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PRENATAL VITAMIN USE IN RHODE ISLAND ACCORDING TO WOMEN, INFANTS, AND CHILDREN (WIC) PARTICIPATION

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PRENATAL VITAMIN USE IN RHODE ISLAND

ACCORDING TO WOMEN, INFANTS, AND

CHILDREN (WIC) PARTICIPATION

BY

ALLISA GEORGIO

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF

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IN

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MASTER OF SCIENCE IN NUTRITION AND FOOD SCIENCE

OF

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UNIVERSITY OF RHODE ISLAND
2020

ABSTRACT

Objectives: To examine prenatal vitamin (PNV) use between women who participate in The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and pregnant women who do not participate in WIC. The secondary objective is to explore associations between PNV use and sociodemographic characteristics of pregnant women.

Methods: A cross-sectional study was conducted among a convenience sample of Rhode Island pregnant women 18 years of age or older. Women were recruited from WIC offices, OB-GYN offices, and pregnant women known to the research team. All women that participated in the study completed an anonymous 21-question survey in-person or online that asked about PNV use, sociodemographic characteristics, and food security. We conducted t-tests and chi-square tests in this data analysis using SPSS. T-tests were used for continuous variables and chi-square was used for categorical variables.

Results: Out of 96 pregnant women, 61% were WIC participants. WIC participants were more likely to be Hispanic (47% vs 16%, $p=0.002$). Race significantly differed between WIC and non-WIC groups ($p=0.02$). Approximately 35% of WIC participants identified as a race other than white compared to 8% of non-WIC women. Education levels significantly differed between groups ($p<0.001$) with 7% of WIC women with a bachelor's degree or above compared to 59% of non-WIC women. WIC participants had a higher prevalence of food insecurity than non-WIC participants (56% vs 27%, $p=0.01$). There was no significant difference in PNV use between WIC and non-WIC

participants ($p=0.91$), with 92% of women from both groups consuming PNVs during pregnancy. WIC participants were more likely to receive PNVs through a prescription than non-WIC participants (53% vs 24%, $p=0.003$).

Conclusion: This study indicates that there is high use of prenatal vitamins in both WIC and non-WIC Participants. In addition, we found that WIC participants are obtaining prescription prenatal vitamins more than women that are not participating in WIC. This is worth further attention as the composition of prescription and non-prescription prenatal vitamins differ.

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PREFACE

This thesis was written to comply with the University of Rhode Island graduate school Manuscript Thesis Format. This manuscript has been written for publication to the *Journal of Nutrition Education and Behavior*.

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MANUSCRIPT

“Prenatal Vitamin Use in Rhode Island According to Women, Infants, and Children (WIC) Participation”

by

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INTRODUCTION

Use of prenatal vitamins (PNVs) in pregnant women can improve maternal nutrition status and decrease the risk of adverse birth outcomes such as preterm birth, low birth weight, long-term cognitive development, cardiometabolic disease, and mortality.¹⁻³ Therefore, clinicians recommend PNVs to meet micronutrient requirements during pregnancy.⁴

PNVs are a combination of vitamins and minerals that facilitate the process of receiving adequate nutrition during pregnancy.⁵ Some populations may be at risk for poor PNV use. Previous studies conducted about one decade ago show poor PNV use among low-income women, African American women, or Hispanic women compared to women that are higher-income and white.^{6,7} This study showed that PNV use was higher in women who have higher education levels and also higher in women that are married or in a domestic partnership compared to single or divorced women.⁶

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is a federally funded supplemental nutrition program for low-income, nutritionally at-risk pregnant women, breastfeeding women, non-breastfeeding postpartum women, and children up to their 5th birthday.⁸ This program is available in all 50 states. The women in this program receive nutrition education, supplemental food vouchers, information on the benefits of breastfeeding promotion and support, and referrals to healthcare. The goal of WIC nutrition education services is to strengthen nutrition education, adopt a more behavioral approach to nutrition education, be client oriented, and focus on healthy behaviors for life.⁸ In order to participate in this program, there is a strict income eligibility requirement based on the

number of participants in the household and annual, monthly, twice-monthly, and bi-weekly incomes. Women participating in WIC receive nutrition education, but it is not required to educate about PNV intake, and women are not prescribed PNV through WIC. Interestingly enough, there are no studies conducted on PNV use among WIC participants. We are interested in examining the prevalence of women consuming any type of PNV during pregnancy and whether PNV consumption differs between women participating in WIC and women not participating in WIC in Rhode Island.

The Rhode Island Department of Health (DOH) conducts surveys every year on 1,900 randomly selected women who gave birth to a live infant in the past year called the Pregnancy Risk Assessment Monitoring System (PRAMS) that determine daily multivitamin (MVI) use 1 month prior to pregnancy.⁹ The survey asks how many times women take a MVI, PNV, or folic acid supplement one month before they conceived, while also measuring sociodemographic characteristics and WIC participation. Mothers that were older than 30 years old, white (non-Hispanic), married, having 12 or more years of education, having private health insurance, and not participating in WIC were more likely to take a MVI one month prior to pregnancy.⁹ Although Rhode Island collects data on these pregnant women that live in Rhode Island, they do not measure actual PNV use during pregnancy.

Results from PRAMS found lower rates of MVI use prior to pregnancy among WIC participants as compared to non-WIC participants.⁹ The purpose of this study is to examine PNV use during pregnancy between WIC and non-WIC participants. Because women participating in WIC are low income, they may be less likely to consume PNVs due to their cost, which would be consistent with previous research

showing that low-income women are less likely to consume PNVs.⁶ The possibility of lower rates of PNV use among WIC participants could serve as a motivator for communities and physicians to provide or supplement PNVs to help women meet their daily micronutrient requirements during pregnancy.

The objective of this cross-sectional study was to assess PNV intake among pregnant women in the state of Rhode Island and explore whether WIC participants PNV use is similar to or different from pregnant women not participating in WIC. We hypothesized that women participating in WIC were less likely to consume PNVs compared to women that do not participate in WIC.

METHODS

Study Design and Participants

We utilized a cross-sectional design to study PNV use among a convenience sample of pregnant women. Our hypothesis is that women participating in WIC will show less PNV intake compared to women that do not participate in WIC. Inclusion criteria included pregnant women 18 years of age or older who are able to read English or Spanish. Participants were recruited from Rhode Island WIC offices to explore PNV use in women that receive WIC services. We piloted using a flyer method in Rhode Island obstetrics and gynecology (OB/GYN) offices and Healthy Babies and Mommies in North Kingstown, RI, to help recruit non-WIC participants, but no one responded. Most of the non-WIC participants were recruited through personal contact. Women were asked to complete a survey either in-person or online with questions about PNV use, sociodemographic information, and food security. Eleven WIC offices in RI were contacted for purposes of administering surveys to WIC participants. Five different sites were willing to participate in the study. Every WIC coordinator in the state of Rhode Island was given a brief overview of the study and asked if they would be willing to have their office participate in the study. Five WIC Coordinators responded and agreed to participate. The research assistant personally recruited women in the waiting room of one WIC site in Providence, RI. For the other four sites, onsite personnel recruited. These sites included Thundermist WIC (Woonsocket, RI), Westerly WIC, Women and Infants WIC (Providence, RI), and Children's Friend WIC (Providence, RI). Recruitment was over once we reached slightly above our goal sample size of 88 that was determined from the a priori power

equation. Once recruitment was over, the investigator picked up the completed surveys at the four different sites. All WIC participants completed the paper survey.

