

EVALUATING THE EFFECTIVENESS OF NUTRITION
EDUCATION FOR WIC SERVICE CLIENTS IN
MANHATTAN - KANSAS

By

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Abstract

In spite of the improvement of nutrition education and the realization of the importance of healthy dietary patterns, the prevalence of unhealthy dietary patterns is still increasing among vulnerable groups (e.g. women and children). Therefore, healthy nutrition education is needed to increase low income families knowledge about healthy food choices. The purpose of this study was to evaluate clients satisfaction of nutrition education methods (individual counseling, interactive notebooks, and online nutrition education) used by the Women, Infants, Children (WIC) program in Manhattan, Kansas, to educate pregnant women, postpartum women and caregivers for children. A cross-sectional survey of 100 clients was conducted using self-reported questionnaire. The WIC staff assigned clients with high risk to individual counseling, whereas clients with low risk assigned to interactive notebooks, online education, or individual counseling. The clients received two nutrition education sessions during the certification process. Nutrition education topics used for this study were whole grains, fruits and vegetables, breastfeeding, MyPlate, and infant feeding. The survey was distributed by the WIC staff and given to the clients after the second nutrition education session. One-way ANOVA and Tukey- Pairwise Comparisons test were performed to find which method has highest client satisfaction. Tukey- Pairwise test shows a significant difference between individual counseling and online method ($P = 0.0149$). Individual counseling had significantly higher client satisfaction scores than online nutrition education method. However, there is no significant difference between individual counseling and notebooks nutrition education. These findings indicate that clients who were assigned to use individual counseling method were more likely to be satisfied than clients who used notebooks and online nutrition education methods.

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Chapter 1 - Field Experience Scope of Work

My field experience was completed at the Riley County Health Department/ WIC office in Manhattan, Kansas under the supervision of Katherine Oestman MPH, CHES and Lisa Ross RD, LD, CBE, the WIC Program Coordinator (Riley County & Fort Riley offices). 240 hours of field experience were completed between June 2, 2014 and November 1, 2014.

For more than 50 years, the Riley County Health Department has been promoting healthy lifestyles and protected our community and environment from infectious diseases with a vision of “Healthy people in a healthy community.”¹ The Riley County Health Department (RCHD) mission statement is “to improve the health of the public by working to prevent epidemics and the spread of disease, by assuring quality and accessible health services for everyone, by responding to community emergencies and by promoting and encouraging healthy behaviors.”¹ The department was established in 1952 as a City-County Health Department, in December 2011, the Health Department became a county health department. In 2013, the Riley County Health Department served approximately 17,940 residents through all of its programs. There are nearly 40 employees including nurses, social workers, dietitians, support staff, and administration.¹ The Health Department is located at 2030 Tecumseh Road in the city of Manhattan.

The health department provides a variety of programs and health services that differ by eligibility and cost. These services included:

- Reproductive Health Services
- Childhood Immunizations and Travel Vaccines
- Emergency Response Planning
- Women, Infant, and Children (WIC) program
- Mother and Baby Program
- Child Care Assistance and Licensing
- Community Health Resources
- Communicable Disease

One of the main services that the Riley County Health Department (RCHD) provides is the WIC program. WIC is a supplemental nutrition program designed to improve pregnancy outcomes, promote the health of pregnant, and delivered women, infants and children under the

age of five. This can be achieved through the four core services including nutrition and health education, health care referrals, checks to buy healthy foods, and breastfeeding support.

The mission of the WIC program is to “safeguard the health of low income women, infants, and children up to age five who are at nutritional risk. This is accomplished by providing nutrition foods, information on healthy eating, and referrals to health care.”¹ WIC is a federally funded nutrition program and specific amount of money specified by the Congress for WIC services. The Food and Nutrition Service (FNS) of the United States Department of Agriculture (USDA) , that manages the program at the federal level, provides these funds to WIC state agencies (state health departments or comparable agencies) to pay for WIC foods, nutrition education, breastfeeding promotion and support, and administrative costs.²

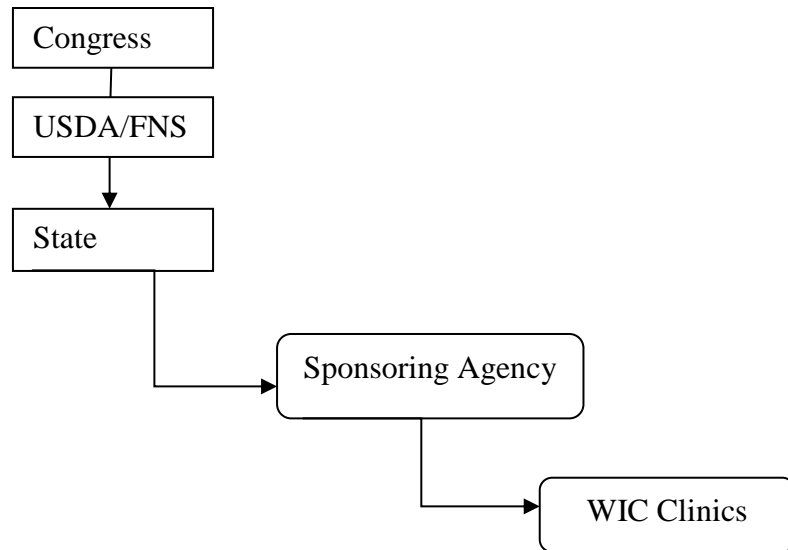


Figure 1: Congress approves funding for the WIC program

In response to the concern over malnutrition of poverty vulnerable groups represented by stricken mothers and young children, the WIC program was piloted in 1972 to improve the health of these groups. In 1974 the WIC program was established in Kansas. In 1975 the WIC program was established as a permanent program.³

Table 1 below shows the number of participants in the WIC program nationally and the funding level for several years.⁴

Year	Number of participants	Funding level in Billions
2013	8.6 million	\$6.522 billion
2010	9.2 million	\$7.3 billion
2000	7.2 million	\$4.0 billion
1990	4.5 million	\$2.1 billion
1980	1.9 million	\$750 million

Nationally, of the 8.6 million people who received WIC benefits each month in 2013, approximately 4.6 million were children, 2 million were infants, and 2 million were women.

Various foods are provided through the WIC program including infant cereal, iron-fortified adult cereal, vitamin C-rich fruit or vegetable juice, eggs, milk, cheese, peanut butter, dried and canned beans/peas, and canned fish. For infants of women who do not fully breastfeed, WIC provides iron-fortified infant formula. The WIC clients receive checks to purchase the foods.⁴

WIC is a unique program since it is the only Food and Nutrition Service (FNS) that provides nutrition education to the clients based on legislative and regulatory requirements.⁴

The WIC services are offered for all kind of families (married and single parents, working or not working). A father, mother, grandparent, foster parent or other legal guardian of a child under five can apply for WIC services.¹ In order to be eligible for the WIC program, the federal regulation set the clients to meet the following criteria:

- Pregnant women
- Breastfeeding, up to baby's first birthday
- Non-breastfeeding mothers, up to six months after baby's birth
- Have a child under the age of five
- Live in Kansas
- Are determined by WIC Dietitian to have a medical or nutritional need
- Meet income guidelines

The WIC program has full-time clinics in Manhattan at the Family and Child Resource Center, 2101 Claflin Rd, and in Fort Riley at the Soldier and Family Support Building 7264 Normandy Drive. Also, WIC staff travel twice a month to Pottawatomie County / in Wamego at 1911 Grandview in the First Baptist Church.¹ Figure 2 clarifies the staff and their position at Riley County Health Department.

