The impact of Internet vs. traditional Special Supplemental Nutrition program for Women, Infants, and Children nutrition education on fruit and vegetable intake

Robert J Bensley, Western Michigan University
Impact of Internet vs. Traditional WIC Nutrition Education on Fruit and Vegetable Intake

ABSTRACT

The purpose of this project was to compare the impact of Internet nutrition education to traditional nutrition education on WIC participant fruit and vegetable consumption. Interventions were delivered at 15 WIC clinics following normal WIC clinic operations or delivered online. A total of 692 and 872 participants from eight WIC agencies self-enrolled into two phases. A quasi-experimental design using an interrupted time series to determine the impact of two methods of nutrition education and follow-up nutrition counseling was used. Data were collected online and at Michigan WIC clinics during 2005-2007, at three-month intervals over a nine-month period (per phase). Two Internet nutrition education modules were compared to WIC traditional nutrition education that included either group classes or a self-guided nutrition education information mall. All interventions were based on the same program learning objectives. Optional motivational negotiation counseling followed three months post-intervention. Stage of change progression, belief in ability to change, and fruit and vegetable consumption were measured at baseline, immediately following the intervention, and three and six months post-intervention. Significance (p<0.05) was analyzed using independent samples t-tests, chi-square distribution, and sample tests for differences in binomial proportions. The Internet group experienced significant positive differences in stage of change progression, perception that the intervention was helpfulness and easy to use, and fruit and vegetable consumption. Traditional nutrition education required follow-up counseling to achieve similar fruit and vegetable consumption levels as the Internet nutrition education group. Based on these findings, this study
supports Internet nutrition education as a viable alternative to traditional nutrition education for increasing fruit and vegetable consumption in some WIC clients.
INTRODUCTION

Half of all infants and one-fourth of all children in the U.S., aged one through four years, participate in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). The number of WIC clients receiving benefits each month reached approximately 9.3 million during the final quarter of 2009 (1). WIC is the largest and most visible program providing services to improve the nutritional status of pregnant women and young children, and thereby, has the greatest potential to influence the health and well being of a portion of the U.S. population.

Nutrition education is central to the core mission of WIC. Many approaches for offering nutrition education exist, with the most successful being client-centered with feedback mechanisms (2-5). At the same time, there is greater support for the need for behavior change education, using models such as the Transtheoretical Model (6-7). This model is based on the premise that long-term behavior change may be achieved by identifying clients’ current stage of readiness to change and then helping them progress along the stage of change continuum. This educational approach helps clients start where they are behaviorally, avoid boredom and failure by providing lessons that are tailored to their interest and needs, and avoid setbacks that may cause them to slip into a previous stage (8-9).

Nester and colleagues reported that WIC participants are not always satisfied with the nutrition education they receive (10). In addition, there has been growing concern over the inability to provide effective nutrition counseling in the current WIC program structure. Numerous challenges include the infrequency of clinic attendance by working WIC clients, increasing use of paraprofessionals and limited resources for training them, absence of outcome measures to assess program effects, and extra demands placed on programs for other non-WIC
related services (e.g., screening for immunizations, educating about substance abuse, and
registering voters) (11). WIC staff reported nutrition education was further compromised by lack
of time, human resources, client tailored information, diversity of staff, and ability to make
nutrition education available outside of normal clinic operating hours (11).

The increased use of the Internet over the past decade has opened the door for a variety of
ways for addressing public health issues, including behaviorally-based nutrition education (12-
14). In particular, nutrition related issues, such as improving fruit and vegetable consumption and
reducing cardiovascular risk factors, have become a growing focus (15-16). Furthermore, WIC
clinics in numerous states are currently using the Internet to provide nutrition education to
promote healthy food choices and eating behavior (17-19).

The project described in this paper studied the relative effectiveness of Internet nutrition
education compared to traditional nutrition education methods (i.e., group education, self-guided
nutrition education information malls) normally provided in WIC clinics. Two fruit and
vegetable Internet modules were developed based on wichealth.org, a nutrition education system
shown to be a highly popular and viable method for impacting movement in stage of change with
a number of parent-child feeding issues (17-18). This website is currently used to provide stage
of change-based nutrition education to WIC clinics in 15 states (18). It uses the model of client-
centered nutrition education by first determining where participants are behaviorally, and then
allowing them to choose lessons tailored to their interests and needs. This system further
facilitates participants’ movement along the stage of change continuum by helping them to
identify barriers to change. Through feedback mechanisms that include empowering statements,
clients remain engaged in the educational process, further aiding in the prevention of setbacks
and minimizing the chance of reverting to a previous stage (20). Extensive evaluation found this
approach to have promise in assisting clients’ movement along the readiness to change continuum, especially from earlier stages (i.e., pre-contemplation, contemplation, and preparation) to action (17).

