
Use of Health Services

Women's Preconceptional Health and Use of Health Services: Implications for Preconception Care

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Objective. To improve understanding of women's use of health care before pregnancy, by analyzing how the health status and health risks of pre- and interconceptional women are associated with health services use.

Data Source. Data are from a cross-sectional random-digit dial telephone survey of a representative sample of 2002 women ages 18–45 years from the Central Pennsylvania Women's Health Study (CePAWHS). A subsample of 1,325 respondents with current reproductive capacity, classified by reproductive life stage (preconceptional or interconceptional), was analyzed.

Study Design. Bivariate and multiple logistic regression analyses were conducted to determine how health needs (including indices of health status and health risks related to adverse pregnancy outcomes) are associated with five indicators of health services use (receipt of a regular physical exam, obstetrician–gynecologist [ob/gyn] visit, receipt of a set of recommended screening services, receipt of health counseling services on general health topics, and receipt of pregnancy-related counseling), controlling for predisposing and enabling variables.

Principal Findings. Only half of women at risk of pregnancy report receiving counseling about pregnancy planning in the past year. One-third of women surveyed did not receive routine physical examinations and screening services, and over half received little or no health counseling. Multivariate analyses showed that all the measures of health needs except for negative health behavior were related to some type of health services use. Psychosocial stress was associated with having a recent ob/gyn visit, with receiving general health counseling, and with receiving pregnancy planning counseling. Cardiovascular risk was positively associated with receiving general health counseling and a regular physical exam, but negatively associated with seeing an ob/gyn. Positive health behaviors were associated with receiving screening services and with receiving general health counseling. Preconceptional reproductive life stage was positively associated with receiving a regular physical exam and negatively associated with having an ob/gyn visit.

Conclusions. Pre- and interconceptional women with specific health care needs may not receive appropriate health care before pregnancy. Improving pregnancy experiences and outcomes requires more comprehensive preconception health care and more preventive care before the first pregnancy.

Key Words. Women's health, pregnancy, preconception health, health care utilization, surveys

Strategies to prevent adverse pregnancy outcomes by improving the health of women before they become pregnant are receiving increased attention for a number of important reasons. Most significantly, rates of preterm and low birthweight births continue to rise in the United States, despite increasing use of prenatal care services (Hoyert et al. 2006). This suggests that interventions after pregnancy occurs do not optimally address risks for adverse pregnancy outcomes that have been shown to be prevalent among women before pregnancy (Anderson et al. 2006; Weisman et al. 2006). In addition, nearly half of all U.S. pregnancies are unintended (Henshaw 1998), suggesting that many women may not realize they are pregnant in time to obtain early prenatal care, initiate preventive measures such as folic acid supplementation, or take steps to address preexisting health problems. In recognition of these issues, professional associations have published guidelines for the health care of women before the first pregnancy and between pregnancies, emphasizing the importance of pregnancy planning and preconceptional health promotion to improve pregnancy outcomes for both mother and baby (American Academy of Pediatrics and American College of Obstetricians and Gynecologists 2002; American Diabetes Association 2002; American College of Obstetricians and Gynecologists 2005; Freda, Moos, and Curtis 2006). Most recently, the Centers for Disease Control and Prevention (CDC) released recommendations to improve preconceptional health and health care (Centers for Disease Control and Prevention 2006).

The purpose of this study is to address how pre- and interconceptional women with specific health needs use health services. Little research has addressed this topic. Both the fragmentation of health care delivery and the lack of universal health insurance are impediments to comprehensive coordinated health care for reproductive-age women in the United States. Women access

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both generalist physicians (internists and family physicians) and obstetrician-gynecologists for primary care services, and these physicians differ in the services they provide (Henderson, Weisman, and Grason 2002; Scholle et al. 2002; Salganicoff, Ranji, and Wyn 2005). Family planning and prenatal care services often are provided in specialized centers including Federally Qualified Health Centers (National Association of Community Health Centers 2004). The responsibility for providing preconceptional care, as it includes assessment of multiple health conditions and risks in the context of reproductive life stages, is ambiguous at best. Accessing such care is problematic not only because it is unclear from whom it may be obtained but also because it may not be covered by health insurance. Medicaid targets women *after* they have become pregnant up to 60 days postdelivery, unless women qualify for health benefits for other categorical or financial reasons; this means that many poor and low-income women are not likely to have coverage for health care before or between pregnancies. A recent study estimated that 36.5 percent of women who had Medicaid payment for childbirth in 1998–2000 had no pre-pregnancy Medicaid coverage (Handler et al. 2006). Even among women with private health insurance, the lack of billing codes associated with preconception services presents a barrier for many providers who might otherwise offer these services.