Figure (2): Riley County Health Department Organization Chart – 2014

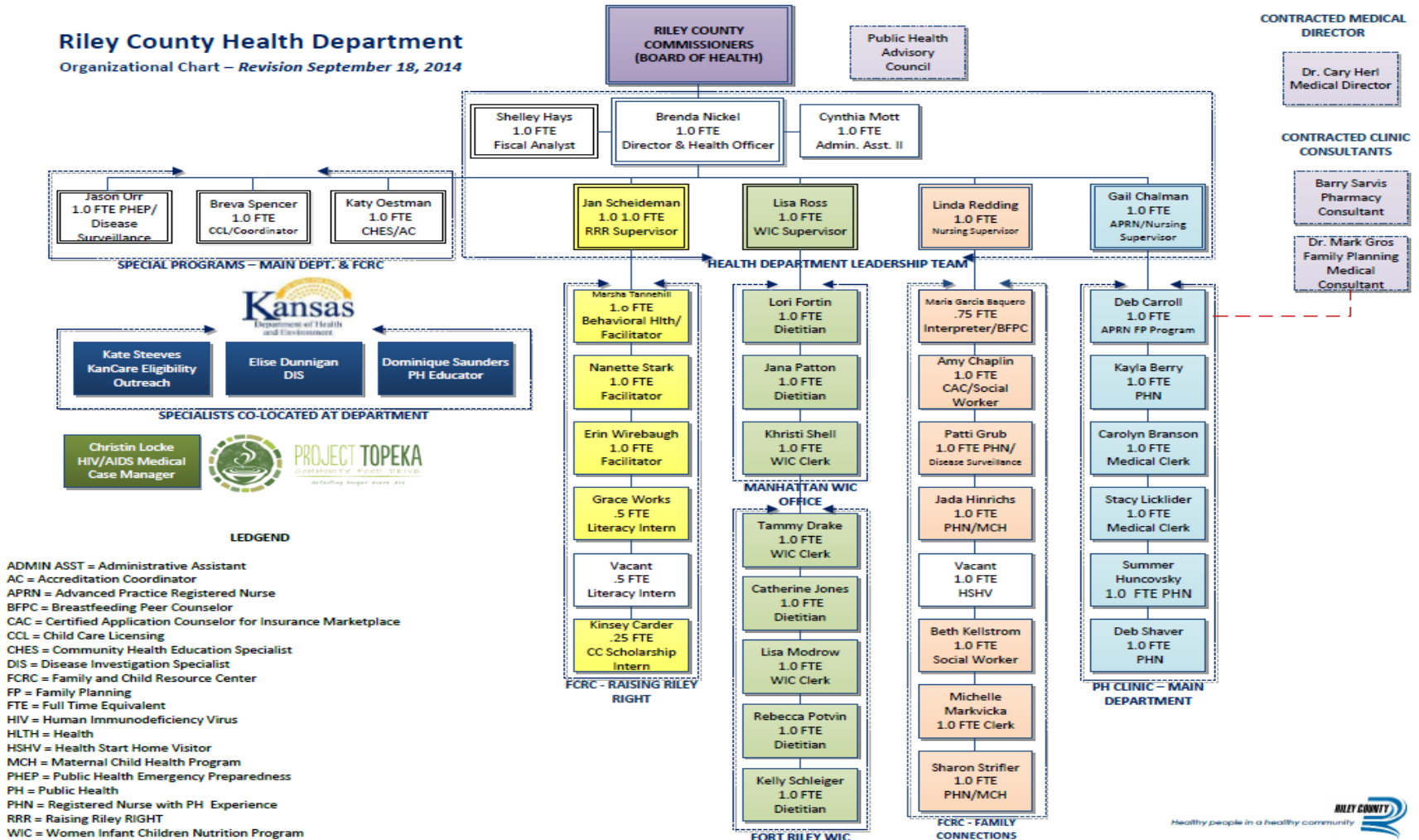


Table 2: Participation Statistics (October 1, 2013 – August 14, 2014)

Participation by Clinic Site	10/13	11/13	12/13	1/14	2/14	3/14	4/14	5/14	6/14	7/14	8/14
Manhattan	1147	1106	1106	1133	1137	1156	1184	1192	1194	1183	1204
FT Riley	2059	1925	1875	1967	1938	1928	1899	1828	1849	1751	1831
Pottawatomie County	141	123	114	116	104	107	118	125	128	135	133
Total (Agency)	3347	3179	3122	3235	3195	3207	3216	3149	3174	3072	3152

Table 3: Referrals for Riley County WIC Agency

Month	Manhattan	Ft Riley	Pottawatomie County
7/13	5164	12778	180
8/13	5201	12849	175
9/13	5022	12775	482
10/13	4822	12426	465
11/13	4780	11932	461
12/13	4746	11904	391
1/14	4733	12153	410
2/14	5051	11882	347
3/14	5266	11615	371
4/14	5256	11008	420
5/14	5241	10393	433
6/14	5325	9811	505
Total	60,023	141,526	4,640

Chapter 2 - Introduction

The most important risk factor that attributes to different chronic diseases such as cancer, cardiovascular diseases (CVD) and diabetes mellitus type II is unhealthy dietary intake.⁵ Conditions such as CVD and obesity that are responsible for morbidity can be controlled when people change their eating behaviors. Unhealthy dietary patterns are common over all socioeconomic groups, but the highest prevalence is among people with a low socioeconomic status (SES).⁶ Low SES groups consume fewer fruits and vegetables and have a higher intake of calories.⁷ The differences in socioeconomic status that are related to dietary intake contribute to variances in some diseases like cardiovascular disease (CVD) and some forms of cancer.⁸

In spite of the improvement of nutrition education and the realization of the importance of long term healthy dietary patterns, the prevalence of unhealthy dietary patterns is still increasing. Therefore, existing healthy nutrition education interventions must be created and improved. Because unhealthy dietary patterns are more prevalent among vulnerable groups (e.g. women and children), it is important that nutrition education services are provided for these groups.⁹ Based on this importance, the WIC services aim to improve the health of clients. One of the most important WIC services is nutrition education. Nutrition education has been defined as “any combination of educational strategies accompanied by environmental supports, designed to facilitate voluntary adoption of food choices and other food – and nutrition related behaviors conducive to health and wellbeing and delivered through multiple venues, involving activities at the individual, institutional, community, and policy level.”¹⁰

Nutrition education is a valuable component of the WIC program that is provided to the clients with legislative and regulatory requirements. The federal regulations require that WIC nutrition education services be provided to the clients at no cost. The goals of nutrition education as explained in federal WIC regulations are:

- Emphasis on the relationship between nutrition, physical activity, and health with special emphasis on the nutritional needs of pregnant, postpartum, and breastfeeding women, infants and children under five years of age.
- To assist the individual who is at nutritional risk in achieving a positive change in dietary and physical activity habits, resulting in improved nutritional status and in the prevention

of nutrition related problems through optimal use of the WIC supplemental foods and other nutritious foods.

- Promote and support exclusive breastfeeding as the standard infant feeding practice. Breastfeeding has been shown to have significant advantages for women and infants.

One of the primary tasks for WIC agencies is to develop nutrition education strategies that support these nutrition education goals. To assist and support the continuity of Revitalizing Quality Nutrition Services (RQNS) in WIC, effective nutrition education must be delivered through specific methods to achieve the nutrition education goals. RQNS is designed to enhance and strengthen the effectiveness of WIC nutrition services. Most studies have shown that WIC needs to strengthen its nutrition education component, adopt a more behavioral approach in nutrition counseling, be more client-oriented, and focus on healthy behaviors for life.¹¹

The Riley County WIC program offers nutrition education in three methods, including:

- Online education: One of the most important ways that nutrition education is provided to WIC participants is the internet education method which allows clients the opportunity to perform their learning at their convenience. The online education through Wichealth.org is an interactive nutrition education website designed and developed to help WIC clients change their behaviors based on their desire to make change. Through the website the clients can learn a lot of healthy nutritional information to modify their eating behaviors. The clients who complete a learning module on the website get a certificate that is used to help the dietitian staff at the local agency to follow up with them.
- Interactive notebooks: Different teaching aids such as pamphlets and posters are utilized for nutrition and breastfeeding education to reinforce clients understanding. The educational message can be enhanced through the pamphlets. They are to be used to supplement the nutrition education provided by local agency staff.
- Individual counseling: Through this method, the dietitian staff uses their critical thinking skills and professional judgment, and they take into account the clients' interests, risk and abilities when developing nutrition education messages. Providing nutrition education through one-on-one counseling integrates behavior change methods that affect clients to improve their health and nutritional behavior. It is worth mentioning, that there are many

counseling methods that fit with clients' needs. However, in order to maintain the positive behavior change, the approach must be interactive.

