



Original article

Preconception Health of Low Socioeconomic Status Women: Assessing Knowledge and Behaviors

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A B S T R A C T

Introduction: The stalled U.S. infant mortality rate and persistent disparities in adverse pregnancy outcomes may be addressed by optimizing a woman's health throughout her childbearing years. This study examines women's knowledge and behaviors related to preconception risk factors in two community health centers serving lower income, racially diverse populations.

Methods: A survey was administered among a convenience sample of women ages 18 to 44 years ($n = 340$). Questions focused on health behaviors and conditions, knowledge of risk factors, and recommendations of health care providers. Outcomes include the prevalence of risk factors and correlations between the presence of a risk factor and either a respondent's knowledge or a health care provider's recommendation. Data were analyzed for total respondents and two subgroups: Black, non-Hispanic and Hispanic.

Results: Despite strong knowledge of risk factors in the preconception period, high-risk behaviors and conditions existed: 63% of women overweight or obese, 20% drinking alcohol, and 42% taking a multivitamin. Significant differences in risk factors were noted between Black, non-Hispanic and Hispanic respondents. Overweight/obesity ($t = 3.0$; $p < .05$) and alcohol use ($\chi^2 = 9.2$; $p < .05$) were higher among Black, non-Hispanics, whereas Hispanic women had lower rates of multivitamin use ($\chi^2 = 11.1$; $p < .05$). The majority of respondents recall being spoken to by a health care provider about pregnancy-related risks. Most risk factors were not influenced by provider's recommendations, including multivitamin use, drinking alcohol, and smoking. However, birth control use was correlated with a provider's recommendation ($\chi^2 = 7.6$; $p < .05$). Correlations between the presence of risk factors and respondent's knowledge existed for immunizations ($\chi^2 = 9.6$; $p < .05$), but not for multivitamin use, drinking alcohol, or smoking.

Conclusion: Our study identified behaviors amenable to change. Knowledge alone or a doctor's recommendation are not enough to change those behaviors. Innovative programs and support systems are required to encourage women to adopt healthy behaviors throughout the childbearing years.

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Background

The idea of preconception health has been around since the 1960s, but received little attention until 2005 when the Centers for Disease Control and Prevention (CDC) and March of Dimes convened a national summit (CDC, 2006). The goal was to address the stalled U.S. infant mortality rate and persistent disparities in adverse pregnancy outcomes (Martin et al., 2009; Mathews & MacDorman, 2010). Compelling evidence exists supporting the need to supplement prenatal care with preconception care because initiating interventions to address risk factors during

pregnancy is often too late. Given that the preconception time period presents a critical window of opportunity to improve pregnancy outcomes, several programs and initiatives to enhance women's health throughout the childbearing years have been undertaken (Biermann, Lang Dunlop, Brady, Dubin, & Brann, 2006; LeRoy, 2010; Thompson, Peck, & Brandert, 2008).

Increasing women's knowledge about risk factors related to adverse pregnancy outcomes has been a focus of many programs and studies have shown that women's knowledge of risk factors is strong in the preconception period (Elsinga et al., 2008; Frey & Files, 2006). Despite this knowledge, the majority of preconception women report at least one risk factor for an adverse pregnancy outcome (Anderson, Ebrahim, Floyd, & Atrash, 2006). In addition to filling knowledge gaps, preconception care must go beyond education to address true barriers to changing lifestyle behaviors and to identifying relevant motivators.

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There is some evidence that comprehensive preconception health programs are effective in changing behaviors. The *Strong Healthy Women* intervention assessed the prevalence of risk factors in a community, and then developed a multidimensional behavioral program to address the identified risk factors (Hillemeier et al., 2008). Although behavior changes pre-post intervention were significant, anthropometric and biomarker measures related to risk factors did not change significantly. Preconception health programs have also proved effective in a clinical setting. Women who received comprehensive preconception counseling increased knowledge of risk factors and changed behaviors. Reductions in adverse pregnancy outcomes was observed, but were not significant (Elsinga et al., 2008). Although these programs had a positive impact on enhancing knowledge and influencing behaviors, program duration and sample size may have limited the impact of maternal clinical measures or pregnancy outcomes.

