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Nebraska WIC Client Survey & Study of Preterm Birth

Caleb Unekwu Adejoh
University of Nebraska Medical Center

SL/CE project

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Abstract

Background: The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) program provides supplemental foods, health care referrals, and nutrition education to low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, and to infants and children. Preterm birth remains the second leading cause of infant mortality following birth defects but there is a dearth of research on characteristics of WIC clients who are at risk of preterm birth. **Objectives**: The objective of the service learning was to design paper and online client satisfaction survey forms in English and Spanish for use by the Nebraska WIC program. The objective of the capstone was to identify factors related to preterm birth among WIC clients. **Methods:** This was a cross-sectional study of 8,714 WIC clients who gave birth in 2016. Chi square tests and multivariate logistic regression were performed to identify factors associated with preterm birth. **Results:** The client satisfaction survey included 34 closed- and open-ended questions on five topics - WIC services, WIC checks, WIC approved foods and stores, nutrition education and breastfeeding, and "you and your family". The online surveys were created in RedCap. So far, there are 3,703 clients who have responded to the paper and online surveys. The multivariate logistic regression analysis showed that older age (≥40 years vs. 20 -29 years) (OR=3.57; 95% CI: 2.19-5.79), multifetal pregnancies (OR 0.09; 95%CI), and maternal underweight compared to normal weight (OR=3.00, 95% CI 1.23- 7.29) were associated with higher odds of preterm births. **Conclusion:** Clients who are older, with a multiple fetal pregnancy, and who are underweight may need additional or tailored services to reduce the risk of preterm birth. The current study was limited to information available in the WIC database. To better understand characteristics of women who are at higher risk for

preterm birth and other negative birth outcomes additional information including smoking status and other risk behaviors should be collected and analyzed.

Introduction

The WIC Program

The WIC program is a supplemental nutrition program for women, infants and children that provides supplemental foods, health care referrals, and nutrition education for low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, and to infants and children up to age five who are found to be at nutritional risk (FNS USDA, 2017). The program operates in U.S. states, Indian Tribal Organizations, and territories, and is open to applicants who meet the income guidelines for the state in which they reside. Applicants must have incomes at or below a level set by the state agency, or be determined automatically income-eligible based on participation in certain programs (e.g., Medicaid). In addition, all applicants must be of nutritional risk (FNS USDA, 2017). Pregnant women who are underweight, have a history of pregnancy complications or outcomes, or have inadequate dietary patterns are among those considered to be at nutritional risk (FNS USDA, 2017). Women are eligible during pregnancy, the postpartum period (up to six months after the birth of the infant or the end of the pregnancy), and the breastfeeding period (up to infant's first birthday). Children are eligible up to their fifth birthday (FNS USDA, 2017).

The Nebraska WIC program was launched in 1974 (Kent, 2006). Currently, the program provides healthy food at no cost, breastfeeding support, and nutrition information to about 37,000 people across the state each month (NebraskaDHHS, 2017).

Preterm Births

According to the Centers for Disease Control and Prevention, a preterm birth is defined as a birth before the 37th week of pregnancy (CDC, 2017). The preterm birth rate is the number of live births with a gestational age at birth of less than 37 weeks (<259 days), expressed as a proportion of all live births (Beck, et al., 2010). It was reported that preterm birth rates decreased by 8.4%, from 10.41% to 9.54% of live births between 2007 and 2014 (CDC, 2017). This recent decline was partly attributed to the reduction in the number of births to adolescent and young mothers (CDC, 2017).

In 2015, preterm birth remained the second leading cause of infant mortality following birth defects (CDC, 2017). Preterm birth affected about 1 of every 10 infants born in the United States in 2015 (CDC, 2017), and is responsible for three-quarters of all neonatal mortality and 35% of all health care spending for infants in the United States (American College of Obstetricians and Gynecology, 2001; American College of Obstetricians and Gynecology, 2013). Racial and ethnic disparities persist in preterm birth, with the proportion of preterm births among African-American women at 13%, about 50 % higher than among white women (9%) (CDC, 2017). The reasons for this disparity are poorly understood and cannot be explained merely by sociodemographic factors (Manuck, 2017). Underlying factors including a complex interaction between maternal, paternal, fetal genetics, epigenetics, and microbiome point to the difference (Manuck, 2017).

Previous studies have shown that advanced maternal age (40 years and over) was found to be associated with an increased risk of preterm birth even after adjustment for confounders (Fuchs, Monet, Ducriet, Chailet, & Audibert, 2018; Tough, et al., 2002). Also, findings from previous studies have shown an association between a low or a high hemoglobin level and an

increased risk of preterm birth (Scanlon, Yip, Schieve, & Cogswell, 2000); others did not find an association (Xiong, Buekens, Fraser, & Guo, 2003; Koura, et al., 2012).