Overall, the purpose of this project is to evaluate the effectiveness of nutrition education for WIC service clients through three different methods (online resources, interactive notebooks, and individual counseling) to determine which method has higher satisfaction scores.

Chapter 3 - Providing effective nutrition education through the WIC program

The effectiveness of nutrition education, that is provided by the WIC program can be determined through the positive behavior change for the clients. Face-to-face meetings between the clients and WIC staff are considered the traditional nutrition education intervention. The communication between clients and WIC staff is significant because it stimulates clients to interact and ask questions based on their nutritional needs. However, due to the limited clinic/staff resources, advances in technology, and different characteristics of the WIC clients, have led the federal, state and local agencies to find ways to support nutrition education through emerging technology and multifaceted methods. In 2001 Governmental Accountability Office (GAO) report titled “Food Assistance: WIC Faces Challenges in Providing Nutrition Services,” defined the challenges that affect WIC program services for improving the use of information technology to reinforce service delivery and program management.¹²

Many studies have been performed on the effectiveness of nutrition education. A number of interventions have been demonstrated that nutrition education which addresses behavior change are more likely to achieve the nutrition education goals than nutrition education interventions that are based on dissemination of information such as lectures and handouts.¹³ The effectiveness of nutrition education interventions are measured by behavior change. Although the ultimate goal is behavior modification, it is essential to take into account the importance of affecting the precursors to behavioral changes and measuring those when evaluating nutrition education in the WIC program. Also, follow up is an important step to determine whether a change in client behavior has taken place, because the follow up provides dietitians with opportunities to reinforce the nutrition education message and maintain a positive behavior.¹⁴ Current studies recommend using different educational theories and/or models to achieve more effective nutrition education intervention regardless of the delivery method or medium used.¹⁵

Elements of an Effective Nutrition Education Contact / intervention:

As mentioned before, providing effective nutrition education should elicit a behavior change that will support the client to improve their nutritional status, change life style, and prevent nutrition related problems, regardless of the delivery medium. Effective nutrition education intervention should be understood by the clients and take into account their sensitive cultural norms, educational and environmental limitations, and WIC requirements.¹⁶ There are six elements taken into account when providing effective nutrition education to clients in the WIC program as illustrated in Figure 3 .

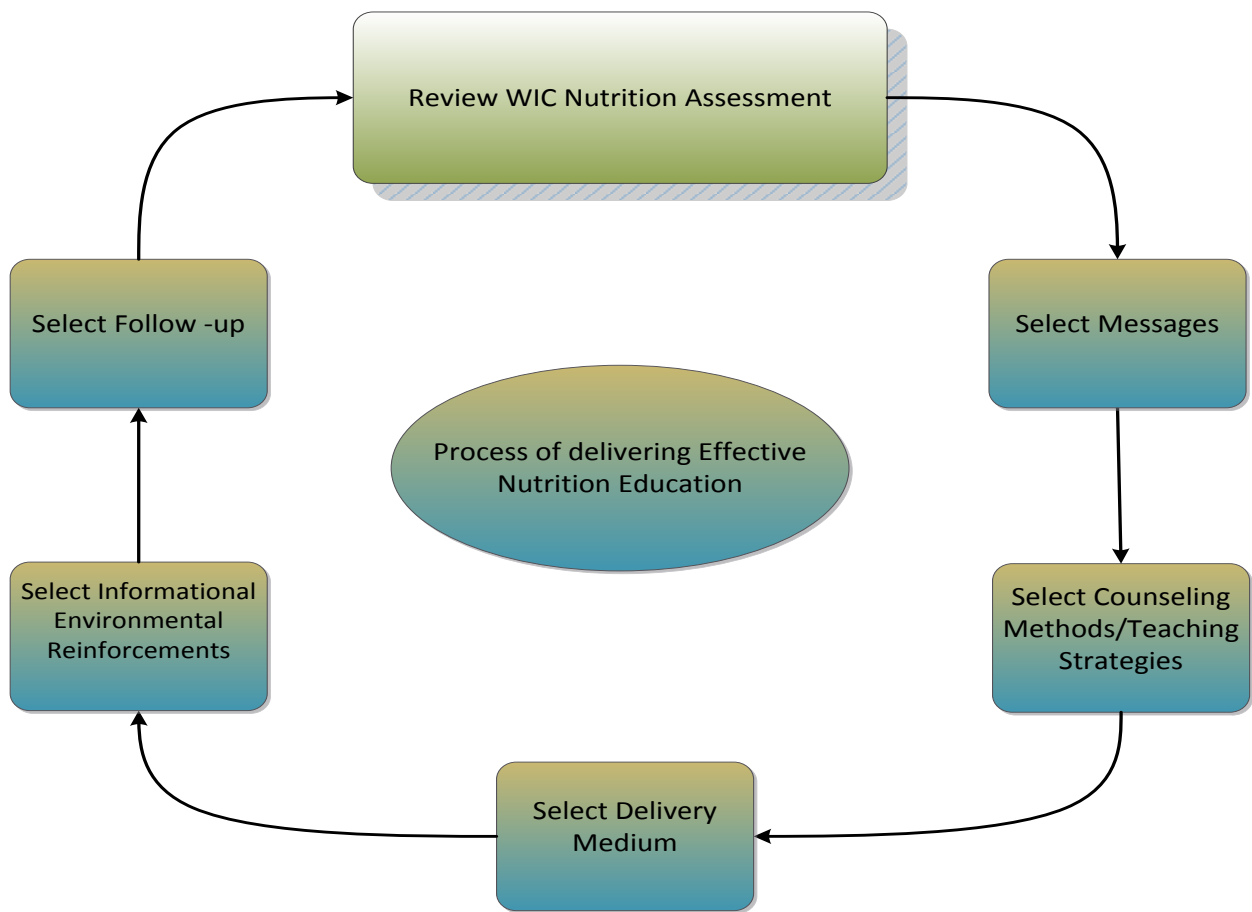


Figure 3: Process of Delivering Effective Nutrition Education in WIC¹⁵

As illustrated in Figure 3 above, the six elements of delivering effective nutrition education in WIC are:

- **Reviewing the WIC Nutrition Assessment :**
A review of the WIC nutrition assessment determines the clients' needs and nutritional risk factors, either high or low. Based on the WIC staff assessment, the nutrition education method is selected to improve the nutritional status and achieve a positive change in behavior. The WIC staff also uses their professional judgment and critical thinking skills to maximize the nutrition service benefits that are offered to clients through the WIC program.
- **Nutrition Education Message :**
A tailored nutrition education message must engage and support the clients. There are different kinds of nutrition education messages that are related to nutritional status and emerging health issues. WIC staff should use their critical thinking skills to provide the clients with simple and relevant messages to accomplish nutrition education goals.
- **Counseling Methods / Teaching Strategies :**
A variety of counseling methods are used to provide nutrition education. Because most of the clients have different abilities to learn, cultural norms, and their readiness to change, the WIC staff should select counseling methods that consider these factors that are addressed during the nutrition assessment to provide effective nutrition education.
- **Delivery Medium :**
The WIC program uses multiple delivery media methods to provide nutrition education that creates opportunities for clients' interaction and feedback. Because the clients have different skills, interests, and abilities, they can employ a delivery medium that fits with their needs and wants.
- **Reinforcement of Nutrition Education:**
Teaching aids such as pamphlets, newsletters, bulletin boards, videotapes, and take-home activities provide an opportunity for nutrition education messages to be repeated. These

reinforcements can be used to support and enhance the nutrition education contacts. However, many studies have pointed out that the use of reinforcements independent of other nutrition education elements is not considered to be effective and should not be considered as a nutrition education intervention.

