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From the Editor

Historical Critique of the Leading Causes of Death in the United States

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Throughout the process of health promotion and disease prevention public health professionals quite often rely upon mortality statistics, primarily alterations therein, as a measure of need as well as guideposts for achieving the goals of *Healthy People 2010.* A common practice, especially given the arrival of the 'new millennium,' is to look back over the previous 100 years in an effort to compare then with now. Twentieth-century mortality patterns exhibited by the United States have been analyzed with shifts in cause of death being lauded as 'dramatic', the most striking feature being a reduction in deaths due to infectious diseases and a concurrent increase in mortality due to chronic conditions associated with lifestyle. In 1900 the three primary causes of death reported were infectious in nature (pneumonia & influenza, tuberculosis, and diphtheria & enteritis) while in 2004 these leading positions were occupied by heart disease, cancer, and stroke. These data, however, may only be contemplated with the knowledge that it wasn't until 1933 when all states in the U.S. became part of the death- and birth-registration system.[1] Death-registration areas were first established in 1900 and included only 10 states and the District of Columbia. Birth-registration areas emerged in 1915 with the same geographic composition. In essence, practitioners could not begin to approach an understanding of national mortality statistics until 1933 when all U.S. states because, per consensio, part of the national reporting system and it wasn't until 1940 that data collected from each state was actually included in tabulated death estimates[2]. Coupled with a public health infrastructure still in its infancy, death statistics did not become 'all inclusive' until just after the beginning of World War II. Though we are all familiar with the leading causes of death in the United States from a historical vantage, the numbers deserve another look in a more critical light then is generally afforded cause of death rankings. Table 1 offers a comparison of the top ten causes of death reported for the U.S. for the years 1900, 1933, 1940, and 2004. Analysis of these data reveals a somewhat contradictory idea to traditional thought that striking changes in death patterns have occurred over the previous 100 years. It is true that in 1900 infectious diseases accounted for over half (53%) of the *top 10 causes* and 34% of *all causes* of death, numbers which are greatly diminished by 1940 (14% and 11%, respectively). However, cause of death *rankings* , particularly with regard to the first three positions change little between 1933 and 2004 with diseases of the heart leading the way followed by cancer. In 1933 intracranial lesions was posited as the 4th leading cause of death just below pneumonia and influenza, but quickly moves up one position by 1940, a position which has been maintained, though due to disease classification criteria is currently

[1] National Center for Health Statistics, 2006

[2] Vital Statistics of the United States, 1950

Table 1: Primary Causes of Death, 1900, 1933, 1940, 2004

1900	1933	1940	2004
Influenza and Pneumonia	Heart Disease	Heart Disease	Heart Disease
Tuberculosis	Cancer	Cancer	Cancer
Diarrhea, Enteritis, Etc.	Influenza & Pneumonia	Intracranial Lesions	Cerebrovascular Disease
Heart Disease	Intracranial Lesions	Nephritis	Chronic Lower Respiratory Diseases
Intracranial Lesions	Nephritis and Other	Pneumonia	Accidents and Unintended Injuries
Nephritis	Tuberculosis	Accidents (Excluding Motor Vehicle Accidents)	Diabetes
All Accidents	Accidents (Except MVA)	Tuberculosis	Alzheimer's Disease
Cancer	Premature Birth	Diabetes	Influenza and Pneumonia
Senility	Motor Vehicle Accidents	MVA	Nephritis and Other
Diphtheria	Diabetes	Premature Births	Septicemia

Source: Centers for Disease Control and Prevention, 2006.

referred to as cerebrovascular disease. So the question remains; have actual causes of death changed dramatically over the last 100 years? Given that 7 of the 10 causes of death reported in 1933 are still on the top 10 list for 2004 (though perhaps with different classification criteria and rankings) one must examine critically the true magnitude of mortality shift when lauding advances in public health over the previous decade. Public health greatly advanced the art and science of health promotion and disease prevention over the last 100 years and will continue to do so, especially if consideration is given to the issue of data quality when using mortality data as a measure of programmatic need.

A Needs Assessment of Hypertension in Georgia

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Abstract

Hypertension is a leading cause of stroke, coronary artery disease, heart attack, and heart and kidney failure in the United States. In Georgia, the percentage of those with hypertension and related diseases remain above the national average. The aim of this paper is to offer a basic review of hypertension including physical complications of the disease and to provide statistics regarding the scope of hypertension in the state of Georgia. Additionally, the paper provides insights on current hypertension programs such as the National High Blood Pressure Education Program (NHBPEP) and Dietary Approaches to Stop Hypertension (DASH). In conclusion, a statewide or local hypertension education program should be implemented to improve awareness, treatment, opportunities, and control of hypertension in an effort to reduce cardiovascular disease rates in Georgia.

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A Needs Assessment of Hypertension in Georgia

Hypertension is a leading cause of stroke, coronary artery disease, heart attack, and heart and kidney failure in the United States. Currently, 50 million Americans have hypertension, generally characterized by a blood pressure of 140/90 mm Hg or over. Another 45 million have a condition known as pre-hypertension (blood pressure of 120–139 mm Hg [systolic] or 80–89 mm Hg [diastolic]) (Hajjar & Kotchen, 2003). A reading below 120/80 mm Hg is considered normal. (Table 1)

The aim of this paper is to offer a basic review of hypertension including physical complications of the disease and to provide statistics regarding the scope of hypertension in Georgia.

CONTRIBUTING FACTORS

Blood pressure is defined as the amount of force placed on artery walls by circulating blood. Narrow arteries cause the heart to work harder to pump blood throughout the body, therefore raising the blood pressure. Hypertension is defined as chronically high blood pressure.

Factors that may contribute to hypertension include obesity, smoking, age, genetics, being African American, lack of physical activity, excessive salt and alcohol consumption, stress, and the use of birth control pills (Cuddy, 2005). Hypertensive patients usually lack symptoms unless their blood pressure is extremely high, however possible symptoms include severe headache, fatigue or confusion, vision problems, chest pain, difficulty breathing, irregular heartbeat, and blood in the urine (Centers for Disease Control and Prevention [CDC], 2005). Though hypertension and subsequent heart problems are common throughout the United States, they are more prevalent in the South, possibly due to culture and other sociodemographic factors such as age, race, gender, education, and income.

Untreated chronic hypertension can lead to numerous health problems, such as stroke, heart attack, heart failure, kidney failure, vision problems and arteriosclerosis. Panza (2001) reported that women and men with a high normal blood pressure (130-139 / 85-90 mm Hg) had a 60% increased risk of suffering a heart attack or stroke. In comparison, the results of the Framingham Heart Study indicate that women and men with a high normal blood pressure had a 2.5 and 1.6 higher risk of suffering a heart attack or stroke respectively, compared to women and men with an optimal blood pressure (Vasan, 2001).

Nationally, only 69% of people with high blood pressure are aware of their condition. Of these, 58% are treated with medication. Of those on medication, 53% are successful at controlling their blood pressure. In essence, only 31% of people with known high blood pressure have the disease under control (Georgia Department of Human Resources [DHR], 2005).

Reducing hypertension can lead to marked reductions in the risk of several adverse events such as hemorrhagic stroke, ischemic stroke, heart disease, and kidney failure (Rein et al., 2006). Lowering blood pressure by 10 mm Hg systolic and 5 mm Hg diastolic reduces the relative risk of major cardiovascular complications by 21%-30% (Campbell, 2004). High blood pressure may be controlled by weight loss, engaging in regular physical activity, developing healthy eating habits, and quitting smoking. For those who are unable to decrease their blood pressure by lifestyle modification alone, medications prescribed by a physician can often control high blood pressure successfully (Gregory et al., 2005). Aggressive medical treatment of hypertension may

Table 1
Blood Pressure Classifications by Blood Pressure Level

Blood Pressure Classification[1]	Blood Pressure level (mm Hg)
Normal	Systolic BP <120 **AND** Diastolic BP <80
Pre-Hypertension	Systolic BP= (120-139) **OR** Diastolic BP= 80-89
Stage 1 Hypertension	Systolic BP= (140-159) **OR** Diastolic BP= 90-99
Stage 2 Hypertension	Systolic BP= (160 or higher) **OR** Diastolic BP= 100 or higher

[1] If systolic and diastolic blood pressure measures fall into two different categories, the blood pressure classification is the higher of the two categories.
Source: The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.

significantly decrease the risk of coronary artery disease, congestive heart failure, stroke, and resulting disability.

Cardiovascular disease (CVD), which includes stroke and heart disease, is the leading cause of death in Georgia. All forms of heart disease and stroke are the first and third most common causes of death in Georgia, respectively. Ischemic heart disease, the most common form of heart disease, and stroke account for about 20% of deaths in the state (Gregory, Wu, Kanny, Chambers, & Jones, 2005).

According to the 2005 Behavioral Risk Factor Surveillance System (BRFSS) data (DHR, 2005) 26.5% of Georgians have been informed by a physician or other health care professional that they suffer from high blood pressure. The national average during the same year was 25.5% of the population. Likewise, Georgia's age-adjusted death rate from heart disease is 578/100,000, about 12% above the national average of 536/100,000 (CDC, 2005). During 2003, CVD caused 23,295 deaths in Georgia, which accounted for 35% of all deaths that year (Gregory et al., 2005). Also in 2003, CVD age-adjusted death rates in Georgia were 1.4 times higher for men than women, and 1.4 times higher for blacks than whites (CDC, 2005).

Of those know to have hypertension in Georgia, 70% of cases are not well controlled through lifestyle change or medication (National Institutes of Health, 2003). In 2004, of the 1.7 million Georgians with hypertension, 469,800 were low income, uninsured, or underinsured (Rein et al., 2006). In 2005, the race distribution in Georgia of those with known high blood pressure was as follows: 26% of Whites, 31.9% of Blacks, 11% of Hispanics and 11.6% of other races (CDC, 2005). Since hypertensive patients are often asymptomatic, many people may be unaware if they have high blood pressure. Therefore, large numbers of the population should be screened for hypertension and persuaded to visit their physician and to learn more about how lifestyle changes could benefit them. Doing so would help to achieve the goals of *Healthy People 2010.* Goals of *Healthy People 2010* include the following: Increasing the percentage of people who have their blood pressure under control to 50% and that 95% of Americans will know if their blood pressure is high or normal.