The purpose of this study was to examine knowledge of preconception risk factors, as well as current health status and behaviors, among women of childbearing age (18-44 years) seeking care in two community health centers (CHCs) located in Westchester County, New York. Beyond contributing to an understanding of women's knowledge of preconception risk factors, our intent is to identify opportunities to introduce preconception risk reduction programs and community-based health care interventions to improve pregnancy outcomes among at-risk populations. The population of Westchester County is nearly one million residents and according to U.S. Census data (U.S. Census Bureau, 2008), approximately 17% of the population is female and of child-bearing age. Westchester is an affluent county with a median household income of \$79,448, compared with the state median household income of \$56,033. Although pregnancy outcomes in Westchester County are comparable to or better than those in New York State, racial and ethnic disparities are significant. Most measures of maternal and infant health for black and Hispanic mothers compare unfavorably to white mothers and are well below the *Healthy People 2010* objectives (March of Dimes, 2010).

Method

Study Design

A survey was administered among a convenience sample of women at two CHCs in Westchester County. The target population served by the combined sites is primarily Black (80%) and Hispanic (18%) with 29% falling below the federal poverty level (personal communication, Executive Director, CHC study site 1, January 14, 2009). Surveys were self-administered by women who were at the CHC to see a provider during a 4-week period in February 2009. Research administrators were on site for survey distribution and collection. Oral consent was obtained and the women completed the survey in the waiting area. Surveys were designed to exclude any information that would violate the Health Insurance Portability and Accountability Act identification and the study was approved by New York Medical College Institutional Review Board.

Survey

The data collection instrument included questions from a survey developed by the March of Dimes in collaboration with the Kentucky Department of Health and Johnson & Johnson

(Healthy Babies Are Worth the Wait: 2007, Baseline Survey, Assessment of Knowledge, Attitudes, and Behaviors of Communities regarding Pregnancy and Childbirth) as well as questions used in the Pregnancy Risk Assessment Monitoring System Phase 5 Core Questionnaires 2004 through 2008 through the CDC. The survey instrument was validated in a previous pilot study and was available in English and Spanish.

Survey questions focused on current health behaviors and conditions, knowledge of risk factors, and recommendations given by health care providers in the preconception time period. For assessment of health behaviors and conditions, participants were asked a series of questions, including: "Do you have high blood pressure?"; "Have you been immunized against German measles (rubella)?"; "Do you take a multi-vitamin?"; and "Do you smoke cigarettes?" Possible responses were "Yes," "No," or "Don't know." To assess knowledge, participants read the following statement: "We would like to know what you believe can affect the health of a baby before a woman becomes pregnant." This was accompanied by a series of statements related to preconception health such as: "Taking folic acid vitamins can have a good effect"; "Alcohol use can have a bad effect"; "Second-hand smoke can have a bad effect"; and "It is important that my immunizations are up to date." Possible responses were "Yes," "No," or "Don't know." The prevalence of health care provider recommendations were assessed by asking participants, "During any of your visits to a doctor in the past year, did a doctor, nurse, or other health care worker tell you that the things listed below were bad, for your baby if you were pregnant, or were to get pregnant?" Statements that followed included harmful risk factors. The question was repeated for protective risk factors such as taking folic acid or getting tested for HIV with the question, "During any of your visits to a doctor in the past year, did a doctor, nurse, or other health care worker tell you that the things listed below were good, for your baby if you were pregnant, or were to get pregnant?" For each statement, the respondent was directed to answer "Yes" if someone talked with them about it, or "No" if no one talked with them about it.