Participants received a 5-dollar electronic Amazon gift card as an incentive.

Overall, 96 women were recruited. Thirty-one women filled out an online survey and 65 women completed a paper survey. Participants were asked to review a consent form in order to participate in the research study and we provided a copy for their records. The survey was available in English and Spanish. The Spanish version was translated by a professional translator from the Supplemental Nutrition Assistance Program (SNAP). This project was approved by the Institutional Review Board on August 16th, 2019. Recruitment took place August 18, 2019 through October 21, 2019.

Survey Development

The survey consisted of 21 questions that asked about the use of PNVs, quality, barriers, socio-demographic characteristics, and food security (Appendix D).^{10,11} Questions in the survey were developed by the study team, such as the number of weeks pregnant, the use of PNVs, the frequency of PNVs, the brand of PNV, the form of PNV, and whether or not the PNV is prescription or nonprescription. The ideas for the questions were derived from studies that showed certain characteristics are important when determining PNV use.^{1,2,6,8} A question was asked about the motivators and barriers to PNV use since certain barriers seemed to be the main concern of inadequate use of PNVs in previous studies.⁶ Two questions were developed by the study team to measure participation in nutrition assistance programs such as WIC and Supplement Nutrition Assistance Program (SNAP). All women that

were receiving SNAP benefits also received WIC benefits, so this question helped the study team determine whether or not the participant is considered to be low-income if they were participating in WIC. The sociodemographic questions were included in the survey since previous studies showed discretion of MVI and PNV intake on sociodemographic characteristics.⁶ The sociodemographic questions were taken from an NIH study that involved a questionnaire.¹⁰ Race was self-reported from a list including African American, native American, Asian/pacific islander, white, and other. Ethnicity was self-reported as Hispanic or non-Hispanic. Lastly, there were two questions about food security that have been validated from a study that identifies families at risk for food insecurity.¹¹

The survey was piloted with five women that are currently in WIC or participated in WIC in the past. The women provided feedback on the survey to what they understood and what needed clarification. From there, the survey was adjusted accordingly. The online survey was developed using Qualtrics (<https://www.qualtrics.com>).

Data analysis and Statistics

The independent variable in this study is reported WIC and non-WIC participation. The dependent variable in this study is PNV use in pregnant women. The sociodemographic characteristics being measured in this study include maternal age in years, marital status, highest level of education, race, and ethnicity. The sample was estimated using an A priori power analysis using the goodness-of-fit tests (χ^2) that determined 88 participants were necessary to achieve 80% power. The final sample

was comprised of 96 participants, exceeding the amount determined by the A priori power analysis. We compiled descriptive statistics such as means and standard deviation of variables. Pearson chi-square analyses were used to find differences between WIC and non-WIC participants in PNV use and sociodemographic characteristics. Statistical significance was set at $p < 0.05$. Continuous variables in this study were gestational age and maternal age. All other variables were categorical.

RESULTS

Out of 96 pregnant women that participated in this study, 61% (n=59) of the survey respondents were WIC participants and 39% (n=37) were non-WIC participants. Characteristics of the participants, by WIC participation, are presented in Table 1. There was a significant difference in race between WIC and non-WIC groups ($p<0.05$). The distribution of race among non-WIC participants was predominately white compared to WIC participants where there was a wide distribution between races. A significant difference was found in ethnicity between WIC and non-WIC groups ($p<0.01$). A higher percentage of WIC participants were Hispanic (47%) compared to women that were Hispanic in the non-WIC sample (16%). Participants also varied by education ($p < 0.001$), with a higher percentage of non-WIC participants (59%) having a bachelor's degree and the majority of WIC participants having attained a high school diploma or GED (42%). There was a significant difference in food security between WIC and non-WIC groups ($p<0.01$) with WIC participants more likely to be food insecure than non-WIC groups. One question on the survey stated "I was worried whether food would run out before I/we got money to buy more. Was this often, sometimes, or never true for (you/your household in the last 12 months?", and participants had to state whether this was often true, sometimes true or never true. The percentage of WIC participants that stated "often true" or "sometimes true" was 56%, indicating some level of food insecurity in that household. The percentage of non-WIC participants that stated "often true" or "sometimes true" was 27%. Another question asked, "The food (I/we) bought did not last and we did not have money to buy more. Was this often, sometimes, or never true for (you/your

household) in the last 12 months?”. WIC Participants that reported “often true” or “sometimes true” consisted of 49% of the WIC sample compared to 22% in the non-WIC sample. There was a significant difference between the groups for this food insecurity question ($p<0.01$).

In terms of PNV use, 92% of women reported consuming PNVs during their pregnancy and there were no statistically significant differences between WIC and non-WIC participants. There were no differences in the frequency of PNV intake with 74% of participants out of the 88 participants that reported current use of PNVs, reporting taking the vitamins between 5-7 times per week. There was a significant difference in the type of PNV use ($p<0.01$), with more than half of the WIC participants reporting using prescription PNVs, and far fewer (24%) of non-WIC participants taking prescription PNVs.

Barriers to consumption of PNVs listed from both non-WIC and WIC groups include difficulty remembering to take it, side effects such as nausea, vomiting, general sickness, bad smell, and bad taste, and difficulty swallowing the pill.

In the survey, a question was asked “Who has recommended that you take prenatal vitamins?” The majority of participants from both WIC and non-WIC groups reported that a doctor recommend they take PNVs. However, some participants also stated they received recommendations from a dietitian, friend, parent, or spouse.

DISCUSSION

Overall, the majority of both WIC and non-WIC participants reported that they were currently using of PNVs. Noting that almost all women from this convenience sample in Rhode Island were taking PNVs, this suggests an improvement from studies conducted one decade ago showing poor PNV use among certain populations including low-income women.