In terms of prevention, current programs to reduce hypertension are being implemented in the United States. The National High Blood Pressure Education Program (NHBPEP), a cooperative effort among health

agencies, state health departments, and community groups, is coordinated by the National Institutes of Health's National Heart, Lung, and Blood Institute (NHLBI). NHBPEP encompasses major hypertension control issues such as excessive stroke mortality in the southeastern states, effective treatments, utility of lowering the systolic blood pressure, lifestyle changes that can prevent and treat hypertension, population strategies for primary prevention of high blood pressure, educational strategies for professional, patient, and public audiences and community organizations, and issues about special populations like African Americans, women, children, and adolescents (NIH, 2006). NHBPEP also offers the following resources to their participants: information collection and dissemination, public, patient, and professional education, community program development, evaluation and data analysis, and technology transfer and electronic distribution.

Due to the efforts of NHBPEP and similar initiatives, the effectiveness of NHBPEP is well established. Public knowledge about the consequences of high blood pressure has dramatically increased over time. When the program began in 1972, less than 25% of Americans knew of the association between hypertension and stroke and hypertension and heart disease (NIH, 2006). Now more than 75% of Americans understand the relationship association between hypertension and stroke and hypertension and heart disease. Most Americans have had their blood pressure measured at least once and 75% of the population has it measured every 6 months. In the past 20 years, the number of those with hypertension who are aware of their condition had dramatically increased (NIH, 2006).

The mortality rate for cardiovascular diseases is another indication of the effectiveness of preventive messages. The age-adjusted mortality rate for stroke and CVD has decreased 60 and 53% respectively from 1971-1994 (NIH, 2006). The decline is observable for men, women, whites, and African Americans and may be attributed to an improvement in hypertension control. The mortality rate from CVD per 100,000 decreased from 195.4 to 92.4 (NIH, 2006). The mortality rate from stroke per 100,000 decreased from 64.6 to 26.7 (NIH, 2006).

Another well known prevention program is Dietary Approaches to Stop Hypertension (DASH), which helps to lower sodium intake and blood pressure. DASH menus containing 2,300 milligrams of sodium can lower blood pressure and a lower level of 1500 milligrams can reduce blood pressure (NIH, 2006). The DASH eating plan follows heart healthy guidelines to limit saturated fat and cholesterol. The plan focuses on increasing the intake of foods rich in minerals such as potassium, calcium, and magnesium, and protein and fiber. The plan also emphasizes the intake of fruits, vegetables, fat-free or low-fat milk products, whole grain products, fish, poultry, and nuts. It reduces the amount of lean and red meats, sweets, sugars, and sugar-containing beverages found in the typical American diet (NIH, 2006). The DASH eating plan along with lifestyle changes can help to lower and prevent hypertension.

According to a study by Whelton et al. (2002), prevention of high blood pressure is based on six lifestyle modifications. These modifications are important for those who have risk factors for high blood pressure that cannot be controlled, including family history, race and aging.

Examples of lifestyle modifications are the following:

- Maintaining a normal body weight, with a body mass index (BMI) of 18.5 to 24.9.

- Reducing sodium to about 2.4 g (2,400 mg) per day, which is about 1 teaspoon of salt.
- Exercise at least 30 minutes a day on most, if not all, days of the week.
- Limit alcohol to less than two drinks per day for men, and no more than one drink per day for women.
- Intake 3,500 mg of potassium every day.
- Follow the DASH eating plan, rich in fruits, vegetables and low-fat dairy products, with reduced amounts of saturated and total fats.

If diagnosed with hypertension, doctors recommend weight loss and regular exercise as the first steps in treating mild to moderate hypertension. A diet rich in fruits and vegetables and fat-free dairy foods, low in fat and sodium can help lower blood pressure. Regular exercise improves blood flow and reduces high blood pressure. These steps are highly effective in reducing blood pressure, but easier to suggest than to achieve. Discontinuing smoking does not directly reduce blood pressure, but it can reduce the risk of dangerous outcomes of hypertension, such as stroke and heart attack. Most patients with moderate or severe hypertension require indefinite drug therapy to reduce their blood pressure to a safe level.

In the state of Georgia, the percentage of those with hypertension, cardiovascular disease, and stroke remain above the national average. The authors provided an overview of hypertension including its physical complications and provided statistics regarding the scope of hypertension in the state of Georgia. Additionally, the authors provided insights on preventive efforts such as the NHBPEP and DASH. In conclusion, a statewide or local hypertension education program should be implemented in Georgia to improve the rates of awareness, treatment, and control of hypertension and to lower cardiovascular disease rates in the state.

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Racial Differences in Perception of Breast Cancer Risk in Rural Southeast Georgia

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Abstract

A university-public health collaborative was formed to more fully understand cancer risk among rural women in Georgia. *Objectives:* This study sought to gain an understanding of racial differences with regard to behavioral risk, perception of breast cancer risk, and perception of barriers to screening. *Design:* Differences in subjects' risk and risk perception were assessed by creating, piloting, and administering a written survey at local health departments. *Sample:* A purposive sample of females enrolled in breast and cervical cancer screening programs in four rural counties in southeast Georgia (n = 147) were surveyed. Subjects were randomly invited to participate. Incentives were provided to enhance participation. *Results:* White females were significantly more likely than were black females to perceive pollution (*OR*: 4.63; p = 0.038), smoking (*OR*: 2.39; p = 0.018), age (*OR*: 3.01; p = 0.013), and hormone replacement therapy (*OR*: 3.17; p = 0.005) as factors influencing their breast cancer risk, and to perceive cost as a barrier to screening (*OR*: 2.89; p = 0.032). From a risk perspective, black females were more likely than white females to have had five-or-more pregnancies (p = 0.005), and to have given birth before age fifteen (p = 0.011). *Conclusions:* This study provided important baseline data about breast cancer risk necessary in developing effective health promotion programs.

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Racial Differences in Perception of Breast Cancer Risk in Rural Southeast Georgia

Excluding skin cancer, breast cancer is the most commonly diagnosed malignancy among women in the United States (American Cancer Society [ACS], 2005). Breast cancer is the second most deadly form of cancer among women, accounting for approximately fifteen percent of all cancer deaths (Landis, Murray, Bolden, et al., 2000), and has a significant fiscal impact on the nation, with treatment cost estimates in the U.S approximating six billion dollars annually (ACS, 2005). All women are at-risk, and many factors are thought to contribute to their increased likelihood of developing breast cancer. Among the risks that have been linked to increased breast cancer morbidity and mortality are: socioeconomic and cultural factors (Casey, Thiede Call, & Klingner, 2001; Friedman, Webb, Weinberg, et al., 1985; Hughes, Lerman, & Lustbader, 1996; Meade & Calvo, 2001), biologic factors (ACS, 2005; Butler, Potischman, Newman, et al., 2000; Lynch & Lynch, 2002; Gail, Brinton, Byer, et al., 1989; McPherson, Steel, & Dixon, 2000), breast cancer knowledge and behavior (Oliviera & Christos, 1997; Hoffman-Goetz, Apter, Demark-Wahnefried, et al., 1998), and race/ethnicity (Jemal, Murray, Samuels, et al., 2003).

In considering race, the data suggest that white women have higher incidence rates of breast cancer than black women, however, mortality rates are disproportionately higher among black women (ACS, 2005; Parker, Davis, Wingo, et al., 1998; Chevarley & White, 1997). In addition, the five-year cancer survival rate is lower among black females as compared to white females (O'Malley, Earp, Hawley, et al., 2001; Blumenthal, 2001). This disparity may be related, in part, to being diagnosed at a much later stage (Eley, Hill, Chen, et al., 1994; McCarty, Burns, Coughlin, et al., 1998; Douglass, Bartolucci, Waterbor, et al., 1995; Hunter, 2000; Makue, Breen, & Fried, 1999). Racial differences in mortality from breast cancer might be attributable to biologically different forms of the disease, as well as disparities in screening behaviors by race. According to several studies, non-white women, in particular black women, are more likely to underutilize available screening services (Douglass et al., 1995; Gornick, Eggers, Reilly, et al., 1996; Foxall, Barron, Houfek, et al., 2001; Calle, Flanders, Thun, et al., 1993; Facione, 1999), resulting in poorer health outcomes. Many factors influence the decision to utilize breast cancer screening services, including one's perception of risk from breast cancer (Hallal, 1982; Holtzman & Celentano, 1983; Rutledge, 1987; Hopwood, 2000; Paul, Barratt, Redman, et al., 1999; Farley & Flanery, 1989; Caplin, Wells, Haynes, et al., 1992). In addition, individual perceptions may be shaped by a number of factors associated with the lack of culturally competent education about the frequency of breast cancer and the benefits of early detection (Erwin, Spatz, Stotts, et al., 1999; Egbert & Parrott, 2001). A woman's vicarious experiences with family and friends, along with her spiritual beliefs, are also thought to influence the perception of breast cancer risk.

Reducing mortality rates and increasing testing, screening, and the proportion of cancer survivors living five-or-more years after diagnosis are among the goals of *Rural Healthy People 2010* (Gamm, Hutchison, Dabney, & Dorsey, 2003). Regardless, little population-based research is available in Georgia vis-à-vis rural females' perceptions of breast cancer risk, what perceived barriers may exist related to obtaining screening, or about rural females' health status. Moreover, there exist in the literature few

studies that illustrate how these factors may differ by race.

The purpose of this study was to determine the point prevalence of perceptual and behavioral factors related to breast cancer risk in a purposive sample of women enrolled in breast cancer screening programs in four rural counties in southeast Georgia. Specifically, this study sought to understand the factors that influence rural women's perceptions of breast cancer risk, their perceptions of barriers to screening, and racial differences that may exist with regard to lifestyle and behavior.

METHODOLOGY

Target Population

The geographic boundaries of this study consisted of four of the ten counties comprising the South Central Health District (SCHD): Dodge, Pulaski, Telfair, and Wheeler counties. The study targeted women enrolled in the Breast and Cervical Cancer Program (BCCP) in these areas, purposively selected because BCCP provides mammograms at no cost to low-income women 50-and-older who are uninsured or under-insured. Program access is achieved through county health departments, which provide local coordination for screening, diagnostic evaluation, treatment, and follow-up. When this study was conducted, Dodge, Pulaski, Telfair, and Wheeler counties had 110, 32, 69, and 56 women, respectively, enrolled in BCCP; sample selection was based on these numbers.

