

Do Pregnant Women Perceive Being Counseled About Nutrition by Healthcare Providers?

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Abstract

BACKGROUND: The American Academy of Nutrition and Dietetics identifies a balanced diet and appropriate weight gain as two important components of a healthy pregnancy. The aim of this study was to examine whether or not a population of pregnant women perceived being counseled by their provider about nutrition during their pregnancy. This study expands on the current literature by examining postpartum women's perception of counseling throughout their pregnancy.

METHODS: We conducted an anonymous, voluntary survey using online software for women who had recently given birth and were less than two-weeks postpartum. Each participant completed a 27-item survey using REDCap (Research Electronic Data Capture) software via email. Discrete variables were analyzed using Chi-square or Fisher's exact test. Analyses were carried out using R statistical software. Differences were considered statistically significant at $p < 0.05$.

RESULTS: Of 201 postpartum women surveyed, 100 (49.8%) perceived receiving nutrition counseling during pregnancy and 101 (50.2%) did not recall receiving nutrition counseling. Of the 101 women who did not perceive receiving counseling, 56% of women reported that they would have liked to receive counseling during pregnancy. There was a statistically significant difference in women reporting receiving preconception nutrition counseling across age, race, education and income level. 41% of women reported feeling "very dissatisfied" about their provider's advice and 36% reported feeling "satisfied."

CONCLUSION: These findings suggest that the majority of women may not be satisfied with nutritional counseling during pregnancy; although this satisfaction may differ among demographics or socioeconomic status. Additional research is needed to determine perceptions of providers' counseling and potential needs in providers' knowledge, skills and attitudes toward nutrition counseling, particularly across different demographic groups and social determinants of health.

Background

Nutrition during pregnancy plays an important role in both maternal and neonatal health (1). The Academy of Nutrition and Dietetics (AND) identifies a balanced diet (e.g. includes vegetables, fruits, dairy, whole grains, and lean protein, with limited added sugar and saturated fat intake) and appropriate weight gain based on pre-pregnancy Body Mass Index (BMI) as being two important components to maintaining a healthy lifestyle during pregnancy (2). The AND recommends following a dietary pattern such as the Mediterranean Diet or the DASH (Dietary Approaches to Stop Hypertension) diet (2). Women should increase their caloric intake by approximately 300 kcal per day throughout pregnancy from food such as protein, fruits, vegetables, and whole grains, with sweets and processed foods kept to a minimum (3). Additionally, the Food and Drug Administration (FDA) 2015 Dietary Guidelines for Americans recommends prenatal supplements including folic acid, iron, and vitamin D before conception and throughout the pregnancy (4). For all micronutrients, it is ideal to meet these needs primarily through food intake, but the use of supplements is recommended as many women do not consume adequate levels of

these micronutrients through food intake. Folic acid supplements taken before conception decrease the risk for neural tube defects in the developing fetus, while deficiencies in folic acid have been associated with megaloblastic anemia during pregnancy (5, 6). Additional birth defects and complications resulting from vitamin deficiencies include congenital rickets and fractures, preterm birth, and preeclampsia (vitamin D), increased mortality rate due to decreased immune function (vitamin A), and cardiovascular risk to the fetus once in adulthood (iron) (1, 5, 6). The AND also advises that certain foods are not to be consumed during pregnancy out of concern for foodborne illness (2). Such foods include “unpasteurized milk and foods made with unpasteurized milk...hot dogs and luncheon meats, raw and undercooked seafood, eggs and meat, refrigerated pâté and meat spreads, and refrigerated smoked seafood” (3). Eating these foods puts women at an increased risk of consuming bacteria and parasites, such as *Listeria monocytogenes*, *Toxoplasma gondii*, *Brucella* species, *Salmonella* species, and *Campylobacter jejuni* which can cause miscarriage, illness, or death of the neonate (2, 7). The FDA and AND state that alcohol should not be consumed during pregnancy due to both behavioral and neurologic effects associated with alcohol consumption during pregnancy. At this time, no safe level of alcohol consumption in pregnancy has been established (2, 4). Per the American College of Obstetrics and Gynecology (ACOG), less than 200 mg of caffeine per day is recommended for pregnant women, as this level has been shown to not increase the risk of miscarriage or preterm birth (8, 9).