Women participating in WIC were more likely to obtain prescription PNVs as compared to non-WIC participants, which is a new finding in research. To further investigate this result, the WIC sites used in this study were asked whether they recommend that patients take a PNV during pregnancy despite the fact that PNV use is not mentioned in the national WIC guidelines for nutrition education. We asked the WIC coordinators at all four offices and they all had similar answers in that they ask all moms if they are taking PNVs, and if they are not, they recommend they talk to their primary care physician or obstetrician about taking them. According to a WIC coordinator from Children's Friend, because WIC participants are low-income, they qualify for Medicaid, which covers PNVs throughout pregnancy. The WIC coordinator confirmed that because women who participate in WIC generally qualify for state medical insurance, the staff purposely refers them to their primary care physician or obstetrician. According to feedback on what the staff reiterated to us, the Nutrition Coordinator for the Rhode Island WIC program from the Rhode Island Department of Health was contacted to gain more insight. Indeed, WIC sites in Rhode Island have a policy regarding PNVs using their new computer system. The patients in WIC programs are asked how many days per week they are taking a PNV and if they

are receiving prenatal care. If a pregnant woman in the WIC program is at risk for inadequate vitamin/mineral supplementation, they are marked at risk. Women in WIC that meet this at-risk factor are encouraged to take PNVs, specifically ones that contain iron, iodine, and folic acid.¹²

This emerging topic on prescription vs. non-prescription PNVs is interesting, given that prescription and non-prescription PNVs have been found to differ in micronutrient availability and composition.^{1,5} One study conducted from the Academy of Nutrition and Dietetics in 2017 found a significant difference in prescription vs. non-prescription PNVs. Prescription PNVs had fewer vitamins and minerals, specifically vitamin A, vitamin D, iodine, and calcium.¹ Just to note, the United States does not have recommendations on the amount of vitamins and minerals in a prenatal supplement.¹ It is important to reach the recommended daily allowance for each vitamin and mineral during pregnancy to reduce the risk of adverse birth outcomes, but just because a prenatal supplement has more nutrients, it does not always mean it is better.¹ If taken in excess, some vitamins can be toxic to the body, but there is little evidence on prenatal nutrition in pregnant women in the United States in general, so it is difficult to determine if toxicity from prenatal supplements often occurs. One study found did show that most women receive enough vitamin A through diet.¹³ If consuming vitamin A through diet and taking a high dose of vitamin A through a PNV, toxicity could occur and potentially lead to birth defects.¹⁴ On the other hand, Vitamin D is important in PNVs since deficiency is common in the US, so it is expected to be higher in PNVs. It would be interesting to know if health care providers are aware of this discrepancy between prescription vs. non-prescription PNVs. Health

care providers should be proactive about evaluating the use of supplements in combination with diet and making the best recommendations for their patients that would benefit both them and the baby.¹⁵

A strong association in race and ethnicity was shown between WIC and non-WIC groups. however; PNV use did not vary by race or ethnicity in this present study.

Food security questions from this 21-question survey showed WIC participants were more likely to be food insecure than non-WIC participants. This is not surprising since the reason they qualify for this program is because they have a low-income.

Only 1 participant from WIC reported cost being a barrier to consuming PNVs, and no participants from the non-WIC group reported cost being a barrier. This is consistent with a study that looked at motivators and barriers to PNVs 1 decade ago.⁶ Interestingly enough, more WIC participants consumed gummy PNVs (20%) compared to non-WIC (8%), although this variable in not significant.

There are some strengths to note in this study. To my knowledge, we are the first to look at the question of PNV use between WIC and non-WIC participants. A limitation to this study is that it was conducted in Rhode Island so it may not be generalizable to other states. Pregnant women in RI have access to health care, which may account for their higher than expected rates of prescription prenatal vitamin use. States where low-income women may not have health care access might show different results. This would be interesting to study for future research.

CONCLUSION

This study shows a high intake of PNVs in WIC participants and non-WIC participants, regardless of sociodemographic characteristics, but also shed light on the amount of WIC women that acquire PNVs through a prescription. Because women have access to prescriptions through health care, the significant uptake in PNV use from 10 years ago could be a reflection on the increased availability of health care. Obtaining prescription PNVs may also increase adherence to PNVs and increase awareness of the importance of PNVs. Overall, health care providers should focus on educating patients and providing the best resources to reach optimal vitamin and mineral intake during pregnancy for both the health of the mother and the baby.¹⁵ For future research implications, it would be interesting to see research surrounding micronutrient intake and diet quality in combination with PNV use.

BIBLIOGRAPHY

1. Saldanha LG, Dwyer JT, Andrews KW, et al. Is Nutrient Content and Other Label Information for Prescription Prenatal Supplements Different from Nonprescription Products? *Journal of the Academy of Nutrition and Dietetics*. 2017. doi:10.1016/j.jand.2017.04.002
2. Zerfu TA, Ayele HT. Micronutrients and pregnancy; Effect of supplementation on pregnancy and pregnancy outcomes: A systematic review. *Nutrition Journal*. 2013. doi:10.1186/1475-2891-12-20
3. Catov JM, Bodnar LM, Olsen J, Olsen S, Nohr EA. Periconceptional multivitamin use and risk of preterm or small-for-gestational-age Births in the Danish National birth cohort. *American Journal of Clinical Nutrition*. 2011. doi:10.3945/ajcn.111.012393
4. Groth SW, Stewart PA, Ossip DJ, Block RC, Wixom N, Fernandez ID. Micronutrient Intake Is Inadequate for a Sample of Pregnant African-American Women. *Journal of the Academy of Nutrition and Dietetics*. 2017;117(4):589-598. doi:10.1016/J.JAND.2016.11.011
5. Perkins A V., Vanderlelie JJ. Multiple micronutrient supplementation and birth outcomes: The potential importance of selenium. *Placenta*. 2016. doi:10.1016/j.placenta.2016.02.007
6. Tessema J, Jefferds ME, Cogswell M, Carlton E. Motivators and Barriers to Prenatal Supplement Use among Minority Women in the United States. *Journal of the American Dietetic Association*. 2009. doi:10.1016/j.jada.2008.10.013
7. Masho SW, Bassyouni A, Cha S. Pre-pregnancy obesity and non-adherence to multivitamin use: Findings from the National Pregnancy Risk Assessment Monitoring System (2009-2011). *BMC Pregnancy and Childbirth*. 2016. doi:10.1186/s12884-016-1002-0
8. USDA. Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). <https://www.fns.usda.gov/wic/women-infants-and-children>.
9. Hanna, Kim, Monteiro, Karine, Cooper, Tara, Viner-Brown, Samara, Weber A. 2018 Rhode Island Pregnancy Risk Assessment Monitoring System Data Book. 2018. <https://health.ri.gov/publications/databooks/2018PregnancyRiskAssessmentMonitoringSystem.pdf>.
10. Koukouli S, Vlachonikolis IG, Philalithis A. Socio-demographic factors and self-reported functional status: The significance of social support. *BMC Health Services Research*. 2002. doi:10.1186/1472-6963-2-1

11. Hager ER, Quigg AM, Black MM, et al. Development and validity of a 2-item screen to identify families at risk for food insecurity. *Pediatrics*. 2010. doi:10.1542/peds.2009-3146
12. Inappropriate Nutrition Practices for Women. 2009;(15):1-7.
13. Sfakianaki AK. Prenatal vitamins- A review of the literature on benefits and risks of various nutrient supplements. *Formulary*. 2013.
14. Richard K, Holland O, Landers K, et al. Review: Effects of maternal micronutrient supplementation on placental function. *Placenta*. 2017. doi:10.1016/j.placenta.2016.12.022
15. Freeman MP, Sosinsky AZ, Moustafa D, Viguera AC, Cohen LS. Supplement use by women during pregnancy: data from the Massachusetts General Hospital National Pregnancy Registry for Atypical Antipsychotics. *Archives of Women's Mental Health*. 2016. doi:10.1007/s00737-015-0586-0
16. Haider BA, Bhutta ZA. Multiple-micronutrient supplementation for women during pregnancy. *Cochrane Database of Systematic Reviews*. 2017. doi:10.1002/14651858.CD004905.pub5
17. Biesalski Hans K, Jana T. Micronutrients in the life cycle: Requirements and sufficient supply. *NFS Journal*. 2018. doi:10.1016/j.nfs.2018.03.001
18. Brownell M, Nickel NC, Chartier M, et al. An unconditional prenatal income supplement reduces population inequities in birth outcomes. *Health Affairs*. 2018. doi:10.1377/hlthaff.2017.1290
19. Thomas Berube L, Messito MJ, Woolf K, Deierlein A, Gross R. Correlates of Prenatal Diet Quality in Low-Income Hispanic Women. *Journal of the Academy of Nutrition and Dietetics*. 2019. doi:10.1016/j.jand.2019.02.004
20. WIC Program Nutrition Education Guidance. https://web.archive.org/web/20161213174058/https://wicworks.fns.usda.gov/wicworks/Learning_Center/ntredguidance.pdf.