Target Sample

Sample size was determined based on a formula for estimating proportions (Daniel, 1987). Specific parameters for sample size calculations included 95 percent confidence and five percent level of precision. With 267 total enrollees in the four counties, we estimated that 157 surveys were needed to achieve desired accuracy. Based on the number of enrollees in each county, we estimated that the study needed to recruit 64 participants from Dodge County, 19 from Pulaski County, 41 from Telfair County, and 33 from Wheeler County.

Content Validity

A unique data collection instrument was created to assess behavioral and perceptual factors related to breast cancer. The lead author of the study created the first draft of the survey. Subsequent drafts were reviewed and modified by staff members at SCHD who had significant interaction with the target population, including the Women's Health Coordinator, the Women's Health Education Coordinator, a Nurse Practitioner, an Outreach Aide in BCCP, and the District Health Program Manager. In addition, SCHD staff was directly involved in all data collection efforts. Two additional faculty members in a related department also reviewed the final draft for readability and content. Modifications were made based on their comments.

Prior to initiating data collection, a pilot test of the survey was administered to a small group of BCCP enrollees in one of the district counties not selected for this study. Fifteen women were asked to complete the survey then give comments to staff administering the instrument. Solicited feedback was included to improve readability, content, format, and comprehension.

Sample Selection

Participant files were maintained in the county health departments where specific services are provided. Based on the number of BCCP enrollees needed, a simple random sampling procedure was utilized to produce a numeric list of potential subjects. This list was matched to another file containing client contact information to create a sequenced participant list; this information was not divulged to anyone outside the District's

operational staff. The client list was then relayed to staff members involved in data collection, who then attempted to contact each enrollee appearing on the list via telephone in the order in which they appeared, noting each attempt that resulted in a busy signal or that went unanswered. Disconnected or nonviable numbers eliminated enrollees from further consideration. Once contacted, subjects were invited to participate by visiting their local health department and completing the survey. Subjects not interested in participating were removed from the list; no attempt was made to assess their unwillingness to participate. Data collectors continued using this systematic approach until a sufficient number of subjects had been selected. To increase participation, incentives were offered, including a free bone density scan and a Wal-Mart gift card in the amount of $25.00.

Survey Administration

The preferred method of data collection was for each participant to complete the survey independently. Those collecting data were instructed not to initially explain the meaning or intent of any item or word on the survey, however, assistance was rendered if a subject requested help. Surveys were collected between September 2002 and December 2002.

Survey Variables

The survey was constructed in sections to assess population characteristics, perceptions of personal health, levels of physical activity, weekly fruit and vegetable consumption, alcohol consumption, tobacco use, breast cancer knowledge and individual screening behavior, perceived breast cancer risk factors, and perceived barriers to screening. For purposes of this study, race was dichotomized to include only black and white participants. Perceived breast cancer risk factors and perceived barriers to screening were dichotomized (yes/no) in order to investigate proportional differences by race. For a more detailed explanation of how data were understanding of results of other variables assessed in the survey, please refer to Table 1.

Data Analysis

Data were analyzed using SPSS for Windows Version 10.0 (SPSS, 2000) and SAS Version 8.1 (SAS, 1999). The Mantel-Haenzel-Cochran (MHC) Chi-square test was used to investigate proportional differences by race with regard to population, behavioral, screening, and perception variables ($\alpha = 0.05$). Holmes' Sequential Standardization technique was also used to identify specific proportional differences in population, behavioral, and screening variables. In addition, the Fisher's Exact Test was employed for cross tabulations with very small expected values. Odds ratios and 95% confidence limits were calculated to assess the magnitude of observed differences by race. All data analysis was either supervised or conducted by faculty within the Center for Biostatistics at Georgia Southern University.

RESULTS

A total of 147 enrollees in the South Central Health District's Breast and Cervical Cancer Program completed surveys during the designated period. In Dodge (n = 54), Telfair (n = 35), and Wheeler (n = 28) counties, approximately 85% of target numbers were achieved; collected surveys in Pulaski County (n = 24) exceeded the target. Among all women who participated, 51.7% (n = 76) were white and 48.3% (n = 71) were black; no statistical differences were found in the proportion of white and black women who participated by county (p = 0.680).

Population Characteristics

The population characteristics of both racial groups were remarkably similar.

Slightly more than one-half of white females in the sample (52.6%) were 50-to-59 years old, compared to one-in-three (35.2%) black females, and a greater percentage of black females (38.0%) were between 40-and-49 years of age, as compared to white females (27.6%). Over one-half of white females (58.2%) and 40.0% of black females reported they were married. Similar proportions of black (36.2%) and white (37.1%) females were poorly educated (i.e., did not complete high school); black (49.3%) and white (48.6%) females reported that they had received a high school diploma at nearly equivalent levels. The majority of females reported living in homes with an annual income of less than $10,000. Among black females, greater than four-in-ten (41.8%) reported no annual household income and nearly one-in-four (22.4 %) had an annual income of less than $10,000. For white females, one-in-four (25.7%) had no annual household income and nearly four-in-ten (39.2%) reported less than $10,000 per annum. The data indicate that 56.6% of white participants and 47.9 % of black participants reported that menstruation began for them at either 12-or-13 years of age. In addition, 44.9% of blacks and 46.0% of whites reported that menopause occurred between 30-and-49 years of age.

Differences by race were detected on only two socio-demographic variables: number of pregnancies (p = 0.005) and age at first delivery (p = 0.011). The proportion of black females reporting five-or-more pregnancies (36.6%) was significantly higher than that reported by white females (13.2%). Regarding age of first delivery, the proportion of black females (9.9%) who reported giving birth before age fifteen was significantly higher than that reported among white females (0.0%). Further, white females (43.4%) were nearly twice as likely as black females (22.5%) to report that their first delivery occurred between 20-and-24 years of age.

Behavioral Characteristics

Results of the analysis of behavioral risk variables by race are presented in Table 2. Nearly six-in-ten white females in the sample reported consuming five-or-more servings of vegetables per week, as compared to four-in-ten black females (p = 0.011). Though no statistical differences were detected in any of the other comparisons, the data suggest that black females in the sample were more 1.43 times as likely as whites to perceive their health as either very good or excellent (p = 0.381), 1.11 times as likely to report eating five-plus servings of fruit per week (p = 0.635), and 1.76 times as likely to engage in 30-or-more minutes of weekly exercise (p = 0.124). Black females were 1.42 times as likely as white females to report drinking alcohol (p = 0.298), but white females were 1.37 times as likely as black females to be smokers (p = 0.326).

Perceptions of Risk and Barriers to Screening

Table 3 shows results of the relative risk analysis conducted on perceived breast cancer risk by race. White females were 4.63 times as likely as black females to perceive pollution as one of the factors that might influence their breast cancer risk (p = 0.038). Similarly, white females were more likely to perceive smoking (*OR*: 2.39; p = 0.018), age (*OR*: 3.01; p = 0.013), and hormone replacement therapy (*OR*: 3.17; p = 0.005) as factors influencing their breast cancer risk. And though no other statistical differences were detected, white females in

Table 1

Population, behavioral, and screening survey variables, South Central Health District, Georgia Division of Public Health, 2003

Variable	Survey Strata
Race	Black; White
Age (in years)	<20; 20-29; 30-39; 40-49; 50-59; 60-69; 70-79; ≥80
Marital status	Single; Married; Separated; Divorced; Widowed; Living with Someone (Not Married)
Number of times pregnant	0; 1; 2; 3; 4; ≥5
Age at first delivery (in years)	<15; 15-19; 20-24; 25-29; 30-34; ≥35
Age at first menses (in years)	≤11; 12; 13; 14; 15; ≥16
Age at menopause (in years)	Not Applicable; Experiencing Symptoms; 20-29; 30-39; 40-49; ≥50
Highest level of education	None; <High School; High School Graduate; Other
Annual household income	None; <$10,000; $10,000-14,999; $15,000-24,999; ≥$25,000
Perceived health	Excellent; Very Good; Good; Fair; Poor
Weekly fruit consumption	0; 1; 2; 3; 4; 5; 6; 7; ≥8
Weekly vegetable consumption	0; 1; 2; 3; 4; 5; 6; 7; ≥8
Types of physical activity	Not Applicable; Running; Walking; Other
Physical activity (times/week)	0; 1; 2; 3; 4; 5; 6; 7; ≥8
Physical activity (minutes/week)	0; 1-5; 6-10; 11-15; 16-20; 21-25; 26-30; ≥31
Alcohol consumption	Yes; No
Smoking status	Never Smoked; Current Smoker; Former Smoker
Knowledge of BSE	Yes; No
Last performed BSE	Never; <1 mo; 1-6 mo; 7-12 mo; 1-2 yrs; >2 yrs
Clinical breast exam	Yes; No
Last clinical breast exam	Never; <1 yr; 1-2 yrs; 3-5 yrs; >5 yrs
Reason for breast exam	Not Applicable; Routine Checkup; Problem with BSE; Other
Last mammogram	Never; <1 yr; 1-2 yrs; 3-5 yrs; >5 yrs

Table 2
Behavioral risk variables by race, South Central Health District, Georgia Division of Public Health, GA, 2003

Behavioral Risk Variable	Black Females	White Females	*p*-Value
Perceived personal health as "very good" or "excellent"	16.9%	11.8%	0.381
Consumed five-or-more servings of fruit per week	36.6%	32.9%	0.635
Consumed five-or-more servings of vegetables per week	40.2%	59.2%	0.011
Consumed alcohol	22.5%	15.8%	0.298
Current smoker	18.3%	25.0%	0.326
Physically Inactive	31.7%	40.0%	0.351
30+ Minutes of Physical Activity per Week	22.4%	12.7%	0.124

the study were more likely than black females to perceive most listed factors as legitimate risk concerns. However, black females perceived breast size, race, and low income as risk factors in slightly higher proportions than did white females.

The vast majority of females reported perceiving no barriers to screening, regardless of race (Table 4). White females were 2.89 times as likely as black females to perceive cost as a barrier to breast cancer screening (p = 0.032). No statistical differences were detected by race in any of the other factors examined, however, white females were only one-half as likely as black females to view transportation as a barrier to screening; embarrassment, inconvenience, and fear of radiation appeared to be non-factors.

