

THE IMPACT OF ONLINE NUTRITION EDUCATION ON WIC CLIENT
RETENTION AND REDEMPTION OF THE CASH VALUE BENEFIT OF FRUIT
AND VEGETABLES.

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All participants of the Indiana Special Supplemental Nutrition Program for Women Infant and Children (WIC) receive supplemental foods, nutrition education, and health care referrals. The Indiana WIC program established an online nutrition education program to help eliminate barriers to participants who are unable to be physically present for their second nutrition education appointments. The aim of this study was to compare the participation of WIC participants enrolled in standard in-person appointments with WIC participants enrolled in the Online Nutrition Education (ONE) pilot program by assessing the completion of the ONE lessons and the cash value benefit usage at 3 months after participants' acceptance into the WIC program.

A quasi-experiment was performed using a time series comparison of WIC participant attendance at their in-person nutrition education appointment to participants completion of an online nutrition education lesson. A second comparison of the two groups observed the participants redemption of their cash value benefit on fruits and vegetables (CVB). The increase in participation from 2019 to 2020 was statistically significant ($P=0.035$). Analysis showed that there was a significant difference ($P \leq 0.001$) between the 2019 and 2020 CVB mean redemption rates. This study provides evidence that WIC participants are more likely to maintain their participation when offered the addition of an online nutrition education appointment type.

Jacquelynn O'Palka, PhD, RD, Chair

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SPECIFIC AIMS

The specific aim of this study was to determine if the addition of an online nutrition education option would increase WIC participation and the Cash Value Benefit redemption of the fruit and vegetable benefit in the Indiana Women, Infants and Children (WIC) program.

Definition of Terms:

- 1) Cash Value Benefit (CVB): The amount of a WIC participant's cash value benefit for fruits and vegetables varies based on the participants WIC category. Women receive \$11.00 a month to spend on eligible fruits and vegetables and children receive \$8.00 a month.
- 2) Second Nutrition Education Contact: A WIC appointment that is normally scheduled twice within a participant's year certification. Typically, this appointment is performed three months after the initial certification and three months after the mid-certification appointments.
- 3) Special Supplemental Nutrition Program for Women, Infants, and Children (WIC): USDA government program that provides supplemental food benefits, health care referrals, and nutrition education for low-income pregnant, postpartum (breastfeeding and non-breastfeeding) women, infants and children until the age of five who are found to be at a nutritional risk.

BACKGROUND AND SIGNIFICANCE

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is the “only Food and Nutrition Service nutrition assistance program with legislative and regulatory requirements to provide nutrition education to participants” (US Department of Agriculture, 2006). The goal of nutrition education is to assist those who are at a nutritional risk to achieve a positive lifestyle change, to improve their nutritional status and to prevent nutrition-related problems arising in the future (US Department of Agriculture, 2006). Over the years, WIC tried to enhance and strengthen the effectiveness of nutrition education to keep WIC a premiere national public health nutrition program (US Department of Agriculture, 2013). Reflecting changes in technology and the many barriers WIC participants encounter, the tools used to deliver high quality nutrition education changed over time.

Participant Satisfaction of Online Nutrition Education

For a WIC participant to maintain an active status they must complete four appointments within a one-year certification; the initial certification, mid-certification, and two second nutrition education contacts. Each appointment is completed every three months within the year certification. Traditionally these four appointments require in-person completion. Over the years, this requirement resulted in a drastic decline in WIC program participation. WIC participants experience many barriers that affect participation rates. These barriers include long wait times, lack of transportation, frequent address changes, scheduling conflicts, and lack of available foods from grocery stores especially in food deserts (Neuenschwander et al., 2013). Many WIC programs incorporated online

nutrition education to maintain client participation. Bensley et al. (2014) conducted an online survey among all 14 western region WIC states during November and December 2011. They collected responses from 8,144 WIC participants, 62% were from the millennial generation and 47% indicated their ethnicity as Hispanic (Bensley et al., 2014). The ethnicity of the remaining respondents was as follows: 57% Caucasian, 7% African American, 7% American Indian/Alaskan native, 6% Asian, 3% Native Hawaiian/Pacific Islander, and 20% “other” or missing (Bensley et al., 2014). These WIC participants reported interest in “expanding the ways in which they could receive nutrition education because 87% thought nutrition education via email would be very useful or somewhat useful and 82% thought nutrition education via text message would be very useful or somewhat useful” (Bensley et al., 2014, p. 89). Bensley et al. (2014) reported a significant increase ($P < 0.05$) in online class preference in participants who possessed a higher education and those participants with the lowest level of education reported a significantly ($P < 0.05$) higher preference for in-person group classes.

