HHS Public Access

Author manuscript

Matern Child Health J. Author manuscript; available in PMC 2015 August 14.

Published in final edited form as:

Matern Child Health J. 2012 December ; 16(0 2): 250–257. doi:10.1007/s10995-012-1166-9.

Preconception Health of Reproductive Aged Women of the Mississippi River Delta

Connie L. Bish,

Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, GA, USA

Sherry Farr,

Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, GA, USA

Dick Johnson, and

Mississippi State Department of Health, 570 East Woodrow Wilson, PO Box 1700, Jackson, MS 39215-1700, USA

Ron McAnally

Mississippi State Department of Health, 570 East Woodrow Wilson, PO Box 1700, Jackson, MS 39215-1700, USA

Connie L. Bish: aez2@cdc.gov

Abstract

Optimal preconception health (PCH) may improve maternal and infant outcomes, priority issues in Mississippi (MS). Our study objective was to compare the PCH of women in the MS Delta to other regions. We analyzed Behavioral Risk Factor Surveillance System data from 2005, 2007, and 2009, and limited analyses to 171,612 non-pregnant black and white women 18–44 years of age. Region was defined as 14 MS Delta counties (MS Delta), remainder of MS (MS non-Delta), Delta states (LA, AR, TN), and non-Delta US states. We calculated adjusted prevalence ratios (aPR) to assess associations between region and 16 indicators of optimal PCH, controlling for demographic characteristics. Healthy PCH factors such as consuming ≥5 fruits and vegetables daily and normal body mass index (18.5 kg/m^2 to <25 kg/m^2), respectively, were more prevalent in the MS non-Delta (aPR = 1.3; 95 % CI: 1.0,1.7 and aPR = 1.2; 95 % CI: 1.0,1.4), non-MS Delta (aPR = 1.5; 95 % CI: 1.2,2.0 and aPR = 1.3; 95 % CI: 1.1,1.5) and non-Delta states (aPR = 1.7; 95 % CI: 1.3,2.2 and aPR = 1.4; 95 % CI: 1.2,1.6) compared to the MS Delta. Physical activity levels were higher among non-Delta US states compared to the MS Delta (aPR = 1.3; 95 % CI: 1.1,1.4). Household income and race confounded the associations between region and PCH. Reproductive aged women in the MS Delta had poorer PCH, particularly for physical activity and nutrition, than women in other regions. MS Delta service providers and public health practitioners should consider implementing or enhancing lifestyle, nutrition, and physical activity interventions, with a special focus on reducing income-based and racial disparities.

Correspondence to: Connie L. Bish, aez2@cdc.gov.

Keywords

Preconception Health; Reproductive Age; Region; BRFSS

Background

Mississippi (MS) ranks highest in the United States in the percentage of the population living below the federal poverty level [1], ranks first in the nation in its urgent need for policy attention regarding education [2], and is one of only four states with a rural majority population [3, 4]. The northwest corner, known as the Delta because of the abundant fertile land adjacent to the MS River, has one of the poorest populations in the US [5]. African Americans, who are more likely to experience adverse health outcomes given our nation's existing racial and ethnic health disparities, make up 66 % of the Delta population, as compared to 36 % of the total state population and 13 % of the total national population [6, 7]. The Delta is primarily rural and includes Bolivar, Coahoma, Holmes, Humphreys, Issaquena, Leflore, Panola, Quitman, Sharkey, Sunflower, Tallahatchie, Tunica, Washington, and Yazoo counties. Compared to other areas of MS, the MS Delta has higher per capita rates of infant mortality, illiteracy, teen pregnancy, and high school dropouts [8, 9].