WIC and Its Potential Impact on Preterm Birth

In addition, a study by Khanani et al., proposed that early entry into prenatal care is generally associated with a reduced risk of infant mortality (Khanani et al, 2010). Prenatal care may decrease adverse pregnancy outcomes for pregnant women by reducing risk factors through education and social support (Raatikainen, 2006; Quinlivan & Evans, 2004), and such education and social support are also among the paramount services rendered by the WIC program (FNS USDA, 2017). A study by Gai Y. and Feng L. suggested that WIC participation significantly reduced the probability of very premature birth and very low birth (Gai & Feng, 2011). This study also found that high-risk births, i.e. to women who have had recurrent miscarriage, benefitted more from WIC than women who have had normal births. The authors concluded that by targeting disadvantaged mothers, the WIC program might have more impact on its participants (Gai & Feng, 2011).

According to the American Pregnancy Association, about 12-20 percent of pregnant women smoke during pregnancy putting their babies at risk of low birth weight (American Pregnancy Association, 2017). The effect of smoking on the risk of preterm birth may be related to increased rates of pregnancy complications (Meyer, 1977; Kyrklund-Blomberg et al., 2005; CDC, 2017) including abruptio placentae, placenta previa, preterm premature rupture of membranes, intrauterine growth restriction and increased risk of preeclampsia.
Previous studies have utilized secondary data to identify risk factors associated with preterm birth; however, none has actually used a Nebraska WIC secondary data set to study the effect

of biological and socio-demographic risk factors on preterm birth, which is why I will be using the Nebraska WIC data of 2016 to better understand the relationships between the risk factors that are available in the data and preterm birth while controlling for confounding factors. Therefore, the objective of the capstone was to identify factors related to preterm birth among WIC clients. The hypotheses of the study were 1) maternal race, age, hemoglobin level, BMI, multifetal pregnancy and history of miscarriage may be associated with preterm birth, and 2) the rate of preterm birth among the different racial categories, age groups, hemoglobin levels, BMI, multifetal pregnancies, and history of miscarriage may be different.

The service-learning part of the project was to develop a performance evaluation survey for the Nebraska WIC program. A performance evaluation survey was developed, implemented and analyzed for the Nebraska WIC program. The performance evaluation survey was conducted to determine the extent of satisfaction with WIC services among program participants. It will be used as a program improvement tool by the Nebraska WIC program to understand the emerging needs and preferences of services among the participants.

Research Methods

Service Learning project

This was a cross-sectional survey study of WIC participants in Nebraska. The WIC program has 13 local agencies in Nebraska, with 100 clinics across the state of Nebraska. In 2017, these clinics serve 21,000 households and 37,000 women and children. The survey was provided to women enrolled in WIC or caregivers of children enrolled in WIC.

There are five sections in the survey, with a total number of 35 questions. The topic areas were 1) WIC services: questions about services offered by WIC; 2) nutrition education and breastfeeding: this section consists of questions on nutrition information, encouragement to breastfeed in the clinic, and about the breastfeeding counselor; 3) WIC checks: this section consists of questions about how easy WIC checks are to use; 4) WIC approved foods and stores: this section consists of questions about the use of WIC checks to purchase WIC-approved foods; and 5) "You and your family": this section consists of questions on the demographics of the participants and other questions about them and their children.

The survey included single select type questions, multiple-choice questions and open-ended questions. The survey was prepared in English and translated into Spanish by DHHS staff in WIC's communications unit.

The self-administered survey was available in paper and online formats, the online format was prepared with REDCap. Eligible clients were asked by staff to complete the survey when they visited a WIC clinic over a 2 month period (March to April 2018) for routine services. Clients were able to complete the survey at the WIC clinic using an internet connected computer.

Capstone Project

Study design and data source

This was a cross-sectional study using Nebraska WIC data. The study population was all Nebraska WIC participants who had a live birth in 2016 and participated in WIC during the pregnancy. Approval for the study was obtained from the Institutional Review Board at the

University of Nebraska Medical Center. WIC program data were provided by the Nebraska Department of Health and Human Services (DHHS), coming from the WIC database.

Variables

The outcome variable was preterm birth. Preterm is defined as babies born alive before 37 weeks of pregnancy are completed. Preterm birth was coded as yes/no based on the infants' gestational age at birth. The predictor variables were maternal race and age group, hemoglobin value, multifetal pregnancy, history of miscarriage, and Body Mass Index (BMI). Race included in this study are the six different categories of race in the United States as used by the U.S census (census.gov, 2018): White, Black, Native American or Alaska Natives, Asian, Native Hawaiian or other Pacific Islander, and two-or-more races. The ages of the participants were grouped into four categories: ≤19, 20-29, 30-39, 40 and above. Multifetal gestation was coded as 'yes' if there were 2 or more fetuses in this pregnancy and as 'no' if there was only 1 fetus in this pregnancy. Miscarriage was coded as 'yes' if she had a history of one or more previous miscarriages and as 'no' if she did not have any history of miscarriages. Maternal hemoglobin values (done within the first 60 days of certification of the WIC participants) were categorized into: anemia (<11g/dl), normal hemoglobin (11 -14.5g/dl), and high hemoglobin (14.5g/dl). Body Mass Index (BMI) was grouped into four categories: underweight (<18.5), normal weight (18.5 – 24.9), overweight (25 – 29.9), and obese (30.0 and above).

