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Title: A brief survey of dietary beliefs and behaviors of pregnant adolescents

Authors: Corrie M Whisner, PhD; Meg Bruening, PhD, MPH, RD; Kimberly O O'Brien, PhD

Affiliations:

Division of Nutritional Sciences, Cornell University, Ithaca, NY (CMW, KOO)

School of Nutrition and Health Promotion, Arizona State University, Phoenix, AZ

(CMW, MB)

Proof and Reprint Requests and Corresponding Author: Corrie M Whisner, Arizona State

University, School of Nutrition and Health Promotion, Phoenix, AZ 85004, Phone: (602) 827-

2261, Fax: (602) 827-2253, Email: cwhisner@asu.edu

Institution Where Work Was Conducted: University of Rochester Midwifery Clinic,

University of Rochester, Rochester, NY and Division of Nutritional Sciences, Cornell

University, Ithaca, NY

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Abstract

Study Objective: To provide a brief assessment of pregnant adolescent dietary beliefs and behaviors, an understudied high-risk population.

Design, Setting and Participants: Diverse pregnant adolescents (n=66) recruited from the Rochester Adolescent Maternity Program at the University of Rochester Medical Center in Rochester, NY completed a nutrition knowledge and beliefs survey once during pregnancy.

Main Outcome Measures: Responses were recorded by a health project coordinator that had good rapport with the teens. Study staff evaluated responses for emergent themes and thematically coded survey data. All responses were assessed relative to demographic variables using chi-square and analysis of variance tests.

Results: The majority (83%) of pregnant teens self-identified as African American with 18% identifying as Hispanic. The majority (92%) of adolescents had medical insurance and 28% (n=18) reported participating in the Supplemental Nutrition Program for Women, Infants and Children (WIC). The importance of proper nutrition was acknowledged but 14% reported that diet did not matter or they were unsure of the importance of nutrition for the fetus. Money, access to food and personal relationships were reported as constraining factors for a healthy diet. Response themes did not differ by demographic characteristics.

Conclusion: Overall, pregnant teens recognize the importance of dietary intake during pregnancy but this knowledge does not always translate into behaviors. Understanding the health knowledge and behaviors of pregnant adolescents may provide a foundation for future lifestyle and clinical interventions.

Key Words: adolescent; pregnancy; nutrition; prenatal care

Introduction

Adolescent pregnancy, despite recent decreases over the last decade, remains a public health concern in the United States accounting for 273,105 births among girls aged 15-19 y in 2013.¹ Historically, pregnancy has been disproportionately high among disadvantaged teens with more than half of adolescent child births occurring in black and Hispanic girls.¹ Childbearing at an early age has been associated with increased risk of various pregnancy complications including preterm birth, low birth weight and neonatal/infant mortality.²⁻⁵ Additionally, poor lifestyle behaviors may predispose adolescents to increased weight gain and greater risk of postpartum obesity.⁶

Dietary intake is an important modifiable behavior that improves maternal and fetal health; however, adolescent diets tend to be high in sugar and low in micronutrients.^{7,8} A comprehensive review of interventions aimed at improving diet and weight gain in pregnant adolescents reported that black adolescents were at greater risk for weight gain outside the recommended range and poor diet quality including reduced vitamin and mineral supplement use.⁹ This review and a recent survey have identified a need for formative research to better understand dietary choices and relevant behavior modification objectives for pregnant teens.^{9,10}

To date, few studies have focused on surveying pregnant adolescent views of health and dietary choices. Despite a dearth of information, two small assessments suggest that pregnant adolescents view healthy eating as important.^{10,11} The most recent study identified four emergent themes following qualitative focus groups with fourteen pregnant teens which included: 1) pregnant teens have knowledge of healthy eating but prefer unhealthy foods; 2) pregnancy behaviors are influenced by multiple factors including relationships with others; 3) appearance,

taste, cravings, convenience and cost are important factors when choosing foods; and 4) pregnancy itself impacts food choices and behaviors.¹¹ More research is needed among this vulnerable population in order to best develop interventions to support their and their baby's healthy growth and development. Thus, the purpose of this study was to briefly assess the general eating behaviors and beliefs of a primarily African American cohort of pregnant adolescents. This assessment provided information regarding health knowledge and influences on dietary intakes. Evaluating dietary beliefs and behaviors by differing socioeconomic characteristics provides a foundation on which future lifestyle interventions can be designed and implemented for pregnant adolescents.