Au, Whaley, Gurzo, et al. (2016) conducted a study to determine WIC participants satisfaction with in-person and online nutrition education and examined satisfaction by language preference, Spanish or English. Of the 1,170 California WIC participants surveyed, 84% were Hispanic and 67% were aged ≤ 35 years (Au, Whaley, Gurzo, et al., 2016). Au, Whaley, Gurzo, et al. (2016) found similar results to Bensley et al. (2014), participants with a higher education preferred to attend online nutrition education classes. In addition, Au, Whaley, Gurzo, et al. (2016) online group “had received WIC for ≥ 5 years, had previous exposure to an online nutrition education class, and had a phone interview at follow-up” (p. 339). Au, Whaley, Gurzo, et al. (2016) noted

that the online group had less Spanish speaking participants resulting in a shorter follow-up time compared with the in-person group. The online group (90%) had a stronger preference to continue receiving online nutrition education than the in-person group (52%) (95% CI, P-value < .001) (Au, Whaley, Gurzo, et al., 2016). Overall, Au, Whaley, Gurzo, et al. (2016) found that each difference between the online and the in-person group was statistically significant and it was evident each group were “highly satisfied and likely to share what they learned with others” (p. 339) (95% CI, P-value = 0.01). Those Spanish speaking participants (66%) in the in-person group exhibited a stronger preference than English speakers (37%) to continue receiving in-person nutrition education (P value < .001) (Au, Whaley, Gurzo, et al., 2016). Au, Whaley, Gurzo, et al. (2016) found that the majority in both groups preferred a combination of online and in-person nutrition education delivery.

Behavior Change and Online Nutrition Education

A common concern for online nutrition education is that WIC participants will not achieve the same level of behavior change compared to traditional in-person nutrition education. However, a study conducted by Neuenschwander et al. (2013) looked at the impact web-based nutrition education had on low-income adults in maintaining a consistent level of behavior change. A sample of 123 Indiana Family Nutrition Program (SNAP-Ed) clients were given a pre-post food-behavior survey to assess nutrition related outcomes (Neuenschwander et al., 2013). The majority of the participants were white (65.9%), female (90.2%), and 43% possessed a high school degree or less (Neuenschwander et al., 2013). There were no statistically significant differences in

demographic characteristics such as race, ethnicity, and education (Neuenschwander et al., 2013). Neuenschwander et al. (2013) identified an online nutrition education model significantly improved most nutrition-related behaviors “and at a magnitude comparable with receiving nutrition education in-person” (p. 123). Table 1 lists common nutrition related behaviors that are main nutrition education topics for low-income individuals.

Lastly, 54% of the participants indicated their favorite way of receiving nutrition education was the online delivery model (Neuenschwander et al., 2013).

Neuenschwander et al. (2013) noted that by completing online nutrition education, clients are provided the opportunity to overcome certain barriers such as “lack of transportation, transience, and social barriers such as discomfort in a group setting” (p. 124).

Table 1. Common nutrition related behaviors and their corresponding education

Nutrition Related Behavior	Definition
Adding a variety of fruit each day	Consuming 2 cups a day based on a 2,000 calorie diet
Adding a variety of vegetables each day	Consuming at least 2.5 cups a day based on a 2,000-calorie diet
Incorporating whole grain foods each day	Half of the daily grain intake should be whole (3oz whole and 3oz refined a day based on a 2,000-calorie diet)
Consuming more water than sugar sweetened beverages each day	Beverages that provide beneficial nutrients should be primary choices such as calorie free, fat-free and low-fat milk and 100% juice compared to sugar sweetened beverages.
Incorporating weekly meal planning	Helps to follow a healthy dietary pattern within budget constraints
Using Nutrition Facts labels	A tool for making informed and healthy food choices
Washing hands before preparing and eating food	Reduces risk of contracting a foodborne illness
Making physical activity count each day	Preschool-aged children should play a variety of activity from light, moderate, or vigorous intensity for at least 3 hours a day. School-aged children and adolescents need at least 60 minutes of moderate to vigorous activity.