Statistical analysis

A descriptive analysis was conducted to summarize the characteristics of the study sample. Univariate analysis was carried out to evaluate the effect of single factors on preterm birth. Chi square test/Fisher's exact test was used to compare the rates of preterm birth across

the different race and age groups, and the other covariates. Multiple logistic regression was used to evaluate the relationship of preterm birth with race, age group, history of miscarriage, maternal BMI, multifetal pregnancy, and hemoglobin value and their interactions. All analyses were conducted using SAS 9.4 (reference). The alpha level of 0.05 was used to determine the statistical significance.

Results

Service Learning

The English and Spanish survey forms are found in Appendix. As of April 14th, 2018, a total of 3,703 women completed the survey (2,984 English, 719 Spanish).

Capstone

Table 1 describes the characteristics of the 8,714 WIC clients who gave birth in 2016. Approximately 60% of the clients were in the age group 20 –29 years; an additional 27.6% were between 30 and 39 years of age. About 10% of clients were 19 years or younger and 2.7% were 40 years or older. The majority of the clients (71.0%) were White, 12.7% were Black, nearly 9.0% were American Indian or Alaska Native, and 4.1% were Asian. A total of 15 women (0.2%) were documented as being homeless.

The majority of participants (71.0%) had normal hemoglobin values (11-14.5 g/dl), while 16.7% had abnormally low (10-10.9g/dl) and 7.0% had abnormally high (>14.5g/dl) hemoglobin values. Hemoglobin value was missing for 469 clients. Multifetal pregnancy value was present for 134 clients (1.5%) and 61 clients (0.7%) had a history of miscarriage. Only one-third (30.5%) of clients were normal weight while 30.5% were overweight and 42.8% were obese. Underweight value was present for 72 clients (0.8%).

Table 1: Characteristics of WIC participants who gave birth in 2016

	Frequency	%
Age group		
≤ 19 years	887	10.2%
20 – 29	5197	59.6%
30 – 39	2401	27.6%
40+	229	2.6%
Race		
White	6160	70.7%
Black or African American	1111	12.7%
American Indian or Alaska Native	764	8.8%
Asian	355	4.1%
Native Hawaiian or Other Pacific Islander	89	1.0%
Two-or-more races	227	2.6%
Missing	8	0.1%
Homeless Participants		
No	8699	99.8%
Yes	15	0.2%
Hemoglobin Group		
<11g/dl (anemia)	1459	16.7%
11 -14.5g/dl (normal hemoglobin)	6177	70.9%
>14.5g/dl (high hemoglobin)	609	7.0%
Missing	469	5.4%
Multifetal Pregnancy		
No	8580	98.5%
Yes	134	1.5%
History of Miscarriage		
No	8653	99.3%
Yes	61	0.7%
BMI Group		
Underweight (<18.5)	72	0.8%
Normal weight (18.5 – 24.9)	2125	24.4%
Over weight (25 – 29.9)	2655	30.5%
Obese (30.0 and above)	3730	42.8%
Missing value	132	1.5%
Pre-term		
Yes	411	4.7%
No	4235	48.6%
Missing	4068	46.7%

Table 2 shows univariate analysis results. All variables except race were significantly associated with preterm birth outcome. Multivariate analysis results (Table 3) are similar to that of the univariate analysis.

Compared to white women, black women had higher odds of preterm birth (OR=1.13). Compared to women between age 20 and 29, older women (or, age groups) had significantly higher odds of preterm birth (OR=1.65 and 3.57, respectively). As for hemoglobin level, compared to women with normal hemoglobin levels, anemic women had lower odds of preterm birth (OR=0.61). The odds of preterm birth were much lower among women with a singleton pregnancy compared to those with multifetal pregnancy (OR=0.09). Finally, underweight women had a higher odds of preterm birth than normal weight women (OR=3.00).

Table 2: Univariate analysis results

	Pre-term		**Not pre-term**		**Pre-term rate**	**P-value**
	Frequency	%	Frequency	%		
Age group						**<0.0001**
≤ 19	30	7.3%	464	10.96%	6.1	
20 – 29	208	50.6%	2558	60.40%	7.5	
30 – 39	146	35.5%	1123	26.52%	11.5	
40 +	27	6.6%	90	2.13%	23.1	
Race						**0.4556**
White	293	71.3%	2971	70.15%	8.9	
Black or African American	60	14.6%	549	12.96%	9.9	
American Indian or Alaska Native	37	9.0%	392	9.26%	8.6	
Asian	9	2.2%	177	4.18%	4.8	
Native Hawaiian or Other Pacific Islander	4	1.0%	46	1.09%	8.0	
Two-or-more races	8	1.9%	98	2.31%	7.6	