Preconception care is recognized as a critical component of health care for women of reproductive age (i.e., women ages 18–44 years) [10]. The main goal of preconception and interconception care is to ensure that women enter pregnancy at their optimum health, thereby reducing risk of poor pregnancy and birth outcomes. In addition to the challenges to living a healthy lifestyle faced by the average US woman, MS Delta residents face additional daily challenges associated with poverty, chronic unemployment, limited educational opportunities, extreme rural living, and a health care infrastructure weakened by increasing demand, rising costs, and diminishing resources [1–5]. Several ongoing programs sponsored by the Mississippi State Department of Health (MSDH), local colleges, and community groups aim to decrease poor birth outcomes in MS by maximizing women's health and the environments in which they live. Comparing preconception health (PCH) measures of MS Delta women with those of women in the rest of MS, other "Deep South" Mississippi River Delta states, and the rest of the US may offer insights into areas of service still needed or in need of further adaptation. Therefore, the purpose of this study was to assess geographic disparities in the prevalence of PCH status among reproductive age women in the MS Delta, MS non-Delta, non-MS Delta states, and the remainder of the US. The methodology presented here may be replicated by localities seeking to better understand PCH among high-risk, disadvantaged populations.

Methods

The Behavioral Risk Factor Surveillance System (BRFSS) is a state-based random digit-dialed complex sample telephone survey of adults ≥18 years of age. Data from the 2005, 2007, and 2009 surveys were used for this cross-sectional study because surveys from these years cover 16 of 17 previously identified BRFSS indicators of optimal PCH [11]. The BRFSS has Centers for Disease Control and Prevention institutional review board approval.

For our study's survey years, the percent of sampled households that could be contacted and agreed to participate (response rate) ranged from 50.6 to 52.5 %. Of contacted households, the percent that agreed to participate (cooperation rate) ranged from 72.1 to 75.1 %.

Sixteen dichotomous PCH measures available in odd years of the BRFSS included education, general and mental health, health insurance, annual checkup, tobacco and alcohol use, fruit/vegetable consumption, body mass index (BMI), physical activity, chronic conditions, and influenza vaccine uptake. For our analysis, an indicator of optimal PCH was defined as the category of each measure associated with better PCH (Table 1). For example, "excellent, very good or good general health", as opposed to "fair or poor general health", is the indicator of optimal PCH for general health status. The expert group who created the PCH indicators dichotomized BMI into "not overweight or obese" (BMI <25 kg/m^2) and "overweight or obese" (BMI ≥25 kg/m^2) [11]. However, since being underweight (BMI <18.5 kg/m^2) may be associated with adverse pregnancy outcomes, we excluded this group of women (n = 4,150, 2.4 %) from analyses on BMI.

Region was defined as 14 MS Delta (MS Delta) counties, the remainder of MS (MS non-Delta), non-MS Delta states (LA, AR, TN—the southern states along the MS River), and non-Delta US states (all other states and District of Columbia, excluding MS, LA, AR, TN). Demographic characteristics assessed in BRFSS and examined as confounders of the association between region and PCH included age, race, marital status, employment status, and annual household income.

We initially examined differences in demographic characteristics between regions using Chi square tests. We then assessed crude and adjusted prevalence ratios (PR) and 95 % confidence intervals (CI) for the associations between region (exposure) and each of 16 indicators of optimal PCH (outcome) separately, using the average marginal predictions approach to logistic regression developed by Bieler et al. [12]. All analyses were conducted with SAS callable SUDAAN [13, 14] to account for the complex sampling design and were weighted to account for differential selection probabilities and survey nonresponse.

In BRFSS data from 2005, 2007, and 2009, MS Delta non-black and non-white racial minorities constituted less than 4 % of the female reproductive age sample. Therefore, for comparative purposes, we limited all analyses to 171,612 non-pregnant black and white women 18–44 years of age in the four US regions of interest. Of those women, the percent missing values for PCH measures varied from 0.1 % for educational level to 5.3 %for BMI. Of the entire sample of women, 9.2 % were missing values for one or more demographic characteristics, with 98 % of those missing values for the variable income (9.0 %of the total sample). Therefore, sample sizes for multivariable models ranged from n = 145,327 (91.7 % of women with BMI ≥18.5 kg/m^2) to n = 155,748 (90.8 %).