The research base on utilization of preconception care is scant, and the information that is available suggests that recommended preconception care is not widely provided. For example, Bernstein, Sanghvi, and Merkatz (2000) found in reviewing patient records that gynecological providers commonly missed opportunities for preconceptional health promotion during routine gynecological visits, as evidenced by failure to document medical histories, prescription drug use, and dietary supplements. Similarly, a survey of reproductive-aged women sponsored by the March of Dimes revealed that elements of preconceptional care such as counseling about folic acid supplementation are often not addressed during preventive visits (March of Dimes Birth Defects Foundation 2004). Only one in four women surveyed reported receiving folic acid information from a health care provider. Among those women not currently taking vitamin supplements on a daily basis, 89 percent said they would be likely to take a multivitamin if advised to do so by their health care provider, suggesting that greater attention to health counseling in the preconception period could facilitate significant health improvement. Finally, a recent survey of 499 patients in primary care practices found that 56 percent were very or somewhat interested in receiving preconceptional health education (Frey and Files 2006).

Conceptualizing the possible determinants of the use of health services for preconceptional care is challenging. While preconceptional health care may be viewed as a type of preventive care, in that a goal is to prevent adverse pregnancy outcomes for the woman and for the infant, the preventive aspects may not be apparent to women. The fact that about half of U.S. pregnancies are unplanned suggests that women do not necessarily think of themselves as “preconceptional” even if they are capable of reproduction or are contemplating a pregnancy at some time in the future. The Behavioral Model of Health Services Use (Andersen 1968, 1995) conceptualizes use of ambulatory health services as a function of three types of variables at the individual level: need (such as symptoms, risks to health, and general state of health, which may be perceived by the individual or evaluated by health professionals); predisposing characteristics (such as age, education, and health beliefs, which affect, for example, individuals’ awareness of health care availability or effectiveness); and enabling resources (such as income and health insurance or social relationships, which affect individuals’ ability to access health care). In this framework, use of preconceptional care would be conceptualized as a function not only of health problems and risks that might affect pregnancy outcomes, but also of predisposing and enabling variables relevant to women at this reproductive life stage. To the extent that health care needs relevant to pregnancy outcomes do not determine use of health care by pre- and interconceptional women, unmet needs for care are likely to exist.

This paper uses a unique population-based data set to address the health status and health risks of pre- and interconceptional women, and how these health-related needs are associated with use of health services of various kinds, taking relevant predisposing and enabling variables into account. More specifically, the research investigates whether there is evidence of underutilization of care for specific types of health problems that are known risks for adverse pregnancy outcomes.

METHODS

Survey and Sample

This study uses data from Phase I of the Central Pennsylvania Women’s Health Study (CePAWHS), which included a random digit dial (RDD) population-based telephone survey of reproductive-aged women residing in a 28-county, largely rural region in Central Pennsylvania. The purpose of the survey was to estimate the prevalence of multiple risk factors related to pre-

term birth and low birthweight outcomes and to identify patterns of health care use. Inclusion criteria were female gender, ages 18–45 years, residence in the target region, and English or Spanish speaking. The Penn State Survey Research Center conducted the survey in English and Spanish, using computer-assisted telephone interviewing. The study was reviewed and approved by the Institutional Review Board of the Penn State College of Medicine and a Certificate of Confidentiality from NIH was obtained.

The RDD sample yielded 2002 completed interviews. A response rate calculated using an estimated proportion eligible among households of unknown eligibility (American Association for Public Opinion Research 2004) yields a response rate of 52 percent. This rate is consistent with recent RDD survey trends reported by Curtin, Presser, and Singer (2005). The cooperation rate was 63 percent. Comparisons of sample demographics with U.S. Census data show that the sample is highly representative of the target population (Weisman et al. 2006).

Because the present study focuses on health care use among women with reproductive capacity, postconceptional women in the original sample were omitted from the analyses. The final analytic sample included the 1,335 respondents who had no history of tubal ligation, hysterectomy, or other cause of infertility such as menopause.

Measures

Need Variables. Measures of health needs were constructed using factor analysis of a set of health status and health risk variables relevant to women's overall health and pregnancy outcomes (Misra, Guyer, and Allston 2003). Because the number of need measures in this study is large, we sought to reduce the data to a manageable number of health indices using factor analytic methods. The constructed indices make it possible to investigate how categories of health-related needs are associated with health services utilization.

A principal axis factor analysis using varimax rotation was conducted on a set of the key health indicators that were prevalent in the study sample or known to be associated with adverse pregnancy outcomes based on evidence from the literature. These indicators included measures of chronic and infectious health conditions, body mass index, depressive symptoms, health behaviors, and psychosocial stress. The factor analysis identified four factors; each of the four factors had an eigenvalue of > 1 , and together these factors explained 56 percent of the total variance. No variable loaded on more than

one factor; the highest factor loading in each case was generally two or more times as high for the identified factor as for the other three factors (see Table 1). The factors are:

Factor 1: Psychosocial Stress and Its Sequelae. This factor includes the score on a 12-item scale measuring the degree to which common hassles (e.g., money worries) were perceived as stressful during the past 12 months, adapted from the Prenatal Psychosocial Profile Hassles Scale (Curry, Campbell,

Table 1: Factor Loadings for Health Status and Health Risk Variables among Preconceptional and Interconceptional Women ($n = 1,325$)*