Hemoglobin						**0.0278**
<11g/dl (anemia)	52	13.5%	769	18.92%	6.7	
11 -14.5g/dl (normal)	306	79.5%	2995	73.68%	9.3	
>14.5g/dl (high)	27	7.0%	301	7.40%	8.2	
History of Miscarriage						**<0.0001**
No	369	89.8%	4234	99.98%	8.0	
Yes	42	10.2%	1	0.02%	97.7	
Multifetal Pregnancy						**<0.0001**
No	384	93.4%	4210	99.41%	8.4	
Yes	27	6.6%	25	0.59%	51.9	
BMI Group						**0.0012**
Underweight (<18.5)	7	1.7%	28	0.62%	20.0	
Normal weight (18.5 – 24.9)	90	22.1%	1055	25.22%	7.9	
Over weight (25 – 29.9)	104	25.6%	1317	31.48%	7.3	
Obese (>30)	206	48.2%	1785	42.67%	10.4	

Table 3. Multivariate analysis results

	Adjusted OR	**95%**	**P-value**
Age group			<0.0001
≤ 19	0.83	0.55 - 1.27	
20 – 29	*Reference*	–	
30 – 39	1.65	1.30 – 2.09	
40 +	3.57	2.19 – 5.79	
Race			0.6563
White	*Reference*	–	
Black or African American	1.13	0.82 – 1.54	
American Indian or Alaska Native	0.98	0.67 –1.42	
Asian	0.58	0.29 – 1.17	
Native Hawaiian or Other Pacific Islander	0.86	0.29 – 2.49	
Two-or-more races	1.12	0.54 – 2.36	
Hemoglobin			0.0074
<11g/dl (anemia)	*0.61*	0.44 – 0.83	
11 -14.5g/dl (normal)	*Reference*	-	
>14.5g/dl (high)	0.84	0.55 – 1.29	
Multifetal Pregnancy			<0.0001
No	0.09	0.05 – 0.15	
Yes	*Reference*	-	
BMI Group			0.0151
Underweight (<18.5)	3.00	1.23 – 7.29	
Normal weight (18.5 – 24.9)	*Reference*	-	

Over weight (25 – 29.9)	0.93	0.68 – 1.28	
Obese (>30)	1.24	0.93 – 1.64	

Discussion

Our study found that advanced maternal age (40 years and over) was associated with increased odds of preterm birth even after adjustment for confounders. The result is in accordance with previous cross-sectional and cohort studies that concluded that advanced maternal age was associated with higher odds and risk of giving birth to preterm infants (Cavazos, et al., 2015; Astolfi & Zonta, 1999; Fuchs, Monet, Ducriet, Chailet, & Audibert, 2018). However, for our study, there was no U-shaped relationship with a corresponding, increased risk for younger women, as suggested by Cavazos, et al. and Astolfi & Zonta (Cavazos, et al., 2015; Astolfi & Zonta, 1999). The biological mechanisms that have been proposed for explaining the associations of maternal age with preterm birth are a direct consequence of maternal age (Lawlor, Mortensen, & Andersen, 2011). For example, it is suggested that at younger maternal age, preterm birth results because the mother conserves energy for her own growth and development rather than that of the fetus (Lawlor, Mortensen, & Andersen, 2011). At an older age, it is proposed that ageing affects ovarian reserve, cardiovascular systems, and metabolic systems, which can lead to preterm birth (Lawlor, Mortensen, & Andersen, 2011). This heterogeneity of odds for preterm births according to maternal age and the variation in changes in age-specific preterm birth rates, coupled with the changes in maternal age distribution over time, propose the need for varying preterm birth preventive actions across the reproductive life span (Ferre, Callaghan, Olson, Andrea, & Barfield, 2016).

However, the association between race and preterm birth was not significant, our study found that compared to white women, black women had higher odds of preterm birth. A higher risk of preterm birth among black women than among white women is well established in the United States (CDC, 2017). Findings from previous study suggests that social and physical environments contribute to disparities in preterm birth, and that the cumulative exposures that black mothers experience throughout their early lives are likely accountable for their increased risk of delivering preterm since circumstances in adulthood (college education, military service, and adequate prenatal care) do not eliminate the discrepancies (Burris, Collins, & Wright, 2011). In addition, a study found evidence to support the role of maternal stress, over the life course, as a cause of racial disparities in premature birth (Kramer & Hogue, 2009)

Our data support the extensive scientific literature on the strong relationship between plurality and the odds of having a preterm infant (Hiersch, Rosen, Okby, Barrett, & Melamed, 2016). In the US in 2013, the twin birth rate reached a new high with 33.7 per 1000 total births. National Vital Statistics revealed that the rate of preterm birth was 56.6% in twins vs 9.7% for singletons (Hamilton, Martin, Osterman, Curtin, & Mathews, 2014). The disparate preterm rates between singletons and babies from multifetal pregnancies may be due to different physiological or pathophysiological mechanisms of preterm birth among singleton pregnancies and multiple pregnancies, which include intrauterine infection or inflammation, hormonal disorders, cervical insufficiency (shortening), uterine overdistension, uterine ischemia, abnormal allograft reaction, and allergy (Stock & Norman, 2010).

