(2009) had developed a nutrition education package for teaching healthy nutrition behaviour to adolescents in school. Similarly *Kakar S.(2009)* had designed and developed a computer aided nutrition lifestyle behaviour modification and psychosocial counselling module for children with Type I Diabetes.

Mathur I (2009) had developed a computer aided nutrition counselling system for coronary heart disease.

Bhatia N (1999) had created a computer aided nutrition counselling system for obesity.

A kid friendly web-based nutrition education system for healthy menu recipe and easy to learn nutrition information was constructed by *Hong & Lee et al.,(2008).*

Noah et al., (2004) had developed a web based system for Dieticians for menu generation and management, called **DietPal.** The system could automatically calculate nutrient and calorie intake of patients based on dietary recall as well as generate suitable diet and menu plans according to calorie and nutrient requirement of the patients based on anthropometric measurements.

Nutrisonic, an internet based food, menu and meal management expert system for nutrition management and nutrition counselling with e-food exchange, nutrient analysis and data transformation was also developed by *Hong & Cho et al., (2008).*

Seventy-eight adolescents (26 males and 52 females) ages 11 to 18 years were recruited to use mobile telephone food record for one or two meals. Positive changes in perceptions regarding use of the mobile telephone food record were

assumed to equate to potentially improved proficiency with the mobile telephone food record. Changes in the participant's abilities to capture useful imaged and perceptions about the usability of the mobile telephone food record were examined. After using the mobile telephone food record, the majority of participants (79%) agreed that the software was easy to use. 11% of participants agreed taking images before snacking would be easy. After additional training the percentage increased significantly to 32%. Adolescents readily adopt new technologies however the mobile telephone food record design needs to accommodate the lifestyle of its users to ensure useful images and continuous use. *(Bethany L. Six., 2010)*

CONCLUSIONS

Nutrient intake analysis has been fraught with difficulty over the years. To overcome the various issues associated with intake analysis, using science and technology in the form of internet or digital photographs seems to be a solution to all the associated problems. Hence internet which has a worldwide access can be used to gather data and analyse data related to dietary intake and facilitate further nutrition research in this field.

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