Table 1: Characteristics of WIC and Non-WIC Pregnant Women in Rhode Island between August 2019 and October 2019

Characteristics	WIC Participation n=59 Mean(SD) or n (%)	Non-WIC Participation n=37 Mean(SD) or n (%)	Pearson Chi- Square
Maternal Age, yrs	25.9(5.1)	28.2(4.6)	0.150 ¹
Gestational Age, wks	22.9(8.7)	25.41(10.7)	0.372 ¹
First Pregnancy	21 (36%)	15 (41%)	
<i>Race</i>			12.070*
African American	6 (10%)	0 (0%)	
Native American	2 (3%)	1 (3%)	
Asian/Pacific Islander	2 (3%)	0 (0%)	
White	30 (51%)	32 (87%)	
Other	11 (19%)	2 (5%)	
<i>Ethnicity</i>			9.703**
Hispanic	28 (47%)	6 (16%)	
Non-Hispanic	31 (53%)	31 (84%)	
<i>Marital Status</i>			6.933
Married or domestic partnership	23 (39%)	24 (65%)	
Single, never married	32 (56%)	11 (30%)	
Other or No response*	3 (5%)	2 (5%)	
<i>Education</i>			32.796***
No school completed, Or some high school, no diploma	12 (20%)	4 (11%)	

High School Diploma or equivalent (GED)	25 (42%)	4 (11%)	
Some college, no degree or Associates degree	17 (29%)	7 (19%)	
Bachelor's degree or above	4 (7%)	22 (59%)	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1. T-test used
2. Other/no response category includes widowed, divorced, separated, other and no response

Table 2: PNV use by WIC and Non-WIC Pregnant Women in Rhode Island between August 2019 and October 2019

	WIC Participation n=59 n (%)	Non-WIC Participation n=37 n (%)	Chi Square P Value
MVI use 3 months prior to pregnancy	27 (56%)	18 (47%)	0.076
PNV Use	54 (92%)	34 (92%)	0.180
PNV use at any point during pregnancy	57 (97%)	36 (97%)	0.105
<i>Frequency of PNV use</i>			2.966
(1-4x/wk)	10/59 (17%)	3 (8%)	
(5-7x/wk)	36 (61%)	29 (78%)	
(More than 7x/wk)	4 (7%)	1 (3%)	
<i>Form of PNV</i>			3.193
Pill	39 (66%)	30 (81%)	
Chewable	3 (5%)	1 (3%)	
Gummy	12 (20%)	3 (8%)	
<i>Prescribed</i>			11.715**
Yes	31 (53%)	9 (24%)	
No	20 (34%)	25 (68%)	
Unsure	3 (5%)	0 (0%)	

****p<0.01**

**Table 3: Food Security by WIC and Non-WIC Pregnant Women in Rhode Island
between August 2019 and October 2019**

Question 1: “I was worried whether food would run out before I/we got money to buy more. Was this often, sometimes, or never true for (you/your household in the last 12 months?”

Question 2: “The food (I/we) bought did not last and we did not have money to buy more. Was this often, sometimes, or never true for (you/your household) in the last 12 months?”

	WIC Participation n=59 n (%)	Non-WIC Participation n=37 n (%)	Pearson Chi Square
<i>Food Security Q1</i>			10.658**
Often True	10 (17%)	0 (0%)	
Sometimes true	23 (39%)	10 (27%)	
Never true	26 (44%)	27 (73%)	
<i>Food Security Q2</i>			8.980*
Often True	7 (12%)	0 (0%)	
Sometimes true	22 (37%)	8 (22%)	
Never true	30 (51%)	29 (78%)	

*p<0.05, ** p<0.01, ***p<0.001

Appendix A: REVIEW OF LITERATURE

Introduction

Use of prenatal vitamins (PNVs) in pregnant women can improve maternal nutrition status and decrease the risk of adverse birth outcomes such as preterm birth, low birth weight, long-term cognitive development, cardio-metabolic disease, and potential mortality.¹⁻³ Therefore, clinicians recommend PNVs to meet micronutrient requirements during pregnancy.⁴

PNVs are a combination of vitamins and minerals that help facilitate the process of receiving adequate nutrition during pregnancy.⁵ Some populations may be at risk for poor PNV use. Previous studies conducted about 1 decade ago show poor PNV use in low income women, African American women, and Hispanic women compared to higher income women and white women.^{6,7} Other studies showed that PNV use was higher in women who have higher education levels and also higher in women that are married or in a domestic partnership compared to single or divorced women.⁶

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is a federally funded supplemental nutrition program for low-income, nutritionally at-risk pregnant women, breastfeeding women, and non-breastfeeding postpartum women.⁸ This program is available in all 50 states. The women in this program receive nutrition education, supplemental foods, and information on the benefits of breastfeeding promotion and support, and other referrals to optimize health care. In order to participate in this program, there is a strict income eligibility requirement based on the number of participants in the household and annual, monthly, twice-monthly, and bi-weekly incomes. These women receive nutrition

education, but they are not prescribed PNV through WIC. Interestingly enough, there are no studies conducted on PNV use in WIC participants. We are interested in seeing the prevalence of women consuming any type of PNV during pregnancy and if they differ between women participating in WIC and women not participating in WIC in the state of Rhode Island.

The Rhode Island Department of Health (DOH) conducts surveys every year called the Pregnancy Risk Assessment Monitoring System (PRAMS) that determine daily multivitamin (MVI) use 1 month prior to pregnancy.⁹ The survey asks how many times women take a MVI, PNV, or folic acid supplement the month before they conceived, while also measuring sociodemographic characteristics and if they participate in WIC. They found that in 2015, 36.8% of women took a daily MVI one month prior to pregnancy. The data showed mothers that were older than 30 years old, white (non-Hispanic), married, has 12 or more years of education, has private health insurance, and did not participate in WIC were more likely to take a MVI one month prior to pregnancy.⁹ Although Rhode Island collects this information and formulates the data on these pregnant women that live in Rhode Island, they do not measure actual prenatal vitamin use during pregnancy.