Results

Maternal demographic and socioeconomic characteristics by region are described in Table 2. The majority of MS Delta women were black (75.3 %); whereas, there were lower percentages of black women in the MS non-Delta (28.1 %), non-MS Delta states (22.8 %),

and non-Delta US (14.8 %) (p value < 0.0001). A lower percentage of women from the MS Delta were married (33.9 %) compared to women from non-Delta MS (52.8 %), non-MS Delta states (60.1 %), and non-Delta U.S. (57.0 %) (p value < 0.0001). More than half (57.9 %) of women in the MS Delta reported an annual income < $25,000 compared to 38.3, 29.9 and 20.8 % of women in non-Delta MS, non-MS Delta states, and the non-Delta US, respectively (p value < 0.0001).

The prevalence of each indicator of optimal PCH is provided in Table 3.With the exception of "Had influenza vaccination in past year", all PCH indicators were significantly different across regions (Chi square p value < 0.05 for all). PCH indicators with the highest prevalence among women in all regions included having ≥high school education (range: 83–94 %), no heavy drinking (range: 94–97 %), no diabetes (94–98 %), and no asthma (89–92 %). PCH indicators with the lowest prevalence among women in all regions included consuming ≥5 servings of fruits and vegetables daily (range: 14–25 %), receiving an influenza vaccination (range: 19–24 %), having normal BMI (range: 23–50 %), and meeting recommended levels of physical activity (range: 34–54 %).

In unadjusted analyses, compared to the MS Delta, regions outside of the MS Delta had higher prevalence of up to 10 of the 16 indicators of optimal PCH (Table 3). After adjustment for demographic characteristics, the prevalence of 5 of these PCH indicators in specific regions remained statistically higher than the MS Delta. Household income and race were the strongest confounders of the associations between region and PCH; low income and black survey respondents reported the lowest prevalence of the five significantly different PCH indicators (data not shown). The prevalence of consuming ≥5 servings of fruits and vegetables daily and the prevalence of having a normal BMI (18.5 kg/m^2 ≤ BMI <25 kg/m^2) remained significantly higher in other regions than in the MS Delta. Women in non-MS Delta states and non-Delta US reported slightly higher prevalence of adequate social and emotional support than MS Delta women. Additionally, women in the non-Delta US states had increased prevalence of meeting the weekly physical activity recommendation and being normotensive compared to women in the MS Delta.

Discussion

Many, if not all, of the preconception health indicators we examined are indicators of good overall health. Improvements in the physical and mental health of women 18–44 years of age, could positively affect their immediate and long-term health as well as the health of any future pregnancy. The main goal of preconception care is to provide health promotion, screening, and interventions for women of reproductive age to increase the likelihood of healthy future pregnancies and birth outcomes. The results of our analysis identify PCH domains for which MS Delta women are falling behind the rest of MS and other US regions, suggesting that MS Delta women may need focused assistance to meet recommended health behaviors [11]. Most notably, MS Delta women had significantly lower prevalence of optimal PCH in the nutrition and physical activity domains, specifically being normal weight, consuming adequate amounts of fruits and vegetables, and achieving recommended levels of physical activity, compared to other regions. Among MS Delta women, approximately a third or fewer had optimal nutrition and physical activity.

Dietary intake reflects both individual and community level factors. Low-income households and households led by young-adults in counties adjacent to the Mississippi River in MS, LA, and AR, (collectively referred to as the Lower Mississippi Delta [LMD]) tend to have less healthy diets than black and white adults in the rest of the United States, and to have insufficient grain, fruit, and vegetable intake [15]. These differences are most pronounced for African American households [16].

Barriers to healthy eating in the MS Delta include cultural norms around eating unhealthy foods, cost [17], and lack of access to fresh produce and healthy foods [18]. A study that included interviews of residents and that evaluated supermarkets, small/medium-sized stores, and convenience stores in the LMD found that limited availability of healthful food and costs influenced purchasing behaviors [18]. Data from the national health and nutrition examination survey (NHANES) III and NHANES 1999–2000 [19] and FOODS 2000 [20] indicated that fruits and vegetables are less available than fats and sweets in the LMD, and cost more per serving in the LMD than in the US overall [21].