	<i>Factor 1: Psychosocial Stress & Sequelae</i>	<i>Factor 2: CV Risk</i>	<i>Factor 3: Negative Behavior</i>	<i>Factor 4: Positive Behavior</i>
Psychosocial Hassles scale [†]	0.748	0.056	0.228	-0.108
Any unfair treatment, past 12 months [‡]	0.643	0.082	0.155	0.083
Depressive symptoms [§]	0.666	0.215	0.109	-0.064
Any gynecological infection, past 5 years [¶]	0.550	-0.064	-0.003	-0.006
Hypertension, past 5 years	-0.091	0.820	0.038	-0.020
High cholesterol, past 5 years	0.025	0.627	-0.055	0.008
Diabetes other than during pregnancy, past 5 years	0.269	0.730	0.184	0.080
Obese (BMI > = 30 kg/m ²)	0.102	0.690	-0.167	-0.190
Binge drinking, past month	0.024	-0.081	0.783	0.021
Smoke cigarettes (current)	0.208	0.083	0.709	-0.210
Illegal drug use, past month	0.374	-0.036	0.777	-0.035
Fruit consumption (daily)	-0.032	-0.074	-0.244	0.808
Vegetable consumption (daily)	0.080	0.010	-0.146	0.657
Physical activity (30+minutes, 4+times per week)	-0.154	-0.046	0.313	0.671
Eigenvalue from rotated factor solution	<i>2.027</i>	<i>2.167</i>	<i>2.053</i>	<i>1.646</i>
Percent variation explained by the four factors: 56%				

*Ten cases were omitted due to missing values.

[†]Score dichotomized at the median (< -16 versus 17+).

[‡]Unfair treatment based on race/ethnicity or gender.

[§]Based on six-item scale, dichotomized at cut point indicating high risk for psychological distress, particularly depression (Sherbourne et al. 2001).

[¶]Includes urinary tract infection, chlamydia, herpes, gonorrhea, syphilis, pelvic inflammatory disease, bacterial vaginosis, vaginal yeast infection, HIV/AIDS, and hepatitis B.

^{||}Defined as five or more drinks on one occasion.

BMI, body mass index.

and Christian 1994) by Misra, O'Campo, and Strobino (2001); perceived unfair treatment due to race/ethnicity or gender in the past year scored across seven domains including "getting medical care," adapted from Krieger (1999); presence of depressive symptoms, based on a six-item scale developed for women's health surveys by Sherbourne and Stewart (1991); and receiving a diagnosis of any one of 10 types of gynecologic infection in the past 5 years (including urinary tract infection, chlamydia, herpes, gonorrhea, syphilis, pelvic inflammatory disease, bacterial vaginosis, vaginal yeast infection, HIV/AIDS, and hepatitis B). The loading of gynecologic infections on this factor is plausible because psychosocial stress may render women more susceptible to a broad range of infections via changes in immune status (Glaser et al. 1999; Wadhwa et al. 2001).

Factor 2: Cardiovascular Risk. This factor includes having hypertension, high cholesterol, or diabetes other than during pregnancy in the past 5 years, as well as current obesity (calculated body mass index ≥ 30 kg/m²). These conditions are all risk factors for cardiovascular disease (CVD), which is associated with adverse pregnancy outcomes and cannot be optimally treated during pregnancy (Misra, Guyer, and Allston 2003; Coppage and Sibai 2005; Henriksen 2006; Raatikainen, Heiskanen, and Heinonen 2006).

Factor 3: Negative Health Behavior. This factor consists of binge drinking (defined as five or more alcoholic drinks on one occasion) in the past month, current cigarette smoking, and illicit drug use in the past month. Each of these behaviors has been linked with adverse pregnancy outcomes, particularly low birthweight (Little et al. 1999; Parazzini et al. 2003; Centers for Disease Control and Prevention 2004; Shankaran et al. 2004).

Factor 4: Positive Health Behavior. This factor consists of nutritional habits (fruit and vegetable consumption at least daily in a typical week) and performing moderate or strenuous physical activity for at least 30 minutes on most days of the week, consistent with current guidelines (National Institutes of Health 1995; Center for Nutrition Policy and Promotion 2005). These behaviors are related to weight gain before and during pregnancy; excessive pregnancy weight gain has been associated with increased risk of adverse infant outcomes including macrosomia, hypoglycemia, and hyperbilirubinemia (Hedderson et al. 2006).

The factor scores were entered as predictor variables in multiple logistic regressions modeling health services use outcomes (see description of these outcomes below). Noteworthy variables that failed to load on any of the four factors were: using a daily multivitamin containing folic acid, a risk factor for birth defects; having a diagnosis of periodontal disease in the past 5 years, a

risk factor for preterm birth; exposure to herbicides, insecticides, and other toxic chemicals in the past 12 months, a risk factor for congenital abnormalities; vaginal douching in the past 12 months, a risk factor for gynecologic infection; and having experienced intimate partner violence, which is associated with higher risk of adverse pregnancy outcomes. Because these variables did not load together or on any of the identified factors, they were excluded from the analyses.