Despite these findings and recommendations, results from surveys given to pregnant women have elucidated that women have inadequate knowledge regarding nutrition guidelines to be followed during their pregnancy (10, 11). Lee et al. in 2016 demonstrated that pregnant women surveyed had limited knowledge of the guidelines for healthy eating during pregnancy and that nutrition counseling during pregnancy is infrequent (10). Furthermore, another study found only 56% of women surveyed only during weeks 20–30 of gestation reported receiving healthcare provider advice on nutrition, meaning that there was “a large percentage of women receiving no advice from providers on weight gain, physical activity, or nutrition during pregnancy” (12). Still, pregnant women were found to have both “high levels of motivation and confidence in their ability to achieve a healthy diet and understand dietary recommendations,” and yet “poor adherence to guidelines” (11). There are limited studies that have examined patient and provider perspectives on nutrition counseling, perception of physical activity counseling, patient satisfaction and patient adherence.

Based on the above information, the aim of this study was to determine whether pregnant women felt that they were counseled by their provider at any time during their pregnancy (e.g. beyond the limited 20–30 weeks of gestation) about nutrition counseling. This study also expands on the content of the counseling pregnant women perceived receiving on use of supplements and foods to avoid or restrict at any time during their pregnancy. The third aim of this study was to determine perception of nutrition counseling across demographics and socioeconomic status, including age, ethnicity, Obstetrician-Gynecologist (OBGYN) practice, household income, education level, and marital status. Using an electronic survey sent to a large sample size of women who had recently delivered allowed us to gather data to analyze whether women perceive receiving nutrition counseling during the entirety of pregnancy.

The survey included specific questions regarding common nutritional recommendations during pregnancy to examine what information pregnant women are receiving if they are being counseled.

Methods

Investigators invited postpartum women from ten OBGYN clinics across Prisma Health – Upstate and Prisma Health – Midlands (in Greenville, and Columbia, South Carolina, respectively) to complete an anonymous survey in the years 2020 and 2021 on their perception of the nutrition counseling provided to them by their obstetric healthcare provider during the course of their pregnancy. The target audience of less than two-week postpartum women was used to ensure recall capture from the entire pregnancy timeline. These clinics served Greenville and Richland, SC counties. Greenville county's total population was estimated in 2019 to be 523,523 persons, of which 68.0% were white, 18.4% were Black or African American, 9.5% were Hispanic or Latino, 2.8% were Asian or Pacific Islander, and 1.3% identified as another race (13). Richland county's total population was estimated in 2019 to be 415,759, of which 41.5% were White, 48.7% were Black or African American, 5.3% were Hispanic or Latino, 3.1% were Asian or Pacific Islander, and 1.4% identified as another race (14).

Due to Covid-19 social distancing precautions and restrictions for in-person interviews, investigators sent each participant an email containing a survey invitation. Each participant was invited to participate in a 27-item survey using REDCap software via patient emails obtained from the Prisma Health Office of Patient Experience, Reporting, and Analytics. Surveys were emailed during the timeframe of November of 2020 through May of 2021, for each participant to be completed within two weeks of delivery. The surveys were to be completed within two weeks of each patient's delivery date in order to ensure the recall period was comprehensive and consisted of the entire gestational period, so that researchers could conclude if counseling had been provided at prenatal encounters during any point of the pregnancy.

This study was approved by the Prisma Health Institutional Review Board. Informed consent was obtained for all participants electronically through the "Invitation to Participate in Research Study," the first document that appeared upon opening the electronic survey. The first question of the survey was "Are you interested in participating in the study?" and if the participant selected "yes" as their answer, the rest of the study was then available. Potential risks were identified and disclosed, which include psychological distress if the patient realizes that they did not receive certain nutrition recommendations from their healthcare provider, or loss of confidentiality. Participants were informed that participation was voluntary, that they did not have to answer any question they were not comfortable with, and that they could withdraw from participation at any point. Exclusion criteria for participants were women who did not speak English, and women who gave birth to stillborn infants or infants that required Neonatal Intensive Care Unit (NICU) care. Email addresses were securely provided by the Reporting and Analytics manager through the Prisma Health Office of Patient Experience, Analytics, and Reporting based on delivery records from hospitals around Greenville, South Carolina (SC) and Columbia, SC. This and all pertinent study data was maintained on password protected electronic files, accessed through password-

protected computers to maintain security and confidentiality. All other individual patient data was collected anonymously via the electronic survey and remained confidential as part of this investigation.