*Information based on the 2020-2025 USDA Dietary Guidelines for Americans (US Department of Agriculture, 2020).

Other researchers have found similar outcomes when looking at online nutrition education among this specific population. Au et al. (2017) found that individuals who completed an online nutrition education lesson retained the information and performed more behavior changes for a longer duration than their in-person appointment counterpart. Au et al. (2017) looked at how effective in-person and online nutrition education classes are for WIC participants in changing their knowledge, self-efficacy, and behaviors related to reducing salt intake. Au et al. (2017) randomly assigned 514 California WIC participants, from November to December 2014, into one of two groups (in-person and online nutrition education) and collected questionnaires before, at 2 to 4 months, and 9 months after the WIC participant attended the in-person and online salt education class. Au et al. (2017) found “no statistically significant differences between the two groups for age, race/ethnicity, education, primary language, duration of WIC participation, work or school participation, food insecurity, Supplemental Nutrition Assistances (SNAP) status, or type of follow-up questionnaire administered” (p. 1388). There was a statistical significance in WIC participants knowledge about salt for both groups at the 2 to 4-month time frame (in-person group $P < 0.001$, online group $P < 0.05$). However, these knowledge improvements diminished greatly at 9 months with the exception of the online group who continued to retain the information from the salt nutrition education lesson ($P < 0.01$) (Au et al., 2017).

Similar findings were discovered by Au, Whaley, Rosen, et al. (2016) who hypothesized that WIC participants receiving online nutrition education would maintain the same level of breakfast-related knowledge, attitudes, and behavior change scores compared with those attending an in-person nutrition education appointment. A sample of

590 California WIC participants were given a pre-and postquestionnaire following the completion of an in-person or an online nutrition education breakfast class (Au, Whaley, Rosen, et al., 2016). The participants were also evaluated at a 2- to 4-month follow up to assess the participant's knowledge, attitude and behavior toward the breakfast intervention. The majority of those surveyed were Hispanic (83%), mothers (97%), and 71% were aged 35 years or younger (Au, Whaley, Rosen, et al., 2016). As demonstrated in the Au, Whaley, Gurzo, et al. (2016) study, this study found a higher percentage of Spanish speakers attended the in-person nutrition education when compared to the online nutrition education group (Au, Whaley, Rosen, et al., 2016). There was a significant difference in knowledge retention between the two nutrition education groups. The in-person group demonstrated a larger improvement in knowledge from baseline to postquestionnaire ($P < 0.0001$) and a greater decline in retention from postquestionnaire to follow up ($P = 0.03$) (Au, Whaley, Rosen, et al., 2016). Au, Whaley, Rosen, et al. (2016) reported that WIC participants for both groups did change in self-efficacy questions for different measures, the participants behavior change scores were not significantly different between the two groups. This demonstrates that WIC participants will experience positive behavior changes by attending either in-person or online nutrition education appointments.

Effect of Online Nutrition Education on Low-Income Individuals

Multiple research studies demonstrate that low-income individuals receiving public benefits, including other federal programs such as Supplemental Nutrition Assistance Program (SNAP), prefer to receive their nutrition education online instead of

the traditional in-person counseling method. After interviewing 100 low-income males aged 18-59 receiving SNAP, Krall et al. (2014) concluded that online nutrition education would be an acceptable option as 61% of those interviewed “indicated that they would most likely participate in nutrition education delivered online” (p. 454). In a study conducted by Neuenschwander et al. (2013) from April to December 2010, out of the 123 low-income adults in the Supplemental Nutrition Assistance Education Program (SNAP-Ed) surveyed, 62.5% preferred to receive online nutrition education.

Online nutrition education continues to demonstrate its effectiveness for low-income individuals. Bensley et al. (2011) surveyed a total of 1,564 Michigan WIC clients from 2005-2007 and discovered WIC participants who took an online nutrition education class consumed more fruits, vegetables, and fruit juice compared to those participants who selected in-person nutrition education. The online nutrition education group within the Bensley et al. (2011) study significantly increased in moving through the behavior stages of change more than the traditional in-person nutrition education group. The online nutrition education group demonstrated a statistical significance in retention of positive behaviors through an increase in self-reported vegetable and fruit juice consumption compared to the traditional nutrition education group ($P < 0.05$) (Bensley et al., 2011). Bensley et al. (2011) commented on the importance of a follow-up counseling session in the online and traditional nutrition education groups. WIC participants who participated in the traditional nutrition education group and declined a follow up counseling session, had a significantly lower consumption of vegetables, fruit, and fruit juice as compared to the online education group (Bensley et al., 2011). However, the addition of the motivational negotiation counseling follow-up in the traditional nutrition education group