Analysis

At the end of the survey administration period, the information collected was entered into a database for analysis conducted with Stata 10 (StataCorp., College Station, TX). As appropriate, *t*-test, *z*-test, and the chi-square test were used to determine the presence of statistical associations. Significance was accepted at the 5% level.

Descriptive statistics were used to provide a quantitative summary of the dataset, including sample size, demographic characteristics, and pregnancy outcomes. Statistics are reported for the total dataset as well as two subgroups: Black, non-Hispanic and Hispanic respondents. To assess health status, the prevalence of high-risk behaviors, conditions, or exposures were identified. Women's knowledge of risk factors in the preconception period was based on prevalence of responding "Yes" to the knowledge assessment questions. The presence of a health care provider's recommendation to avoid harmful risk factors and adopt protective factors was based on prevalence of responding "Yes" to the health provider recommendation questions. Last, correlations between the presence of a risk factor and either a respondent's knowledge of that risk factor or a health care provider's recommendation were examined.

Table 1
Study Population Demographic Characteristics

	Total 100% (n = 340)	Black, Non-Hispanic 38% (n = 130)	Hispanic 36% (n = 124)	Statistic ^a	p-Value
Mean age (yrs)	29.5	29.2	29.2		
Education (%)				$\chi^2 = 110.3$	<.001
≤HS graduate	47.4	50.0	61.3		
≥Some college credit	36.4	46.9	33.1		
Not reported	16.2	3.1	5.6		
Household income (%)				$\chi^2 = 75.5$	<.001
<\$25,000	61.2	64.6	77.4		
≥\$25,000	14.7	23.9	6.5		
Not reported	24.1	11.5	16.1		
Births (#)	421	152	195		
Preterm (%)	16	20	12	$z = 2.0$	<.05
Low birth weight (%)	14	13	11		

* Tests of statistical significance are the chi-square (χ^2) test or the z-test, as appropriate.

Results

We collected 417 surveys, with a final sample size of 340 respondents owing to incomplete surveys and other exclusions, such as women who were outside the age limitations. Results indicate a diverse population with the majority of survey respondents Black, non-Hispanic (38%) or Hispanic (36%; Table 1). The mean participant age was 29.5 years ($SD = 7.2$) with 47% having a high school diploma or less as their highest education achieved, and 61% reporting a household income of less than \$25,000 per year. Hispanic women had less education and lower income than Black, non-Hispanic women. Self-reported pregnancy outcomes revealed preterm and low birth weight occurrences at 16% and 14%, respectively. Black, non-Hispanic women had significantly higher rates of reported preterm births compared with Hispanic women.

Health Status Assessment

High-risk behaviors, conditions, and exposures were prevalent with 63% of women overweight or obese, 25% exposed to second-hand smoke, 20% drinking alcohol, and 59% reporting a need for dental care (Table 2). Several harmful risk factors were

significantly higher among Black, non-Hispanic women including overweight/obesity ($t = 3.0$; $p < .05$), second-hand smoke exposure ($\chi^2 = 9.9$; $p < .05$), and alcohol use ($\chi^2 = 9.2$; $p < .05$) compared with Hispanic women.

Protective factors were also present with 42% of women taking a multivitamin, 63% immunized against rubella, and 85% tested for HIV. Hispanic women had significantly lower rates of multivitamin use ($\chi^2 = 11.1$; $p < .05$) and rubella immunization ($\chi^2 = 34.9$; $p < .001$) compared with Black, non-Hispanic women.

Knowledge Assessment

Women's knowledge of the adverse effects of preventable risky behaviors in the preconception period was strong. Seventy percent of women reported that taking folic acid was beneficial, and 92% knew that smoking had a harmful effect. Differences in risk factor knowledge in the preconception period among Black, non-Hispanic and Hispanic women were not significant (Table 3).