Because the factor scores may not reflect women's perceptions of their overall health needs, an additional measure of need—Self-rated Health Status—was included in the analyses. This is a single item from the SF-12v2 Health Survey (Ware, Kosinski, and Keller 1996) in which women rated their overall health as excellent, very good, good, fair, or poor. Responses were categorized as excellent or very good (67 percent of the sample) versus good, fair, or poor (33 percent).

Predisposing Variables

Reproductive Life Stage. Respondents were classified as either preconceptional (never having been pregnant) or interconceptional (having had one or more pregnancies). Interconceptional women might be more likely than preconceptional women to have established health care patterns related to a prior pregnancy and to have opportunities for pregnancy-related services, including the opportunity to ask questions about pregnancy planning, although there are often breaks in women's use of services between pregnancies (Lu et al. 2006). In the analytic sample, 34 percent of women were preconceptional and 66 percent were interconceptional.

Age Group. Respondent age was categorized as either 18–34 years (63 percent of the sample) or 35–45 years (37 percent). The younger age category represents the primary reproductive years (Martin et al. 2006). While younger women are more likely to be preconceptional than interconceptional, they may be less likely to seek preconceptional advice or services due to uncertainty about reproductive plans (Finer and Henshaw 2006), lack of awareness of preconception care (Centers for Disease Control and Prevention 2006), or other factors.

Race/Ethnicity. Race/ethnicity was dichotomized as either white, non-Hispanic (90 percent of the sample), or other race/ethnicity (10 percent), reflecting the largely white rural target population. While the sample includes non-Hispanic blacks and Hispanics in the “other race/ethnicity” category, the numbers in these subgroups are not sufficient for a finer categorization on

this variable. Nonwhite women might be less likely to seek health services related to pregnancy planning due to factors such as lack of awareness of preconception care or perceptions of unequal treatment within the health care system (Institute of Medicine 2003).

Educational Attainment. Respondent education was dichotomized as high school diploma or less (33 percent of the sample) or some college or more (67 percent). Prior analyses suggest that those with post-high school education are more likely to use health services. Higher educational level is likely to predispose women to make use of health services related to pregnancy planning due to greater awareness of health issues related to pregnancy.

Employment. The employment status of respondents was categorized as employed either full- or part-time (76 percent of the sample) or not employed (24 percent). Employment status has implications for health status, as occupational involvement is an aspect of social embeddedness that is related to health, as well as for health insurance coverage.

Marital Status. Current marital status was coded as either married or living with a partner (75 percent of the sample) or never married, widowed, divorced, or separated (25 percent). Married or partnered women may be more predisposed to use pregnancy-related services due to their greater exposure to pregnancy risk.

Enabling Variables. The enabling variables include measures of poverty status and health insurance. Being poor or near poor, having no health insurance or only public health insurance, and having a gap in health insurance coverage during the past year are expected to be associated with lower use of health services.

Poverty Status. Using data on household income and household composition, a dichotomous variable was created to indicate whether the respondent's poverty status was nonpoor (71 percent of the sample) or either poor (below the federal poverty level) or near poor (below 200 percent of the federal poverty threshold) (29 percent of the sample).

Health Insurance Type. Each respondent was assigned to one of the following three mutually exclusive insurance categories: no health insurance coverage (11 percent of the sample), private insurance coverage only (76 percent), or public insurance coverage (13 percent) at the time of interview. Women with both private and public insurance coverage were included in the public insurance category. In this reproductive-aged population,

Medicaid was the predominant type of public health insurance reported. A set of two dummy variables was created with private insurance as the omitted category.

Gap in Health Insurance. A dichotomous variable was created to indicate the presence of any gap in health insurance coverage over the past 12 months. Among women in the sample 18 percent reported a gap in coverage (the average gap reported was 6.5 months), and 82 percent reported continuous insurance coverage.

Outcome Variables. The outcomes variables are indicators of use of health services, including making specific types of visits and receiving specific types of preventive services, the latter including preconception counseling.

Physical Exam. A dichotomous variable indicates receipt of a regular physical examination in the past 12 months. This variable reflects access to routine primary care. Nearly two-thirds of the women in the sample (63 percent) reported receiving a routine exam in the past 12 months.

Ob/Gyn Visit. A dichotomous variable indicating any visit to an ob/gyn in the past 2 years. This variable reflects access to reproductive health care. The 2-year time frame reflects national utilization patterns: while 84 percent of women ages 18–44 in the 2004 Kaiser Women's Health Survey reported a provider visit in the past year, only 55 percent reported a visit to an ob/gyn in the past year (Salganicoff, Ranji, and Wyn 2005). Because nonpregnant women often do not see an ob/gyn annually, the 2-year time window for this variable is appropriate for assessing ob/gyn use among pre- and interconceptional women. In this sample, 70 percent of women reported visiting an ob/gyn in the past 2 years.