DISCUSSION

This research was conducted to establish point prevalence data regarding the perceptual and behavioral factors related to breast cancer risk among a purposive sample of women enrolled in breast cancer screening programs in four rural counties in southeast Georgia. In a collaborative between academia and public health practitioners, the study examined racial differences that existed regarding rural females' lifestyle and behavior, including behavioral risk, perceived breast cancer risk, and barriers to screening. Apart from the significance of providing southeast Georgia with a set of baseline data, understanding racial differences in this population was of particular importance, since nearly three-in-ten (28.7%) women in the state are black, and since many reside in rural areas of the state (U.S. Census Bureau, 2003). In addition, developing culturally sensitive and effective health promotion strategies to reduce the impact of breast cancer in the region is predicated upon understanding such differences.

Participants were surprisingly similar on most socio-demographic variables under study, yet despite these parallels there were several findings worth noting. Black females were more likely than whites to report five-or-more pregnancies and to give birth at a younger age. These findings suggest a reduced risk among

Table 3

Perceived Risk by Race, South Central Health District, Georgia Division of Public Health, GA, 2003

Perceived Risk	% Answering "YES" Black Females	% Answering "YES" White Females	*p*-Value[1]	Odds Ratio[2]	95% CI
History of childbirth	2.8	5.3	0.682 *	1.96	0.34 – 10.80
Use of birth control pills	22.5	27.6	0.477	1.31	0.62 – 2.78
Pollution	2.8	11.8	0.038	4.63	0.97 – 22.25
Smoking	22.5	40.8	0.018	2.39	1.15 – 4.87
Sexually transmitted diseases	1.4	5.3	0.368 *	3.89	0.42 – 35.66
Alcohol consumption	9.9	14.5	0.394	1.55	0.56 – 4.24
Breast size	11.3	9.2	0.681	0.80	0.27 – 2.33
Race	5.6	1.3	0.197 *	0.22	0.02 – 2.05
Low income	8.5	2.6	0.156 *	0.29	0.06 – 1.50
Lack of exercise	14.1	14.5	0.946	1.03	0.41 – 2.60
Family history	42.3	52.6	0.208	1.52	0.79 – 2.91
Age	11.3	27.6	0.013	3.01	1.23 – 7.33
Access to health care	8.5	10.5	0.668	1.28	0.42 – 3.87
Hormone replacement therapy	14.1	34.2	0.005	3.17	1.40 – 7.20

[1] An asterisk denotes use of the Fisher's Exact Test

[2] Odds ratios were calculated using black females as the referent group

black females relative to their white counterparts, since pregnancy at a young age, especially before the age of twenty, has been associated with markedly reduced rates of breast cancer in some populations (Vogel, 2000), and women who give birth after thirty years of age may increase their likelihood of developing breast cancer by as much as twofold (Kelsey, Gammon, & John, 1993; Spicer, Krecker, & Pike, 1995). The two groups did not differ statistically on any of the other socio-demographic variables. Still, given the inverse relationship between breast cancer risk and socioeconomic factors such as literacy, educational level, income, and access to health care (Meade & Calvo, 2001; Friedman et al., 1995; Kagawa-Singer, 1995; Hayward, Shapiro, Freeman, et al., 1988), and given the demographic makeup of our sample, many residents of the region may be at-risk due to these factors.

Individual biologic factors are also associated with breast cancer risk. Empirical data suggest that early age at menarche and late age at menopause are related to increased risk of developing breast cancer. Compared with those who experience menarche at age sixteen, girls who undergo menarche two-to-five years earlier have a ten-to-thirty percent greater risk of developing breast cancer later in life (Butler et al., 2000). Similarly, women who experience menopause at age 55-or-older are fifty percent more likely to

develop breast cancer than those whose onset of menopause is between 45-and-55 years of age (McPherson et al., 2000). No differences associated with race were detected among those in our sample for either age at menarche or age of menopause. However, a sizeable proportion reported beginning menstruation at 12-to-13 years old, which for them may suggest an elevated risk of developing breast cancer. And though four-in-nine women in our study (45.5%) appeared to be at a reduced risk of breast cancer from having experienced menopause between 30-and-49 years of age, a notable percentage (3.5%) was at-risk due to late menopause. As is the case with many other chronic diseases, the absolute risk of breast cancer increases with age (Kosary, Ries, Miller, et al., 1995).

Analysis of behavioral risk by race yielded only one statistically significant result. Subjects did not differ in their perceptions of personal health, physical activity levels, fruit intake, alcohol consumption, or smoking, however, white females were significantly more likely to eat five-or-more servings of vegetables each week. Though few differences were detected, the findings did reveal several areas of practical significance worth noting. First, weekly physical activity levels and fruit consumption were disappointing, with three-in-ten subjects physically inactive and 8.8 percent eating no fruit in a typical week. We were less concerned with participants' vegetable intake because both groups indicated a reasonable weekly consumption of vegetables. As a function of program enrollment, each woman is provided with preventive health messages related to making changes to her diet, particularly in light of the role of lifestyle and behavior modification as an important determinant in defining one's risk of chronic disease, including cancer (Brownson, Rakowski, Enrich, et al., 1998). The substantial number of program enrollees not engaging in appropriate behavior modifications is a serious health problem in itself, but the above finding may also imply that less-than-effective preventive public health messages are being delivered to those currently using these services. As such, administrators may consider a full assessment of this important program feature to maximize its future effectiveness.

Several important differences by race in the ways in which women perceived their breast cancer risk emerged. For instance, white women were more likely to perceive pollution, age, smoking, and hormone replacement therapy as predictors of risk. However, what concerned us was the apparent limited ability of all study participants to recognize these factors as potentially serious. This result may imply that less-than-effective public health messages are being delivered to those currently using services, since history of childbirth, age, use of birth control pills, family history, alcohol consumption, and hormone replacement therapy are among the most well-known breast cancer risk factors in women nationwide (ACS, 2005). Increased knowledge is associated with increases in perceived risk of breast cancer (Paul et al., 1999). This knowledge, along with the subsequent set of beliefs formed, is typically gained via vicarious interactions, or exposure to health professionals (Erwin et al., 1999; Egbert & Parrott, 2001). Black women have recognized feeling a greater sense of risk as compared to their white counterparts, though not universally so. In cases where perceptions of breast cancer risk are lower, cultural forces such as interpersonal relationships and

Table 4

Perceived Barriers by Race, South Central Health District, Georgia Division of Public Health, 2003

Perceived Barrier	% Answering "YES" Black Females	% Answering "YES" White Females	*p*-Value [1]	Odds Ratio [2]	95% CI
None	77.5	71.1	0.375	0.71	0.34 – 1.51
Cost	8.5	21.1	0.032	2.89	1.06 – 7.87
Pain and/or discomfort	7.0	9.2	0.631	1.34	0.41 – 4.43
Embarrassment	0.0	0.0	--	--	--
Transportation	2.8	1.3	0.610	0.46	0.04 – 5.19
Inconvenience	1.4	0.0	0.483 *	--	--
Fear of radiation	1.4	0.0	0.483 *	--	--

[1] An asterisk denotes use of the Fisher's Exact Test

[2] Odds ratios were calculated using black females as the referent group

spirituality may be contributory factors (Hughes, Lerman, & Lustbader, 1996).

Education and income have each been documented as barriers to screening participation in other studies (Pearlman, Rakowski, Enrich, et al., 1996; Han, Wells, & Primus, 2003). Additionally, rural populations tend to report a significant number of barriers resulting in poor access to health services (Paskett, Tatum, Rushing, et al., 2004). Regarding the women in our sample, we were encouraged by the low percentage who perceived barriers to screening; pain and discomfort were the barriers most often listed. Nevertheless, fewer than one-in-ten cited this as a barrier to seeking screening. Cost was the sole barrier that differed by race; white women were nearly three times as likely as their black counterparts to perceive cost as barrier. Embarrassment, known to predict self-efficacy in the ability to comply with breast and cervical cancer screening (Garber, Jessop, Foti, et al., 2003), did not factor into women's perceptions of screening in this study.

Several other limitations also necessitate that caution be used in interpreting study findings. First, all measures were self-report, thus the extent to which participants were inclined to provide socially desirable responses is not fully known. For example, social desirability could explain in part the high levels at which participants reported no perceived barriers to screening. Second, the scope of the study design (i.e., the purposive sample) limits our ability to generalize to all women in the region. Since women recruited into the study were already enrolled in a breast cancer screening program, their perceptions of barriers related to screening may not necessarily be congruent with other rural women. In other words, we may be "Speaking to the Choir" of women who do not view cost, embarrassment, etc. as impediments to their participation, or who might have overcome the barriers they encountered along the way, resulting in their eventual enrollment in screening. Nevertheless, findings should stimulate future research in this area, with the emphasis placed on also recruiting those *not enrolled* in a formal program to more accurately assess barriers to screening that may exist among all rural women. Third, the current study was also limited in that it did not control for outside factors

that might have posed threats to external validity, for example, the receipt of transportation by participants and how that might have affected their perceptions. The potential for threat due to volunteer bias is well-known (see Campbell & Stanley, 1966) and may also have played a role in the current study. Insofar as there was no intent to generalize results, and given the limited resources available, there was no attempt to ascertain whether study participants were different than those who elected not to participate. Study designs that control for each of the aforementioned factors should be a priority in future research efforts. Finally, since this study was non-experimental and provided only a snapshot of current status, conclusions concerning any causal relationships that may exist among the variables under study are not warranted.

CONCLUSIONS

Despite its limitations, this study was meaningful in that it contributed to the southeast region of Georgia by providing baseline data about breast cancer risk, which is an important first-step in the delivery of effective programs and in understanding a traditionally underserved group. As population-based research continues to increase in Georgia, a commitment to improving health outcomes for all, but especially among the rural citizenry, is essential. To this end, it is important that similar partnerships and collaboratives be created to further advance our understanding of the magnitude of health disparities in Georgia. The diverse population characteristics of the state warrant additional investigation into racial/ethnic differences related to risk. Moreover, broader understanding of barriers to screening would assist Georgia in reaching its *Healthy People 2010* objectives for cancer. Population-based research should continue to be the focus for improving the lives of all Georgians, since it is through these efforts that more effective public health interventions can be designed and successfully implemented in the underserved and rural areas of the state.