Health Care Provider's Recommendation

At least two thirds of the women recalled being spoken to by a health care provider about pregnancy-related risks. Black,

Table 2
Current Behavior, Conditions, and Exposures

Indicator (%)	Total (n = 340)	Black, Non-Hispanic (n = 130)	Hispanic (n = 124)	Statistic ^a	p-Value
Multivitamin use	42 n = 310	53 n = 126	32 n = 121	$\chi^2 = 11.1$	<.05
Rubella immunization	63 n = 297	81 n = 124	45 n = 113	$\chi^2 = 34.9$	<.001
HIV/AIDS tested	85 n = 299	89 n = 125	86 n = 119	$\chi^2 = 1.4$.50
Birth control use	37 n = 294	33 n = 120	41 n = 116	$\chi^2 = 2.5$.29
Overweight or obese	63 n = 248	71 n = 114	54 n = 83	$t = 3.0$	<.05
Tobacco use	11 n = 306	13 n = 127	7 n = 121	$\chi^2 = 1.8$.40
Second-hand smoke exposure	25 n = 301	32 n = 124	16 n = 120	$\chi^2 = 9.9$	<.05
Alcohol use	20 n = 304	27 n = 126	13 n = 120	$\chi^2 = 9.2$	<.05
Self-reported need for dental work	59 n = 311	57 n = 126	60 n = 121	$\chi^2 = 1.4$.70
Prescription drug use	24 n = 303	27 n = 124	20 n = 118	$\chi^2 = 2.4$.31

* Tests of statistical significance are the chi-square (χ^2) test or the t-test, as appropriate.

Table 3
Women's Knowledge of Risk Factors During Preconception Period

Indicator	Total (n = 340)	Black, Non-Hispanic (n = 130)	Hispanic (n = 124)
Good effect before pregnancy (% agree)			
Taking folic acid	70 n = 216	64 n = 85	76 n = 79
Immunizations	95 n = 218	94 n = 87	96 n = 78
Bad effect before pregnancy (% agree)			
Alcohol use	88 n = 216	86 n = 86	91 n = 77
Tobacco use	92 n = 217	91 n = 87	92 n = 77
Second-hand smoke	91 n = 216	90 n = 87	91 n = 77
Certain medications	88 n = 217	90 n = 87	83 n = 77

non-Hispanic women were significantly more likely to be warned about alcohol ($\chi^2 = 5.8$; $p < .05$) and tobacco use ($\chi^2 = 4.7$; $p < .05$) as well as taking certain medications ($\chi^2 = 6.1$; $p < .05$) compared with Hispanic women (Table 4).

Correlations

We examined correlations between the presence of risk factors and either a health care provider's recommendations or a respondent's knowledge of the risk factor (Table 5). A health care provider's recommendation was correlated with an HIV test ($\chi^2 = 24.2$; $p < .001$) and using birth control ($\chi^2 = 7.6$; $p < .05$). Multivitamin use, drinking alcohol, and smoking were not influenced by the provider's recommendation. Correlation between presence of risk factors and respondent's knowledge existed for immunizations ($\chi^2 = 9.6$; $p < .05$), but not for multivitamin use, drinking alcohol, or smoking.

Limitations

The use of a convenience sample may not accurately represent the population. Additionally, the location of the study at CHCs may have biased the results. CHCs were chosen because they are a major source of preventive health services for reproductive-age women among vulnerable populations (National Association of Community Health Centers, Research & Data, 2008). Additionally, CHCs have been shown to reduce

disparities in pregnancy outcomes (Wilnesky & Proser, 2008). The respondent's knowledge of preconception risk factors and health care provider recommendations may have been driven in part by the mission of the CHC.

Discussion

The first step in providing preconception care requires an understanding of a woman's access to health services and her knowledge of preconception risk factors. In our study, women had access to health care providers through a CHC and had good knowledge of both protective behaviors and harmful risk factors in the preconception period. Several risks and behaviors that are amenable to change and have the potential to improve pregnancy outcomes were identified, including 1) use of folic acid, 2) need for immunizations, 3) need for dental care, 4) weight reduction, 5) exposure to second-hand smoke, and 6) alcohol use. Differences were noted between Black, non-Hispanic and Hispanic women, with the prevalence of overweight/obesity, exposure to second-hand smoke, and alcohol use higher among Black, non-Hispanic women; the use of folic acid and immunization rates lower among Hispanic women.