- Follow up:

Follow up may occur through an individual counseling session, by telephone or electronic means. Follow up provides many benefits such as creating a chance for both the nutrition educator and the client to examine where the client was at the beginning of the process and where the client is presently, provide positive support, identify barriers that may be hindering the clients progress, and provide the opportunity to reassess and refine future nutrition education plans. Follow up may be performed during the second nutrition education, at certification process, check pick up, by telephone or electronic means.¹⁵

Certification

As of Federal Fiscal Year 2014 approximately 1258 clients received benefits from the WIC office in Manhattan, Kansas. New applicants and existing clients must go through a certification process to determine if they are eligible for WIC services. At each certification visit, the eligibility must be determined. A person must meet categorical, residential, financial and nutritional risk requirements and provide documents to prove identity, residency, and financial eligibility. Examples of documents that prove eligibility are as follows:

- Proof of Identity: the client needs to bring one of the following: Birth Certificate, Driver's License, Passport, Social Security Card, Photo ID, School ID, State ID, or Work ID.
- Proof of Home Address: the client needs to bring one of the following: Bill, Driver's License, Rental Agreement, State ID, or WIC Appointment Letter.
- Proof of Income: the client needs to bring one of the following: Statement from Employer, Tax Form, or Payment Award Letter.

During the certification appointment, the WIC staff performs a health and nutrition screening for each client and this is summarized in the following points:

- Measure the weight
- Measure Height and Length
- Measure Iron in the Blood (Hemoglobin)
- Health History
- Review a diet questionnaire
- Discuss what you or your child eats

Usually, certification appointments take approximately 15 to 30 minutes for each person with an appointment.

Low and High Risk Nutrition Education (Secondary Nutrition Education):

At least one secondary nutrition education contact must be provided to all clients during each certification period. WIC uses many ways to deliver secondary nutrition education such as individual counseling, self-study, interactive group education, and web-based education. The method that is used to provide secondary nutrition education should include effective nutrition education concepts and behavior change theories that motivate the clients to change their behavior.¹⁷ “Secondary nutrition education contacts are the nutrition education visits offered between the certification visits. These visits are referred to as low risk and high risk nutrition education.”¹⁸ At the certification visit, the WIC staff performs a nutrition assessment of the client to identify the kind of risk (high or low level). Regardless of the method used to provide secondary nutrition education, the secondary contact must be developed to recognize the different cultural and language needs of the clients.¹⁷

There are two methods of documenting secondary nutrition education for WIC participants

- Nutrition Education:

This is used to record the completion of secondary nutrition education offered to the clients with **low risk**. An individual secondary nutrition education (Nei) appointment is scheduled for low risk clients to meet individually with the RN or RD.

The NE+ appointment is scheduled for low risk clients to use other delivery methods of secondary nutrition education such as self-study notebook, online education (wichealth.org). The Clerk, RN, or RD has the authority to document completion of this appointment. The WIC staff assigns an appropriate self-study nutrition education topic based on client nutritional status. When WIC uses wichealth.org computer lessons, clients are given access information.¹⁷

- Nutrition Education – RD:

The nutrition education–RD is used to document completion of an individual secondary nutrition education that is offered to clients with **high risk**. Only a Registered Dietitian has the authority to perform secondary nutrition education for the client with high risk. An International Board Certified Lactation Consultant (IBCLC) who is not a RD has the authority to perform high risk nutrition education appointments for a breastfeeding woman or infants who are at risk due to breastfeeding problem. “High risk clients are defined as those clients having one or more high–

nutrition risk factors, or to whom the professional discretion high risk has been assigned”.¹⁹ Clients assigned as high risk; have a red **HR** after their name on the client home page. However, clients assigned by professional discretion high risk have a red **PDHR** on the client home page.¹⁷

When the clients are scheduled for NEI, NE+, or RD appointment, the WIC staff encourages the clients to complete secondary nutrition education. In case of clients who reject completing secondary nutrition education (NEI, NE+, and RD appointment), WIC policy states that the food checks may not be withheld from the clients. Sometimes the clients are not able to attend the high or low risk nutrition education appointment; in this case the client has the authority to choose a caregiver to attend the appointment.¹⁷ It is an alternate plan to make sure that the nutrition information will reach the clients.

Clients who have one or more of these conditions are classified as high risk participant as explained in WIC Policy and Procedures Manual:

- **Pregnant Women:**

Alcohol and/or Illegal Drug Use, Cancer, Celiac Disease, Diabetes Mellitus, Drug Nutrient Interactions, Eating Disorders, Genetic and Congenital Disorders, Gestational Diabetes, History of Birth with Nutrition Related Birth Defect, History of Gestational Diabetes, Hyperemesis Gravidarum, Inborn Errors of Metabolism, Infectious Diseases, Low Hemoglobin/Hematocrit, 1st, 2nd or 3rd Trimester, Maternal Weight Loss During Pregnancy, Nutrient Deficiency Diseases, Recent Major Surgery, Trauma, Burns, Renal Disease, Underweight.

- **Breastfeeding Women:**

Alcohol and/or Illegal Drug Use, Cancer, Celiac Disease, Diabetes Mellitus, Drug Nutrient Interactions, Eating Disorders, Genetic and Congenital Disorders, Inborn Errors of Metabolism, Infectious Diseases, Nutrient Deficiency Diseases, Potential Breastfeeding Complications, Renal Disease, Underweight.

- **Postpartum Women:**

Cancer, Celiac Disease, Diabetes Mellitus, Drug Nutrient Interactions, Eating Disorders, Inborn Errors of Metabolism, Infectious Diseases, Nutrient Deficiency Diseases, Renal Disease, Underweight.

- **Infant:**

At Risk of Becoming Underweight, Weight/Length, Cancer, Celiac Disease, Diabetes Mellitus, Disabilities Interfering with the Ability to Eat, Drug Nutrient Interactions, Elevated Blood Lead Levels, Failure to Thrive, Genetic and Congenital Disorders, Inborn Errors of Metabolism, Infectious Diseases, Low Birth Weight, Low Hemoglobin/Low Hematocrit, Nutrient Deficiency Diseases, Potential Breastfeeding Complications, Recent Major Surgery, Trauma, Burns, Renal Disease, Underweight, Weight/Length, Very Low Birth Weight.

- **Children:**

At Risk of Becoming Underweight (BMI/Age), At Risk of Becoming Underweight (Weight/Length), Cancer, Celiac Disease, Diabetes Mellitus, Disabilities Interfering with the Ability to Eat, Drug Nutrient Interactions, Elevated Blood Lead Levels, Failure to Thrive, Genetic and Congenital Disorders, Inborn Errors of Metabolism, Infectious Diseases, Low Hemoglobin/Low Hematocrit, Nutrient Deficiency Diseases, Overweight, BMI/Age, Overweight(Weight/Length), Recent Major Surgery, Trauma, Burns, Renal Disease, Underweight (BMI/Age), Underweight (Weight/Length), and Very Low Birth Weight.

Role of Behavior Change Theories

Generally, the success of effective public health and health promotion programs require behavior change at many levels (e.g., individual, organizational, and community). Not all organizations that provide health services are equally successful. However, an understanding of targeted health behaviors and environmental context are the most important steps to achieve the desired outcome.²⁰ Therefore; health behavior theory could play a significant role throughout the program planning success. Theory provides the health professionals with feedback for studying problems, developing appropriate interventions, and evaluating their success.²¹ Examples of behavior change theories include: Theory of Planned Behavior, Health Belief Model, Social Cognitive Theory, Stages of Change (Transtheoretical), and Precaution Adoption Process Model. In this study we used the Transtheoretical Model (TTM).²¹ Below is the description for Transtheoretical Model (TTM).