It is important to look at the comparison between WIC and non-WIC populations in Rhode Island since PRAM studies found a difference in MVI/PNV use one month prior to pregnancy between women that participate in WIC and women that do not participate in WIC. We are exploring if WIC women are still less likely to consume PNVs during pregnancy than non-WIC women. Because WIC women are classified as having a low income, they may not be able to afford PNVs which would

also be consistent with previous research showing that low-income women are less likely to consume PNVs. By potentially identifying low-income women who are unable to obtain PNVs due to cost, communities and physicians could provide or supplement PNVs to help women meet their daily micronutrient requirements during pregnancy.

The objective of this cross-sectional study was to assess the prevalence of PNV intake based on a sample of pregnant WIC and non-WIC women in the state of Rhode Island and explore if WIC participants ability to buy PNVs is impacted due to their low socioeconomic status. We hypothesized that women participating in WIC were less likely to consume PNV compared to women that do not participate in WIC.

Micronutrient Deficiencies in Pregnancy

Micronutrients are vitamins and minerals that are necessary in the human body for proper functioning, growth and development.¹⁶ Multiple micronutrient deficiencies exist in pregnant women globally, leading to adverse maternal and infant outcomes.^{1,16} These deficiencies are a form of undernutrition among pregnant women and many major risk factors are associated with deficiencies including preeclampsia, preterm delivery, poor placenta function, gestational diabetes, and low birth weight babies.^{14,17} Micronutrients are essential during pregnancy to assist in cellular metabolism, provide optimal tissue function and growth, and be involved in enzyme and hormone production.¹⁴ Groth's research found that adequate micronutrient intake is critical for fetal development, positive pregnancy outcomes, prevention of birth defects, preterm birth, and neural tube defects.⁴

Deficiencies in micronutrients such as folate, iron, zinc, vitamins A, B6, B12, C, E and riboflavin are highly prevalent among pregnant women.² For example, according to data reviewed in the 2015-2020 Dietary Guidelines for Americans, dietary intakes from food alone among pregnant women was 24% below the Estimated Average Requirement (EAR) for calcium, 26% below for vitamin A, 29% for folate, 30% for vitamin C, 90% for vitamin D, 94% for vitamin E, and 96% for iron.¹ One study in Hackney, London showed that 78% of women that gave birth to a low birth weight baby had poor nutrition, and inadequate consumption of micronutrients, only meeting less than 4 of 16 dietary reference intake values.¹⁷

There are many reasons why certain micronutrients are needed during pregnancy, as it plays a role in the physiological change in the body, decreases risk for adverse birth outcomes, and impacts long-term cognitive and mental development in the offspring.¹⁸ Some primary nutrients include: iron, iodine, selenium, zinc, folate, vitamin D, and vitamin A. Iron is an extremely common micronutrient deficiency among pregnant women, and is needed to support fetal development and anemia risk with advanced gestation.¹⁴ Iodine deficiency during pregnancy is the number one preventable cause of brain damage and mental retardation in newborns and is important for synthesizing thyroid hormones during pregnancy.¹⁴ Maternal selenium deficiency can lead to miscarriage, preeclampsia, intrauterine growth restriction (IUGR), and preterm birth. Selenium deficiency during pregnancy can also create disorders in the infant including cardiac myopathy, muscular dystrophy, impaired thyroid metabolism, and abnormal neurological disorders. Zinc is involved in carbohydrate metabolism, protein metabolism, nucleic acid synthesis, and cell

differentiation. Folate deficiency during pregnancy can cause congenital malformations such as neural tube defects (NTD).¹⁴ Pregnant women with maternal vitamin D deficiency can lead to poor fetal brain development, diabetes, fetal hypocalcemia and rickets in a newborn.¹⁷ Vitamin A assists in lung function and deficiency can lead to broncho-pulmonary diseases in a newborn. Overall, each micronutrient contributes to positive health for both the mother and the baby.

Populations at risk for micronutrient deficiencies

Although micronutrients are critical for fetal development, there are some populations that are at risk for micronutrient deficiencies and inadequate intake of PNVs according to prior research studies. The populations at risk for poor supplement use include low income women and certain races or ethnicities.^{6,7} In a study measuring diet quality among low-income pregnant Hispanic women, diet quality was suboptimal, and women were not meeting the recommended 2015-2020 Dietary Guidelines for Americans, with apparent disparities between race, ethnicity, and socioeconomic status.¹⁹

Women with a low socioeconomic status tend to have adverse birth outcomes such as preterm birth and low-birthweight babies compared to women with a higher socioeconomic status with one of the factors relating to poor nutritional intake and poor access to prenatal care.¹⁸ One study conducted shed light on income affecting prenatal nutrition and birth outcomes overall. This research showed that low-income women that received 64 supplemental dollars per month in the 2nd and 3rd trimester through a program called “The Healthy Baby Prenatal Benefit” were less likely to

have low birth weight babies and preterm births.¹⁸ The group that did not receive the supplemental dollars had more adverse birth outcomes such as preterm birth and low birth weight babies. The research believes that women who were supplemented with money each month were more likely to afford prenatal nutrition care, although what the women did with the supplemental dollars was not measured.¹⁸ Although this article does not discuss prenatal vitamins, women with the supplemental dollars could have used that money to buy PNVs and obtain the appropriate micronutrient amounts their body needs for a healthy pregnancy.

PNV use and populations at risk for poor intake

PNVs contain vitamins and minerals that are tailored to fit the increased needs of the pregnant population due to the rapid physiological change that occurs in pregnancy.¹³ PNV supplementation allows women to compensate for any nutrients that may be low or missing in their diet, given that micronutrient requirements during pregnancy are increased.

Masho and colleagues conducted a study investigating multivitamin use one month prior to pregnancy.⁷ This study found that more than half of women (55%) did not take any multivitamin (MVI) pre-pregnancy and only 30% of women showed a daily intake of MVI pre-pregnancy. From this data, Masho divided these intakes between demographic subgroups and found that MVI intake was strongly associated with socio-demographic characteristics of the women such as marital status, income, race, age, and ethnicity.⁷ This study shows that there is a significant difference associated with sociodemographic characteristics including socioeconomic status.

In 2009, Tessema and colleagues found that 52% of non-Hispanic black women were inconsistent users of PNVs and 52% of Hispanic women were inconsistent users, showing that more than half of these populations report inadequate use of PNVs.⁶ However, no further research has been conducted since 2009 regarding PNV use comparing demographic subgroups. Given this knowledge gap in literature, secondary evaluation of PNV use across racial and ethnic subgroups shed light on how disparity has changed over the last decade.