Screening Services. A dichotomous variable was constructed based on a sum of four recommended screening services for women of reproductive age (pelvic exam, Pap smear, physical breast exam by a health professional, and blood pressure check). The variable measures receipt of each of these services in the past 12 months from any type of health care provider. The mean number of preventive services reported was 3.2 (SD = 1.4). The sum of services received was dichotomized to contrast those receiving zero to three services (34 percent) with those receiving all four services (66 percent).

Health Counseling. A dichotomous variable was constructed based on a sum of seven preventive counseling topics (excluding pregnancy planning and contraceptive counseling) received in the past 12 months. Respondents were asked, "In the past 12 months, has a doctor or other health professional

asked you or talked to you about any of the following things: smoking or tobacco use, diet or nutrition, exercise or physical activity, alcohol or drug use, concerns about safety or violence in your home, sexually transmitted infections, and stress or stress management.” All of these topics are relevant to preconceptional care, and this variable is an indicator of the number of topics the respondent recalls being discussed. The mean number of health topics reported was 1.6 (SD = 1.8). The sum of topics was dichotomized to contrast those receiving counseling on zero to one topics (57 percent) with those receiving counseling on two or more topics (43 percent).

Pregnancy Planning Counseling. A dichotomous variable, based on two questions, indicates whether or not a “doctor or other health professional asked you or talked to you about planning for pregnancy” and/or “about birth control” in the past 12 months. This is an indicator of whether or not the respondent perceives that any pregnancy-related counseling took place. Half the sample (50 percent) reported receiving pregnancy planning counseling.

Analyses

Frequency distributions were generated and bivariate associations between health services outcomes and other study variables analyzed using the χ^2 test for 2×2 tables or the Wilcoxon rank-sum test for independent samples. For the four factors listed in Table 2, the Wilcoxon test was used on the ranked data. For all other variables, χ^2 was computed for a 2×2 table with the health service outcomes (column) classified as present or absent and the covariates (row) dichotomized as indicated.

Multivariable logistic regression models were fitted for each of the five health services outcomes. All variables were examined for multicollinearity before multivariate modeling, and no problems were detected. Odds ratios in Table 3 represent the estimated increase in odds of the outcome being positive conditional on the predictor being in the stated versus reference category. For example, the value of 1.69 for the odds of a physical exam as a function of reproductive life stage means that there is a 69 percent greater chance of someone in the preconceptional stage having a physical exam than for someone in the interconceptional stage, adjusting for all other measured covariates. For continuous predictors the odds ratio estimates the change in outcome for an increase of one unit in the predictor. Table 3 also displays 95 percent confidence intervals which are slightly asymmetric because of the scale of the logistic regression models. Coefficients in bold type are statistically significant ($p < .05$) from the null hypothesis value of 1.0.

Table 2: Bivariate Relationships between Health Services Outcomes and Other Variables (Direction of Relationship and p -value Associated with χ^2 or Wilcoxon Statistic)

	Health Services Outcomes				
	Physical Exam	Ob/Gyn Visit	Screening Services	Health Counseling	Pregnancy Counseling
<i>Need variables</i>					
Psychosocial stress and sequelae (factor 1)	NS	NS	NS	(+) <0.0001	(+) <0.0001
Cardiovascular risk (factor 2)	(+) 0.021	(-) 0.0001	NS	(+) <0.0001	NS
Negative health behavior (factor 3)	NS	NS	NS	(+) 0.026	(+) 0.0004
Positive behavior (factor 4)	(+) 0.002	(+) 0.002	(+) <0.0001	NS	NS
Self-rated health status (<i>good/fair/poor versus exc/aged</i>)	NS	(-) 0.0004	(-) <0.0001	(+) <0.0001	NS
<i>Predisposing variables</i>					
Reproductive life stage (<i>pre- versus interconceptional</i>)	(+) 0.005	(-) 0.002	NS	NS	(+) 0.0007
Age group (<i>35+ versus 18-34</i>)	NS	(-) 0.006	NS	NS	(-) <0.0001
Race/ethnicity (<i>other versus white non-Hispanic</i>)	NS	NS	(-) 0.013	NS	NS
Educational attainment ($\leq HS$ versus some college+)	NS	(-) 0.003	(-) <0.0001	(-) 0.002	(-) 0.048
Employment status (<i>not employed versus employed</i>)	(-) 0.009	NS	(-) 0.0001	NS	NS
Marital status (<i>not married/partnered versus married/partnered</i>)	NS	(-) <0.0001	(-) <0.0001	NS	NS
<i>Enabling variables</i>					
Poverty (<i>near-poor/poor versus not poor</i>)	NS	NS	(-) <0.0001	NS	NS
Health insurance type (<i>none or public versus private</i>)	(-) 0.0002	(-) <0.0001	(-) <0.0001	NS	NS
Gap in health insurance (<i>gap versus no gap</i>)	(-) <0.0001	(-) <0.0001	(-) <0.0001	NS	NS

NS, not statistically significant at $p < .05$, based on χ^2 test.