Stages of Change (Transtheoretical Model)

Stages of change and the processes of change are the key parameters for this model. The stages identify when behavior change occurs and the processes identify how people make behavior changes. These stages are classified as pre- contemplation, contemplation, preparation, action, and maintenance. Based on this model, people shift from no motivation to change through gradual steps of planning adopting a behavior, preparing to do it, initiating the behavior, and finally reaching a stage of regular performance.²² In this study, the Stages of Change constructed from the Transtheoretical Model were used to identify the readiness of clients to change their behavior. The clients, who were assigned to use the online nutrition education method, were awarded a certificate after completing the WIC lesson. The purpose of the wichealth.org is to determine stage of change for the clients who were assigned to use online education method. When the clients completed the lesson, the system automatically asked them a series of questions to determine the stage of change. Based on their answers, they are directed to educational and skills links targeted to address their stage of readiness. After seeing the learning materials, clients may be asked additional questions to determine if they are ready to make progress to the next stage. If the clients do progress, then they will be provided with new learning materials to advance in their readiness of behavior change.²³

These clients that the WIC staff scheduled to do individual counseling and notebooks were asked a few simple questions by the RD to determine the stage of change participants are in. For example:

- Are you interested in feeding your kids fruits and vegetables? (pre contemplation)
- Are you planning to use fun ways to introduce fruits and vegetables to your kids? (contemplation)
- Are you ready to plan how you will convince your kids to eat fruits and vegetables?(preparation)
- Are you in the process of making eating fruits and veggies fun for your kids? (Action)
- Are you trying to continue to eat fruits and veggies and find more ways to keep increasing fiber in your family is diet? (Maintenance).

Getting feedback from clients can help the WIC staff determine where the client is on the continuum of change and to develop nutrition education programs appropriate to their needs and wants. This model has been demonstrated to be a valuable model in discontinuation of addictive behaviors and has been implemented successfully to other health promoting behaviors.²⁴ The Transtheoretical model components are depicted in Table 4.²⁵

Table (4): Stages of Change Model

Stage	Definition	Potential Change Strategies
Precontemplation	Has no intention of taking action within the next six months	Increase awareness of need for change; personalizing information about risks and benefits
Contemplation	Intends to take action in the next six months	Motivate; encourage making specific plans
Preparation	Intends to take action within the next thirty days and has taken some behavioral steps in this direction	Assist with developing and implementing concrete action plans; help set gradual goals
Action	Has changed behavior for less than six months	Assist with feedback, problem solving, social support, and reinforcement
Maintenance	Has changed behavior for more than six months	Assist with coping, reminders, finding alternative, avoiding slips/relapses (as applicable)

Chapter 4 - Methodology

Purpose

The purpose of this study was to review and evaluate the effectiveness of nutrition education methods used by WIC office and to learn which one has a higher satisfaction scores.

Study Design

This study was approved by the Institutional Review Board at Kansas State University for research involving human subjects. The survey was developed in consultation with preceptors at Riley County Health Department. There are three methods of nutrition education in this project (individual counseling, online education, and interactive notebooks). Three surveys were designed, distinguished by the color. For instance, the green survey was used by online clients, the blue survey was used by notebooks clients, and the yellow survey was used by individual counseling clients. The dietitian staff assigned the clients to the specific nutrition education method. Everyone who participated in a NE+ or Nei got a survey. For those clients who were assigned to use the online method, the clerk or dietitian gave the clients access information to log in. When the clients completed the WIC lesson, they had to print their certificate to acknowledge their completion and return it to the WIC office to follow up with the dietitian. Clients who were assigned to use the interactive notebooks completed a short quiz and returned the quiz to the clerk when they finished, at the office.

Every survey included two parts; Part A contains questions to identify which nutrition education method has a higher satisfaction scores. Four response categories for the client satisfaction questions were: 1= Disagree, 2= Strongly Disagree, 3= Agree, 4= Strongly Agree. Part B involves questions related to demographic information. The survey was given to clients after they completed their nutrition education appointment and it took approximately five minutes to complete. A short paragraph at the beginning of the survey included directions on how to complete the survey which asked participants to not identify who they were. It also stated that their responses would be strictly confidential, detailed the importance of the study, and included the Terms of Participation which detailed essential elements required of informed consent, thus an additional consent form was not used.

Participants were also informed that the results of the study would be available to them at the WIC office by the December. 2014. The results for participants will be in the form of a one page executive summary.

The surveys of NE+ appointments were distributed by the WIC clerk. The clerk would ask the client to complete the nutrition education assigned by the dietitian and then upon completion the clerk would ask them to complete the survey corresponding to the education method they just utilized. The dietitians distributed the surveys to clients who had Nei appointments. The dietitian would ask the client to complete the survey once the appointment was complete.

After the surveys were collected, they were separated into three categories (individual counseling, online education, or interactive notebooks). The data was then entered into Microsoft Excel spreadsheets. Every nutrition education method had its own separate data sheet. The data was then exported into SAS statistical software. Descriptive statistics and ANOVA test was used to examine the effectiveness of different methods of delivering tailored nutrition education. The survey questions are shown in the Appendix A.

Results

The study examined if the nutrition education effectiveness mean is higher for one of these education methods than others. The main elements of this statistical model are specified as:

1. Research Question: Is there nutrition education method with higher satisfaction scores than others? The conceptual representation of this question in statistical form (the Statistical Model): Are all the μ_i 's equal or are some different?

2. Experimental Units (EU): is the smallest unit to which a treatment is assigned, in this study the WIC clients are the experimental unit.

3. Replication: for this study the number of EU per factor level specified as 40, 40, 20 for the online, notebook, and individual counseling, respectively.

Statistical Hypothesis

$$H_0 : \mu_{\text{individual counseling}} = \mu_{\text{Notebook}} = \mu_{\text{online}}$$

H_1 : At least one μ_i is different from the rest

μ_i : Is the true mean for the education effectiveness for the i th methods (treatments)

Table 5: The Means Procedure

Analysis Variable : Satisfaction scores							
Method	N	Mean	Median	Std Dev	Std Error	Lower 90% CL for Mean	Upper 90% CL for Mean
Individual counseling	20	17.75	18.00	2.17	0.49	16.91	18.59
Notebooks	40	17.08	17.00	2.40	0.38	16.44	17.71
Online	40	16.58	17.50	3.65	0.58	15.60	17.55

Table 6: ONE-WAY ANOVA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	49.8900000	24.9450000	3.10	0.0494
Error	97	779.5500000	8.0365979		
Corrected Total	99	829.4400000			

As shown in Table 6 the p-value based on Kuehl's table is **0.0494**. Since, the p value is less than 0.05 we conclude there is significant difference between the mean client satisfaction scores. At least one of the three nutrition education methods for WIC clients (individual counseling, notebook, and online education) is different from the others. Based on the one way ANOVA Table 6, there is evidence for method differences. But until this step, it couldn't be determined as the source of difference. Therefore, Turkey's Pairwise Comparison was implemented to compare each method mean with each of the other method means.

Table 7: Tukey- Kramer Pairwise Comparisons

Differences of Method Least Squares Means Adjustment for Multiple Comparisons: Tukey-Kramer									
Method	Method	Estimate	Standard Error	DF	t Value	Pr > t	Alpha	Lower	Upper
Individual counseling	Notebooks	1.4250	0.7764	97	1.84	0.0695	0.05	-0.1159	2.9659
Individual counseling	Online	1.9250	0.7764	97	2.48	0.0149	0.05	0.3841	3.4659
Notebooks	Online	0.5000	0.6339	97	0.79	0.4322	0.05	-0.7581	1.7581

The Pairwise Comparisons hypothesis for Tukey's test is:

$$H_0: \mu_{\text{individual counseling}} = \mu_{\text{Notebook}}$$

$$H_1: \mu_{\text{individual counseling}} \neq \mu_{\text{Notebook}}$$

$$H_0: \mu_{\text{individual counseling}} = \mu_{\text{online}}$$

$$H_1: \mu_{\text{individual counseling}} \neq \mu_{\text{online}}$$

$$H_0 : \mu_{\text{Notebook}} = \mu_{\text{online}}$$

$$H_1 : \mu_{\text{Notebook}} \neq \mu_{\text{online}}$$

Based on the p-value (0.0149) for the Tukey Pairwise Comparisons test we conclude upon evidence for a significant difference in nutrition education effectiveness between individual counseling and online method, at a 5% Type I error rate. However, for online and notebooks nutrition education methods there is no difference between them, neither between notebooks and individual counseling nutrition education methods since the p value is higher than 0.05.