demonstrated a significant increase in fruit and fruit juice consumption equal to what was observed among the online nutrition education group who declined the follow-up counseling ($P < 0.05$) (Bensley et al., 2011). Bensley et al. (2011) stated that valuable WIC staff resources are more readily available to provide individual counseling to high-risk and other WIC participants when participants use the online nutrition education option. This study also noted that WIC participants have “consistently identified time and convenience as being benefits associated with completing nutrition education online” (Bensley et al., 2011, p. 753).

Effect of Online Nutrition Education on WIC Clinic Staff

Nutrition education requires time for staff to meet with families. This time requirement can lead to schedule issues if families require more time than allotted for their appointment. This leads to staff prioritizing specific WIC categories in an effort to prevent long wait times and ensuring the needs of the WIC participant are being met within the designated time allotment. By evaluating clinic flow, when online nutrition education is offered to low risk participants, which USDA defined as a diet-based risk such as inadequate dietary pattern (US Department of Agriculture, 2019), staff is afforded sufficient time to focus more on those households that are considered to possess a high nutritional risk (Bensley et al., 2011). USDA defined high risk as a medically-based risk such as anemia, under and overweight, maternal age, history of pregnancy complications, or poor pregnancy outcomes (US Department of Agriculture, 2019). The addition of online nutrition education for low risk participants, provides staff flexibility with

appointment times to devote more time to other clients who may possess other barriers such as language or scheduling conflicts to be seen in the same day.

With the use of an online nutrition education option for low risk WIC participants, WIC clinic staff are able to free up an additional ten to twenty minutes per low risk individual of scheduled time to focus on high risk participants, new to the program participants, or families that require additional time for translation services and/or breastfeeding support. Families are also provided the opportunity to maintain their participation and increase their redemption of WIC benefits if they are unable to be physically present for their second nutrition education contact through the use of online nutrition education. The option of an online nutrition education eliminates such barriers to service as transportation and finding time outside their work schedule for appointment times which are major issues among WIC participants. Participants are also afforded the flexibility and freedom that comes with completing a lesson online. Participants are able to work at their own pace allowing them the opportunity to look further into the additional resources provided that they might not have had time for during an in-person appointment. Online lessons also allow the participant to dictate their own schedule allowing them to complete their appointment when it is most convenient for them. Since participants are learning these lessons during a time that is suitable for them, they are more likely to retain more of the information allowing them to create long term healthy behaviors.

To date, research on the effectiveness of online nutrition education in increasing participant retention rates in the WIC population is limited. Available research on low-income individuals demonstrates that online nutrition education does invoke the same

behavior change as in-person nutrition education (Au et al., 2017; Bensley et al., 2011; Neuenschwander et al., 2013). Thus, it was inferred that clients who complete any method of online nutrition education will make the necessary behavior changes to improve their dietary and physical activity habits.

Indiana WIC and Online Nutrition Education

Just like other state WIC programs, over the past five years Indiana WIC has seen a steady decrease in WIC participation. In an effort to maintain participant engagement and help work through common barriers to service, Indiana WIC established an Online Nutrition Education program through the use of a mobile application. In October 2017, Indiana WIC released a mobile app statewide to keep participants connected. The mobile app provides the following information: locations for nearby WIC clinics and vendors, WIC-approved food list and current food benefits, ability to scan WIC foods at the store to determine if the item is approved, appointment reminders and notifications, and access to other WIC resources. Since the October 2017 launch, 161,427 individuals have downloaded the mobile application and 139,489 households have at least one registered user which represents 82.7% of total Indiana WIC households. In February 2020, the Indiana WIC program released the Online Nutrition Education (ONE) pilot program which was a beta test for the nutrition education lessons that were made available through the Indiana WIC mobile app. The ONE pilot program was initially designed to be completed over a three-month period. It began on February 1, 2020 with an anticipated end date of April 30, 2020; however, the study was extended to September to provide the Indiana State WIC nutrition services team more time to test system functionality. When

the ONE pilot began there were 12 nutrition education lessons for WIC participants to complete. The 12 lessons included general nutrition for all ages (two lessons per age starting with one to five), indoor and outdoor physical activity, picky eating, and fruits and vegetables. These nutrition education lessons provide a mix of audio, video, images, text, and questions. Since the conclusion of the ONE pilot program on September 7, 2020, local agency staff began submitting additional nutrition education lessons. Current lessons are in the process of being translated into Spanish. The Indiana State breastfeeding team also created four breastfeeding lessons that were added to the ONE program. All nutrition education content is validated by the Indiana State WIC nutrition services team before being imported into the Indiana WIC mobile app.