Consistent with research showing low income women are more likely to have poor maternal nutrition, studies have shown that socioeconomic status is a factor in consuming PNV.⁶ Low-income women are more likely to be inconsistent users of PNVs than higher income women. Women with an income of less than \$25,000 per year were at a high risk for inconsistent PNV use, more specifically, 68% of women reported inconsistent use. With women who had a household income of \$25,000 - \$50,000, only 43% were inconsistent users, a 24% difference between the two income categories.⁶

One study conducted in 2011 showed that women who take supplemental vitamins and minerals in the form of a MVI showed a reduced risk in adverse birth outcomes such as preterm birth and fetal growth restriction.³ In this study, only 60.7% of women reported PNV use. Of those 60.7%, they were more likely to have a low socio-occupational status meaning that they were unemployed or unskilled workers. This study also showed periconceptional multivitamin use was associated with reduced risk of preterm birth and more prominently, small for gestational age.³ Another study conducted in 2013 showed MVI use during pregnancy reduces the

incidence of small for gestational age infants specifically in low-income women, suggesting that that income plays a role in PNV consumption.¹³

Prescription vs. Nonprescription PNVs

PNVs differ between prescription and non-prescription products in composition and dosing of nutrients.¹ A study conducted in 2016 looked the labeling content to determine the difference between prescription and nonprescription prenatal supplements. Prescription products had less vitamins and minerals compared to nonprescription products including Vitamin A, vitamin D, iodine, and calcium. However, they did find that folic acid was higher in prescription products, and iron, zinc, and DHA were very similar in both prescription and nonprescription. In addition, nonprescription PNVs contained more botanical ingredients and probiotics. Interestingly enough, 17% of prescription PNVs contained a stool softener, while nonprescription PNVs did not. Overall, health care providers should be focusing on the patients diet to determine the appropriate PNV to ensure the patient is obtaining the correct nutrient amount in their body.¹

Special Supplemental Nutrition Program for Women, Infants, and Children

Federal food assistance programs such as the Supplemental Nutrition Program for Women, Infants, and Children, are an important source of healthy food for low-income populations.⁸ WIC is a national public health nutrition program that supplements nutritious foods, provides nutrition education and counseling, and screening and referrals to other health, welfare, and social services.⁶ The target

population at WIC is low-income, nutritionally at-risk pregnant women, breastfeeding women, non-breastfeeding postpartum women (up to 6 months after birth of infant), infants up to first birthday, and children up to their 5th birthday. The goal of WIC nutrition education services is to strengthen nutrition education, adopt a more behavioral approach to nutrition education, be client oriented, and focus on healthy behaviors for life.⁸ Although nutrition education is delivered at WIC appointments, PNVs are not supplemented. Updated on January 25th, 2017, the federal guidelines for nutritional education for WIC specifically states that nutrition education is 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.²⁰ The goal for WIC is to educate in obtaining a healthy diet through nutritious foods rather than offering PNVs to supplement the missing micronutrients in their diet. WIC offices typically do not supplement PNVs or offer them in their clinic. There is data lacking on PNV use in WIC participants. Understanding if women that participate in WIC are at a high risk for poor use of PNV can help the program strive to perform maximum education or budget ways to include PNVs to distribute to the women who participate in WIC.

Barriers to Prenatal Vitamin Intake

Common barriers to women consuming PNVs include adverse effects, poor communication from health care providers, skepticism toward the benefits, busy lifestyle, non-adherence, and bad taste.⁶ Descriptions of adverse side effects of bad taste include gagging, nausea, emesis, general sickness, constipation.⁶ In a study of

non-Hispanic black women, many women expressed reluctance to take medicines prophylactically or said they experience difficulty taking any pills and requested the pill be in an alternate form such as liquid, patch, injection, shake/smoothie, or a sweetened, chewable pill.⁶ Lastly, many that reported poor use of PNVs had limited understanding of the purpose of vitamins and minerals in PNVs and how they relate to the development and growth of the fetus.⁶ Therefore, there should be more communication from health care providers about the positive impact of PNV use during pregnancy.

BIBLIOGRAPHY

1. Saldanha LG, Dwyer JT, Andrews KW, et al. Is Nutrient Content and Other Label Information for Prescription Prenatal Supplements Different from Nonprescription Products? *Journal of the Academy of Nutrition and Dietetics*. 2017. doi:10.1016/j.jand.2017.04.002
2. Zerfu TA, Ayele HT. Micronutrients and pregnancy; Effect of supplementation on pregnancy and pregnancy outcomes: A systematic review. *Nutrition Journal*. 2013. doi:10.1186/1475-2891-12-20
3. Catov JM, Bodnar LM, Olsen J, Olsen S, Nohr EA. Periconceptional multivitamin use and risk of preterm or small-for-gestational-age Births in the Danish National birth cohort. *American Journal of Clinical Nutrition*. 2011. doi:10.3945/ajcn.111.012393
4. Groth SW, Stewart PA, Ossip DJ, Block RC, Wixom N, Fernandez ID. Micronutrient Intake Is Inadequate for a Sample of Pregnant African-American Women. *Journal of the Academy of Nutrition and Dietetics*. 2017;117(4):589-598. doi:10.1016/J.JAND.2016.11.011
5. Perkins A V., Vanderlelie JJ. Multiple micronutrient supplementation and birth outcomes: The potential importance of selenium. *Placenta*. 2016. doi:10.1016/j.placenta.2016.02.007
6. Tessema J, Jefferds ME, Cogswell M, Carlton E. Motivators and Barriers to Prenatal Supplement Use among Minority Women in the United States. *Journal of the American Dietetic Association*. 2009. doi:10.1016/j.jada.2008.10.013
7. Masho SW, Bassyouni A, Cha S. Pre-pregnancy obesity and non-adherence to multivitamin use: Findings from the National Pregnancy Risk Assessment Monitoring System (2009-2011). *BMC Pregnancy and Childbirth*. 2016. doi:10.1186/s12884-016-1002-0
8. USDA. Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). <https://www.fns.usda.gov/wic/women-infants-and-children>.
9. Hanna, Kim, Monteiro, Karine, Cooper, Tara, Viner-Brown, Samara, Weber A. 2018 Rhode Island Pregnancy Risk Assessment Monitoring System Data Book. 2018. <https://health.ri.gov/publications/databooks/2018PregnancyRiskAssessmentMonitoringSystem.pdf>.
10. Koukouli S, Vlachonikolis IG, Philalithis A. Socio-demographic factors and self-reported functional status: The significance of social support. *BMC Health Services Research*. 2002. doi:10.1186/1472-6963-2-1

11. Hager ER, Quigg AM, Black MM, et al. Development and validity of a 2-item screen to identify families at risk for food insecurity. *Pediatrics*. 2010. doi:10.1542/peds.2009-3146
12. Inappropriate Nutrition Practices for Women. 2009;(15):1-7.
13. Sfakianaki AK. Prenatal vitamins- A review of the literature on benefits and risks of various nutrient supplements. *Formulary*. 2013.
14. Richard K, Holland O, Landers K, et al. Review: Effects of maternal micronutrient supplementation on placental function. *Placenta*. 2017. doi:10.1016/j.placenta.2016.12.022
15. Freeman MP, Sosinsky AZ, Moustafa D, Viguera AC, Cohen LS. Supplement use by women during pregnancy: data from the Massachusetts General Hospital National Pregnancy Registry for Atypical Antipsychotics. *Archives of Women's Mental Health*. 2016. doi:10.1007/s00737-015-0586-0
16. Haider BA, Bhutta ZA. Multiple-micronutrient supplementation for women during pregnancy. *Cochrane Database of Systematic Reviews*. 2017. doi:10.1002/14651858.CD004905.pub5
17. Biesalski Hans K, Jana T. Micronutrients in the life cycle: Requirements and sufficient supply. *NFS Journal*. 2018. doi:10.1016/j.nfs.2018.03.001
18. Brownell M, Nickel NC, Chartier M, et al. An unconditional prenatal income supplement reduces population inequities in birth outcomes. *Health Affairs*. 2018. doi:10.1377/hlthaff.2017.1290
19. Thomas Berube L, Messito MJ, Woolf K, Deierlein A, Gross R. Correlates of Prenatal Diet Quality in Low-Income Hispanic Women. *Journal of the Academy of Nutrition and Dietetics*. 2019. doi:10.1016/j.jand.2019.02.004
20. WIC Program Nutrition Education Guidance. https://web.archive.org/web/20161213174058/https://wicworks.fns.usda.gov/wicworks/Learning_Center/ntredguidance.pdf.