Methods

A subset (n=66) of pregnant adolescents recruited from a larger cohort study (N=144) completed an optional nutrition knowledge and beliefs survey during pregnancy. While all 144 participants were eligible to complete the survey, only the subset were able and willing to stay after their appointment to complete the additional survey. This subset of adolescents was a convenience sample and not required to complete the survey. Adolescents who completed this survey were recruited from the Rochester Adolescent Maternity Program (RAMP) in Rochester, NY between 2008 and 2012 and participated in a prospective longitudinal study designed to characterize maternal and fetal iron status during pregnancy. Inclusion criteria included ≤ 18 years of age at time of enrollment, ≥ 12 weeks of gestation at enrollment and carrying a single fetus. Exclusion criteria included current or previous diagnosis of HIV, diabetes, malabsorption diseases and eating disorders. All procedures were approved by the Institutional Review Board

of the University of Rochester. Written informed consent was obtained from participants aged 15 y and older while participants 14 y and younger provided assent with guardian/parental consent.

Height and weight measurements were extracted from medical records by study staff and body mass index (BMI) calculated as kg/m^2 . If time allowed during one of the research visits, adolescents completed an eight-question nutrition knowledge and beliefs survey that was developed using the theory of planned behavior as a guide (**Table 1**). The health project coordinator administered the questionnaire verbally and recorded written summaries of subject responses on the paper survey in an effort to obtain data in a timely and consistent manner across all participants. Questions included on the survey aimed to characterize respondent food preferences, influences on eating behaviors, and changes in eating behaviors resulting from pregnancy. Dietary intake was assessed up to 3 times over pregnancy during pregnancy using the 24-h recall method and data were analyzed using the Nutrient Data System for Research (versions 2008 and 2009; Nutrition Coordinating Center, University of Minnesota, Minneapolis, Minnesota). More detailed information regarding the collection of dietary data have been previously published.¹²

Demographic (race/ethnicity) and anthropometric data, obtained from self-report, and health history questionnaires were analyzed using JMP Pro 10.0 (SAS Institute, Cary, NC) and Stata Statistical Software (Release 13, College Station, TX: StataCorp LP, 2013.). Survey responses were analyzed by identifying thematic commonalities for each question. During the initial coding of responses, two of the authors evaluated the survey responses independently to identify emergent themes. Once the first pass was complete, the authors built consensus by comparing major themes. Key phrases were then coded as categorical variables and relationships between themes and demographic information were assessed using chi-square and analysis of

variance statistical tests. Specifically, contextual factors such as race, ethnicity, socioeconomic status, education, age and parity were examined by ANOVA, Wilcoxon-Rank Sum or correlation analyses as appropriate.

Many Eyes visualization software (IBM, Armonk, NY)¹³ was used to empirically generate word clouds to illustrate variation and frequency of common responses for each survey question. The size of each word in a cloud corresponds to the frequency at which the word was used in responses to survey questions; the larger the word, the more often respondents used it as a response. Many Eyes treats variation in letter cases (“Taco” vs. “taco”) as different words and filters out all common words (i.e. no, the, a, at, etc.) by default. Data processing was done to consolidate similar words and spelling variants such as “mcdonalds” and “McDonalds” or “veggies” and “vegetables.” In these two examples, the correct spelling of McDonald’s was used and “veggies” was re-coded as “vegetables” for consistency. Letter case differences were addressed by capitalizing all proper names and using lower-case for all other entries. In order to keep common words in phrases such as “no changes” (frequently used response to whether the participant changed their behavior during pregnancy) that provided important contextual information, responses were transcribed with no spaces (“nochanges”).