For a low-nutritional risk Indiana WIC participant to be given the option of completing a ONE lesson, WIC clinic staff will discuss this nutrition education contact choice with the participant and will assign a lesson which is achieved through the INWIC Nutrition Education Screen. WIC clinic staff will recommend a lesson that addresses a nutritional issue tailored for the client from the Nutrition Education screen and the Online NE Recommendation button. The recommended lesson will display with a red “recommended” banner over the nutrition education lesson. WIC clinic staff are able to view a participant’s in-progress and completed lessons through the Online NE Recommendations screen. Once the lesson is completed by the WIC participant, a general Nutrition Ed/Counseling Note is created within their INWIC chart documenting the completion of the lesson, including lesson title, and the questions and answers that were completed as part of the lesson (Indiana State WIC Program, 2019). All ONE lessons include a question if the WIC participant requests to speak with a WIC nutritionist

regarding the lesson completed, which is documented in the Nutrition Ed/Counseling Note. If the WIC participant requested to speak with a WIC nutritionist, they will receive a follow-up call from a WIC nutritionist who will then remotely load the participant's benefits once the follow up appointment is completed. If the WIC participant declines to speak with the WIC nutritionist, the WIC clinic staff will review the completed lesson and load benefits remotely.

To create the ONE lessons, the same nutrition education materials that are utilized within the WIC clinic were used as a baseline to provide all WIC participants uniform nutrition education content. The ONE lessons are interlaced with similar motivational interviewing techniques that the WIC clinic staff use for in-person nutrition education counseling. ONE lessons include self-assessment questions to help the WIC participant retain the knowledge learned and self-directed goal setting questions to help the WIC participant work towards a positive behavior change.

Since eighty-two percent of Indiana WIC households use the mobile app, this study assumed that the majority of WIC participants would be able to complete an online nutrition education lesson and maintain a consistent positive behavior change similar to the WIC participant receiving an in-person nutrition education. Therefore, the purpose of this study is to determine if nutrition education through a mobile app platform increases client participation and cash value benefit (CVB) redemption.

METHODOLOGY

The Indiana University Purdue University Indianapolis Institutional Review Board approved the study protocol and waived participants informed consent.

The ONE pilot program ran from February 1 – September 7, 2020. This longitudinal study evaluated client participation and redemption of the cash value benefit during the ONE pilot program. Client participation and redemption of the cash value benefit was measured during February 1 – September 7, 2019. By assessing the same time frame, this study adjusted for seasonality to assess the pilot's efficacy. For recruitment purposes, clinic staff provided eligible caregivers with the choice of completing their second nutrition education contact online or in person. After the completion of the ONE pilot program, the study looked at those WIC participants who completed a second nutrition education contact appointment during the months of February to September. Those WIC participants were grouped into participation vs non-participation based on the completion of at least one mobile ONE lesson. The study also analyzed the participants redemption of the cash value benefit for fruits and vegetables for 2019 and 2020.

SUBJECTS

WIC participants were recruited for the Indiana ONE pilot program from a list of participants scheduled to complete their second nutrition education contact appointment from February to September 2020. Only WIC clients and caregivers of children ages one to five categorized as having a low nutritional risk were recruited. Low risk is considered a diet-based risk such as inadequate dietary pattern (US Department of Agriculture, 2019). All other WIC categories were excluded during this pilot as stipulated by the Indiana WIC Policy and Procedure Manual (2019). WIC participants who met the definition of high risk were excluded from this pilot program as they are required to receive a one-on-one individual counseling session with a qualified nutritionist as directed by the federal regulations. High risk is deemed a medically-based risk such as anemia, under and overweight, maternal age, history of pregnancy complications, or poor pregnancy outcomes (US Department of Agriculture, 2019).