Appendix B



*The University of Rhode
Island*

Research Study

**Are you interested in receiving a
\$5.00 Amazon Gift Card?**

**Are you currently pregnant and at
least 18 years old?**

**Dr. Brietta Oaks and Allisa Georgio
would like you
to participate in a survey about
prenatal vitamin intake in pregnant women.
The survey will only take 5-10 minutes of your
time.**

If you are interested,
please email
Allisa Georgio at
Allisa_Georgio@my.uri.edu

This
research has been
approved by the
University of Rhode
Island Institutional
Review Board.

APPENDIX C

THE
UNIVERSITY
OF RHODE ISLAND

IRB
Exempt Consent

Dr. Brietta Oaks
Nutrition and Food Sciences
Examining the use of prenatal vitamins according to Women, Infants, and Children (WIC) participation.

You are being asked to take part in a research study. The purpose of the research study is to examine the use of prenatal vitamins among pregnant women in Rhode Island. Please read the following before agreeing to be in the study. If you agree to be in this study, it will take you approximately *5-10 minutes* to complete this survey. Questions will be asked about prenatal vitamin use, sociodemographic characteristics, and food security. There are no known risks to participating in this study. You will be compensated with a 5-dollar Amazon gift card for participating in this study.

Your responses will be strictly anonymous. The responses may be used in a research paper.

The decision to participate in this study is entirely up to you. You may refuse to take part in the study at any time without affecting your relationship with the investigators of this study or the University of Rhode Island (URI). Your decision will not result in any loss of benefits to which you are otherwise entitled. You have the right not to answer any single question, as well as to withdraw completely from the survey at any point during the process; additionally, you have the right to request that the researchers not use any of your responses.

You have the right to ask questions about this research study and to have those questions answered by me before, during or after the research. If you have questions about the study, at any time feel free to contact Dr. Brietta Oaks from the Department of Nutrition and Food Sciences at the University of Rhode Island (URI) at 401-874-4021.

Additionally, you may contact the URI Institutional Review Board (IRB) if you have questions regarding your rights as a research participant. Also contact the IRB if you have questions, complaints or concerns which you do not feel you can discuss with the investigator. The University of Rhode Island IRB may be reached by phone at (401) 874-4328 or by e-mail at researchintegrity@etal.uri.edu. You may also contact the URI Vice President for Research and Economic Development by phone at (401) 874-4576.

Keep a copy of this document for your records. You may also contact the researcher to request a copy. By completing the survey, you indicate that you have read and understood the above and volunteer to participate in this study.

APPENDIX D

Research Survey

Congratulations on your pregnancy and thank you for agreeing to participate in this survey. We are interested in learning a little bit more about you and your diet during pregnancy. Please answer all of the questions to the best of your ability. Answer a question by circling the correct answer. If you do not know the answer to a question, or would prefer not to answer, please just skip to the next question.
Thank you.

How many weeks pregnant are you?

Is this your first pregnancy?

Yes

No

Were you taking any multivitamins or prenatal vitamins in the 3 months prior to your pregnancy?

Yes

No

Unsure

Have you taken a prenatal vitamin at any point during this pregnancy?

Yes

No

Unsure

Are you currently taking any prenatal vitamins?

Yes

No

Unsure

If you answered no to question number 5, please skip to question number 10. If you answered yes to question number 5, please answer the questions below.

6. How often do you take prenatal vitamins?
 - a. 1 to 4 times per week
 - b. 5 to 7 times per week
 - c. More than 7 times per week
 - d. Other _____

7. What is the brand name of your prenatal vitamin? (Some common brands include NatureMade, One A day, CVS, PreNatal, Vitafusion, Alive!)
- a. _____
8. In what form do you take your prenatal vitamin?
- Pill
 - Chewable
 - Gummy
 - Other
9. Is your prenatal vitamin prescription or non-prescription?
- Prescription
 - Non-Prescription
 - I am unsure if my prenatal vitamin is prescription or non-prescription
10. If you do not take a prenatal vitamin, what is the reason for it? (Check all that apply)
- Cost
 - Side effects such as nausea, vomiting, or general sickness
 - Difficulty swallowing the pill
 - Bad taste
 - Bad smell
 - Difficulty remembering to take it
 - Other _____
11. Are you currently participating in the Women, Infants, and Children (WIC) program?
- Yes
 - No
12. Are you currently participating in the Supplemental Nutrition Assistance Program (SNAP)?
- Yes
 - No
13. Has anyone recommended that you take prenatal vitamins?
- Yes
 - No
14. If yes, who has recommended that you take prenatal vitamins?

- a. Doctor
- b. Dietitian or Nutritionist
- c. Friend
- d. Parent
- e. Spouse
- f. Other _____

Please answer the following questions regarding socio-demographic characteristics.

15. Are you Hispanic Or Latino?

- a. Yes
- b. No

16. Please specify your race.

- a. African American
- b. Native American
- c. Asian / Pacific Islander
- d. White
- e. Other _____

17. How old are you?

- a. _____

18. What is your marital status?

- a. Married or domestic partnership
- b. Widowed
- c. Divorced
- d. Single, never married
- e. Separated
- f. Other

19. What is the highest degree or level of school you have completed?

- a. No school completed
- b. Some high school, no diploma
- c. High school diploma or equivalent (for example: GED)
- d. Some college, no degree
- e. Associate degree
- f. Bachelor's degree
- g. Master's degree or above

Please read the questions below and specify often true, sometimes true, or never true.

20. *I was worried whether food would run out before (I/we) got money to buy more.* Was this often, sometimes, or never true for (you/your household) in the last 12 months?
- Often true
 - Sometimes true
 - Never true
21. *The food (I/we) bought did not last and we did not have money to buy more.* Was this often, sometimes, or never true for (you/your household) in the last 12 months?
- Often true
 - Sometimes true
 - Never true

Thank you for your time.

APPENDIX E

THE
UNIVERSITY
OF RHODE ISLAND

IRB
Exempt Consent
Spanish Version

Dr. Brietta Oaks
Nutrition and Food Sciences
Examining the use of prenatal vitamins according to Women, Infants, and Children (WIC) participation.