The 27-item, predominately multiple-choice survey was developed and validated according to the process described by Zamanzadeh et al, drawing from nationally accepted guidelines for nutrition during pregnancy (2, 4). The development of the survey involved determining the scope of questioning, generating appropriate items for response, instrument formation, revision and consolidation of instruments, and preliminary team consensus. The process also involved a team of experts from a wide variety of backgrounds in the development and review of the survey. The survey development team included one PhD-trained, professionally board-certified Lifestyle Medicine scientist, one board-certified OBGYN clinician, two second-year medical students, and one senior biostatistician in order to maximize content importance of the survey questions, which ensured the survey questions engaged the participants in topics that were up to date and evidence based (1, 2, 3, 4). Investigators designed the survey to be brief; average time to complete was less than ten minutes, in an effort to respect each participant's time, keep the participant's attention, and reduce chance of survey errors due to postpartum fatigue and infant care demands.

Content validity of the survey was established through the following process. Team members proposed topics, and determined an appropriate length and content for a survey. Internal review of this draft survey was performed by the PhD-trained, professionally board-certified Lifestyle Medicine scientist and the board-certified OBGYN clinician, with edits performed. External validity was then completed through pilot testing from external obstetric providers, nursing staff and pregnant women not participating in the study who provided feedback to improve the instrument for optimal patient engagement. This review process ensured the questions were clear to all parties, and that the survey was concise enough to be completed in the estimated time of ten minutes. The survey was designed to be brief in order to respect the time of respondents, reduce recall bias, and maintain the participant's attention throughout the duration of the survey (15).

Participants completed the survey on a Health Insurance Portability and Accountability Act (HIPAA)-secure, user-friendly, web-based online application that collects and stores data (REDCap, Vanderbilt University). Analyses examined nutrition counseling perception and content, nutrition information obtained by a source other than an obstetric provider, and demographics. Discrete variables are reported as N (%). Discrete variables were stratified by demographics and analyzed using Chi-square or Fisher's exact test. All analyses are carried out using R statistical software (R Foundation for Statistical Computing, version 4.0.4). A *P* value of < .05 was considered statistically significant.

Results

A total of 1,650 email requests were sent out via secure email to two-week postpartum women; out of these requests, 229 women consented to complete the survey (12.2% response rate). Twenty eight (12.2%) women who opened the survey declined to complete the survey; therefore, 201 women completed

the survey. Of the women surveyed, 157 (78.11%) were white, 142 (70.65%) were between age 26–35, 139 (69.16%) had at least a four-year degree, and 180 (89.55%) received care at an OBGYN practice in Upstate South Carolina (Table 1). One hundred and fifty nine (79.10%) women received prenatal care from a physician. Of the 201 women, 100 (49.75%) reported receiving nutrition counseling from their healthcare provider during pregnancy, and 101 (50.25%) did not recall receiving nutrition counseling from their provider during pregnancy (Table 2). Of the 101 women who did stated that they did not receive nutrition counseling during pregnancy, 56 (56%) of women reported that they would have liked to receive nutrition counseling during pregnancy. Ten women (4.98%) reported receiving nutrition counseling while trying to conceive, and 130 (64.68%) women reported that they did not receive counseling. Sixty (30.35%) women were not trying to conceive. One hundred and eight (53.75%) women reported obtaining information about nutrition during pregnancy from a source other than their healthcare provider. The internet was the most common source for women to obtain information, with 87 (80.56%) women reporting they had used this resource. Forty-two (38.89%) women reported a family member, 40 (37.04%) reported a book, and 37 (34.26%) reported a friend as their source of information about nutrition and pregnancy other than their provider. (Table 2).

Table 1
Groups Summary

	All
N=	201
Age, N (%)	
< 25	25 (12.44)
26–35	142 (70.65)
> 35	34 (16.92)
Ethnicity, N (%)	
White/Caucasian	157 (78.11)
African American	23 (11.44)
Other*	21 (10.45)
Practice care, N (%)	
Upstate	180 (89.55)
Midlands	10 (4.98)
NA	11 (5.47)
Household Income, N (%)	
< \$50,000	43 (21.39)
\$50,000 - \$149,999	116 (57.71)
>= \$150,000	38 (18.91)
NA	4 (1.99)
Education Level, N (%)	
High school/GED or less	24 (11.94)
Some college/ Associates	38 (18.91)
Bachelor's degree	62 (30.85)
Advanced degree	77 (38.31)
Marital Status, N (%)	
Married	171 (85.07)
Unmarried	30 (14.93)