Discussion and Limitations

This study was implemented to examine the effectiveness of three common nutrition education methods provided to the WIC clients. These methods are individual counseling, notebook, and online education.

Recruitment of participants and data collection occurred from July 2014 to September 2014 by the WIC office at the Riley County Health Department in Manhattan, Kansas. WIC staff invited all eligible clients to participate in the study. A total of 100 clients aged 14 to 45 years old participated. 54% of participating clients were between 25 to 34 years old (Figure 4), 78% were white (Figure 7), the majority of the participants were female (95%) Figure 8 and 30% of the clients had high school diploma (Figure 5). Figures below show the demographics information and percentage of each category for the clients participated in this study.

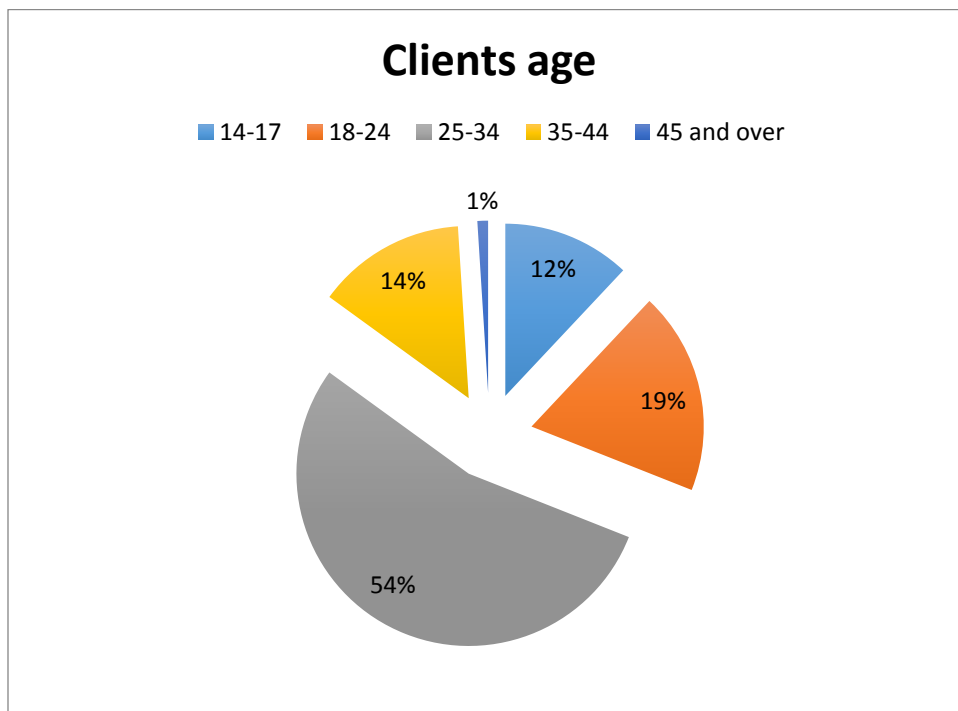


Figure 4: percentage of clients' age

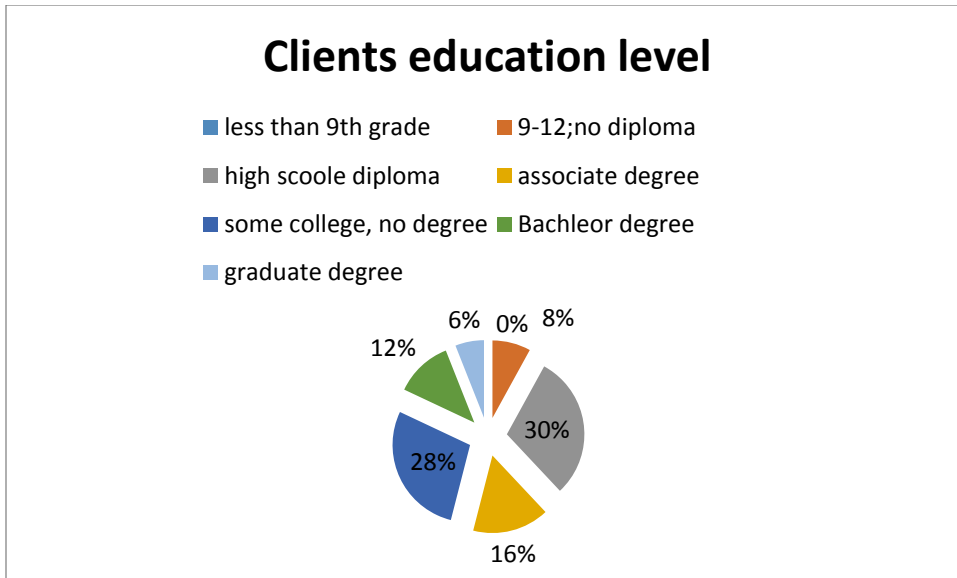


Figure 5: percentage of clients' educational level

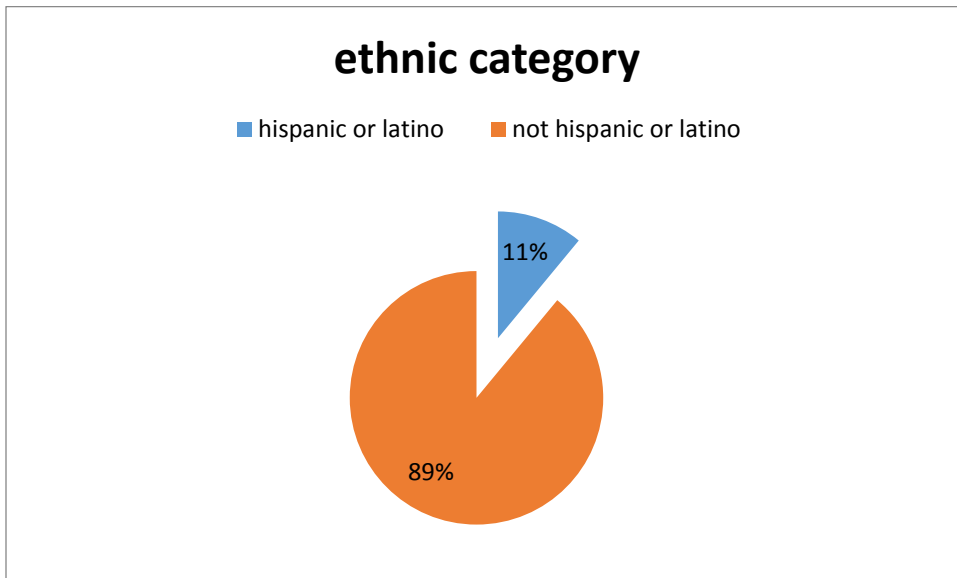


Figure 6: Percentage of ethnic category

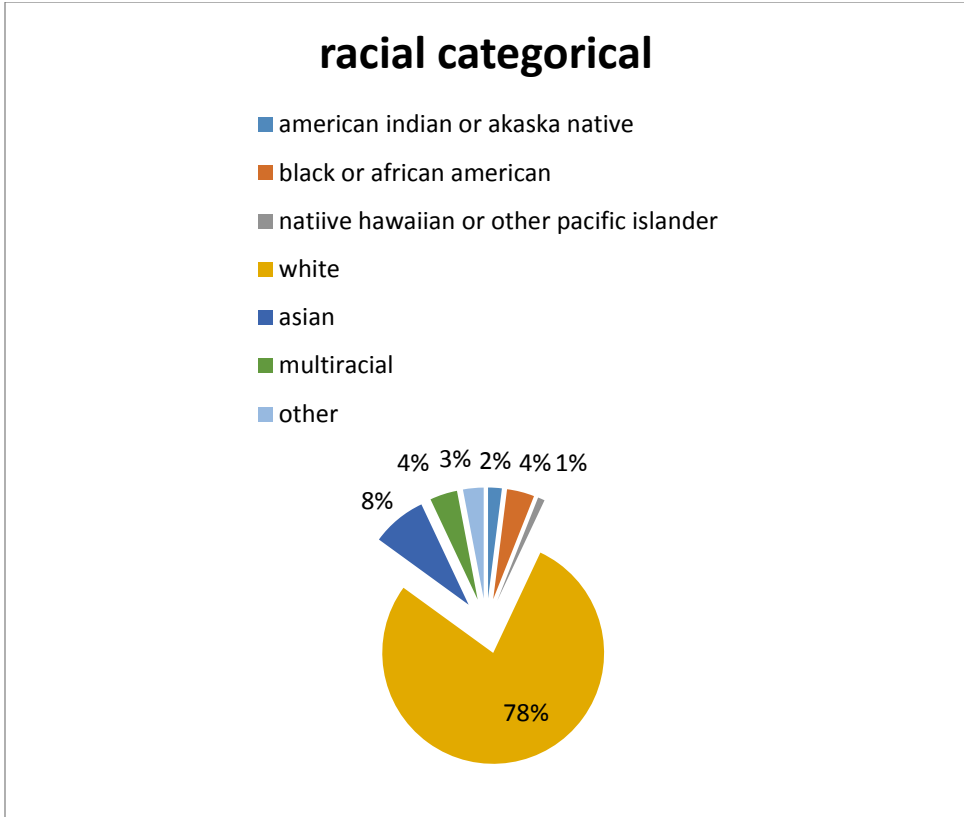


Figure 7: Percentage of racial categorical

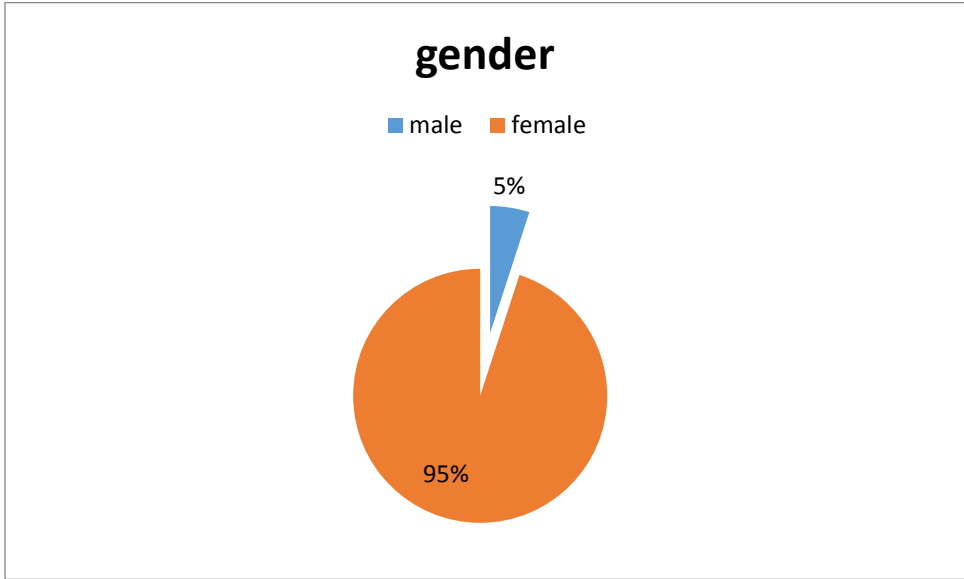


Figure 8: percentage of clients' gender

The intended audience were pregnant women, postpartum women (breastfeeding up to one year postpartum and non breastfeeding up to six months postpartum), and caregivers for children. The dietitian determines the client’s secondary education contact (individual counseling, online education, or interactive notebook). The nutrition education topics used for this study were whole grains, fruits and vegetables, breastfeeding, MyPlate, and infant feeding: start solids.

All statistical analysis was performed with SAS software version (9.3). Descriptive summary statistics such as means and standard deviation were reported for the overall sample. We used one way ANOVA test and Tukey Pairwise Comparisons tests to check the source of significant difference. Alpha was set at 0.05.

The results of this study indicated that the individual counseling had significantly higher satisfaction scores than online nutrition education method. Many studies have been performed on the evaluation of the effectiveness of nutrition education in the WIC programs, which have shown that individualized nutritional education is effective in achieving positive behavior change. For example, a study conducted by Oklahoma Cooperative Extension Service Expanded Food and Nutrition Program, investigated the effects of nutrition education by paraprofessionals on dietary intake, maternal weight gain, and infant birth weight in pregnant Native Americans. The result indicated that the nutrition education by paraprofessionals was effective in improving the clients eating behavior.²⁶

Table 8: Number of clients in each stage for all nutrition education methods

Stage	Interactive Notebooks	Online Education	Individual Counseling
Pre-contemplation	2	5	5
Contemplation	7	1	3
Preparation	20	5	3
Action	2	15	4
Maintenance	9	14	5
Total	40	40	20

In this study, the WIC staff determined the stage of change for those clients who were assigned to use individual counseling and interactive notebooks but for those clients who were assigned to use the online education method, the system automatically determined the stage of change. As shown in Table 8, looking at client satisfaction versus learning outcome, we concluded that the clients like to use individual counseling and interactive notebooks but they learned more through the online education method.

There are some limitations that should be taken into account when interpreting the findings from this study. First, the data analyzed in this study were not the most representative especially for the individual counseling nutrition education method because there were only 20 samples collected which might affect the result of the study. Second, information provided by family members might not be accurate. Third, for the clients who were assigned to use the online nutrition education method, the system automatically determines the stage of change participants are in. However, for clients who were assigned to use notebooks and individual counseling methods the stage of change was determined by the dietitian. Finally, there is no follow up to assess behavior change of the clients from one appointment to the next.