A few studies have identified similarly low levels of physical activity, as well as barriers and facilitators to physical activity, in the MS Delta and other southern states. A community based observational study in Jackson, MS, found that a third of female participants had engaged in no moderate or vigorous leisure-time physical activity in the past year [22]. A qualitative study of diet and physical activity in the MS Delta suggested that interventions designed to balance caloric intake and expenditure by rural, low-income African Americans should highlight healthy eating and physical activity, consider the depressed socioeconomic environment and low self-esteem that characterize the living conditions and psychology of the population, and capitalize on the community pride, geographical identity, and respect for the family unit [23]. A qualitative study of Southern cities identified that barriers to health-protective behaviors such as physical activity included time, work, apathy, and low efficacy [24].

MS Delta women also had lower levels of adequate support compared to other regions. Boothe et.al. [25] hypothesized that achievement of adequate social support may be one way to increase self-efficacy, mitigate maternal stress, and influence overall health behaviors of postpartum women. Targeting the factors related to inadequate social support may improve social support specifically and promote healthy behaviors in other PCH domains.

The prevalence of several indicators of optimal PCH (≥good general health, ≥high school education, no diabetes, no hypertension, and receiving an influenza vaccination) were lower for MS Delta women, compared to others, in unadjusted analyses, but no longer differed statistically after adjusting for demographic characteristics. Income and race were the strongest confounders of the associations between PCH and region. Socioeconomic challenges and racial disparities faced by black women in the MS Delta may affect their PCH, ability to manage medical conditions, and health seeking behavior [26, 27]. Black women of lower SES, such as those in the MS Delta, may have lower self-perceived medical needs due to less education [28]. Therefore, programs that improve living conditions, reduce racial disparities, increase health knowledge, and increase overall educational status among

women in the MS Delta may also improve their PCH. And, improved PCH may improve disparities in perinatal outcomes.

In addition to differences across regions, we also identified PCH indicators with a low prevalence in all regions. Only 19–25 % of women from any region received an influenza vaccination in the past year. However, 63–74 % of women reported receiving a general check up in the last year. When seasonally appropriate, influenza vaccination should be documented at all clinical appointments and, for women who have not received one, encouraged by their clinicians.

Ongoing programs sponsored by public and non-profit agencies in MS that provide PCH-related and interconception health services can use the results of this analysis to better understand the PCH of the women they serve and to determine areas of need to focus their efforts. Given our study findings, these programs might be well served to evaluate their nutrition, physical activity, and social support assessments and services. The MSDH provides preconception counseling and physical exams (medical history, Pap test, clinical breast exam, height, weight and blood pressure) at little to no cost through the U.S. Department of Health and Human Services, Office of Population Affairs, Title X Family Planning program [29]. While no formal evaluation of PCH services at Title X clinics has been completed in MS, the Family Planning program offers PCH counseling statewide; therefore, Family Planning data can be collected and used to evaluate PCH among program recipients. Additionally, the MSDH, in partnership with the University of Mississippi Medical Center, is piloting an interconception health program for black women from the Delta who delivered an infant weighing <1,500 g. Case management services are offered for 24 months postpartum with goals of improved health (nutritional counseling, infection control), improved life status (vocational training, housing assistance), and achievement of recommended birth spacing of 18–24 months [30]. This intervention will be evaluated at the end of the data collection period in 2013, and if benefit is evident, the protocol will be incorporated into existing or new MSDH services.

Another opportunity to focus on nutrition, physical activity, and social support domains of PCH may exist with home visiting or community based programs like Healthy Start that offer a consortium of neighborhood residents, clients, medical providers, social service agencies, faith representatives, and the business community focused on healthy pregnancy outcomes [31]. Since 2001, Tougaloo College/Delta Health Partners (TC/DHP) have worked to reduce infant mortality among high-risk and underserved residents of seven MS Delta counties (Bolivar, Coahoma, Quitman, Sunflower, Tallahatchie, Tunica and Washington). The partnership offers coordinated, comprehensive health services that include outreach and recruitment, case management, health education and training, interconception care, and screening and referral for depression and other risk factors [32].

A nutrition-specific intervention introduced in the MS Delta in 2009 is the Delta Health Alliance’s Body and Soul program. This program is an adaptation from an evaluated effective church-based diet intervention from the National Cancer Institute to meaningfully increase fruit and vegetable consumption among participants [33].