Surprisingly, WIC clients with low hemoglobin had lower odds of preterm birth compared to clients with a normal hemoglobin level. Some studies have shown an association

between low hemoglobin levels and increased risk of preterm birth (Scholl, Hediger, Fischer, & Shearer, 1992; Levy, Fraser, Katz, Mazor, & Sheiner, 2005), whereas others have not (Xiong, Buekens, Fraser, & Guo, 2003; Koura, et al., 2012). The surprising result in our study could have been due to WIC's intervention by recommending iron supplements/iron-rich foods to participants found to be anemic after they were screened for hemoglobin level (within their first 60 days of participating in the WIC program).

Our study found that women in underweight BMI categories of pregnancy are at the highest risk of preterm delivery compared to women in other BMI categories. This is consistent with findings from previous studies that also adjusted for other maternal charactersitics and comorbidities (Girsen A. , et al., 2016). Although several factors have been proposed, the mechanisms behind a preterm birth of underweight women are unknown (Girsen A. , et al., 2016). It is possible that the association between maternal underweight and preterm birth exists directly due to the lack of nutrients or indirectly due to the effect of multiple other behavioral factors like medical illness, smoking, and poor diet (Girsen A. , et al., 2016). Studies with more detailed information on such factors are needed to investigate the complex relationship between maternal underweight and preterm birth. Another study had a similar suggestion about the pathophysiologic mechanism of underweight and preterm birth (Han, mulla, Beyene, & Liao, 2010). The study stated that the association between maternal underweight and preterm birth might be explained by a lack of nutrients resulting in reduced fetal growth.

Our study found that obese women are at higher, though non-significant, odds of giving birth to a preterm infant than normal-weight pregnant women. This is in accordance with a

systematic review and meta-analysis concluding that obese women had higher risk of preterm birth (McDonald, Han, Mulla, & Beyene, 2010; Cnattingius, et al., 2013). Several literatures have been able to suggest the mecahnisms between maternal obesity and preterm birth (Goldenberg, Culhane, Iams, & Romero, 2008; Ramsay, et al., 2002; Soltani & Fraser, 2000). It was proposed that maternal obesity is associated with inflammatory up-regulation (Goldenberg, Culhane, Iams, & Romero, 2008) through increased production of adipokines by adipose tissue and increased systemic secretion of proinflammatory cytokines (Ramsay, et al., 2002). In pregnancy, visceral fat mass is increased, particularly in obese women (WISSE-BE, 2004), and adipokines from visceral fat are known to elevate systemic inflammation and (Soltani & Fraser, 2000) and systemic fetal inflammation is known to cause preterm birth (Kemp, 2014). Other mechanisms that may contribute to preterm delivery in obese pregnant women include insulin resistance, endothelial dysfunction, oxidative stress, and lipotoxicity (Fontana L, 2007). Visceral fatness is also accompanied by reduced insulin sensitivity and increased levels of glucose (Ramsay, et al., 2002; Jarvie, et al., 2010) and findings have shown that gestational diabetis and hyperglycemia are risk factors of premature labour (Ju, et al., 2015).

Conclusion and Implications

In conclusion, this cross-sectional study demonstrated that after adjusting for potential confounders, maternal age, multifetal pregnancy, hemoglobin level, and BMI were significantly associated with the risk of having a preterm delivery. While the Nebraska WIC program already screens for and has interventions to improve outcomes for women with these risk factors, our results suggest that additional tailored services are warranted. Due to limitations of Nebraska's

Journey database, we were unable to obtain data on maternal smoking and other key factors associated with preterm delivery. With the decreasing funding available to health and human services programs both in Nebraska and nationally, more detailed studies are needed to isolate potential intervention points to decrease preterm delivery in this vulnerable population.

Conflict of Interest

Author states that there is no conflict of interest.

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Appendix

NEBRASKA WIC CLIENT SATISFACTION SURVEY (ENGLISH &

SPANISH VERSIONS)

2018 Nebraska State WIC Participant Satisfaction Survey

Local Agency Name_____

Your answers to this survey will help the Nebraska WIC Program improve the services you and your family receive. You don't need to give your name, and your answers will not be connected to you. Whether or not you complete the survey will not affect your receipt of WIC or other benefits. Thank you!