Results

Table 2 presents sociodemographic characteristics and dietary intakes of pregnant adolescents (ages 14-18 years) who completed the eating behaviors survey. Mean gestational age of adolescents at entry to prenatal care was 13.5 ± 6.5 weeks and 12.5% had a parity ≥ 1 . All adolescents were unmarried; 28.7% were enrolled in the Supplemental Nutrition Program for Women, Infants and Children (WIC) and 92.4% reported receiving medical insurance. Of those

providing the name(s) of their health plan, 20% reportedly received Medicaid. A total of 15.1% of teens had a history of smoking, of which, one person reported current use of cigarettes during pregnancy. Similarly, ten adolescents reported previous (n=8) or current (n=2) alcohol consumption. Of those self-reporting drug use, cocaine and marijuana use were reported in one (1.6%) and 20 (30.8%) adolescents, respectively.

Eating behavior survey responses are visualized in the **Figure**. A total of 47.0% adolescents reported enjoying fast food before pregnancy while 27.3% recalled liking home cooked meals, specifically comfort foods prepared by mothers and grandmothers. Common foods that were reported as favorites were fast food (i.e. McDonald's, Burger King, burgers), candy, fried chicken and pizza. The majority of teens (56.1%) reported making no dietary changes after becoming pregnant, while 37.9% reported making one or more changes. A total of 21.1% teens stated that they experienced food cravings or changes in taste preferences while 16.7% reported engaging in healthy eating. Common responses regarding food changes included, "now eat veggies, can't stand chicken (used to love it)" and "try to eat more greens." When asked to describe what "healthy eating" meant to them, three common themes emerged which were categorized as specific food items (77.2%), meal frequency/portion sizes (31.8%) and not eating too much (10.6%). Example statements relating to specific food items were "vegetables and fish, yucky food" and "spinach and broccoli" while common responses about meals/portion sizes were "breakfast, lunch, dinner; no snacking" and "3 meals a day."

Overall, pregnant teens felt that prenatal dietary choices impacted the health of their baby (74.2%); however, 13.6% of the 66 teens reported being unsure of dietary influence on the health of the baby or that diet did not impact the fetus. Of those reporting an impact of dietary choices on their baby, 31.8%, 22.7% and 19.7% of responses were categorized into respective themes of

155 infant needs, sharing foods/nutrients between mom and baby, and consequences for not eating
156 healthy. Despite the general belief that maternal nutrition was important for fetal growth,
157 misconceptions were identified: “baby gets good things from my food even if I eat bad,” while
158 others expressed difficulty in making healthy food choices: “the baby probably wants me to eat
159 healthy, but I don’t always.”

160 When making food choices, pregnant teens reported seeking advice from various sources.
161 A total of 50.0% of teens reported seeking advice from healthcare professionals, including
162 midwives, medical doctors, nurses and nutritionists (RAMP is run by midwives and staffed with
163 nutritionists, nurses and social workers). Other common advisers included older female relatives
164 (40.9%; mother, grandmother and aunt) and peers (30.3%; sister, cousin, friend). Although,
165 boyfriends and the fathers of the teen were listed as a source of advice, this response was less
166 common with 13.6% for boyfriends and 4.5% for fathers.

167 Three major themes emerged relating to the primary dietary influences of the pregnant
168 teens. These were hunger/cravings/feelings (43.9%), food availability (28.8%) and money
169 (28.8%). Time and family/friends were also mentioned by 10 participants as potential
170 influencers. Data on barriers to healthy eating revealed 5 major themes: taste preferences,
171 availability, difficulty, money and time. Taste preference was the most important factor
172 preventing healthy eating and was mentioned by 45.4% of teens from this cohort. A total of
173 21.2% teens reported food availability as an inhibiting factor, including access at home as well as
174 in stores. A representative response was, “not really difficult except when mom doesn’t go
175 shopping.”

Despite frequently relying on others for food, 66.7% of pregnant teens reported having a lot of control over their diet, while 22.7% and 15.2% responded with themes of some/little control or other individuals have control, respectively. Two representative survey responses for those with greater control were “I control my life” and “I eat what I want, no one can tell me what to do; cravings can be out of control but mostly have control.” Conversely, an example quote from those with no control was “mom likes me to eat what she cooks.”