All
* Includes Latino, Asian/Pacific Islander, and other

Table 2
Counseling Sources Summary

N=	201
Have you ever been counseled by your medical provider? N(%)	
Yes	100 (49.75)
No	101 (50.25)
Were you ever counseled by your medical provider about your nutrition while you were trying to get pregnant? N(%)	
Yes	10 (4.98)
No	130 (64.68)
N/A I was not trying to get pregnant	61 (30.35)
What type of practitioner was your primary provider during your pregnancy? N(%)	
Physician	159 (79.10)
Nurse practitioner	18 (8.96)
Certified Nurse Midwife	24 (11.94)
Other	0 (0)
Have you received information about nutrition while pregnant from any source other than a medical provider? N(%)	
Yes	108 (53.73)
No	92 (45.77)
NA	1 (0.50)

Of the 100 women who reported receiving counseling about nutrition during pregnancy, 57 (57%) reported that their provider initiated the conversation about nutrition. The five most common topics of nutrition counseling were “water consumption” (n = 80, 80%), “the importance of a balanced/healthy diet” (n = 61, 61%), “eating small meals frequently” (n = 59, 59%), “eating more fruits and vegetables” (n = 47, 47%), and “eating less sugar” (n = 37, 37%). Ninety eight (98%) of women reported that their healthcare provider recommended taking a general prenatal vitamin during pregnancy, 34 (34%) reported receiving a recommendation to take an iron supplement, and 21 (21%) reported receiving a recommendation to take a folate supplement. For those who perceived being counseled on foods to avoid during pregnancy, 72

(72%) were advised to avoid raw or undercooked meat, 68 (68%) were advised to avoid sushi made from raw fish), and 65 (65%) were advised to avoid fish high in mercury. In addition to the response from the nutrition questions, 71 (71%) women recalled counseling on avoiding alcohol during pregnancy, 65 (65%) recalled counseling on avoiding cigarettes or tobacco products, 57 (57%) recalled counseling on avoiding E-cigarettes or vaping devices, and 55 (55%) recalled counseling on avoiding recreational drugs (Table 3).

Table 3
Summary of Responses to Counseling Questions

If Provider Recommend = No	
N=	101
Would you have liked to receive information about nutrition while pregnant? N(%)	
Yes	56 (56)
No	42 (42)
N/A	3 (2)
If Source Information = Yes	
N	108
Where have you received information about nutrition while pregnant? (Multiple choices) N(%)	
A different medical provider from your primary provider	9 (8.33)
Group pregnancy meetings	5(4.63)
Family member	42 (38.89)
Friend	37 (34.26)
Internet	87 (80.56)
Magazine	5 (4.63)
Book	40 (37.04)
Other	16 (14.81)
If Provider Recommend = Yes	
N	100
When you talked to your provider about nutrition, do you remember who started that conversation? N(%)	
Participant	19 (19)
Provider	57 (57)
Unsure	24 (24)
During the course of my pregnancy my provider (Multiple choices) N(%)	
Asked me about the foods I eat	38 (38)
Encouraged me to eat healthy foods	84 (84)
Gave advice about the amount of food to eat	42 (42)

If Provider Recommend = No	
Gave advice about how to plan and prepare healthy food	21 (21)
Were you counseled by your medical provider about any of the following? (Multiple choices) N(%)	
The importance of a balanced/healthy diet	61 (61)
Caloric recommendations	22 (22)
Eating more fruits and vegetables	47 (47)
Eating less sugar	37 (37)
Eating less processed food	28 (28)
Macronutrients (Proteins,Carbohydrates, Fats)	23 (23)
Micronutrients	23 (23)
Water consumption	80 (80)
Eating small meals frequently	59 (59)
Avoiding over-indulgence	15 (15)
Did your physician recommend you take any of the following supplements during pregnancy? (Multiple choices) N(%)	
General prenatal vitamin	98 (98)
Folate	21 (21)
Iron	34 (34)
Calcium	9 (9)
Vitamin D	8 (8)
None	0 (0)
Did your medical provider recommend you avoid or quit using any of the following during pregnancy? (Multiple choices) N(%)	
Alcohol	71 (71)
Tobacco/cigarettes	65 (65)
E-cigarettes or vaping devices	57 (57)
Recreational drugs	55 (55)
Herbal supplements	31 (31)
CBD products	38 (38)
Caffeine	25 (25)