Participants were drawn from the following Indiana rural clinics in the counties that piloted the ONE Program: Bartholomew, Jackson, Jennings, and Johnson counties. These counties were chosen because they represented sponsoring agencies throughout the state of Indiana. Johnson county is a single county sponsoring agency while Bartholomew, Jackson, and Jennings counties belong to a multi-county sponsoring agency. A secondary reason for choosing Bartholomew, Jackson, and Jennings counties was that these counties are largely rural and have inconsistent availability of internet. If online counseling was successful in these rural counties, it would strengthen the study results.

STATISTICAL METHODS

This study used data from the Indiana Women, Infant, and Children (INWIC) database for clients of households that contain children ages 1-5 who possessed a low nutritional risk. “Client retention” was defined as the completion of two Nutrition Education contacts. “Client participation” was defined as the issuance of the cash value benefit (CVB) for fruits and vegetables. By assessing the issuance of the CVB, the researcher was under the assumption that for a household to be issued their CVB the client participated in their traditional, in-person appointment or completed at least one online nutrition education lesson. CVB redemption rate was defined as a percentage of the cash value benefit dollar amount redeemed out of total dollar amount issued to each client.

The data were analyzed using a chi square test to compare the percentage of WIC participants who completed a nutrition education appointment. A t-test was used to compare the average redemption rate of the two groups and a second t-test to compare the average redemption rate within each of the four clinics during 2019 and 2020. Means and standard deviations were calculated for the numeric variables and frequencies and percentages for the categorical variables. A 95% Confidence Interval (CI) was used to calculate the relative odds (OR) for client participation. P-value less than 0.05 was considered statistically significant for the participation percentage and the average CVB redemption rates for 2019 and 2020 including the average redemption rate within each clinic. All statistical data were analyzed using SAS 9.4 (2013, SAS Institute Inc.).

RESULTS

A total of 68,748 participants attended the traditional second nutrition education contact appointment during the February 1 – September 7, 2019. The participant percentage for 2019 was 71.21% for completing an in-person nutrition education appointment.

Redemption rate was calculated using the following formula ($\frac{\$ \text{ amount redeemed}}{\$ \text{ amount issued}}$) multiplied by 100. The average redemption rate for the Cash Value Benefit (CVB) for 2019 was $74.81\% \pm 35.43\%$ (s.d.) with a range of 0-100%.

A total of 78,857 participants attended the second nutrition education with the addition of the ONE pilot program. The percentage for participants completing a nutrition education appointment was 75.89%. This increase in percentage of participants is a statistically significant increase with a P-value of 0.035. Table 1 shows the percentage of participants who completed a nutrition education appointment in 2019 and 2020.

The average redemption rate for the pilot group was $70.03\% \pm 39.90\%$ (s.d.). The analysis showed that the redemption rate for the ONE pilot group was significantly lower than the in-person nutrition education group.

Table 2 shows the number of WIC participants and the average CVB redemption rate for each clinic during February – September 2019 and 2020. All counties reported lower rates of CVB redemption in 2020 compared to 2019. Jackson county had a redemption rate of $69.81\% \pm 38.07$ (s.d.) in 2019, compared to a $64.24\% \pm 41.98$ (s.d.) in 2020. Jennings county had a redemption rate of $75.19\% \pm 34.16$ (s.d.) in 2019 and a $70.18\% \pm 39.45$ (s.d.) in 2020. Bartholomew county had a redemption rate of $73.12\% \pm 36.05$ (s.d.) in 2019 and a $67.59\% \pm 40.55$ (s.d.) in 2020. Lastly, Johnson county had a

redemption rate of $78.61\% \pm 33.46$ (s.d.) in 2019 and a $75.49\% \pm 37.43$ (s.d.) in 2020.

When analyzing the 2019 and 2020 redemption rates of each WIC clinic, the data showed each clinic had a statistically significant decrease in redemption rates. Table 3 demonstrates the decrease in CVB redemption rates of each WIC clinic from 2019 to 2020.

The CVB redemption rates were further analyzed to view the first month of the ONE pilot, from February 2019 and 2020. There were 9,339 WIC participants who completed a traditional in-person second nutrition education contact for February 2019 from the same four represented counties that took part in the ONE pilot program. During the ONE pilot program, there were 9,677 WIC participants from all four counties who completed a second nutrition education contact in February 2020. The redemption rate for the in-person nutrition education group was $70.83\% \pm 37.98$ (s.d.). The redemption rate for the ONE pilot group was $72.46\% \pm 37.92$ (s.d.). This reveals a statistically significant increase with a P-value of 0.003. Table 4 demonstrates the CVB redemption rates for February 2019 and 2020 for all WIC clinics. The analysis showed that the redemption rate for the ONE pilot group was significantly higher than the in-person nutrition education group.