Table 3: Results of Multivariate Regression Analyses Modeling Each of Five Health Service Utilization Outcomes

	OR (95% CI)				
	Physical Exam	Ob/Gyn Visit	Screening Services	Health Counseling	Pregnancy Planning Counseling
<i>Need variables</i>					
Factor 1: psychosocial stress and its sequelae	1.05 (0.96,1.15)	1.11 (1.01,1.22)	1.08 (0.98,1.19)	1.25 (1.15,1.37)	1.18 (1.08,1.29)
Factor 2: CVD risk	1.13 (1.03,1.24)	0.91 (0.84,0.99)	1.04 (0.96,1.13)	1.18 (1.08,1.29)	0.95 (0.88,1.03)
Factor 3: negative health behavior	1.00 (0.91,1.09)	0.99 (0.90,1.09)	0.98 (0.90,1.08)	0.99 (0.91,1.06)	0.99 (0.91,1.08)
Factor 4: positive health behavior	1.21 (1.10,1.32)	1.08 (0.99,1.19)	1.16 (1.06,1.28)	1.14 (1.04,1.24)	1.03 (0.95,1.13)
Self-rated health (<i>good/fair/poor versus excellent/good</i>)	0.97 (0.72,1.32)	0.87 (0.63,1.20)	0.79 (0.58,1.07)	1.51 (1.13,2.03)	1.07 (0.79,1.44)
<i>Predisposing variables</i>					
Reproductive stage (<i>pre- versus interconceptional</i>)	1.69 (1.22,2.34)	0.67 (0.48,0.94)	1.00 (0.72,1.40)	1.17 (0.86,1.60)	1.14 (0.83,1.56)
Age group (<i>35+ versus 18-34</i>)	1.31 (0.99,1.75)	0.48 (0.35,0.65)	0.87 (0.65,1.18)	0.97 (0.73,1.28)	0.27 (0.21,0.37)
Race/ethnicity (<i>other versus white non-Hispanic</i>)	1.09 (0.70,1.71)	0.92 (0.58,1.47)	0.86 (0.55,1.34)	1.22 (0.78,1.89)	1.35 (0.87,2.10)
Education (\leq HS versus some college+)	1.27 (0.94,1.72)	0.78 (0.57,1.07)	0.67 (0.50,0.91)	0.53 (0.39,0.72)	0.87 (0.65,1.18)
Employment (<i>not employed versus employed</i>)	0.75 (0.55,1.04)	1.19 (0.83,1.71)	0.78 (0.56,1.08)	0.99 (0.72,1.38)	0.84 (0.61,1.16)
Marital status (<i>not married/partnered versus married/partnered</i>)	1.19 (0.84,1.68)	0.58 (0.41,0.82)	0.64 (0.45,0.90)	0.84 (0.61,1.18)	0.50 (0.36,0.70)
<i>Enabling variables</i>					
Poverty status (<i>near-poor/poor versus not poor</i>)	1.24 (0.89,1.72)	0.95 (0.66,1.35)	0.79 (0.57,1.11)	1.10 (0.79,1.53)	0.64 (0.46,0.89)
Health insurance (<i>none versus private</i>)	0.63 (0.39,1.02)	0.56 (0.34,0.91)	0.45 (0.28,0.73)	0.97 (0.59,1.60)	1.30 (0.80,2.11)
Health insurance (<i>public versus private</i>)	0.92 (0.59,1.44)	1.03 (0.63,1.68)	0.74 (0.47,1.15)	1.26 (0.81,1.97)	1.34 (0.86,2.08)
Gap in health insurance (<i>gap versus no gap</i>)	0.59 (0.40,0.88)	0.55 (0.36,0.83)	0.83 (0.55,1.24)	0.70 (0.47,1.05)	0.66 (0.44,0.99)
<i>n</i>	1,099	1,098	1,099	1,099	1,099
Full model statistics	-2 LL = 1370.24 $\chi^2 = 65.24$ df = 15, $p < .0001$	-2 LL = 1221.14 $\chi^2 = 82.04$ df = 15, $p < .0001$	-2 LL = 1285.34 $\chi^2 = 80.69$ df = 15, $p < .0001$	-2 LL = 1394.79 $\chi^2 = 108.49$ df = 15, $p < .0001$	-2 LL = 1392.77 $\chi^2 = 130.69$ df = 15, $p < .0001$

Bold type denotes significant predictor of outcome ($p < .05$).
CVD, cardiovascular disease; OR, odds ratio; CI, confidence intervals.

RESULTS

Table 2 presents a summary of the bivariate association tests between the five health care outcome variables and the covariates of interest. Each of the outcome variables was related to one or more measures of need. Receipt of a physical exam in the past 12 months was positively associated with cardiovascular risk as well as more positive health behavior.

Having had an ob/gyn visit in the past 2 years was negatively associated with two measures of need: cardiovascular risk and lower self-rated health status. More reported positive health behavior was positively correlated with having an ob/gyn visit. Positive health behavior was also positively associated with reported receipt of recommended screening services; good/fair/poor self-rated health was inversely related to receipt of these services. Reported receipt of health counseling was positively associated with the presence of psychosocial stress, cardiovascular risk, and greater reported negative health behavior. Reported pregnancy counseling receipt was positively associated with psychosocial stress as well as with more reported negative health behavior.