If Provider Recommend = No	
Do you feel that you altered your diet in any way based on the advice of your medical provider? N(%)	
Yes	73 (73)
No	27 (27)
During your pregnancy, were you diagnosed with any of the following? N(%)	
Prediabetes	2 (2)
Gestational diabetes	20 (20)
I had diabetes before pregnancy	1 (1)
I was not diagnosed with any of these	79 (79)

Of these 100 women who recalled receiving counseling about nutrition during pregnancy, 73 (73%) felt that they altered their diet during pregnancy based on the recommendations from their healthcare provider. Forty one (41%) women reported feeling “very dissatisfied” about their provider’s advice, 1 (1%) reported feeling “dissatisfied,” 21 (21%) reported feeling “neutral”, 36 (36%) reported feeling “satisfied,” and 1 (1%) reported feeling “very satisfied.”

Twenty (20%) women reported receiving a diagnosis of gestational diabetes, while 79 (79%) reported no diagnosis of gestational diabetes (Table 1). Statistically significant differences were found based on age, ethnicity, and household income. Women who received nutrition information while trying to get pregnant had statistically significant demographic differences (Table 4 with race $p = 0.012$, by age $p = < 0.001$, and by income $p = 0.001$, by education $p = 0.006$).

Table 4
Comparative Analysis by Race

	Ethnicity			p-value
	Caucasian/ White	African American	Other*	
N	157	23	21	
Were you ever counseled by your medical provider about your nutrition while you were trying to get pregnant? N(%)				0.012
Yes	7 (4.46)	2 (8.70)	1 (4.76)	
No	110 (70.06)	8 (34.78)	12 (57.14)	
N/A I was not trying to get pregnant	40 (25.48)	13 (56.52)	8 (38.10)	
What type of practitioner was your primary provider during your pregnancy? N(%)				0.032
Physician	128 (81.53)	15 (65.22)	16 (76.19)	
Nurse practitioner	9 (5.73)	5 (21.74)	4 (19.05)	
Certified Nurse Midwife	20 (12.74)	3 (13.04)	1 (4.76)	
Other	0 (0)	0 (0)	0 (0)	

Table 5
Comparative Analysis by Age

	Age			p-value
	< 25	26–35	> 35	
N	25	142	34	
Were you ever counseled by your medical provider about your nutrition while you were trying to get pregnant? N(%)				< 0.001
Yes	0 (0)	6 (4.23)	4 (11.76)	
No	7 (28.00)	101 (71.13)	22 (64.71)	
N/A I was not trying to get pregnant	18 (72.00)	35 (24.65)	8 (23.53)	

However, there was no statistically significant difference in nutrition counseling during pregnancy between age, race, income, education. There is a difference in the type of medical providers between education (p = 0.002), income (p < 0.001), ethnicity (p = 0.032). Women with lower household income and

less education were more likely to be seen by non-physician providers, including nurse midwives and nurse practitioners (Table 6, Table 7).

Table 6
Comparative Analysis by Income

	Household Income			p-value
	< \$50,000	\$50,000 - \$149,999	>= \$150,000	
N	43	116	38	
Were you ever counseled by your medical provider about your nutrition while you were trying to get pregnant? N(%)				0.001
Yes	0 (0)	9 (7.50)	1 (2.38)	
No	20 (42.55)	75 (62.50)	31 (73.81)	
N/A I was not trying to get pregnant	23 (48.94)	32 (26.67)	6 (14.29)	
What type of practitioner was your primary provider during your pregnancy? N(%)				< 0.001
Physician	27 (57.45)	92 (76.67)	37 (88.10)	
Nurse practitioner	11 (23.40)	7 (5.83)	0 (0)	
Certified Nurse Midwife	5 (10.64)	17 (14.17)	1 (2.38)	
Other	0 (0)	0 (0)	0 (0)	