Conclusion

In this study, individual counseling nutrition education method had significantly higher satisfaction scores than online and notebooks methods. This may suggest that those clients who selected to use individual counseling nutrition education were more likely to be satisfied than clients who used notebooks and online nutrition education methods. Using this method of intervention may be an effective tool to encourage changes in dietary patterns for WIC clients. Therefore, I recommend using individual counseling as an effective approach in nutrition education delivery for WIC clients.

Future study could focus on evaluating the effectiveness of nutrition education methods on behavior change for WIC clients. In addition, future research should investigate effect of demographics information on nutrition education methods.

Chapter 5 - Experiences and Academic Application

Before beginning my field experience at the WIC office, I did not have much information about the WIC program. After few weeks of my training, I was surprised at the importance and variety of services that are offered to the client. I have never seen a program like this in my country (Jordan) or even in the Arabic Countries. Through my training, I have performed many activities such as writing an IRB application, observed the WIC dietitians during nutrition assessment appointments, developed a survey to determine which nutrition education method is most effective, entered the data into computer, listened to and understood each client's unique circumstance, and delivered a presentation for the Riley County Health Department staff about the findings of the study. Also, I engaged in many meetings with the WIC staff to discuss activities and strategic plans. My preceptors provided me with some resources and information to write the report and they directed me to the resources that I needed. I learned about many medical conditions and nutritional risk factors, either high or low, for women, infants, and children that need constant nutritional monitoring.

For this project, I was responsible for developing a survey to measure which nutrition education method is most effective and analyzing the data to reach a conclusion and make an executive summary available for the clients at the end of this year.

The core competencies that were relevant to my field experience included Epidemiology, Biostatistics, Social and Behavioral Basis of Public Health, Administration of Healthcare Organization, Environmental Toxicology, and Functional Food and Chronic Disease. These were all applied through my field experience. The variety of courses provided me with a foundation to apply general knowledge and skills in a broad spectrum during my field experience at the WIC office in Manhattan, Kansas. Epidemiology was applied when discussing the effects of dietary intake could be modified by another exposure such as physical activity and alcohol consumption as well as understanding the interaction among the exposure and the population. Also, this course was useful when discussing the nutritional risk factors that might affect clients. Biostatistics has played an integral role in obtaining, analyzing and interpreting data in order to determine which nutrition education method is most effective. Social and Behavioral Basis of Public Health prepared me with a thorough understanding of several behavior change theories. This course was also utilized to identify the readiness of clients to change their behavior. In addition, taking Administration of Healthcare Organization helped me to understand how the WIC office works

with other partners in the health care system to improve the quality of health services for the population and to understand the factors and trends in the community.