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Care Quality for Adult Medicaid Beneficiaries with Type 2 Diabetes Varies by Primary Care Provider Subspecialty [3]

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Abstract

The Georgia Medicaid primary care case management (PCCM) program, phased in over the 1994-1997 period, has now given way to a capitated managed care model of regional care management organizations (CMOs). Using Georgia Medicaid eligibility and provider claim data for 1996-1998, this study investigated diabetes care quality and whether it varied by primary care provider subspecialty in a longitudinal follow-up of newly diagnosed adults with type 2 diabetes during the early phase of the PCCM program. Results indicated that the quality of diabetes care was suboptimal and varied significantly by PCP subspecialty, with patients seen by generalists least likely to have their HbA_{1c} monitored as recommended during office visits (odds ratio = 0.34, (95% confidence interval 0.16-0.73). No PCP subspecialty consistently performed better or worse on all diabetes care quality indicators investigated. The lessons learned from this investigation are that variations in Medicaid care quality by PCP subspecialty is likely to remain and the new CMO model of care will unlikely demonstrate immediate improvement in diabetes care quality.

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Care Quality for Adult Medicaid Beneficiaries with Type 2 Diabetes Varies by Primary Care Provider Subspecialty

The Georgia Medicaid Program, like other Medicaid Programs throughout the country, continues to make significant administrative, structural, and policy changes to provide better care to its beneficiaries and reduce unnecessary expenditures. The major emphasis of these changes is to ensure that each Medicaid beneficiary has a "primary care home" with an individual provider to deliver primary care services and coordinate specialty referral for other services. Under the Georgia Medicaid primary care case management (PCCM) program, physician participation was open to family practitioners, general practitioners, internists, pediatricians, gynecologists and physician specialists. More than 3500 physicians contracted with the Medicaid Program to serve as primary care case managers to its 1.2 million beneficiaries. PCCM in Georgia, which was phased in over the 1994-1997 period, has now given way to a capitated managed care model of regional care management organizations (CMOs) (Johnston, 2002; Moriarty, 2005). Since Medicaid enrollees are required to choose a primary care provider (PCP) under the new managed care model, the basic structure of a mandatory primary care home remains intact.

As the Medicaid CMO model goes statewide, already reported patient-care problems threaten physician participation in the regional networks, making access to care more difficult for low-income patients (Moriarty, 2006). Among the many problems reported are delayed physician payments, failure to assign patients to the appropriate physician specialty, and errors in assigning patients to their regular PCP (Bozeman, 2006; Hardcastle, 2006; Miller, 2006; Moriarty, 2006). Some historical PCPs are weighing whether to accept Medicaid patients, except for emergency care, because of contract difficulties with CMOs. If these reports are true and common, the achievable goal of a primary care home for each Medicaid beneficiary is challenged and the negative impact on quality of care is predictable. Also implicit in the angst among physicians is that only a select group of physicians will voluntarily participate in the new program as PCPs and the PCP-patient relationship will be negatively impacted.

We have previously reported on the quality of diabetes care among Georgia Medicaid beneficiaries during the transition period of the PCCM program (Mayberry *et al.*, 2005). One of the implications of our findings was that the PCP-patient relationship improved adherence to diabetes care standards during patient follow-up visits. However, the relative quality of diabetes care for Medicaid beneficiaries by PCP subspecialty is unknown, and we did not specifically explore this issue in previous analyses.

The present study investigates whether care quality varied in a one-year period of care by PCP subspecialty for Medicaid diabetic adults during the early phase of the PCCM program. This study adds to the research literature by exploring the relationship between care quality and PCP subspecialty and provides "lessons learned" from the PCCM program as the state's Medicaid Program transitions to the new CMO model of care of historical and new PCPs.

RESEARCH DESIGN AND METHODS

The patient characteristics and research design and methods for this study have been previously described (Mayberry et al., 2005). In brief, Georgia Medicaid

eligibility and provider claim data for 1996-1998 were used to evaluate the relationship between PCP subspecialty and the rate of monitoring for glycemia, hyperlipidemia, and early signs of eye and kidney diabetic complications during physician office visits. The study population was black and white adult Medicaid enrollees, 18 years of age and older, with a new physician-reported diagnosis of type 2 diabetes (International Classification of Disease, 9th Revision, Clinical Modification (ICD-9-CM) codes 250.0- 250.9) (Medicode, 1999). Patients diagnosed with diabetes in 1996 and 1997, with no previous claims in the previous ten years for diabetes services, were followed for a 12-month period from initial diagnosis through years 1997 and 1998, respectively, according to Medicaid claim histories. Only beneficiaries with continuous Medicaid eligibility were included as study patients (n=2956). Hispanics (0.68%), Asian Americans (0.65%), and beneficiaries whose ethnicity was unknown (11.8%) were not included in this investigation due to their relatively small numbers.

The PCP was defined as the physician identified on the first diabetes services claim and who provided most, if not all, of the follow-up care for the diabetic patient during office visits for the 12-month period after the initial diagnosis. Claims for which a specific physician subspecialty or specialty for the Medicaid beneficiary was not indicated (9.9%) were not included in these analyses. The larger groups of PCPs (i.e., family medicine and internal medicine) were the PCP subspecialty categories used in analyses.

Most (74.9%) diabetic patients in this study population made more than half (52.4%) of all physician office visits to the same PCP. Physician office visits were defined as unique physician claims for office and other outpatient services, exclusive of hospital and emergency department services, as identified by Current Procedural Terminology (CPT) codes (American Medical Association, 2001). Four processes of care recommended by the American Diabetes Association (ADA) were used as quality indicators for this investigation ("Standards of medical care in diabetes--2006", 2006): biannual HbA_{1c} testing (primary quality indicator), and annual eye exam, lipid profile, and nephropathy test. All quality indicators were identified in Medicaid claim files according to CPT codes.

The annual rate of each recommended clinical laboratory test by PCP subspecialty was initially examined using chi-square statistics (Fleiss, Levin, & Cho Park, 2003). Multivariate logistic regression modeling was used to calculate the likelihood of each monitoring test by PCP subspecialty during the one-year patient care follow-up period, accounting for covariates of testing (i.e., number of physician office visits, age, race, gender, other demographic factors, co-morbid conditions, and diabetic medication use) (Kleinbaum et al, 1998).

RESULTS

The rate of adherence to recommended monitoring for glycemia, hyperlipidemia, and eye and kidney complications among newly diagnosed type 2 diabetes patients in the 12 month patient care follow-up period was low and, with the exception of nephropathy testing, varied significant by PCP subspecialty (Table 1). Only 20.3% of Medicaid patients had at least one HbA_{1c} test during a physician office visit in the one-year period following the initial diagnosis, with 7.7% having the recommended 2 or more HbA_{1c} tests. Initial, unadjusted results (Table 1) indicated that patients of internal medicine physicians had a higher annual rate of 2 or more HbA_{1c} tests (11.5%) as well a higher rate of eye exam 13.1%), lipid test (18.6%), and nephropathy test (18.6%) than other PCP subspecialties. Patients of general medicine physicians were least likely to have the

recommended 2 or more annual HbA_{1c} tests (2.8%).

Results of multiple logistic regression analyses indicated significant variation in HbA_{1c} and other monitoring test rates by PCP subspecialty, after adjusting for patient age, gender, county of residence, number of co-morbidities, hypertension, diabetic medication, and number of physician office visits (Table 2). Adjusted results confirmed that patients seen by general medicine physicians were least likely to have their glycemic status monitored two or more times per year as recommended (odds ratio [OR] = 0.34, 95% confidence interval [CI] 0.16-0.73). With the exception of internal medicine physicians, patients seen by PCP subspecialists were less likely than patients who visited other primary care providers to have been monitored for retinopathy relative to physician specialists. Patients of family physicians were significantly more likely than those who visited other primary providers to have been monitored for hyperlipidemia (OR = 1.49, 95% CI = 1.08-2.06).

CONCLUSIONS

Significant variation in diabetes care quality by PCP subspecialty was observed in this longitudinal investigation of newly diagnosed diabetic patients in the early phase of the Medicaid Program transition from the traditional fee-for-service program to the PCCM. Generalists were least likely to adhere to the cornerstone standard of diabetes care (i.e., two or more annual HbA_{1c} tests). However, no PCP subspecialty, nor physician specialists who provided primary care, consistently performed better or worse on all diabetes care quality indicators investigated in this study when other covariates such as population demographics, co-morbidity, diabetes medication, and frequency of physician office visit were accounted for.

Previous studies have suggested significant variation in diabetes care by provider specialty in other patient populations, although findings have not been entirely consistent or without debate (Al Khaja *et al.*, 2002; Chin *et al.*, 2000b; Cobin, 2002; Greenfield *et al.*, 1995). Differences in the populations studied, follow-up periods, and methods of data collection make comparison of study results difficult. This study specifically indicates significant variation by PCP subspecialties in a low-income patient population which has a disproportionately higher diabetes burden, severe complications and generally poorer diabetes care quality. The lowest rate of HbA_{1c} monitoring observed for generalists in this study, as has been suggested in other studies (Al Khaja et al., 2002; Levetan *et al.*, 1999), points to the need for CMOs to be more vigilant in monitoring patient care within their provider networks.

The overall quality of diabetes care received by Medicaid recipients was suboptimal during this time period in Georgia and remains suboptimal today in many public and private primary care settings throughout the country (Chin *et al.*, 2000a; Coon & Zulkowski, 2002; Rust & Curtin, 2001). Although this investigation examined diabetes care by PCP subspecialty, the results may be best interpreted as more frequent exposure to one PCP versus another. However, observed variations in diabetes care quality are mostly due to differences in primary care settings, under the direction of PCP team leader (Cobin, 2002; Mayberry et al., 2005). Diabetes care requires a coordinated team of health professionals to effectively manage the disease. A greater knowledge of disease and diabetes care, a more focused practice, and better support systems of diabetes educators and nutritionists as well as the knowledge, skills, and experience of the PCP are important factors to remember in implementing new models of Medicaid managed care that aim to improve care quality. This study of diabetes care in the PCCM program suggests that variations in Medicaid care

quality by PCP subspecialty is likely to remain and that the new CMO model of care will unlikely demonstrate significant improvement in diabetes care quality in its early phase of implementation. Even assuming the reported problems of delayed physician reimbursements and failure to assign patients to the correct providers can be overcome, the benefits of the new, more structured system to better manage chronic disease will likely only be seen once the system has attained at least a few years of maturity.