Table 7
Comparative Analysis by Education Level

	Education Level				p-value
	High school/GED or less	Some college/ Associates	Bachelors degree	Advanced degree	
N	24	38	62	77	
Have you ever been counseled by your medical provider? N(%)					0.676
No	14 (58.33)	19 (50.00)	33 (53.23)	35 (45.45)	
Yes	10 (41.67)	19 (50.00)	29 (46.77)	42 (54.55)	
Were you ever counseled by your medical provider about your nutrition while you were trying to get pregnant? N(%)					0.006
Yes	0 (0)	0 (0)	3 (4.84)	7 (9.09)	
No	11 (45.83)	21 (55.26)	44 (70.97)	54 (70.13)	
N/A I was not trying to get pregnant	13 (54.17)	17 (44.74)	15 (24.19)	16 (20.78)	
What type of practitioner was your primary provider during your pregnancy? N(%)					0.002
Physician	16 (66.67)	26 (68.42)	53 (85.48)	64 (83.12)	
Nurse practitioner	6 (25.00)	8 (21.05)	1 (1.61)	3 (3.90)	
Certified Nurse Midwife	2 (8.33)	4 (10.53)	8 (12.90)	10 (12.99)	
Other	0 (0)	0 (0)	0 (0)	0 (0)	
Have you received information about nutrition while pregnant from any source other than a medical provider? N(%)					0.015
No	16 (66.67)	22 (57.89)	28 (45.16)	26 (33.77)	
Yes	8 (33.33)	16 (42.11)	34 (54.84)	50 (64.94)	
N If Provider Recommend = No (N = 101)					
Would you have liked to receive information about nutrition while pregnant? N(%)					0.011
No	10 (41.67)	11 (28.95)	12 (19.35)	9 (11.69)	
Yes	4 (16.67)	7 (18.42)	20 (32.26)	25 (32.47)	
N/A	10 (41.67)	20 (52.63)	30 (48.39)	43 (55.84)	

There was a difference in percentage of women wanting to receive information while pregnant when stratified by income (P = 0.018), with women with higher incomes wanting nutrition information more

than women with lower incomes (Table 7).

Table 8
Comparative Analysis by Household Income

	Household Income			p-value
	< \$50,000	\$50,000 - \$149,999	>= \$150,000	
N	43	116	38	
Have you ever been counseled by your medical provider? N(%)				0.85
No	20 (42.55)	60 (50.00)	19 (45.24)	
Yes	23 (48.94)	56 (46.67)	19 (45.24)	
Were you ever counseled by your medical provider about your nutrition while you were trying to get pregnant? N(%)				0.001
Yes	0 (0)	9 (7.50)	1 (2.38)	
No	20 (42.55)	75 (62.50)	31 (73.81)	
N/A I was not trying to get pregnant	23 (48.94)	32 (26.67)	6 (14.29)	
What type of practitioner was your primary provider during your pregnancy? N(%)				< 0.001
Physician	27 (57.45)	92 (76.67)	37 (88.10)	
Nurse practitioner	11 (23.40)	7 (5.83)	0 (0)	
Certified Nurse Midwife	5 (10.64)	17 (14.17)	1 (2.38)	
Other	0 (0)	0 (0)	0 (0)	
Have you received information about nutrition while pregnant from any source other than a medical provider? N(%)				0.363
No	23 (48.94)	52 (43.33)	15 (35.71)	
Yes	19 (40.43)	64 (53.33)	23 (54.76)	
N If Provider Recommend = No (N = 101)				
Would you have liked to receive information about nutrition while pregnant? N(%)				0.018

	Household Income			p-value
No	14 (29.79)	19 (15.83)	8 (19.05)	
Yes	6 (12.77)	38 (31.67)	11 (26.19)	

Discussion

The study suggests that a disproportionate number, over 50%, of women across age, race, and income demographics, perceive that they did not receive nutrition counseling during the course of their pregnancy. Over 53% of the women surveyed reported receiving information from non-healthcare professional sources, including family, friends, internet sources, and books. This finding indicated that outside resources are significant sources of information for pregnant women about nutrition, with a concern that information received may not be correct or evidence-based. Women of lower income and education levels also reported increased incidence of unintended pregnancy, and increased incidence of prenatal nutrition counseling before becoming pregnant. These findings may be related to decreased access to healthcare both in the preconception period and during pregnancy and decreased education about pregnancy (16, 17).