The purpose of this paper is to share findings associated with differences observed between Internet and traditional nutrition education in the WIC clinic setting related to the following educational outcomes: (1) intent, perceptions, and beliefs associated with fruit and vegetable consumption; (2) WIC client movement along the stages of readiness to change continuum; (3) changes in fruit and vegetable consumption; and (4) the additive effect of follow-up nutrition counseling.

METHODS

This project was based on a quasi-experimental design using an interrupted time series to determine the impact of two methods of education and follow-up nutrition counseling on fruit and vegetable consumption among WIC participants. The theory-driven Internet nutrition education modules used in this study were designed to influence client intent to increase intake of fruits and vegetables, specifically the number of fruit, vegetable, and fruit juice servings per day. The project also incorporated staff training and use of follow-up motivational negotiation counseling skills (an abbreviated counseling version of motivational interviewing adapted for the WIC setting) to facilitate client movement in fruit and vegetable consumption from a planned behavioral intent to active engagement (4).

Study participants were recruited from 15 clinics in eight Michigan WIC agencies, representing the broader racial demographic characteristics of all Michigan WIC clinics. Clients who met inclusion criteria (non-high risk, one or more WIC eligible children) were invited by WIC staff to participate in the study during their normal visit to the WIC clinic. All participants
were existing WIC clients who had not yet received formal nutrition education associated with fruit and vegetable consumption. Participants self-selected to be part of either an Internet nutrition education group or a traditional nutrition education group. Internet nutrition education followed the established models and practices currently being implemented in the behavior-based wichealth.org Internet nutrition education system (18). Traditional nutrition education was either in the form of group nutrition education classes at the WIC clinic, using a standard fruit and vegetable education lesson, or a self-guided nutrition education information mall consisting of applicable educational material displayed on a bulletin board. As the focus of the study was to compare an Internet nutrition education approach to the standard practice currently being used in WIC clinics, agencies had the choice of using their own nutrition education materials, as long as the lessons met the learning objectives used for both methods of intervention. All participants were given the option to receive follow-up nutrition counseling provided by WIC clinic staff using motivational negotiation counseling techniques. WIC staff received training on motivational negotiation available via a CD-ROM or Internet-based self-tutorial (21). This self-study training program was approved for two hours (CPEU level 2) continuing education credit by the Commission on Dietetic Registration.

Data were collected online and at Michigan WIC clinics during 2005-2007. Two nine-month intervention phases were used to determine overall impact. Phase I focused on adult (caregiver) fruit, vegetable, and fruit juice consumption, while phase II focused on child consumption of the same. Each phase consisted of baseline data collection (obtained at the initial WIC certification visit) and three posttest surveys. Identical protocols for data collection were implemented and monitored by WIC staff in all study agencies.
The surveys consisted of up to 12 items, using a mix of “mark all that apply,” “select the best answer,” and categorical data type questions. All participants completed a baseline survey at enrollment. A posttest survey was administered immediately following each educational intervention (occurring up to three months after the baseline survey). The Internet group completed the survey online at the end of the educational session, while the traditional nutrition education group completed the same survey in a paper/pencil format following their intervention. Follow-up surveys were also administered during the participants’ next two WIC clinic visits (approximately three and six months post-intervention). Follow-up nutrition counseling was offered to all participants three months post-intervention. Attendance at follow-up counseling was voluntary and not all clients chose to attend.

Included in the first posttest were six Likert-scale items relating to the usefulness and helpfulness of the information, degree of learning that took place during the educational intervention, and beliefs about ability to make change based on what was learned. These items were adopted directly from existing wichealth.org survey methodology, which have previously undergone extensive psychometric testing, resulting in consistent factor analysis driven subscales (“usefulness” and “use”) and Cronbach alpha coefficients (between 0.82 and 0.90). A single staging item with five possible responses was used on all paper/pencil surveys to determine the impact on stage of readiness to change. Staging was automatically determined for the Internet nutrition education group based on user progression through web pages containing the same staging questions. Fruit and vegetable consumption was measured using three items adopted from the CDC Behavioral Risk Factor Surveillance System (22). Questions focused on how many times per day juice was consumed and fruits and vegetables were eaten.

**Statistical Analysis**
All quantitative data were analyzed using the Statistical Analysis Software (version 9.1.3, 2006, SAS Institute Inc, Cary, NC). Two sample tests for differences in binomial proportions were used to determine significance (p<0.05) associated with items related to “usefulness” and “use.” For change in stage movement, the significance (p<0.05) in relative risk of change was determined using the chi-square distribution. Independent samples t-tests were used to evaluate the mean difference (p<0.05) between groups in both fruit and vegetable consumption and the impact of follow-up counseling on consumption.