Currently, partnerships exist between the MSDH's Office of Chronic Disease Prevention and community organizations (e.g., churches, mayors, city councils) to offer health education regarding diet and exercise for chronic disease prevention and management [34]. Additionally, the MSDH Office of Preventive health offers the Stanford University Chronic Disease Self-Management program to the public —a 6-week step-by-step workshop to help guide those who live with a chronic condition [35]. Reproductive aged women have not been a specific target population for these programs, but the prevalence of overweight and obesity, hypertension, asthma, and diabetes among reproductive aged women found in our study suggests a need to expand these services to reproductive aged women. MSDH family planning, the special supplemental nutrition program for women, infants and children (WIC), MSDH Office of Tobacco Control, and other existing public health programs providing services to a large percentage of women of reproductive age could be used as gateways to specific programs like these to improve nutrition, physical activity, social support, and chronic disease management [36].

Determining baseline levels of PCH, examining changes over time, and evaluating the effectiveness of specific PCH programs in the MS Delta can help ensure resources are devoted to the most promising programs and that MS Delta women receive services that ultimately improve their health and the health of future pregnancies.

Strengths of this analysis include the ability to evaluate region specific data by using BRFSS county codes and the large sample size for all regions. This report also has some limitations. Approximately 10 % of the women in the sample were missing data on PCH outcomes or demographic characteristics, with the majority missing information on income. To assess the potential for bias from missing data on income, we compared crude PR estimates for PCH outcomes with and without exclusion of women with missing values for income. The crude PR estimates did not change substantially; therefore, excluding women with missing data on income from the multivariable models likely had little effect on adjusted estimates. Additionally, it is possible that a survey respondent had recently relocated into any of the regions; if so, their preconception health indicators would likely reflect their previous residency region and not the region of current residence. However, any misclassification of exposure would likely drive results toward the null, and, overall, the MS Delta is experiencing population emigration rather than immigration [5].

Conclusions

Reproductive aged women in the MS Delta had poorer PCH than black and white women in the MS non-Delta, non-MS Delta states, and the remainder of the US, including indicators of nutrition, BMI, physical activity, social and emotional support, and hypertension. MS Delta service providers and public health programs can use these findings to implement or enhance lifestyle, nutrition, and physical activity interventions. Programs focusing on education, income and racial disparities may also improve PCH in the MS Delta. Further research is recommended to delineate the components of region that influence PCH.