These findings of patient perception on obstetric provider counseling add valuable insight to what the women may perceive regarding nutrition counseling during the course of their pregnancy. They are consistent with the literature that suggests women feel that they receive inconsistent counseling about nutrition during pregnancy. Whitaker et. al (2019) found 63% of post-partum women surveyed reported being counseled by their provider about “nutrition during their twin pregnancy” (18). This study focused exclusively on nutrition and physical activity counseling in twin pregnancies, with the nutrition questionnaire content limited to questions on caloric intake, macronutrient intake, and general recommendations such as “foods to limit or avoid,” “small meals, frequently,” and “don’t overindulge.” Our study’s survey requested more detailed information such as whether pregnant women perceived being counseled on specific foods to limit and/or avoid, included substance use questions, and adding supplements to their diet; helping to expand on the findings of prior studies.

Additionally, others have suggested that providers may not have adequate information regarding nutrition and may be operating under time constraints that make it difficult to properly counsel pregnant women on nutrition (19). However, a compelling finding from our study is that 73% of patients who reported receiving nutrition counseling changed their diet based on their provider’s advice. This highlights the importance of nutrition counseling as an effective way for patients to learn evidence-based guidelines for nutritional recommendations during pregnancy.

One of the strengths of this study is the large sample size (n = 201), variety of ages, surveying participants who received care at numerous OBGYN practices, incomes, and education levels of the

participants. This data validates previous studies of similar sample sizes with similar findings. Additionally, the sample was taken from OBGYN practices that serve two large cities, Greenville, SC and Columbia, SC, with populations of 523,523 and 415,759 respectively. This study highlights the implication that a large number of women in this area are likely not receiving nutrition counseling during pregnancy, and shows that this is likely a systemic issue. Another strength of this study is the reproducibility of the methods. Using a validated electronic survey means that it is simple and easy to repeat a similar study, which would provide more insight into women's perception of nutrition counseling across the country.

Limitations to this study include a racial distribution composed of mostly participants who identify as Caucasian or White, instead of a more heterogeneous distribution of race and ethnicity. The distribution sampled was similar to Greenville's population, but it was different from that of Columbia. This discrepancy may be seen as not representative of the greater United States population, although this study used a randomized sample of patients who had recently given birth at one of the hospitals in Upstate South Carolina. A second limitation was possible recall bias due to interviewing women up to two weeks after delivery. However, studies show that a majority of women accurately remember events during their pregnancy for many years after delivery, even up to thirty years later (20, 21, 22). Due to the Covid-19 pandemic, the studies were distributed electronically in accordance with Centers for Disease Control and Prevention (CDC) guidelines and Prisma Health Upstate hospital policies at that time. We chose to allow for women to complete the survey for up to two weeks post-delivery to allow time for life change while keeping within the two-week period for optimal recall. A final perceived limitation is lack of provider perspective, as we did not cross-interview providers to ascertain their perception of nutrition counseling in pregnancy. However, this was intentional as the purpose of this study was to investigate patient perceptions of nutrition counseling during pregnancy. This is clinically relevant as it underscores the importance of women's perception and understanding of the counseling they received as the key factor in initiating nutritional changes during pregnancy, not whether the provider believed they counseled their patients.

Based on the findings of this research, there are many opportunities for further studies. One possibility is to conduct an interventional study, providing nutrition education to pregnant women and measuring changes in their diet throughout pregnancy. Additionally, conducting a study in which both patients and providers are interviewed to determine concordance in perception of nutrition counseling in pregnancy is a possibility.

Conclusion

We hypothesized that pregnant patients were not receiving adequate education regarding the importance of nutrition throughout pregnancy. This study found that only 50% of women perceived receiving nutrition counseling throughout pregnancy. These findings suggest that the majority of women may not be satisfied with nutritional counseling during pregnancy; although this satisfaction may differ among demographics or socioeconomic status. Additional research is needed to determine perceptions of

providers' counseling and potential needs in providers' knowledge, skills and attitudes toward nutrition counseling, particularly across different demographic groups and social determinants of health. We hope that these empirical findings may be useful in prompting future studies to evaluate other related factors, such as healthcare provider motivation or aversion to providing nutrition counseling to pregnant women, and secondarily in promoting awareness and adherence among healthcare providers to the current nutrition guidelines for pregnant patients.