Despite recommendations from health care providers, risk factors were present across both harmful and protective pregnancy outcome determinants. In some cases, health care providers seem to be addressing risk factors specific to their populations with warnings at a more resonant level among Black, non-Hispanic women for alcohol and tobacco use, where the prevalence is higher. Although recognizing the needs of different population groups is important in addressing risk factors, behavior change is difficult without comprehensive programs and support that move beyond preconception care in the clinical setting.

This study illustrates that knowledge alone or a doctor's recommendation are not always enough to change behaviors. Knowledge and a provider's advice must be transformed into action by understanding and addressing the true obstacles to adopting healthier behaviors. Strategies and interventions designed to promote healthy behaviors need to be culturally sensitive and take into account misperceptions and the ability to make lifestyle changes. For example, de Jong-van den Berg, Hernandez-Diaz, Werler, Louik, and Mitchell (2005) found that in addition to being aware of the benefits of folic acid in the preconception period, the use of folic acid was independently related to education level, family income, and ethnicity. In terms of barriers, the CDC (2008) reports "forgetting" as the most

Table 4
Provider Recommendation of Risks During and Before Pregnancy

Indicator (%)	Total (n = 340)	Black, Non-Hispanic (n = 130)	Hispanic (n = 124)	Statistic*	p-Value
Smoking	78 n = 317	84 n = 127	73 n = 122	$\chi^2 = 4.7$	<.05
Drinking alcohol	78 n = 315	86 n = 127	74 n = 121	$\chi^2 = 5.8$	<.05
Certain medicines	71 n = 309	77 n = 126	62 n = 117	$\chi^2 = 6.1$	<.05
Taking folic acid/multivitamin	67 n = 309	64 n = 127	72 n = 119	$\chi^2 = 2.0$.15
Using birth control	82 n = 312	85 n = 126	81 n = 118	$\chi^2 = .83$.36
Testing for HIV/AIDS	88 n = 315	90 n = 128	88 n = 119	$\chi^2 = .16$.69

* Test of statistical significance is the chi-square (χ^2) test.

Table 5
Correlations: Risk Factors and Provider Recommendations/Respondent Knowledge

Indicator	Correlation Between Risk Factor and	
	Provider Warnings (χ^2/p -Value)*	Respondent Knowledge (χ^2/p -Value)*
Smoking	1.5/.474 n = 297	0.19/.996 n = 211
Drinking alcohol	2.8/.237 n = 293	2.4/.661 n = 208
Taking folic acid/multivitamin	3.2/.198 n = 295	7.8/.100 n = 210
Using birth control	7.6/<.05 n = 284	N/A
Testing for HIV/AIDS	24.2/<.001 n = 290	N/A
Immunizations	N/A	9.6/<.05 n = 205

* Test of statistical significance is the chi-square (χ^2) test.

common reason for not taking a vitamin supplement on a daily basis. However, in a study conducted among Hispanic women of low economic status, reasons for not taking vitamins on a regular basis included financial considerations, time constraints, and misperceptions about the side effects and role of folic acid (Quinn, Hauser, Bell-Ellison, Rodriguez, & Frias, 2006).

Innovative initiatives are required to remove barriers to behavior change so that women can adopt healthy lifestyles throughout their childbearing years. As CHCs continue to provide poor women with access to health care, they should play a key role in developing and implementing preconception health programs. Subsequent research should encompass a richer understanding of the impact of potential preconception health interventions with the intent to modify and develop programs to specifically address preconception health needs for women of childbearing age and improve pregnancy outcomes.

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Author Descriptions

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