SECTION 1: WIC Services

1. How often do WIC appointment times work for you?
   ☐Always ☐Usually ☐Sometimes ☐Never

2. How would you like to be reminded about your appointments?
   ☐Phone call ☐Text alerts ☐Email
   ☐Mailed letter ☐Facebook
   ☐ Other, please specify _____

3. Have you ever missed an appointment?
   ☐Yes ☐No

   If yes, what reasons apply?
   ☐ I forgot
   ☐ The appointment time didn't work
   ☐ I or my child was sick
   ☐ I did not have a way to get to the clinic
   ☐ I had to work
   ☐ Other: _____

4. How long do you usually have to wait in the clinic waiting room past the time of your scheduled appointment?
   ☐Less than 5 minutes
   ☐6-15 minutes
   ☐16-30 minutes
   ☐More than 30 minutes

5. Is your clinic space private enough for you to feel comfortable asking or answering personal questions?
   ☐Always ☐Usually ☐Sometimes ☐Never

6. Do you feel comfortable asking the WIC staff when you have questions? ☐ Yes ☐ No
   If no, explain why _____

7. Which 3 things do you like the most about WIC?
   ☐Checks for healthy foods
   ☐Checks for infant formula
   ☐Breastfeeding support
   ☐Availability of breast pumps
   ☐Nutrition information such as tips on feeding my family in a healthy way
   ☐Referrals to health services and other programs
   ☐Other: _____

8. Would you recommend WIC to a friend?
   ☐Yes ☐No
   If no, why not? _____
   _____

SECTION 2: Nutrition Education and Breastfeeding

9. How helpful is the nutrition information you receive?
   ☐ Very helpful
   ☐ Slightly helpful
   ☐ Not at all helpful

10. Has the WIC program helped you learn about healthy eating?
    ☐Yes ☐No

11. If WIC could give information in any of the following ways, which top **2 ways** would you choose?
    ☐Face to face (individual counseling)
    ☐Group sessions in clinic
    ☐Telephone calls
    ☐Online website lessons
    ☐Booklets or pamphlets
    ☐Video group chat
    ☐Video individual chat
    ☐Texting

12. Have you heard about the online nutrition education website called WIC Health.org?
    ☐Yes ☐No

    If yes, have you used WIC Health.org?
    ☐Yes ☐No

13. Have you met with a breastfeeding peer counselor?
    ☐Yes ☐No

    If yes, was the breastfeeding counselor helpful?
    ☐Yes ☐No

14. Is your WIC office breastfeeding-friendly?

    ☐**If yes** - explain why _____
    _____

    ☐**If no** - explain why _____
    _____

SECTION 3: WIC Checks

15. Did the WIC clinic staff tell you how to use your WIC checks at the store? ☐Yes ☐No

16. Please rate your understanding of how to use your WIC checks.
    ☐Good ☐Fair ☐Poor

17. How easy are WIC checks to use?
    ☐Easy ☐Moderate ☐Difficult

SECTION 4: WIC Approved Foods and Stores

18. Do you usually buy **all the foods listed** on your WIC checks?
    ☐Yes ☐No

19. Do you usually use the **full dollar amount** of your fruit/vegetable checks?
    ☐Yes ☐No

    If no, what is the reason?
    _____
    _____

20. How helpful is the WIC food list?
    ☐Very helpful ☐Slightly helpful ☐Not at all helpful

21. How often are the cashiers at the grocery store or pharmacy helpful?
    ☐Always ☐Usually ☐Sometimes ☐Never

22. Do you ever feel embarrassed using the WIC checks at the store?
    ☐Yes ☐No

Section 5: You and Your Family

23. Are you Hispanic? ☐Yes ☐No

24. Please indicate your race(s) from the following list (check all that apply).
    ☐White
    ☐Black or African American
    ☐Indian or Alaskan Native
    ☐Asian
    ☐Pacific Islander/Native Hawaiian
    ☐Other, please specify:_____

25. Which of these describe you (check all that apply)?
    ☐ Pregnant
    ☐ Postpartum, not breastfeeding
    ☐ Postpartum, breastfeeding
    ☐ Parent or guardian of child age 1-4 years on WIC
    ☐ Parent or guardian of baby on WIC

26. How long have you been coming to WIC?
    ☐Less than 6 months ☐6-12 months ☐1-2 years
    ☐3-5 years ☐More than 5 years

27. Do you have access to a smartphone or computer with internet? ☐Yes ☐No

28. Where did you first hear about the WIC program?
    ☐Family or friends ☐Hospital
    ☐Grocery store or pharmacy ☐Facebook ads
    ☐Billboard ☐Radio ☐TV ☐Newspaper
    ☐Brochure or flyer ☐Doctor's office
    ☐Access Nebraska
    ☐Internet
    ☐Other:_____

29. Do you have children **under age 5** who are **not** on WIC?
    ☐Yes ☐No
    If yes, why not? _____
    _____

30. How many children do you have that **are** on WIC? _____

31. How old are your children that are **on WIC** (check all that apply)?
    ☐Under 1 year ☐1-2 years ☐2-3 years ☐ 3-4 years

32. Until what age do you think a child can be on WIC?
    _____

33. Use the space below to tell us anything else you would like us to know.

Thank you for your time! Your answers will never be associated with you or your family.

Encuesta sobre la satisfacción de los participantes de WIC en el estado de Nebraska

Nombre local de agencia_____

Sus respuestas a esta encuesta ayudarán al Programa WIC de Nebraska a mejorar los servicios que usted y su familia reciben. No tiene que dar su nombre, y sus respuestas no quedarán vinculadas con usted. Completar o no la encuesta no afectará que reciba beneficios de WIC u otros. ¡Gracias!