The Western Michigan University and Michigan Department of Community Health Institutional Review Boards approved the study protocol and all participants provided written informed consent during enrollment.

RESULTS

A total of 1,564 WIC clients elected to participate in this project, with 692 and 872 enrolled in phases I and II, respectively. Regardless of the addition of numerous retention strategies, approximately half (51.6%) either dropped out or were lost to follow-up. An oversampling process was used, as the anticipated dropout rate that was observed is consistent with previously reported research (23). Internet nutrition education group sizes for phases I and II were 139 and 104, while 216 (phase I) and 318 (phase II) participants completed traditional nutrition education.

Demographic data were available for participants who completed the education interventions. Racial representation was similar to that found both within the study agencies and across the state WIC system. The majority of participants for each group across both phases were white. The greatest racial difference was observed in the phase II traditional education group. Traditional nutrition education participants tended to be younger in age on average across both
phases. Both intervention groups were similar in their relationship to the child and varied slightly in age of child enrolled in WIC. Participant prior exposure to other fruit and vegetable oriented education was similar for groups across both phases. Exposure to fruit and vegetable websites was similar for both groups in phase I but differed in phase II (see Table 1).

Internet nutrition education participants reported having easier access to computers from home, work, parent’s home, or friend’s home (72.5% and 72.2% for phases I and II, respectively) than the traditional nutrition education group (51% and 54%). Self-reported frequency of Internet use was also found to be higher among the Internet group for both phase I (60.8%) and phase II (75%) compared to those enrolled in the traditional nutrition education group (30.6% and 32.4%).

Over 95% of all participants found both intervention methods easy to use, easy to understand, and helpful, with the phase I Internet nutrition education group reporting significantly (p<0.05) more positive results than the phase I traditional nutrition education group. Both intervention groups were highly positive, but not significantly different, in reported “usefulness” (i.e., learned something, belief in ability to make changes) of the education interventions. Also, the majority of participants in the Internet nutrition education group (82% of phase I and 74% of phase II) reported they liked to learn from the Internet better than other educational activities offered at the WIC agency.

The Internet nutrition education group differed significantly (p<0.05) from the traditional nutrition education group in terms of progressing from preparation to action stages of change in relation to fruit and vegetable consumption over time. In both phases combined, 96.7% of Internet nutrition education participants beginning in earlier stages of change progressed to the
action stage by the end of the study, compared to 60.9% of the traditional nutrition education group.

At the phase I initial follow-up visit, the Internet nutrition education group demonstrated retention of positive behaviors over time by showing a significant (p<0.05) increase in self-reported vegetable and fruit juice consumption compared to the traditional nutrition education group. Although longer-term behavior retention at six months was still positive for the Internet nutrition education group in phase II, it was not significantly (p<0.05) different than the traditional nutrition education group’s behaviors (see Table 2).

Phase I participants who chose Internet nutrition education without follow-up counseling had significantly (p<0.05) greater consumption of vegetables, fruit, and fruit juice post-intervention as compared to the traditional nutrition education group without follow-up counseling. The addition of motivational negotiation counseling as a follow-up to traditional nutrition education resulted in a significant (p<0.05) increase in fruit and fruit juice consumption equal to what was observed in the Internet nutrition education group that did not receive follow-up counseling. Phase II again demonstrated those who selected Internet nutrition education consumed more vegetables, fruits, and fruit juice than those who selected traditional nutrition education, although no significant statistical difference was observed. As previously found with phase I adult consumption patterns, the addition of follow-up motivational negotiation counseling to traditional nutrition education significantly (p<0.05) improved child vegetable and fruit juice consumption in phase II (see Table 3).

DISCUSSION

Results of this study demonstrated the Internet nutrition education intervention to be a viable education method for many WIC clients who chose it. It employed the key concepts of
WIC’s initiative for Revitalizing Quality Nutrition Services (RQNS) and its Value Enhanced Nutrition Assessment (VENA) project in that it was behaviorally focused and client-centered (24-25). The Internet nutrition education modules provided information clients found relevant and useful, it moved clients along the stages of change continuum in both adult and child fruit and vegetable consumption, and it demonstrated that WIC clients maintained the nutrition education and behavior they learned. These findings also demonstrated the Internet nutrition education group was highly satisfied with their experience. Regardless of advancement in stages of change, participants found the education helpful and easy to use and established their intent to improve on or continue healthy management of fruit and vegetable consumption behaviors.

WIC program staff also benefited from this online educational approach. Internet nutrition education, as modeled by wichealth.org, demonstrated both efficiency and effectiveness as a means for enhancing WIC nutrition education services to achieve positive health outcomes. The Internet nutrition education provided WIC staff with: (1) an effective means of providing nutrition education with less staff time used per client, (2) more time to address clients with high risk needs, and (3) more choices for providing nutrition education to clients; all of which support RQNS and VENA.