Thematic responses were assessed in relation to sociodemographic and delivery data using chi-square and analysis of variance tests. Maternal race/ethnicity, paternal race/ethnicity, baby sex and race, WIC participation, insurance coverage, parity, chronological age and gestational age at the time of the questionnaire were not significantly associated with response themes (data not shown).

Discussion

These data suggest that pregnant teens are generally aware of the importance of diet for a healthy pregnancy; however, this cohort may have lacked understanding of the specific connections between maternal diet and fetal development as many did not make any changes to their intake after becoming pregnant. Cravings, food availability, taste preference and financial factors were among the most common factors reported to influence dietary intake. While pregnant teens relied on others to provide food, the majority reported having the most control over the food they consumed.

Overall, this cohort of pregnant teens described healthy eating as minimizing snack intake, eating regular meals, and including fruits/vegetables in their meals. Despite this knowledge, previous reports from this cohort have indicated that most teens did not meet the

estimated average requirements for prenatal nutrients such as vitamins E and D, calcium, magnesium and iron while also exceeding sugar recommendations, particularly for added sugars.^{12,14} Our results agree with previous findings that dietary patterns among pregnant adolescents often include skipped meals and frequent snacking on energy-dense convenience foods that are low in micronutrients.¹⁵ These findings present a need for focused educational programs early in pregnancy as inadequate diet quality in pregnant adolescents has been associated with preterm birth, low birth weight and small for gestational age infants.^{7,8,16}

Greater than 50% of pregnant adolescents reported making no dietary changes after becoming pregnant. Taste preference may have been influential as teens continue to value taste over the health properties of food after becoming pregnant.^{11,15} This cohort frequently reported that taste preferences prevented them from making healthy food choices. These findings are impactful as the majority (74.2%) of surveyed teens acknowledged the importance of dietary intake for fetal health. Teens' interest in delivering healthy infants presents a timely opportunity to implement targeted health programs for this high-risk population as a previous study found that teens make healthier choices if they value the health of their fetus and have adequate knowledge to change unhealthy behaviors.¹⁰

Previous teen-specific nutrition interventions, outlined in a systematic review,⁹ have been successful at improving birth weight but more rigorous studies are needed to independently evaluate the role of nutrition on maternal and neonatal outcomes. Successful teen pregnancy interventions were often individually focused and provided education via multidisciplinary teams which included group support.⁹ Findings from the present cohort mirror results from a recent midwife-led nutrition education program in which dietary choices of pregnant teens were often influenced by external social factors.¹⁷ Another qualitative study aimed at describing beliefs

about healthy eating found that pregnant teens were more likely to attend nutrition education programs if teens were made aware of education topics prior to attending, the delivery method was peer-focused, and programming included participation incentives (i.e. tools which made cooking healthy foods more convenient and cost-effective or infant-related items).¹¹ In the future it is important to focus on how finances, food availability, and relationships influence food choices during teen pregnancy.

These findings provide unique insights into the attitudes and beliefs of pregnant adolescents on prenatal nutrition that have not been evaluated previously. Strengths include that data were collected by study staff who had good rapport with the teens. A major limitation of this study was that survey responses were written by study staff without audio recording, which may have resulted in some nuances of the responses being lost. Additionally, data were not compared to data from pregnant adult women as inclusion of this comparison group was outside the scope of the primary project and study aims. Although the sample size was limited, this cohort was more than double those previously reported in similar assessments of this high-risk pediatric population.^{10,11} The study sample was primarily African American providing broad data on teen pregnancy-related health beliefs from a particularly high-risk demographic which may be beneficial for clinicians who work with this population. Additionally, the use of a convenience sample of adolescents who were willing to enroll in a longitudinal study may limit the generalizability of these results.

Adolescence is a critical time for growth and development which is influenced by nutrition. Dietary modification can greatly impact maternal and neonatal health outcomes during adolescent pregnancy thereby reducing the risk of adverse birth outcomes including miscarriage, premature birth and low birth weight.¹⁸ During this important life period, health behaviors may

be negatively impacted by peer relationships and individual taste preferences which further contribute to the risk for negative outcomes.¹⁹ Data from this study suggest that future studies and health education programs for pregnant adolescents should focus on providing consistent access to healthy foods, improving self-efficacy and motivation to eat healthily, and engaging teens alongside peers, significant others and family who may also have an impact on the teens' dietary behaviors.