Acknowledgments

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

References

1. US Census Bureau. [Accessed September 30, 2012] State rankings—statistical abstract of the United States. Persons below poverty level. 2007. http://www.census.gov/statab/ranks/rank34.html.
2. The Rural School and Community Trust. Why Rural Matters in Mississippi. 2003 http://files.ruraledu.org/states/ms.htm.
3. The rural school and community trust. Why Rural Matters. Percentage of State's Population that is Rural. 2003 http://files.ruraledu.org/streport/pdf/imp1_2003.pdf.
4. Miller K. Why Definitions Matter: Rural Definitions and State Poverty Rankings. 2010 http://www.rupri.org/Forms/PovertyandDefinitionofRural.pdf.
5. [Accessed September 30, 2012] Mississippi Quick Facts from the US Census Bureau: Selected counties. http://quickfacts.census.gov/qfd/states/28000.html.
6. [Accessed September 30, 2012] 2010 Census Data. http://2010.census.gov/2010census/data/index.php.
7. Mississippi statistically automated health resource system (MSTAHRS). [Accessed September 30, 2012] Population tab. 2005, 2007, 2009 customized county and state US Census Data. http://mstahrs.msdh.ms.gov/.
8. The rural school and community trust. Facts and Figures about States with Low Rural Graduation Rates. http://www.ruraledu.org/articles.php?id=2757.
9. Mississippi statistically automated health resource system (MSTAHRS). [Accessed September 30, 2012] Pregnancy tab for 10–19 year olds and Infant Mortality tab. http://mstahrs.msdh.ms.gov/.
10. Johnson K, Posner SF, Biermann J, Cordero JF, Atrash HK, Parker CS, et al. Recommendations to improve preconception health and health care—United States a report of the CDC/ATSDR preconception care work group and the select panel on preconception care. MMWR. 2006; 55:1–23. [PubMed: 16617292]
11. Broussard DL, Sappenfield WB, Fussman C, Kroelinger CD, Grigorescu V. Core state preconception health indicators: a voluntary, multi-state selection process. Maternal and Child Health Journal. 2011; 15(2):158–168. [PubMed: 20225127]
12. Bieler GS, Brown GG, Williams RL, Brogan DJ. Estimating model-adjusted risks, risk differences, and risk ratios from complex survey data. American journal of epidemiology. 2010 Advance Access published February 4, 2010.
13. SAS Procedures Guide. Cary, NC: SAS Institute Inc; 1999.
14. SUDAAN User's Manual. Research Triangle Park. North Carolina, USA: Research Triangle Institute; 2003.
15. McCabe-Sellers BM, Bowman S, Stuff JE, Champagne CM, Simpson PM, et al. Assessment of the diet quality of US adults in the Lower Mississippi Delta. American Journal of Clinical Nutrition. 2007; 86:697–706. [PubMed: 17823435]
16. Champagne CM, Bogle ML, McGee BB, et al. Dietary intake in the lower Mississippi delta region: Results from the foods of our delta study. Journal of the American Dietetic Association. 2004; 104:199–207. [PubMed: 14760567]
17. Zoellner J, Bounds W, Connell C, Yadrick K, Crook L, et al. Meaningful messages: Adults in the lower Mississippi delta provide cultural insight into strategies for promoting the mypyramid. Journal of nutrition education and behavior. 2010; 42:41–50. [PubMed: 19910255]
18. McGee BB, Johnson GS, Yadrick MK, Richardson V, Simpson PM, et al. Food shopping perceptions, behaviors, and ability to purchase healthful food items in the lower Mississippi delta. Journal of Nutrition Education and Behavior. 2011; 43(5):339–348. [PubMed: 21795120]
19. Block G. Foods contributing to energy intake in the US: data from NHANES III and NHANES 1999–2000. Journal of Food Composition and Analysis. 2004; 17:439–447.

20. Yadrick K, Connell C, Simpson P, et al. Fats and sweets more available than fruits and vegetables in rural Mississippi Delta. FASEB journal : official publication of the Federation of American Societies for Experimental Biology. 2005; 19 suppl S(2):A978.
21. Connell CL, Zoellner JM, Yadrick MK, Chekuri SC, Crook LB, et al. Energy density, nutrient adequacy, and cost per serving can provide insight into food choices in the lower Mississippi delta. Journal of nutrition education and behavior. 2011:1–6.
22. Dubbert PM, Robinson JC, Sung JH, Ainsworth BE, Wyatt SB, et al. Physical activity and obesity in African Americans: the Jackson Heart Study. Ethnicity and Disease. 2010; 20(4):383–389. [PubMed: 21305826]
23. Parham GP, Scarinci IC. Strategies for achieving healthy energy balance among African Americans in the Mississippi Delta. Preventing chronic disease [electronic resource]. 2007; 4(4) http://www.cdc.gov/pcd/issues/2007/oct/07_0076.htm.
24. Hovick SR, Johnson-Turbes CA, Freimuth VS, Chervin DD. Assessing perceptions of and responses to multiple health risks among the Southern poor. Preventing chronic disease [electronic resource]. 2011; 8(1):A11. http://www.cdc.gov/pcd/issues/2011/jan/09_0222.htm.
25. Boothe AS, Brouwer RJ, Carter-Edwards L, Ostbye T. Levels and predictors of unmet social support for healthy behaviors among overweight and obese postpartum women: Results from the active mothers postpartum study. Journal of Womens Health. 2011; 20(11):1677–1685.
26. Cox RG, Zhang L, Zotti ME, Graham J. Prenatal Care Utilization in Mississippi: Racial Disparities and Implications for Unfavorable Birth Outcomes. Maternal and Child Health Journal. 2011; 15(7):931–942. [PubMed: 19943096]
27. Zhang L, Cox RG, Graham J, Johnson D. Association of maternal medical conditions and unfavorable birth outcomes: Findings from the 1996–2003 Mississippi linked birth and death data. Maternal and Child Health Journal. 2011; 15(7):910–920. [PubMed: 19760166]
28. Wiltshire JC, Person SD, Kiefe CI, Allison JJ. Disentangling the influence of socioeconomic status on differences between African American and White women in unmet medical needs. American Journal of Public Health. 2009; 99(9):1659–1665. [PubMed: 19608942]
29. Mississippi State Department of Health. [Accessed September 30, 2012] Family Planning. http://msdh.ms.gov/msdhsite/_static/41,0,107.html#Services.
30. The MIME and DIME Programs: Challenges and Successes of Implementing Interpregnancy Care among High-Risk Mississippi Women. AMCHP Innovation Station. http://www.amchp.org/programsandtopics/BestPractices/InnovationStation/ISDocs/MIME-DIME.pdf.
31. National Healthy Start Association. http://www.nationalhealthystart.org/healthy_start_initiative/healthy_start_to_the_rescue.
32. Tougaloo College, Health and Wellness Center, Delta Health Partners. http://www.tougaloo.edu/health/dhp/index.htm.
33. Delta Health Alliance. Body and Soul. http://www.deltahealthalliance.org/projects/eating-and-living-well/body-and-soul.
34. Mississippi State Department of Health. [Accessed September 30, 2012] Chronic Disease Prevention. http://msdh.ms.gov/msdhsite/_static/43,0,91.html.
35. Mississippi State Department of Health. [Accessed September 30, 2012] Chronic Disease Self-Management Program. http://msdh.ms.gov/msdhsite/_static/43,0,91,474.html.
36. Mississippi State Department of Health. http://www.msdh.state.ms.us.