Lastly, the data was further reviewed to determine the relationship between each WIC clinic within the first month of the ONE pilot program. Table 5 shows the CVB redemption rates for each clinic in February 2019 and 2020. Jackson and Bartholomew counties were not statistically significant for this time frame. Jennings and Johnson counties were statistically significant during this time frame.

Table 2. Percentage of WIC participants who completed a nutrition education appointment from February – September 2019 and 2020

Compliant Participants in 2019 (%)	Compliant Participants in 2020 (%)	P-Value
71.21	75.89	0.0353*

(*) represents significant changes with a p-value below 0.05.

Table 3. CVB Redemption rate for each WIC clinic during February – September 2019 and 2020

Clinic	# of Participants	2019 Redemption Rate (%)	Standard Deviation	# of Participants	2020 Redemption Rate (%)	Standard Deviation	Min.	Max.
1803	13,366	69.81	+/- 35.43	17,898	64.24	+/- 41.98	0.00	100.00
1805	8,749	75.19	+/- 34.16	9,764	70.18	+/- 39.45	0.00	100.00
1807	20,709	73.12	+/- 36.05	22,492	67.59	+/- 40.55	0.00	100.00
4401	25,924	78.61	+/- 33.46	28,703	75.49	+/- 37.43	0.00	100.00

(1803 – Jackson County WIC Clinic, 1805 – Jennings County WIC clinic, 1807- Bartholomew County WIC Clinic, 4401 – Johnson County WIC clinic)

Table 4. WIC clinics with a significantly different redemption rate from 2019 to 2020.

Clinic	2019 Redemption Rate (%)	Standard Deviation	2020 Redemption Rate (%)	Standard Deviation	Difference	P-Value
1803	69.81	+/- 35.43	64.24	+/- 41.98	5.57	<.0001*
1805	75.19	+/- 34.16	70.18	+/- 39.45	5.01	<.0001*
1807	73.12	+/- 36.05	67.59	+/- 40.55	5.53	<.0001*
4401	78.61	+/- 33.46	75.49	+/- 37.43	3.11	<.0001*

(*) represents significant changes with a p-value below 0.05. (1803 – Jackson County WIC Clinic, 1805 – Jennings County WIC clinic, 1807- Bartholomew County WIC Clinic, 4401 – Johnson County WIC clinic)

Table 5. CVB Redemption rate during February 2019 and 2020.

Year	Mean (%)	Standard Deviation	P-Value
2019	70.83	+/- 37.98	0.003*
2020	72.46	+/- 37.92	0.003*

(*) represents significant changes with a p-value below 0.05.

Table 6. CVB Redemption rate for each WIC clinic during February 2019 and 2020.

Clinic	2019 Redemption Rate (%)	Standard Deviation	2020 Redemption Rate (%)	Standard Deviation	P-Value
1803	66.66	+/- 40.18	66.15	+/- 40.02	0.6915
1805	69.22	+/- 36.88	75.25	+/- 35.78	<.0001*
1807	67.24	+/- 38.29	68.38	+/- 39.88	0.2780
4401	76.59	+/- 36.14	78.37	+/- 34.70	0.0345*

(*) represents significant changes with a p-value below 0.05. (1803 – Jackson County WIC Clinic, 1805 – Jennings County WIC clinic, 1807- Bartholomew County WIC Clinic, 4401 – Johnson County WIC clinic)

DISCUSSION

The study findings suggest that when provided with an online nutrition education option, more WIC participants increased their participation in completing their second nutrition education appointments within the Indiana WIC program. To maintain an active status within the Indiana WIC program, a household must complete four appointments within the certification period. The initial certification to establish program eligibility and nutrition risk, a second nutrition education contact, a mid-certification to re-evaluate nutrition pattern and risk, and a final second nutrition education contact. In the past, all four of these appointments were required to be completed in-person, the present study focused on the effect of an online nutrition education choice for the participants second nutrition education contact in helping WIC participants maintain an active participation status.