The health services outcomes were also found to be associated with other variables which are expected to predispose to or enable use of care. Preconceptional women were more likely to receive a physical exam and less likely to have had an ob/gyn visit than were interconceptional women; they were also more likely to report having received pregnancy-related counseling in the past year. Older women were relatively less likely to have had an ob/gyn visit or to report having received pregnancy counseling. Nonwhite women were less likely to report having received screening services; race/ethnicity was not related to the other health services outcomes. Lower educational attainment was negatively associated with receipt of four of the five health outcomes, and marital status, poverty status, not being employed, and insurance status were also negatively associated with health services use.

Moving to a multivariate framework, Table 3 presents odds ratios and 95 percent confidence intervals derived from multivariate logistic regressions modeling each of the five health services outcomes. In the first model, after taking other factors into account, the presence of cardiovascular risk is significantly associated with increased likelihood of receiving a regular physical exam within the past year, as is greater reported positive health behavior. Preconceptional women are also more likely to have had a recent physical exam. Conversely, the likelihood of a recent physical exam is significantly decreased among women who experienced a recent gap in health insurance

coverage. The two other factor scores, perceived psychosocial stress and negative health behaviors, were not significantly related to receipt of a regular physical exam.

Results from the second model show that net of other factors the likelihood of seeing an ob/gyn in the past 2 years is significantly increased among women with elevated psychosocial stress, and decreased among those with CVD risk. Older women, those who are not married or living with a partner, and those who have no insurance or have experienced a recent gap in health insurance coverage have significantly lower odds of having a recent ob/gyn visit. It is also the case that preconceptional women are significantly less likely than interconceptional women to have seen an ob/gyn. Reported receipt of the recommended screening services was significantly related to more positive health behavior, but not to the other need factors. Those with lower educational attainment, unmarried women, and those without health insurance were less likely to report having received the preventive services in the previous year.

The fourth model identifies factors related to reported receipt of health counseling on preventive topics relevant to reproductive health. Women with greater psychosocial stress, those who have cardiovascular risk factors, those with more positive health behavior, and those with poorer self-rated health were significantly more likely to report having received counseling. Lower educational attainment was associated with reduced likelihood of receiving this counseling.

The final model indicates that reported receipt of counseling specific to pregnancy planning in the past 12 months is related to only one of the health need variables—the presence of elevated psychosocial stress. The likelihood of reporting such counseling is reduced among older women, unmarried women relative to those who are married or living with a partner, those who are poor or near-poor, and those who have experienced a gap in health insurance.

In analyses not shown here, we explored the possibility of theoretically relevant interactions (e.g., between reproductive life stage and age group), but found no statistically significant interactions.

DISCUSSION

The objective of this study was to determine how the health status and health risks of pre- and interconceptional women are related to their health services

use, controlling for predisposing and enabling variables. A unique data set including a broad range of health-related variables relevant to pregnancy outcomes provided an opportunity to investigate the relationship of health care utilization to clusters of important health needs. Health care use was measured in several ways, including receiving specific types of services (physical exam, recommended screening, and counseling) and seeing an ob/gyn. Multivariate findings show that all of the measures of health needs except for negative health behavior (binge drinking, cigarette smoking, and illicit drug use) are related to some type of health services use.

Most notably, psychosocial stress was associated with making a visit to an ob/gyn with the past 2 years, with receiving general health counseling, and with receiving counseling related to pregnancy planning. Cardiovascular risk (having hypertension, high cholesterol, diabetes other than during pregnancy, and/or obesity) was associated with receiving general health counseling. Positive health behaviors (nutrition and physical activity) were associated with receiving screening services and with receiving general health counseling. Self-rated overall health was associated with receiving general health counseling.

The only negative association between health need and utilization was that cardiovascular risk reduced the odds of seeing an ob/gyn in the past 2 years, possibly indicating that women with cardiovascular risks tend to see non-ob/gyn providers for management of their chronic condition and either receive reproductive services from those other providers or forego reproductive care. The lack of association between negative health behavior and health care use suggests either that women engaging in negative behaviors are indifferent with regard to seeking health care, or that the health care they do receive has not influenced their negative behaviors; this cannot be sorted out in a cross-sectional study, but it does suggest a degree of unmet need for care or a lack of effective health services for pre- and interconceptional women engaging in these behaviors.