Clinical Implications

Nationally, teen pregnancy is most prevalent in Hispanic populations which differs slightly to the racial and ethnic distribution of this population from Rochester, New York. Despite previous findings that racial disparities exist for gestational weight gain and diet quality among pregnant adolescents, shared themes for dietary beliefs and behaviors were identified in this primarily African American cohort. These data support previous findings that health providers are an important resource for nutrition education in this high-risk population.¹⁰ Overall, this study provided unique insights into how and why adolescents made food choices during pregnancy which will help practitioners identify relevant behavior modification objectives for pregnant teens.

Although, additional studies are needed to evaluate how the nutrition knowledge and beliefs of pregnant teens translate into health behaviors, current evidence has identified several key areas for clinical intervention. As observed in this and other studies,^{10,11} pregnant teens recognize the importance of healthy eating for adequate fetal development. Health practitioners working with this population should capitalize on this finding by devoting time at prenatal visits for healthy eating discussions. In addition, clinicians should strive to connect high-risk or

266 limited-resource teens to external resources including food assistance programs such as Women,
267 Infants and Children. Whenever possible, nutrition discussions should be geared specifically
268 towards teens and include key influencers (i.e. parents, friends and partners).

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Table and Figure Legends

Table 1. Nutrition knowledge and beliefs survey questions for pregnant adolescents

Table 2. Demographic, clinical and dietary characteristics of pregnant adolescents (n=66)

*Derived from medical records; †Based on CDC cutoffs

Figure. Cloud visualization of survey responses for pregnant adolescents. The size of words relates to the frequency of use in responses to each question. **Panel a** depicts question 1 responses; **Panel b** depicts question 2 responses; **Panel c** depicts question 3 responses; **Panel d** depicts question 4 responses; **Panel e** depicts question 5 responses; **Panel f** depicts question 6 responses; **Panel g** depicts question 7 responses; **Panel h** depicts question 8 responses. Questions are in **Table 1**. FOB: father of baby

Table 1. Nutrition knowledge and beliefs survey questions for pregnant adolescents

Survey Questions

- 1) Tell me about the foods and places you liked to eat most before you became pregnant.
 - 2) Now I'd like to hear about any changes you've made to the foods you eat now that you are pregnant.
 - 3) Can you explain to me what the words "healthy eating" mean to you?
 - 4) What difference do you think it makes for the baby inside which foods you eat?
 - 5) Who are the people you trust most to give you advice about what to eat during your pregnancy?
[Mother, partner, friends, prenatal care]
 - 5a) Why?
 - 6) What other things influence the foods you eat?
 - 7) What are the things in your life that make it more difficult to eat the foods you think are healthy?
 - 8) How much control do you think you have over what you eat now and about changing what you eat?
 - 8a) Tell me about that.
-

Table 2. Demographic characteristics of pregnant adolescents (n=66)

Characteristic	Mean $\pm$ SD
Age at enrollment, y	16.8 $\pm$ 1.1
Maternal Race, % (n)	
Black	83 (55)
White	17 (11)
Ethnicity, % (n)	
Hispanic	18 (12)
Non-Hispanic	82 (54)
Pre-pregnancy BMI, percentile*† (n)	67.8 $\pm$ 27.7 (63)
Overweight, % (n)	15.9 (10)
At Risk of Overweight, % (n)	20.6 (13)
Healthy Weight, % (n)	61.9 (39)
Underweight, % (n)	1.6 (1)
Gestational Weight Gain, kg (n)*	16.2 $\pm$ 6.0 (63)
Energy Intake, kcal	1754 $\pm$ 768
Fat, % of kcal	33.7 $\pm$ 8.3
Carbohydrate, % of kcal	55.8 $\pm$ 10.2
Protein, % of kcal	12.0 $\pm$ 2.5
Added sugar, g	93.9 $\pm$ 66.1
Dietary fiber, g	10.9 $\pm$ 5.7

*Derived from medical records; †Based on CDC cutoffs