SECCIÓN 1: Servicios de WIC

1. ¿Con cuánta frecuencia le convienen las horas de las citas de WIC?
   ☐Siempre ☐Típicamente ☐A veces ☐Nunca

2. ¿Cómo le gustaría que le recordaran sobre sus citas?
   ☐Llamada ☐Alertas por texto ☐Correo electrónico
   ☐Carta por correo ☐Facebook
   ☐ Otro, por favor especifique _____

3. ¿Alguna vez ha faltado a una cita?
   ☐Sí ☐No
   De ser así, ¿cuáles razones aplican?
   ☐ Se me olvidó
   ☐ La hora de la cita no convino
   ☐ Mi hijo o yo estuvimos enfermos
   ☐ No tuve como llegar a la clínica
   ☐ Tuve que trabajar
   ☐ Otro: _____

4. Típicamente, ¿cuánto tiene que esperar después de la hora de su cita programada en la sala de espera de la clínica?
   ☐Menos de 5 minutos
   ☐6-15 minutos
   ☐16-30 minutos
   ☐Más de 30 minutos

5. ¿El espacio de su clínica es lo suficientemente privado para que se sienta cómoda al hacer o responder a preguntas personales?
   ☐Siempre ☐Típicamente ☐A veces ☐Nunca

6. Cuando tiene preguntas, ¿se siente cómoda haciéndole preguntas a los empleados de WIC?
   ☐ Sí ☐No
   Si no, explique por qué_____

7. ¿Cuáles 3 cosas son las que más le gustan acerca de WIC?
   ☐Cheques para alimentos saludables
   ☐Cheques para fórmula infantil
   ☐Apoyo para lactancia
   ☐Disponibilidad de sacaleches
   ☐Información sobre nutrición como consejos para alimentar a mi familia de forma saludable
   ☐Remisiones a servicios de salud y otros programas
   ☐Otro: _____

8. ¿Le recomendaría WIC a una amiga?
   ☐Sí ☐No
   Si no, ¿por qué no?_____

SECCIÓN 2: Educación sobre nutrición y lactancia

9. ¿Qué tan útil es la información sobre nutrición que usted recibe?
   ☐ Muy útil
   ☐ Algo útil
   ☐ Nada útil

10. ¿El programa WIC le ha ayudado a aprender sobre alimentación saludable? ☐Sí ☐No

11. Si WIC pudiera darle información en alguna de las siguientes formas, ¿cuáles serían las **2 primeras formas** que elegiría?
    ☐En persona (asesoría individual)
    ☐Sesiones de grupo en la clínica
    ☐Llamadas telefónicas
    ☐Lecciones por internet en sitio web
    ☐Folletos o impresos
    ☐Chat de grupo por video
    ☐Chat individual por video
    ☐Por texto

12. ¿Ha escuchado alguna vez sobre el sitio web de educación sobre nutrición llamado WIC Health.org?
    ☐Sí ☐No

    De ser así, ¿ha usado WIC Health.org?
    ☐Sí ☐No

13. ¿Se ha reunido con una consejera par de lactancia?
    ☐Sí ☐No

    De ser así, ¿la consejera de lactancia le fue de utilidad?
    ☐Sí ☐No

14. ¿Su oficina de WIC es apta para la lactancia?

    ☐**De ser así** - explique por qué_____
    _____

    ☐**Si no** - explique por qué _____

SECCIÓN 3: Cheques de WIC

15. ¿Los empleados de la clínica de WIC le dijeron cómo usar sus cheques de WIC en la tienda?
☐Sí ☐No

16. Por favor evalúe su comprensión sobre cómo usar sus cheques de WIC.
☐Buena ☐Regular ☐Mala

17. ¿Qué tan fáciles de usar son los cheques de WIC?
☐Fáciles☐Moderados ☐Difíciles

SECCIÓN 4: Alimentos y tiendas aprobadas por WIC

18. ¿Usted compra típicamente **todos los alimentos mencionados** en sus cheques de WIC?
☐Sí ☐No

19. ¿Usted usa típicamente la **cantidad total en dólares** de sus cheques para frutas/vegetales?
☐Sí ☐No

Si no, ¿cuál es la razón?
_____

20. ¿Qué tan útil es la lista de alimentos de WIC?
☐Muy útil ☐Algo útil
☐Nada útil

21. ¿Qué tan útiles son los cajeros en las tiendas de alimentos o farmacias?
☐Siempre ☐Típicamente ☐A veces ☐Nunca

22. ¿Alguna vez siente vergüenza al usar los cheques de WIC en la tienda?
☐Sí ☐No

Sección 5: Usted y su familia

23. ¿Es hispana? ☐Sí ☐No

24. Por favor indique su(s) raza(s) en la siguiente lista (marque todas las que apliquen).
☐Blanco
☐Negro o afroamericano
☐Nativo americano o nativo de Alaska
☐Asiático
☐Isleño del Pacífico o nativo hawaiano
☐ Otro, por favor especifique _____