Se le está pidiendo participar en un estudio de investigación. El propósito de este estudio de investigación es examinar el uso de vitaminas prenatales entre mujeres embarazadas en Rhode Island. Por favor lea lo siguiente antes de aceptar estar en el estudio. Si acepta estar en este estudio, le tomará aproximadamente *5-10 minutos* para completar esta encuesta. Se le harán preguntas sobre el uso de vitaminas prenatales, características sociodemográficas y seguridad alimentaria. No hay riesgos conocidos por participar en este estudio. Se le compensará con una tarjeta de regalo de 5 dólares de Amazon por participar en este estudio.

Sus respuestas serán estrictamente anónimas. Las respuestas pueden ser utilizadas en un trabajo de investigación.

La decisión de participar en este estudio es totalmente suya. Usted puede reusarse a tomar parte en el estudio en cualquier momento sin afectar su relación con los investigadores de este estudio o la Universidad de Rhode Island (URI). Su decisión no resultará en la pérdida de los beneficios a los que usted tiene derecho. Tiene el derecho de no responder cualquier pregunta, así como de retirarse por completo de la encuesta a cualquier momento durante el proceso; además, tiene el derecho a solicitar que los investigadores no utilicen ninguna de sus respuestas.

Usted tiene el derecho de hacer preguntas sobre este estudio de investigación y de que yo las responda antes, durante o después de la investigación. Si tiene preguntas sobre el estudio, no dude en contactar en cualquier momento a Brietta Oaks del Departamento de Nutrición y Ciencia de los Alimentos en la Universidad de Rhode Island (URI) al 401-874-4021.

Adicionalmente, puede comunicarse con la Junta de Revisión Institucional de URI (URI Institutional Review Board (IRB)) si usted tiene preguntas sobre sus derechos como participante. También comuníquese con el IRB si tiene preguntas, quejas o inquietudes de las cuales considere que no pueda discutir con el investigador. Puede comunicarse con el IRB de la Universidad de Rhode Island por teléfono al (401) 874-4328 o por correo electrónico (e-mail) al researchintegrity@etal.uri.edu. También puede comunicarse con el Vicepresidente de Investigación y Desarrollo Económico de URI por teléfono al (401) 874-4576.

Ejemplo 1 (Encuesta anónima en línea): Si desea conservar una copia de este documento para sus registros, por favor imprima o guarde esta página ahora mismo. También puede comunicarse con la investigadora para solicitar una copia.

Al darle clic a continuación para ser llevada a la encuesta, usted ha indicado que ha leído y comprendido lo anterior y se ofrece como voluntario para participar en este estudio.

APPENDIX F

Encuesta de Investigación

Felicidades por su embarazo y gracias por aceptar participar en esta encuesta. Estamos interesados en conocer un poco más sobre usted y su dieta durante el embarazo.

Por favor responda a todas las preguntas lo mejor que pueda. Responda cada pregunta circulando la respuesta correcta. Si no sabe la respuesta a una pregunta, o prefiere no contestar, por favor solo salte a la siguiente pregunta. Gracias.

1. ¿Cuántas semanas de embarazo tiene?

2. ¿Este es su primer embarazo?

Sí

No

3. ¿Estuvo tomando algún multivitamínico o vitaminas prenatales en los 3 meses previos a su embarazo?

a. Sí

b. No

c. No estoy segura

4. ¿Ha tomado vitaminas prenatales en algún punto durante este embarazo?

a. Sí

b. No

c. No estoy segura

5. ¿Actualmente está tomando algunas vitaminas prenatales?

a. Sí

b. No

c. No estoy segura

***Si contestó que no a la pregunta número 5, por favor salte a la pregunta número 10.
Si contesto que sí a la pregunta número 5, por favor conteste las siguientes preguntas.***

6. ¿Con que frecuencia toma vitaminas prenatales?

d. 1 a 4 veces a la semana

e. 5 a 7 veces a la semana

f. Más de 7 veces a la semana

g. Otra _____

7. ¿Cuál es la marca de sus vitaminas prenatales? (Algunas marcas comunes incluyen NatureMade, One A day, CVS, PreNatal, Vitafusion, Alive!)

- a. _____
8. ¿En qué forma toma sus vitaminas prenatales?
- Píldora
 - Masticable
 - Gomita
 - Otra
9. ¿Sus vitaminas prenatales son de prescripción o sin prescripción?
- Prescripción
 - Sin prescripción
 - No estoy segura si mis vitaminas prenatales son de prescripción o sin prescripción
10. ¿Si no toma vitaminas prenatales, cual es la razón? (Marque todas las que apliquen)
- Costo
 - Efectos secundarios como náusea, vómito o mal estado general
 - Dificultad para tragar la píldora
 - Mal sabor
 - Mal olor
 - Dificultad para recordar tomarla
 - Otra _____
11. ¿Está actualmente participando en el programa de Women, Infants, and Children (WIC)?
- Sí
 - No
12. ¿Está actualmente participando en el programa Supplemental Nutrition Assistance Program (SNAP)?
- Sí
 - No
13. ¿Alguien le ha recomendado tomar vitaminas prenatales?
- Sí
 - No
14. Si la respuesta es sí, ¿quién le ha recomendado tomar vitaminas prenatales?
- Doctor
 - Dietista o Nutricionista
 - Amiga/o
 - Madre/Padre
 - Pareja

f. Otro _____

Por favor responda las siguientes preguntas respecto a características sociodemográficas.

15. ¿Es usted Hispana o Latina?

- a. Sí
- b. No

16. Por favor especifique su raza.

- a. Afroamericano
- b. Americano Nativo
- c. Asiático / Isleño Pacífico
- d. Blanco
- e. Otro _____

17. ¿Qué edad tiene?

- a. _____

18. ¿Cuál es su estado marital?

- a. Casada o asociación doméstica
- b. Viuda
- c. Divorciada
- d. Soltera, nunca casada
- e. Separada
- f. Otro

19. ¿Cuál es su título o nivel de escuela más alto que ha completado?

- a. Sin escuela completa
- b. Algo de preparatoria, sin diploma
- c. Diploma de escuela preparatoria/secundaria o equivalente (por ejemplo: GED)
- d. Algo de universidad, sin título
- e. Título de preparación universitaria básica/título de asociado
- f. Licenciatura
- g. Maestría o más alto

Por favor lea las siguientes preguntas y especifique si es a menudo cierto, a veces cierto o nunca cierto.

20. *Estaba preocupada de que se acabara la comida antes de que (yo/nosotros) tuviéramos dinero para comprar más. ¿Era esto a menudo, a veces o nunca cierto para (usted/su casa) en los últimos 12 meses?*

- a. A menudo cierto
- b. A veces cierto
- c. Nunca cierto

21. *Los alimentos que (yo/nosotros) compramos no duraron mucho tiempo y no tuvimos dinero para comprar más. ¿Era esto a menudo, a veces o nunca cierto para (usted/su casa) en los últimos 12 meses?*

- a. A menudo cierto
- b. A veces cierto
- c. Nunca cierto

Gracias por su tiempo.