Predisposing and enabling variables are associated with all types of utilization in largely expected ways, although race/ethnicity and employment status fail to attain significance in any of the regression models. Notably, younger women (ages 18–34) were more likely to have seen an ob/gyn and to report having received pregnancy planning counseling, independent of reproductive life stage, and interconceptional women, compared with preconceptional women, were more likely to see an ob/gyn. Higher educational attainment was associated with receiving screening services and general health counseling, possibly reflecting higher levels of health awareness or more

assertive health care seeking among more highly educated women; alternatively, more highly educated women may be more likely to recall screening and counseling services received. Being married or living with a partner also was associated with greater health services use—including seeing an ob/gyn, receiving screening services, and receiving pregnancy planning counseling—possibly because these women are predisposed to seeking pregnancy-related care or have established regular health care use patterns within the context of family health care. Health insurance figures prominently in the findings: having no health insurance (compared with private health insurance) reduces the odds of seeing an ob/gyn and receiving screening services, and experiencing a gap in health insurance coverage in the past year reduces the odds of having received a physical exam, seeing an ob/gyn, and receiving pregnancy planning counseling. Interestingly, the health insurance variables are not associated with receiving health counseling, which could indicate that health insurance is important for getting in the door for basic care, but that receiving health counseling is influenced more by a sustained pattern of continuous care that is not captured in these measures. Finally, poverty status (poor or near poor versus not poor) reduces the odds of receiving pregnancy planning counseling. This finding is of particular interest because women of lower socioeconomic status are at substantially elevated risk for poor birth outcomes, including preterm birth and low birthweight (Kramer et al. 2000; Finch 2003), and therefore have greater need for pregnancy planning counseling.

There are a number of implications of these findings for health services delivery among pre- and interconceptional women. Most notably, only half of women at risk of pregnancy report that they receive counseling with respect to pregnancy planning, and receipt of such counseling is not associated with some important health needs. That is, women at higher risk for adverse pregnancy outcomes due to cardiovascular risks or unhealthy behaviors are not more likely than lower-risk women to receive pregnancy planning counseling. This result confirms earlier studies showing that preconception counseling is rarely provided even for women at high risk of poor pregnancy outcomes (March of Dimes Birth Defects Foundation 2004). Raising women's awareness of the need for pre-pregnancy care, particularly when they are at risk of adverse pregnancy outcomes, is an obvious need.

Furthermore, multiple types of health care providers have a role to play in promoting women's health before or between pregnancies. In data not shown, the women in this study reported seeing family physicians or general internists for regular health care, and most also reported seeing ob/gyns (67 percent of preconceptional women and 75 percent of interconceptional

women saw ob/gyns). However, the findings also point to less use of ob/gyns among women with CVD risks. Consequently, it would be inappropriate to assume that ob/gyns would see all women at risk of adverse pregnancy outcomes before their pregnancies or that they could be the exclusive providers of preconception care. Generalist physicians are likely to see many women with risks for adverse pregnancy outcomes, including unhealthy behaviors and CVD risks, and therefore must be included in efforts to increase awareness and provision of preconception health services.

Longitudinal research is needed to clarify the timing of utilization of health care for specific needs before or between pregnancies, as well as how health care use might affect risk status for adverse pregnancy outcomes over time. Research also is needed on the specific barriers that women confront in seeking pre- or interconceptional care. Our findings confirm that health insurance is a key facilitator of obtaining care, but additional potential barriers, such as availability of services in women's communities and the cultural competence of providers, require further exploration.

There are several limitations of this study. First, the cross-sectional nature of the data means that we cannot determine the timing of health care use in relation to the development of needs, we cannot assert that needs "cause" health care use, and we cannot ascertain the impact of use on needs. The data indicate how pre- and interconceptional women's reports of health needs and health services use are associated at a point in time, with current health needs examined in relation to health care use in the past year (for four outcome measures) and the past 2 years (for one outcome measure). Second, all data were collected by self-report. Although access to medical record data would have provided additional documentation of health status, the reported prevalence of risk factors for adverse pregnancy outcomes and frequency of health services use appear reasonable and are comparable with those seen in other research (Anderson et al. 2006; Lethbridge-Cejku, Rose, and Vickerie 2006). Medical record information would not adequately capture health care use because this is a population-based sample in which women may receive health care from diverse sources. Third, although we have measured women's perceptions that they received specific types of health services, we cannot attribute services received to specific types of providers (e.g., we cannot determine whether pregnancy planning counseling was received from ob/gyns or other types of providers).

In light of recent CDC recommendations for preconception care for all women of reproductive age in the United States, the findings of this study confirm both that pre- and interconceptional women have substantial health

needs and that these needs are not always associated with receiving health services. Furthermore, variables other than need—including educational status and health insurance—are associated with health care use in this population. If preconception care is to realize its promise of improving women's health and reducing the incidence of adverse pregnancy outcomes, services must address the key health needs among pre- and interconceptional women, including those with less than optimal access to health care.

ACKNOWLEDGMENTS

This project is funded, in part, under grant number 4100020719 with the Pennsylvania Department of Health. The authors wish to acknowledge the staff of the Penn State Survey Research Center who conducted the RDD telephone survey; Walther Eisenhauer, Patricia Fonzi, and D. Alfred Owens, who helped design the CePAWHS; Sara Baker, the project manager; Diana Velott, who assisted with data management; and Dawn P. Misra, who provided consultation to the project.

Disclaimers: The Pennsylvania Department of Health specifically disclaims responsibility for any analyses, interpretations, or conclusions.

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