Abbreviations

REDCap: Research Electronic Data Capture

AND: Academy of Nutrition and Dietetics

BMI: Body Mass Index

DASH: Dietary Approaches to Stop Hypertension

FDA: Food and Drug Administration

ACOG: American College of Obstetrics and Gynecology

OBGYN: Obstetrician-Gynecologist

NICU: Neonatal Intensive Care Unit

SC: South Carolina

HIPAA: Health Insurance Portability and Accountability Act

CDC: Centers for Disease Control and Prevention

Declarations

Ethical Approval and Consent to Participate

This study was approved by the Prisma Health Institutional Review Board for Human Subjects Protection (Pro00100057). Investigators obtained an electronic informed consent form from each participant prior to collecting data. The authors confirm that all study methods were performed in accordance with all Declaration of Helsinki regulations and guidelines.

Consent for Publications

Not applicable

Availability of Data and Materials

Data from this study is stored electronically in REDCap. The data sets used and analyzed are available from the corresponding author upon request.

Competing Interests

The authors declare that they have no competing interests.

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Authors' Contributions

HJ and ES participated in literature review, data collection, data interpretation, and manuscript drafting and revision. HJ prepared tables and figures included in the text. JT participated in literature review, data interpretation and manuscript revision. XT participated in data analysis and interpretation. All authors contributed to drafting and editing the manuscript and approved the final manuscript.

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Authors Information

N/a

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Figures

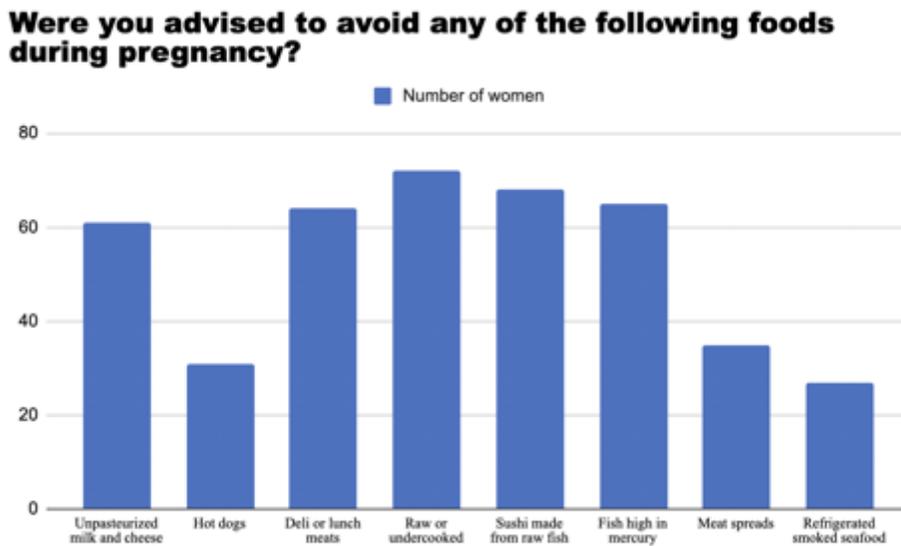


Figure 1

Legend not included with this version.

Rate your satisfaction with provider advice on nutrition you received during your pregnancy.

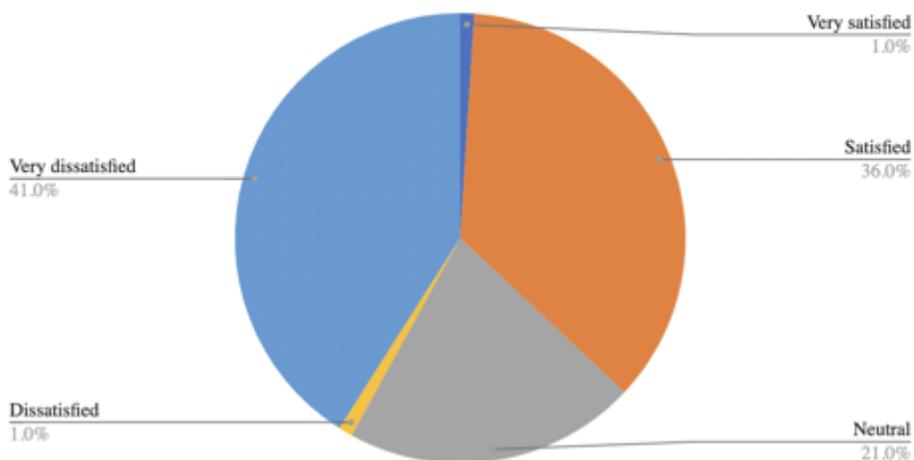


Figure 2

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Supplementary Files

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