The finding that nearly all Internet nutrition education participants who began in earlier stages of change (pre-contemplation, contemplation, preparation) moved to the action stage following the intervention demonstrated solid intent to progress toward improving consumption of fruits and vegetables. Being that wichealth.org provides an avenue for clients to meet their secondary nutrition education contact requirement, the behavioral intent associated with progressing in stage of change can provide WIC nutrition counselors with a starting point for the client’s next clinic visit. As a result, WIC staff may be able to focus more directly on clients’
needs rather than having to re-establish where clients are in relation to their behavior change process.

An impressive finding was the Internet nutrition education group did not need follow-up nutrition counseling to have significant impact on consumption of fruits and vegetables. This finding has major implications for WIC staff who struggle with having enough time and resources needed to provide effective nutrition education (11). While it is not the intent for wichealth.org educational modules to be suitable for all WIC clients, participants who can and do use this educational mode free up critical WIC staff resources that can be used to provide individual counseling to high-risk and other WIC clients. Practically speaking, the Internet education program is one more tool in the nutrition practitioners’ tool box for providing effective and efficient quality nutrition education. WIC clients who do not have access to or interest in Internet nutrition education can receive other forms of traditional nutrition education options, such as group classes, nutrition education information malls, or facilitated group discussions.

Review of recent literature concerning educational programs to increase fruit and vegetable consumption supports the results of this study. Stage of change based interventions incorporating some aspects of tailoring or motivational counseling have demonstrated significant increases in fruit and vegetable consumption (0.2 to 1.3 servings per day) compared to comparison or control groups (26-29). The increases observed in this study are impressive considering it is reported that only 28% of the U.S. population consumes the minimum recommendations of fruit servings per day and only 3% consume the minimum daily recommendations of vegetable servings, and close to 30% of older infants and toddlers in WIC are still not consuming a single serving of fruits or vegetables on a given day (30-31).
From the perspective of dietetic practice, findings emphasize the benefits of client-educator partnerships to help clients have more control of their educational experience, which is a benefit of the wichealth.org educational program. Since inception in 2002, clients have consistently identified time and convenience as being benefits associated with completing nutrition education online (32). The Internet nutrition education component of this intervention reinforces the ability of nutrition counselors to determine the stage of change of their clients and provide education that is truly client centered. The didactic nature of wichealth.org makes it a seamless process to stage client readiness to change. This enhances the possibility of actual behavior change in this population by reinforcing small steps toward change.

The ability to retain participants beyond the initial posttest survey was a limitation that may have impacted the study results. There were no marked differences between study participants and those lost to follow-up with regard to client age, child age, relationship to child, clinic, computer access, or race. The percentage of initial project enrollees that completed at least one posttest is consistent with findings reported elsewhere (23).

It was impractical to implement a randomized control study for this project while using operating WIC clinics, due to client nutrition education selection freedom and inability to control client time. The practicality of being able to actually study comparisons of nutrition education intervention modalities in a typical clinic setting overcompensated for the lack in ability to develop a randomized design. Comparisons within group (intervention and added counseling impact) have great value and are relevant. Comparison patterns between groups (Internet vs. traditional nutrition education) can be reported but need to consider that group differences may or may not have existed. Group size was ultimately influenced by the non-randomized study design. The project allowed participants to choose their preferred form of nutrition education,
consequently resulting in unequal group sizes. As a result of this limitation, clients who opted for
the Internet nutrition education might have differed in important ways from the clients who opted
for the traditional nutrition education.

Lessons learned concerned the barriers the project faced throughout both study phases.

Expanded implementation of this project or replication of similar studies in other WIC settings
should anticipate and plan for WIC staff turnover, clients missing appointments or leaving WIC
for unknown reasons, alteration in clinic services, and staff motivation.

CONCLUSIONS

Internet nutrition education was found to be a viable method for increasing WIC client fruit and
vegetable consumption. It was also discovered that those in the Internet nutrition education group
preferred that educational approach over traditional methods and could succeed with or without
post-intervention nutrition counseling. The convenience of completing the educational modules
at home free from distractions and reducing client time in traveling to the WIC clinics,
accompanied by the breadth of information available in a controlled setting, were viewed by
WIC clients as benefits to this program.

Future research should expand this study to other parent and child feeding behaviors in
order to determine if similar findings exist. Results from this type of study can provide a more
definitive direction on how Internet nutrition education can be used to alleviate costs and staff
resources associated with providing effective education to an increasing WIC population.
REFERENCES


25. US Department of Agriculture Food and Nutrition Services, National WIC Association. Value enhanced nutrition assessment in WIC.