25. ¿Cuál de estas le describe (marque todas las que apliquen)?
☐ Embarazada
☐ Posparto, no lacta
☐ Posparto, sí lacta
☐ Padre o tutor de menor de 1-4 años de edad en WIC
☐ Padre o tutor de menor de bebé en WIC

26. ¿Por cuánto tiempo ha estado asistiendo a WIC?
☐Menos de 6 meses ☐6-12 meses ☐1-2 años
☐3-5 años ☐Más de 5 años

27. ¿Tiene acceso a un *smartphone* (teléfono inteligente) o computadora con internet? ☐Sí ☐No

28. ¿Dónde escuchó del programa WIC por primera vez?
☐Familia o amigos ☐Hospital
☐Tienda de alimentos o farmacia
☐Anuncios en Facebook
☐Cartel publicitario ☐Radio ☐TV ☐Periódico
☐Folleto o volante ☐Oficina de doctor
☐ACCESSNebraska
☐Internet
☐Otro:_____

29. ¿Tiene hijos **menores de 5 años** que **no** están en WIC?
☐Sí ☐No
De ser así, ¿por qué no? _____
_____

30. ¿Cuántos hijos tiene que **sí están** en WIC? _____

31. ¿Cuáles son las edades de los hijos suyos que están **en WIC** (marque todas las que apliquen)?
☐Menos de 1 año ☐1-2 años ☐2-3 años ☐ 3-4 años

32. ¿Hasta qué edad cree usted que un niño puede estar en WIC?
_____

33. Use el espacio más abajo para decirnos cualquier otra cosa que quiera que sepamos.

¡Gracias por su tiempo! Sus respuestas jamás serán asociadas con usted o su familia.

Service Learning/Capstone Experience Reflection

My placement site was the Nebraska WIC program. The Nebraska WIC program is a special supplemental Nutrition Program for Women, Infants, and Children across the state of Nebraska. It provides supplemental foods, health care referrals, and nutrition education to low-income and nutritionally at-risk women and their children up to 5 years of age. During my Service Learning/Capstone Experience (SLCE) project, the staffs of this organization conducted themselves in a professional manner, and without the collaborative efforts of the WIC staffs, the project would not have been a success. I learned that professionalism and effective team collaboration is paramount to attaining project objectives and goals.

In the way the Nebraska WIC program operates, my expectations were met (even beyond). I was provided with the necessary tools and resources to carry-out my Service Learning/Capstone Experience project. The Nebraska WIC Staffs were timely, dedicated, answered all my questions, and offered assistance in addressing unforeseen situations that arose during the course of my SLCE project.

My Service Learning project was a cross-sectional survey study of WIC participants in Nebraska. A performance evaluation survey was developed for the Nebraska WIC program, which was conducted to determine the extent of satisfaction with WIC services among program participants. It will be used as a program improvement tool by the Nebraska WIC program to understand the emerging needs and preferences of services among the participants. The survey was prepared in English and translated into Spanish. The self-administered survey was available in paper and online formats (the online format was prepared with REDCap). Eligible clients were

asked by staff to complete the survey when they visited a WIC clinic for routine services from March to April 2018. So far, 3,700 clients have responded to the survey.

My Capstone project was a cross-sectional study of 8,714 WIC clients who gave birth in 2016. Chi square tests and multivariate logistic regression analysis were performed to identify factors associated with preterm birth. As a pre-requisite to completing the SLCE project, I gave an oral presentation to lay and professional audiences (faculty, students, and general public) about the outcome of my research.

My greatest accomplishment/contribution of my Service Learning project was designing a performance evaluation survey study and development of data collection forms for the study (paper and online versions), while for my capstone project, my greatest accomplishment was identifying factors that are associated with preterm birth. I brought into my SLCE project skills like project management, survey design, and critical thinking. The greatest challenge during my SLCE project was the delay encountered during the Institutional Review Board (IRB) approval process. The delay was a good experience for me that will allow me to consider applying for an IRB approval early in the development of a future project.

My SLCE project has had a positive impact on how I view public health practice. From this project, I have learned the importance of 1) having clearly stated goals to know if project met its objectives, 2) seeking opinion or ideas from professionals or colleagues who are knowledgeable in the subject matter, and 3) having project timeline and due dates to making sure the project moves forward just as planned. The training (e.g., survey design, data analysis and report writing) I received during my MPH program at the University of Nebraska Medical Center, was also key in preparing me for my Service Learning/Capstone project.

Acknowledgement

The success of this project required supervision from individuals whose guidance and assistance I was extremely privileged to have received. I wish to express my warmest gratitude to my preceptor in the person of Ms. Peggy Trouba who gave me the opportunity to work on this project. Without her acceptance, I would not have been able to have this statewide experience especially on a project that would have a positive effect on the life of thousands of Nebraskans. Bestowing trust on me alone to work on this project is something I will forever be thankful to her for. She provided me with all the needed tools and resources for the project and her continued support throughout made the project saw success.

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