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Pregnancy and Delivery Costs in Georgia Medicaid: PCCM versus Fee-for-Service Enrollees[4]

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Abstract

This study examines the enrollment, resource utilization, and prenatal care cost patterns among pregnant black and white women in Georgia's PCCM program, Georgia Better Health Care (GBHC), compared with those acquiring pregnancy and delivery services through Georgia's Fee for Service (FFS) sector. Birth certificate data from 1998 were linked with Medicaid enrollment and claims data from 1997 and 1998 to construct a retrospective pregnancy history for each Medicaid woman giving birth in Georgia hospitals in 1998. Total payments for pregnancy and delivery services and on the total number of prenatal care visits were derived for each woman in the sample. Multivariate logistic analyses were employed to assess the role of PCCM versus FFS in determining total payments and the likelihood of a prenatal hospitalization, length of hospital stay longer than 2 days following delivery, and cesarean section delivery. While prenatal pregnancy services and delivery costs were higher for those in PCCM than FFS, PCCM women had fewer prenatal care visits and were less likely to have delivery stays longer than 2 days postpartum compared with FFS women. The higher costs under PCCM are apparently related to the finding that this delivery system was highly associated with having more prenatal hospitalizations compared with FFS. In similar analyses conducted separately for white and black pregnant women, black women served by PCCM followed these overall results across delivery systems while there were no differences in the likelihood of a prenatal hospitalization or total prenatal care visits for whites served by PCCM versus FFS. In light of Georgia's turn toward full capitation under its new managed care initiative, many issues regarding pregnancy services and delivery such as earlier program enrollment, coordination of care, payment policies and capitation rates will need to be addressed.

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Pregnancy and Delivery Costs in Georgia Medicaid: PCCM versus Fee-for-Service Enrollees

Primary care case management (PCCM) is a form of managed care that links enrollees in an insurance program with a primary care provider (PCP) who serves as first point of contact when the enrollee has health care needs. The PCP is contracted with to provide primary and preventive care for the individual, coordinate referrals for specialty and ancillary care, and usually, to authorize the use of emergency department facilities and direct non-urgent care requests to office sites. PCCM programs were first introduced into state Medicaid programs in the early 1980's (Hurley, Freund & Paul, 1993) with the dual goals of improving access and quality of care for enrollees and reducing unnecessary expenditures for Medicaid programs.

PCCM is not the dominant form of Medicaid managed care nationwide. While approximately 58% of all enrollees are in some form of managed care, only 23% of these are enrolled in PCCM (Kaye, 2005). Still, over half of the States (29 out of 50) use PCCM as a part of their overall managed care program. Regardless of the form states use, more than half make special arrangements for maternity-related expenses (Holahan, Rangarajan & Schirmer, 1999). Some make lump-sum payments, while others transfer maternity expenses into infant rates; some states pay a substantially higher rate for poverty-related eligible women (Holahan et al., 1999).

In Georgia, the focus state of this study, special arrangements for pregnant women under PCCM were made. Those eligible under the poverty-related expansions (up to 235% at time of study), or the Right From the Start Moms (RFTSM) in Georgia, could enroll in PCCM on a voluntary basis, while those eligible under welfare-related or disability eligibility criteria were mandated to participate as PCCM phased in over the 1994-1997 time period. Women in either group, however, could choose an Obstetrician / Gynecologist as their PCP rather than receive one assigned to them through the system. It was hypothesized however, that along with these program features, marked differences in the characteristics of women served by the fee-for-service (FFS) and PCCM delivery sectors in Georgia's Medicaid system would be revealed. For example, welfare-eligible women are lower income, single and more likely to be enrolled prior to pregnancy than the Right from the Start Medicaid mothers (RFTSMs).

While the effects of PCCM in Georgia on physician participation and children's use of services has been examined (Adams, Bronstein, & Florence, 2003; Bronstein, Adams, & Florence, 2005), little is known about the enrollment and resource utilization patterns of pregnant women in Georgia's PCCM program. In the current study, 1998 data are used to examine:

- How different the characteristics of pregnant women enrolled in FFS versus PCCM are in Georgia's Medicaid program?
- After adjusting for these characteristics, are there differences in the service utilization patterns of women served in the two sectors?
- Do these differences result in lower costs in the PCCM versus FFS sector?
- Is there evidence of racial disparities in costs due to length of stay and prenatal hospitalization served by PCCM and FFS?

As states continue to move from PCCM into stronger forms of Medicaid managed care, it is important to understand how PCCM performs relative to FFS. It is especially important to understand how states' policies regarding

pregnant women have interacted with this form of managed care and what this means for a state like Georgia which is now moving into a capitated form of Medicaid managed care.

In theory, PCCM arrangements should offer all of the advantages that individuals receive from having an identifiable usual source of care, including better access to services, less use of emergency departments and more regular use of preventive care (Rowland, Rosenbaum, Simon, & Chait, 1995; Xu, 2002). In practice, the measured impacts of implementing PCCM arrangements in Medicaid programs are mixed. A summary of early evaluations of PCCM suggested that the most consistent effects were a decrease in emergency department use, and ancillary and inpatient services (Hurley et al., 1993, chap. 6). A decrease in emergency department use over time or less use in areas where PCCM is in operation continues to be documented as an effect in recent evaluations (Smith, Des Jardin, & Peterson, 2000; Piehl, Clemens, & Joins, 2000; Zuckerman, Brennan, & Yemane, 2002).

In terms of the use of primary and preventive care, Hurley et al. (1993) reported that for the 12 best program assessments they reviewed, 3 reported increases in visits, 5 reported decreases, and 4 reported no change. Long and Coughlin (2001) reported no difference in physician usage between those in FFS versus managed care, but Schoenman, Evans and Schur (1997) reported an increase in primary care utilization after the implementation of PCCM in Maryland. Using national data, Zuckerman, Brennan and Yemane (2002) reported that Medicaid covered children enrolled in PCCM programs had a greater likelihood of seeing a physician, but no greater likelihood of receiving preventive care than those Medicaid covered children enrolled in FFS.

Only a few studies have actually examined the impact of PCCM on provider networks. One study, specific to the implementation of PCCM in Georgia and Alabama, found that there were associated declines in the proportion of participating physicians, reductions in small Medicaid practices, and declines in Medicaid visit volume among those still participating (Adams, et al., 2003). After following the same children over time as PCCM was implemented, an associated decline not only in emergency room use, but also in primary and preventive care was found in this study (Adams, et al., 2003). These results indicate that the PCCM delivery system may not have been able to better manage the care of pregnant women in Georgia.

There have been relatively few studies which have looked at the impact of Medicaid managed care specific to pregnant women. One study of mandatory Medicaid HMO care in Missouri conducted by Sommers, Kenney, and Dubay (2005) found that managed care counties showed relatively smaller increases in prenatal care and use of WIC, but a larger decrease in smoking than FFS counties. In another study, the move from voluntary to mandatory HMO enrollment for pregnant women in Ohio found mandatory enrollment had positive effects on both prenatal care and reductions in smoking, but no effect on birth weight (Howell, Dubay, Kenney, & Sommers, 2004. A study specific to PCCM also found that while there was a general upward trend in levels of prenatal care use, women in Iowa counties still served by FFS experienced a more dramatic improvement than those in counties serving women through PCCM (Schulman, Sheriff, & Momany, 1997). While there was no association of PCCM with improved birth outcomes, the lack of controls for certain baseline medical and social risk factors could have affected this comparison, e.g., women in PCCM were in more urbanized county areas (Schulman et al.., 1997).

The present study adds to this body of literature by examining PCCM and pregnant women in Georgia, a southern state in which Medicaid pays for

approximately 45% of all births. While a pre-post analysis was not able to be completed as in these earlier studies of PCCM, this study does provide significant new information on the differences in caseloads and costs that can occur under state policies which make PCCM mandatory for pregnant women in the lowest-income strata, but voluntary for higher-income women.

METHODOLOGY

A retrospective cohort study design was employed to examine the relationship between enrollment in either PCCM or fee-for-service (FFS) within Georgia Medicaid on the total costs of prenatal care and delivery, and several utilization measures (i.e., length of stay following delivery, number of prenatal visits, prenatal hospitalization, and cesarean section delivery) that affect total costs.

The data employed in the current study were actually part of a larger investigation that funded the time and effort needed to link three separate data sources. An outside vendor, Medstat, Inc., was paid to link the birth certificate and Medicaid enrollment data for 1998. Deterministic matching based on social security number was used yielding a 99% match rate. Claims data for 1997 and 1998 were then linked back to the birth certificate/enrollment file to achieve a retrospective pregnancy history for each Medicaid woman giving birth in a Georgia hospital during 1998. Each woman's outpatient and inpatient claims were then linked to her birth certificate/enrollment record to provide full information on prenatal and delivery experiences and costs while Medicaid enrolled. This linkage covered the period from delivery date back to conception. Medicaid enrollment data for both years were used to identify those pregnant women with continuous enrollment during their pregnancy. Due to the lag in obtaining complete claims data, especially those linked to birth certificate data, Georgia birth certificate data along with Medicaid outpatient and inpatient claims data for 1997-1998 were the latest available for the study. By linking birth certificate data to Medical enrollment and claims data, a comprehensive pregnancy history dataset was created thus, providing a unique way to explore the past performance of PCCM.

The study subjects were Medicaid pregnant women, categorized into 3 age groups (10-17, 18-34, or 35 years old or older) who delivered a singleton live birth without congenital abnormalities in a Georgia hospital during the year 1998. The main exposure variable of interest was the Medicaid delivery system for prenatal and delivery care, either PCCM or FFS. Women who delivered in 1998 were retrospectively followed over their entire prenatal period through Medicaid claims and birth certificate data to assess outcomes in the FFS versus PCCM sectors. Only those women who spent their full time in Medicaid in their respective delivery sector, regardless of the length of their enrollment, were included. In addition, a variable was constructed to reflect whether the mother delayed her enrollment into Medicaid by comparing the trimester her prenatal care began from the birth certificate data (whether or not paid for by Medicaid) with the trimester she was Medicaid enrolled. If her enrollment trimester lagged behind the trimester that she initiated care, she was categorized as 'delaying Medicaid enrollment'.

Bundled billing is when providers typically bill a specific CPT code after all antepartum care has been rendered using the last antepartum visit as the date of service. In Georgia, specific rates for a packaged group of pregnancy-related services which include prenatal care, labor and delivery, and postpartum care, are paid through a single "bundled" payment. As such, in the current study, 2 separate global billing variables, Global1 and Global2, were constructed from specific inpatient and outpatient CPT procedures. For Global1, women were flagged if they

received prenatal and delivery care billed under the following obstetrical care CPT bundled codes: 59400, 59510, 59610 and 59618. Women with a Global2 flag had their care billed under one of the following obstetrical care CPT bundled codes: 59400, 59510, 59610 and 59618. Differences in the tendency of women in the PCCM and FFS to have had their care provider bill under Global1 or Global2 were tested.