The analysis of the present study is consistent with the findings of Au, Whaley, Gurzo, et al. (2016) who surveyed 1,170 California WIC participants who reported a higher satisfaction and preference rate for online nutrition education than the traditional in-person method. Au, Whaley, Gurzo, et al. (2016) also reported 45% of the online group and 53% of the in-person group preferred a combination of online and in-person nutrition education delivery methods ($P < 0.001$). With the Indiana ONE program it aligns with this finding as 50% of the appointments will be in-person and online if the WIC participants chooses the online nutrition education choice.

The increase in participation shown within this study matches the findings from Krall et al. (2015) who reported 61% of 100 low-income individuals would like to receive nutrition education online and Neuenschwander et al. (2013) who reported 62.5% of 123 low-income individuals show a higher preference for completing nutrition

education online. Neuenschwander et al. (2013) discussed that when provided with more flexible nutrition education options such as online nutrition education, clients are provided the opportunity to overcome certain barriers such as “lack of transportation, transience, and social barriers such as discomfort in a group setting” (p. 124). Eliminating these barriers to service, participants are permitted to continue receiving access to all resources made available to them through active participation in the WIC program.

The Indiana ONE lessons are specifically designed to mimic motivational negotiation practices that WIC participants receive during in-person nutrition education appointments. Based on the findings of Bensley et al. (2011) who reported online nutrition education participants retained positive behaviors over time. And through the use of self-assessment and self-directed goal setting questions that is found throughout the ONE lessons, this study can assume these WIC participants will continue to demonstrate an increase in positive behavior change through the ONE program.

When viewing the redemption of the participants Cash Value Benefit (CVB) of fruits and vegetables, the redemption rate from 2019 (74.81%) to 2020 (70.03%) significantly decreased. This study took place during the global outbreak of Coronavirus Disease 2019 (COVID-19). Due to this global pandemic, the results of this study may not reflect usual behavior. Health department and government officials’ rules and guidelines made it more difficult for Indiana WIC participants to redeem their monthly WIC benefits. School districts closed and moved all students to virtual learning. Daycare organizations either closed or cut down the number of children they were providing care to on a weekly basis. Parents were forced to work from home if possible or quit their jobs to care for their children. Grocery stores limited the number of shoppers to two per

household and most prohibited children from accompanying parents into the store. Grocery stores limited shopping hours and reserved the morning hours for those deemed high risk population such as the elderly. With the fear of the pandemic, many grocery store's stock began to drastically diminish. Unfortunately, many households, especially WIC and SNAP households, were unable to adequately secure food and were forced to go without or purchase non-eligible foods.

During COVID-19, Indiana WIC clinics discontinued in-person appointments but continued to provide and maintain uninterrupted program benefits to participants by providing appointments over the phone. As of March 18, 2020, the Indiana State WIC office provided COVID-19 guidance that allowed a portion of the ONE program to expand to the entire state to permit clients receiving uninterrupted WIC services. This in turn may have resulted in WIC participants shifting from using the mobile app online nutrition education feature to completing their appointments over the phone. In part of the upheaval COVID-19 caused, the ONE pilot program was extended and completed on September 7, 2020. In addition, this extension afforded the Indiana State WIC Nutrition Services team to continue testing system functionality of the Nutrition Education lessons within the INWIC mobile app.

When comparing these two groups (2019 and 2020), the introduction of an online nutrition education option to replace the standard in-person nutrition education method did demonstrate an increase in client participation as hypothesized. However due to the global pandemic, data was further analyzed to view the first month within the ONE pilot which was considered pre-COVID-19. The study analyzed February 2019 and 2020 average cash value benefit (CVB) redemption rates to determine if COVID-19 had not

occurred would there be a similar decrease. As demonstrated in Table 5, the average CVB redemption rate for the ONE pilot increased compared to the in-person nutrition education group. Therefore, it can be inferred that if the ONE pilot program had been able to continue as planned, before COVID-19 took place, that client CVB redemption would have increased significantly proving the addition of an online nutrition education option as an optimal choice in maintaining WIC participation.

CONCLUSION

This study suggests WIC participants are more likely to increase their participation when offered the choice of an online nutrition education appointment over a traditional visit. With the global outbreak of Coronavirus Disease 2019 (COVID-19) and people being quarantined to home, it is difficult to determine if the significant decrease in redemption rate was due to the addition of an online nutrition education option. Further research is needed to sort out the impact of the pandemic.

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