Environmental Toxicology was useful when discussing food safety regarding washing and handling cooked or ready to eat food. Additionally, this course used when encouraging the pregnant women to avoid eating heavy metals found in food resources. Functional Food for Chronic Disease Prevention was beneficial when trying to promote eating the essential nutrients that we need for excellent health.

Overall, I have become interested in this part of my training by learning about nutrition education within the WIC program. Thus, this experience will support me with a useful tool to make an impact and judge regarding different issues in the health care system.

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Appendix- A

Online education Questionnaire:

The WIC office and Kansas State University are conducting a survey to evaluate the effectiveness of nutrition education for WIC (Women, Infant, and children) clients in Manhattan. We would like to ask you to participate in this survey.

Directions: This survey is designed to find out about what you know, think, and like about nutrition education tools WIC uses. The survey will take 5 minutes. Check the box to your response to each question. All of your responses will be held strictly confidential. Please do not write your name anywhere on this survey. After the study, the result will be available in the WIC office at your next appointment.

TERMS OF PARTICIPATION: I understand this project is research, and that my participation is completely voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and stop participating at any time without explanation, penalty or loss of benefits, or academic standing to which I may otherwise be entitled.

On a scale of 1-4 rate the following nutrition education tools using the description below.

- 1 _____ Strongly disagree
- 2 _____ Disagree
- 3 _____ Agree
- 4 _____ Strongly agree

The questions below are asking you about WIC health.org online learning. Please answer the following questions by placing X in the appropriate box.

N	Question	Disagree	Strongly disagree	Agree	Strongly agree
1.	Wichealth.org website is easy to use.				
2.	The information on this website is easy to understand				
3.	The information on the website is helpful.				
4.	I believe I can make changes using what I learned.				
5.	I want to use web pages to learn about other WIC topics.				

- Rank how you would like to learn about nutrition and WIC topics:
 - Online
 - Nutrition Notebooks
 - One on one individual counseling

- ❖ The last few questions are about you. Please select one answer for each question:
 - 1- What is your age?
 - 14-17 years
 - 18 - 24 years
 - 25 - 34 years
 - 35 - 44 years
 - 45 and over

 - 2- What is the highest level of school you have finished?
 - Less than 9th grade
 - 9-12; no diploma
 - High school diploma (or GED equivalent)
 - Associate degree or vocational training
 - Some college; no degree
 - Bachelor's degree
 - Graduate or Professional degree

 - 3- Ethnic Category (check one)
 - Hispanic or Latino
 - Not Hispanic or Latino

 - 4- Racial Categories (check all that apply)
 - American Indian or Alaska Native
 - Black or African American
 - Native Hawaiian or other Pacific Islander
 - White
 - Asian
 - Multiracial
 - Other: (specify): _____

 5. Gender: I identify as:
 - Male
 - Female
 - Other (specify): _____

Individual Counseling Questionnaire:

The WIC office and Kansas State University are conducting a survey to evaluate the effectiveness of nutrition education for WIC (Women, Infant, and children) clients in Manhattan. We would like to ask you to participate in this survey.

Directions: This survey is designed to find out about what you know, think, and like about nutrition education tools WIC uses. The survey will take 5 minutes. Check the box to your response to each question. All of your responses will be held strictly confidential. Please do not write your name anywhere on this survey. After the study, the result will be available in the WIC office at your next appointment.

TERMS OF PARTICIPATION: I understand this project is research, and that my participation is completely voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and stop participating at any time without explanation, penalty, or loss of benefits, or academic standing to which I may otherwise be entitled.

On a scale of 1-4 rate the following nutrition education tools using the description below.

- 1 _____ Strongly disagree
- 2 _____ Disagree
- 3 _____ Agree
- 4 _____ Strongly agree

The questions below are asking about individual counseling with the dietitian. Please answer the following questions by placing X in the appropriate box.

N	Question	Disagree	Strongly disagree	Agree	Strongly agree
1.	The nutrition education I get through individual counseling is easy to use.				
2.	The information offered by the dietitian is easy to understand				
3.	The information offered by the dietitian was helpful.				
4.	I believe I can make changes using what I learned.				
5.	I want to use individual counseling to learn more about other WIC topics.				

- Rank how you like to learn about nutrition and WIC topics:
 - Online
 - Nutrition Notebooks
 - One on one individual counseling

❖ The last few questions are about you. Please select one answer for each question:

1-What is your age?

- 14-17 years
- 18 - 24 years
- 25 - 34 years
- 35 - 44 years
- 45 and over

2-What is the highest level of school you have finished?

- Less than 9th grade
- 9-12; no diploma
- High school diploma (or GED equivalent)
- Associate degree or vocational training
- Some college; no degree
- Bachelor's degree
- Graduate or Professional degree

3-Ethnic Category (check one)

- Hispanic or Latino
- Not Hispanic or Latino

4-Racial Categories (check all that apply)

- American Indian or Alaska Native
- Black or African American
- Native Hawaiian or other Pacific Islander
- White
- Asian
- Multiracial
- Other: (specify): _____

5. Gender: I identify as:

- Male
- Female
- Other (specify):_____

Notebooks Questionnaire:

The WIC office and Kansas State University are conducting a survey to evaluate the effectiveness of nutrition education for WIC (Women, Infant, and children) clients in Manhattan. We would like to ask you to participate in this survey.

Directions: This survey is designed to find out about what you know, think, and like about nutrition education tools WIC uses. The survey will take 5 minutes. Check the box to your response to each question. All of your responses will be held strictly confidential. Please do not write your name anywhere on this survey. After the study, the result will be available in the WIC office at your next appointment.

TERMS OF PARTICIPATION: I understand this project is research, and that my participation is completely voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and stop participating at any time without explanation, penalty, or loss of benefits, or academic standing to which I may otherwise be entitled.

On a scale of 1-4 rate the following nutrition education tools using the description below.

- 1 _____ Strongly disagree
- 2 _____ Disagree
- 3 _____ Agree
- 4 _____ Strongly agree

The questions below ask you about the WIC nutrition notebooks. Please answer the following questions by placing X in the appropriate box.

N	Question	Disagree	Strongly disagree	Agree	Strongly agree
1.	The nutrition notebook was easy to use.				
2.	The information in the nutrition notebooks is easy to understand.				
3.	The information in the nutrition notebooks is helpful.				
4.	I believe I can make changes using what I learned.				
5.	I want to use nutrition notebooks to learn more about other WIC topics.				

- Rank how you would like to learn about nutrition and WIC topics:

- Online
- Nutrition Notebooks
- One on one individual counseling

❖ The last few questions are about you. Please select one answer for each question:

1-What is your age?

- 14-17years
- 18 - 24 years
- 25 - 34 years
- 35 - 44 years
- 45 and over

2-What is the highest level of school you have finished?

- Less than 9th grade
- 9-12; no diploma
- High school diploma (or GED equivalent)
- Associate degree or vocational training
- Some college; no degree
- Bachelor's degree
- Graduate or Professional degree

3-Ethnic Category (check one)

- Hispanic or Latino
- Not Hispanic or Latino

4-Racial Categories (check all that apply)

- American Indian or Alaska Native
- Black or African American
- Native Hawaiian or other Pacific Islander
- White
- Asian
- Multiracial
- Other: (specify):_____

5. Gender: I identify as:

- Male
- Female
- Other (specify):_____

Appendix- B



University Research Compliance Office

TO: Tandalayo Kidd
Human Nutrition
203 Justin

Proposal Number: 7249

FROM: Rick Scheidt, Chair
Committee on Research Involving Human Subjects

DATE: 07/15/2014

RE: Proposal Entitled, "Evaluating the effectiveness of nutrition education for WIC (Women, Infant and Children) service clients in Manhattan, Kansas."

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written - and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, 45 CFR §46.101, paragraph b, category: 2, subsection: ii.

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.