Potential risk factors in this study included:1) demographic characteristics (i.e., age, marital status, education, residence, and race); 2) behavioral risk factors (i.e., smoking and alcohol use); 3) obstetric conditions (i.e., number of previous pregnancies, history of spontaneous abortion, previous pregnancy); 4) adverse pregnancy and/or birth outcomes (i.e., preterm birth or small for gestation or low weight birth, abruptio placentae, cervix incompetence, placenta previa, delivery type, and fetal distress); 5) medical conditions (i.e., preeclampsia, eclampsia, preexisting chronic hypertension, diabetes mellitus, vaginosis, and anemia); and 6) the trimester the woman entered into prenatal care. A single index indicating the presence of any of the complications from the above list of adverse pregnancy outcomes and medical conditions was also created. This summary measure is used in the demographic analysis.

Outcome variables included prenatal hospitalization, total Medicaid costs, length of stay longer than 2 days following delivery, total number of prenatal care visits, and delivery by cesarean section. In this study, prenatal hospitalization was defined as a hospital admission for a pregnancy-related complication without delivery, or a hospital admission more than two days before delivery. Total costs included the amounts paid by Medicaid for all inpatient and outpatient services used during pregnancy or at delivery. Since global billing was used extensively in Georgia, only the combined costs of prenatal and delivery services together were examined.

Differences in prenatal care and delivery costs across the two sectors were assessed using Pearson chi-square contingency statistics and multivariate log linear and logistic analysis. Multiple logistic regression procedures were used to derive the adjusted odds that a woman had a prenatal hospitalization, a length of stay longer than 2 days following delivery, or a cesarean section at delivery. Log-linear regression analysis on total costs for pregnancy and delivery services and total prenatal care visits was also estimated; direction and significance of the impact of PCCM using a dummy variable for enrollment in that sector was employed. Testing for the effect of being in PCCM using data on only those women for whom services were not globally billed was employed.

RESULTS

Marked differences in the characteristics of pregnant women served by these two sectors were revealed (Table 1). Women enrolled in PCCM during their pregnancy were the mirror image of those in FFS in terms of eligibility group. Whereas 86% of those in PCCM were eligible through welfare-related criteria, only 16% of those in FFS were; correspondingly, 84% of those in FFS are RFTSMs. There are virtually no disabled pregnant women served by the FFS sector, while 11% of the PCCM sample fall into that category.

Differences in eligibility criteria in PCCM versus FFS has implications for length of enrollment in the two sectors as the RFTSMs were eligible only when their pregnancy is confirmed, whereas the other two groups are eligible for Medicaid whether pregnant or not. Almost all of the women in PCCM, 97%, were enrolled from their first trimester, whereas only 74% of those served by FFS were enrolled this early. Women in the FFS sector were also less likely to be teens (8% vs. 22%), far more likely to be white (57% vs. 20%),

Table 1

Demographic Characteristics of Women PCCM and FFS Sectors

	Fee For Service (FFS) (N=29,306)	Georgia Better Health Care (PCCM) (N=3,523)	X^2 & p-value
Aid Category Recipients			
Pre-qualified	16%	86%	12193.93, p<.0001
Right From the Start Medicaid Mom (RFTSM)	84%	3%	
Disability	0%	11%	
Enrollment Term			
Since 1st Trimester	74%	97%	945.22, p<.0001
Since 2nd Trimester	19%	2%	
Since 3rd Trimester	7%	1%	
Bundled Claims (Global 1)			
Yes	72%	69%	7.25, p<.01
No	28%	31%	
Bundled Claims (Global 2)			
Yes	10%	14%	68.92, p<.0001
No	90%	86%	
Mother's Age			
18-34	87%	73%	745.50, p<.0001
> 35	5%	5%	
10-17	8%	22%	
Mother's Race			
White	57%	20%	1864.01, p<.0001
African American	43%	80%	
Mother's Marital Status			
Married	41%	17%	771.34, p<.0001
Single	59%	83%	
Any Pregnancy Complications			
Yes	26%	25%	4.39, p<.05
No	74%	75%	
Maternal Smoking During Pregnancy			
Yes	17%	10%	119.98, p<.01
No	83%	90%	
Delay			
No Delay	80%	94%	535.28, p<.0001
Delay 1 Trimester	13%	1%	
Delay 2 Trimesters	5%	1%	
Delay Other (3 Trimesters)	2%	4%	
Mean Total Prenatal Care Visits	11.78	10.83	t=187.90, p<.001

married (41% vs. 17%) and somewhat more likely to be smokers (17% vs. 10%). FFS women were more likely to have Global1 bundled claims (72% vs. 69%) and less likely to have Global2 claims (10% vs. 14%) than those served by PCCM. Those served by FFS were slightly more likely to experience an adverse birth outcome or pregnancy complication (25% vs. 24%) compared with those served by PPCM.

PCCM women compared with FFS were also less likely to have a delay between the trimester they enrolled in Medicaid and the trimester prenatal care began (94% vs. 80%), and less likely to have a one trimester (1% vs. 13%) or a 2 trimester (1% vs. 5%) delay. PCCM women were twice as likely as FFS women (4% vs. 2%) to initiate prenatal care in the 3rd trimester having had enrolled into Medicaid that same trimester or earlier.

Despite the differences in various characteristics between the two groups and the shorter time enrolled in Medicaid for those served by FFS, FFS women had a slightly (not statistically significant) higher number of prenatal care visits, X = 11.78, versus X = 10.83 visits for those in PCCM. Although certain characteristics of those in the FFS sector, i.e., higher income, white, married, could be predictive of lower costs, they were more likely to smoke and had more prenatal care visits.

Data in Table 2 confirmed the expected (based on their characteristics) lower costs for women served by FFS. Mean Medicaid costs were $7,570 for women in PCCM, while average costs were only $5,742 for FFS women. Although marked differences in the characteristics of women in each group would guide differences in the overall means within virtually all strata, PCCM enrollees cost more than FFS with one exception, the disabled. Average costs for FFS disabled pregnancies and deliveries were almost $15,000 compared with approximately $9,000 for those disabled in the PCCM sector. However, since the number of disabled women in the FFS sample was noted to be too small for comparison (n = 38), this group was omitted from further analyses.

While PCCM was expected to achieve some cost-savings compared to FFS, it is clear that PCCM served a more needy (lower income) and less healthy population. PCCM served these women for a longer period during their pregnancy and indeed, perhaps prior to pregnancy. Higher average costs in this sector may reflect then, the longer duration of service provision costs related to higher case-mix (not fully measured here). Furthermore, it may be the case that PCCM, through its primary physician case management function, actually provided more of the care needed by pregnant women.

To further assess the differences in the costs by service sector, multivariate analyses were conducted not only to account for the differences in demographics but also to examine separate outcomes thought to drive observed differences in total costs. Specifically, in Table 3, adjusted outcome results are presented for 1) log of dollar costs, 2) logistic analysis of whether the woman stays longer than 2 days post delivery, 3) logistic analysis of whether the woman had a prenatal hospitalization; 4) logistic analysis of whether she experienced cesarean section delivery, and 5) log linear analysis of the total number of prenatal care visits received.

The results for total costs indicate that even after adjusting for the numerous differences in the characteristics in the two sectors, those in PCCM were more costly to the Medicaid program. Interpretation of a semi-logarithmic function requires taking the exponent of the coefficient and subtracting 1.00; hence, a woman served by PCCM can be expected to cost Medicaid close to 12% more than if served by the FFS sector. As such, despite the primary care management function of PCCM, after adjusting for the greater needs and enrollment duration of the women it

Table 2

Net Pay: Means (Standard Deviations), F-test/t-test

	Fee For Service (FFS) (N=29,306)	Georgia Better Health Care (PCCM) (N=3,523)	t-test /F-test p-value
ALL	$5,742 ($3,337)	$7,570 ($4,794)	t=294.59, p<.0001
Aid Category Recipients			
Pre-qualified	$6,398 ($3,280)	$7,391 ($4,414)	F=278.15, p<.0001
Right From the Start Medicaid Mom (RFTSM)	$5,604 ($3,045)	$7,421 ($3,344)	
Disability	$14,785 ($33,888)	$9,011 ($7178)	
Enrollment Term			
Since 1st Trimester	$5,835 ($3,114)	$7,578 ($4,774)	F=186.56, p<.0001
Since 2nd Trimester	$5,577 ($4,175)	$8,209 ($7,058)	
Since 3rd Trimester	$5,194 ($2,949)	$6,166 ($2,411)	
Bundled Claims (Global 1)			
Yes	$7,099 ($4,909)	$7,7776 ($4,729)	F=486.79, p<.0001
No	$4,969 ($4,051)	$6,049 ($2,952)	
Delay			
No Delay	$5,800 ($3,085)	$7,566 ($4,772)	F=129.01, p<.0001
Delay 1 Trimester	$5,611 ($4,712)	$8,147 ($7,224)	
Delay 2 Trimesters	$5,180 ($2,972)	$6,166 ($2,457)	
Delay Other (3 Trimesters)	$5,556 ($3,083)	$7,861 ($4,736)	
Mother's Race			
White	$5,677 ($3,429)	$8,142 ($4,723)	F=294.47, p<.0001
African American	$5,829 ($3,209)	$7,431 ($4,801)	
Mother's Marital Status			
Married	$5,746 ($3,165)	$8,264 ($5,589)	F=291.50, p<.0001
Single	$5,740 ($3,450)	$7,431 ($4,608)	
Trimester When Prenatal Care Began			
1st Trimester	$5,764 ($3,410)	$7,577 ($4,512)	F=170.78, p<.0001
2nd Trimester	$5,648 ($2,927)	$7,489 ($5,738)	
3rd Trimester	$5,556 ($3,083)	$7,861 ($4,736)	

serves, this sector incurred more costs, rather than less.

Some additional insights are gained regarding PCCM from the remaining outcomes in Table 3. PCCM is associated with greater odds of having a prenatal hospitalization, but lower odds of a postpartum hospital stay longer than 2 days. Finally, being served by PCCM did not result in more prenatal care visits but rather, somewhat fewer.

To further examine outcome differences for PCCM and FFS, we conducted separate analyses for blacks and whites. An abbreviated table of the results is provided (Table 4). For both racial groups, total costs are higher under PCCM than under the FFS delivery system after controlling for other factors. Also, both white and black mothers were less likely to have a stay longer than 2 days if served by PCCM versus FFS. However, blacks serviced by PCCM were less likely to have more prenatal care visits compared with blacks served by FSS, whereas there was no effect of delivery system on the number of visits for whites. In contrast to whites, blacks were far more likely to have a prenatal hospitalization under PCCM than blacks in the FFS sector. The results for blacks tend to mirror our overall results.

DISCUSSION

Despite the expectation that PCCM should lead to lower costs, current results did not indicate lower combined prenatal and delivery cost savings. To the contrary, higher PCCM costs as well as more prenatal hospitalizations, longer postpartum stays, and more cesarean sections were revealed compared to FFS. While this study provides new information on the PCCM program within Georgia Medicaid, there are several key limitations. First, selection into the two sectors is heavily affected by Georgia's program structure making it very difficult to separate out the effects of demographics from the program itself. Overwhelmingly, PCCM serves those women who fall into the much lower income welfare-related and disabled eligibility groups compared to those in the FFS sector. While eligibility group and numerous other demographics have been controlled, there are likely unmeasured characteristics (e.g., general health status) correlated with eligibility group that affect the ability of each sector to serve its enrolled population.

It is also important to note that this study is not a pre-post design but rather, a cross-sectional comparison of two sectors. In earlier analysis of PCCM in Georgia, pre-post analysis with appropriate control counties (those not yet in PCCM) or individuals serving as their own controls over time were used (Bronstein, Adams and Florence, 2004; Bronstein et al., 2005). These studies employed stronger analytic designs. In the current investigation, resources did not allow for linking Medicaid enrollment, claims, and birth certificate data over a longer period. Perhaps, if these women were followed over a longer period of time, potential cost savings under PCCM would be realized in less future health related problems and their associated costs.

In addition, the use of global billing in Georgia, as in other states, meant that separating out the costs of individual prenatal care services was not possible. Rather, the combined costs of pregnancy and delivery were examined in the current study. The costs for those women whose services were billed globally were captured by the amount paid by Medicaid for the global bill plus other individually billed services thus diluting the costs specific to prenatal versus delivery effects.

Due to the structure of policies within the Georgia PCCM program, a lower-income, and generally a sicker population of pregnant women relative to FFS are served. Despite the expectation that PCCM should lead to lower costs, current results did not indicate lower combined prenatal and delivery cost savings. To the contrary, higher PCCM costs as well as

Table 3

Multinomial Log Linear Regressions & Multinomial Logistic Regressions

	TOTAL COSTS (Log Linear)	LENGTH OF STAY (Logistic)	PRENATAL HOSPITALIZATION (Logistic) Odds Ratio	DELIVERY BY CESAREAN (Logistic) Odds Ratio	TOTAL PNC VISITS (Log Linear)
Enrollment Term					
Since 1st Trimester	.19***	.96	3.06***	1.02	.11***
Since 2nd Trimester	.10***	1.05	3.46***	.99	.05***
Since 3rd Trimester (ref)	--	--	--	--	--
Prenatal Care Began					
Since 1st Trimester (ref)	--	--	--	--	--
Since 2nd Trimester	.02*	.81**	.75***	.88**	-.35***
Since 3rd Trimester	.06*	.83	1.01	.92	-.91***
Maternal Age					
18-34	.03**	.99	.99	1.50***	.05***
35+	.04*	1.51***	1.37**	2.32***	.07***
10-17 (ref)	--	--	--	--	--
Recipient's Aid Category					
Pre-qualified	.16***	1.21***	1.39***	1.06	-.01
RFTSM (ref)	--	--	--	--	--
Maternal Race					
White (ref)	--	--	--	--	--
African American	-.007	1.18***	.81***	1.09*	-.06***
Marital Status					
Married (ref)	--	--	--	--	--
Single	.04***	1.11*	.63***	.90**	-.03***
Previously Pregnant					
Yes	.11***	.69***	.91	.86***	-.03***
No (ref)	--	--	--	--	--
Smoking While Pregnant					
Yes	.04***	.86*	.65***	1.03	-.07***
No (ref)	--	--	--	--	--
Maternal Residence					
Urban (ref)	--	--	--	--	--
Rural	-.10***	.90*	1.20***	1.24***	-.04***
Health Care Group					
FFS (ref)	--	--	--	--	--
PCCM	.11***	.68***	1.33***	1.00	-.05***
Vaginosis					
Yes	.08*	.69	1.01	.86	.04*
No (ref)	--	--	--	--	--
Chronic Hypertension					
Yes	.19***	2.39***	.93	1.80**	.01
No (ref)	--	--	--	--	--
Preclampsia and Eclampsia					
Yes	.05	7.43***	1.21	1.84***	-.05*
No (ref)	--	--	--	--	--
Diabetes Mellitis					
Yes	.14***	1.97***	1.72***	2.28***	.06***

Table 3
Multinomial Log Linear Regressions & Multinomial Logistic Regressions, Continued

No (ref)	--	--	--	--	--
Maternal Anemia					
Yes	.02	.99	1.12	1.11	.01
No	--	--	--	--	--
Fetal Distress					
Yes	.20***	1.65***	.91	10.91***	.01
No (ref)	--	--	--	--	--
Hx of Induced Abortion					
Yes	.10	3.18 (p=.09)	.01	3.07*	-.05
No	--	--	--	--	--
Hx of Spontaneous Abortion					
Yes	.05***	1.40***	1.12 (p=.09)	1.24***	.03***
No (ref)	--	--	--	--	--
Incompetent Cervix					
Yes	.39***	1.56	2.04 (p=.08)	2.13**	-.15***
No (ref)	--	--	--	--	--
Premature Membrane Rupture					
Yes	.10***	3.47***	1.36*	1.16 (p=.13)	-.14***
No (ref)	--	--	--	--	--
Placenta Previa					
Yes	.16*	3.46***	2.84**	15.68***	-.04
No (ref)	--	--	--	--	--
Precipitous Labor					
Yes	-.10**	.48**	.83	.05***	-.10***
No (ref)	--	--	--	--	--
Abruptio Placentae					
Yes	.29***	2.13***	1.41	5.63***	-.17***
No (ref)	--	--	--	--	--
Number of Observations	32,362	32,405	32,405	32,405	32,059
Tests, df, & p-values **Log Linear : R-square & F** **Logistic: Wald Chi-square**	R^2=.05 F=70.95, df= 26, p<.0001	X^2=708.43, df=26, p<.0001	X^2=347.98, df=26, p<.0001	X^2=1585.49, df=26, p<.0001	R^2=.27 F=463.38, df= 26, p<.0001

*Beta coefficients listed for log linear regression model with Total Costs & Total Prenatal Visits; Odds Ratios listed for logistic regressions models with length of stay, prenatal hospitalization and c-section. * = p<.05, ** = p < 0.01, *** = p < 0.001.*

more prenatal hospitalizations, longer postpartum stays, and more cesarean sections were revealed compared to FFS. It is impossible to say whether these effects are due to more contact with a primary care physician or to the receipt of better care. It is difficult to say whether the prenatal hospitalizations could have been prevented through better care management, or whether they represent extra care needed during pregnancy. Given the lower odds of a stay longer than 2 days at delivery, it may represent the latter. Perhaps, if these women were followed over a longer period of time, potential cost savings under PCCM would be realized in less future health related problems and their associated costs.

A major objective of PCCM is to better manage and coordinate care which, in turn, should reduce costs and perhaps, reduce racial disparities. The current data lend some support to the notion that racial disparities may still exist among Georgia women receiving pregnancy and delivery services by PCCM and FFS. The key racial difference is a significantly higher odds of prenatal hospitalization under PCCM versus FFS for blacks but not whites. It is difficult to say whether these are due to emergencies or better management of risky pregnancies. That PCCM also lowers

Table 4
Multinomial Log Linear & Multinomial Logistic Regressions: Whites & Blacks

	TOTAL COSTS (Log Linear)	LENGTH OF STAY (Logistic)	PRENATAL HOSPITALIZATION (Logistic)	DELIVERY BY C-SECTION (Logistic)	TOTAL PRENATAL VISITS (Log Linear)
WHITES					
FFS	--	--	--	--	--
PCCM	0.17***	0.51** (0.33-0.79)	1.09 (0.80-1.48)	1.21 (0.96-1.54)	0.01
BLACKS					
FFS	--	--	--	--	--
PCCM	0.12***	0.76** (0.62-0.93)	1.50** (1.21-1.86)	0.97 (0.84-1.12)	-0.04***

*Beta coefficients listed for log linear regression model with Total Costs & Total Prenatal Visits; Odds Ratios listed for logistic regressions models with length of stay, prenatal hospitalization and c-section. * = p<.05, ** = p < 0.01, *** = p < 0.001.*

the number of prenatal care visits for blacks and not whites is of concern.

While the results indicate higher costs in the PCCM sector, it is difficult to predict what costs would be to the Medicaid Program in the absence of PCCM, given the health status and health needs of pregnant women enrolled prior to pregnancy. One could speculate that the cost to Medicaid would be even higher if this low-income, needier population did not receive the better coordination of services available under PCCM. These issues will need to be addressed as Georgia continues to turn toward full capitation under its new managed care initiative requiring all pregnant women to enroll in capitated care within days of enrollment. A major policy issue will be whether managed care companies (MCOs) can get RFTSMs to enroll earlier and hence, manage their care better. Data indicate that over one quarter of women served by the FFS, predominantly RFTSMs, enrolled later than the first trimester. This will make it difficult for MCOs to screen for maternal and infant complications or provide counseling regarding risk behaviors; smoking rate, for example, among those in the FFS sector was far greater than among those in PCCM.

Yet, MCOs have the ability to help lower-income and disabled women prevent unintended pregnancies and to 'bridge' the intrapartum period between pregnancies. They can serve these groups both pre-pregnancy and for longer durations during pregnancy and postpartum. The question is whether they can find methods to serve them better than they were served under the PCCM system. If the historical experience of PCPs within PCCM means they will incur higher costs for this group, then will they tend to avoid enrolling them in their plans, or use other forms of 'risk selection'. Georgia will need to review its payment policies and capitated rates to induce plans to serve both longer-term enrolled pregnant women as well as the RFTSMs more efficiently and effectively.

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