Table 1

Definitions of preconception health indicators[a] for women aged 18–44 years

Domain	Sub-domain	Indicator
General health status and life satisfaction	Self-rated health	Percentage of women who report good, very good or excellent health
Social determinants of health	Education	Percentage of women with a high school education/GED or greater
	Health care Access to and utilization of health care	Percentage of women who currently have some type of health care coverage
		Percentage of women who had a routine checkup in the past year
Tobacco, alcohol and substance use	Smoking	Percentage of women who are non-smokers
	Alcohol consumption	Percentage of women who have not participated in heavy drinking (>1 drink daily) in the past month
		Percentage of women who have not participated in binge drinking (≥ 4 drinks on ≥1 day) in the past month
Nutrition and physical activity	Fruit and vegetable consumption	Percentage of women who consume fruits and vegetables at least five times per day
	Obesity and overweight	Percentage of women who are normal weight based on body mass index (18.5 $kg/m^2 \leq$ BMI <25 kg/m^2)
	Exercise/physical activity	Percentage of women who participate in either moderate physical activity defined as 30 or more minutes per day for 5 or more days per week, or vigorous activity for 20 or more minutes per day on 3 or more days
Mental health	General mental distress	Percentage of women who report that their mental health was good for 15 or more of the past 30 days
	Adequacy of support	Percentage of women who always or usually get the social and emotional support they need
Chronic conditions	Diabetes	Percentage of women who have never been told by a health care provider that they have diabetes, not including gestational diabetes
	Hypertension	Percentage of women who have never been told by a health care provider that they have hypertension, not including hypertension during pregnancy
	Asthma	Percentage of women who currently do not have asthma
Infections	Immunizations	Percentage of women who received an influenza vaccination within the past year

[a] Adapted from Broussard et al. 2011 [11]

Table 2

Characteristics of black and white reproductive aged women by region*, Behavioral Risk Factor Surveillance System, 2005, 2007, 2009

	MS Delta* n = 625 % (95 % CI)†	MS non-Delta* n = 3,199 % (95 % CI)†	Non-MS Delta states* n = 8,060 % (95 % CI)†	Non-Delta U.S. states* n = 159,728 % (95 % CI)†
Total				
Age (years)‡				
18–19	10.0 (6.3, 15.6)	6.6 (5.2, 8.2)	5.1 (4.4, 5.9)	6.4 (6.1, 6.6)
20–24	12.4 (9.1, 16.6)	18.3 (16.3, 20.6)	12.1 (11.1, 13.3)	15.4 (15.0, 15.8)
25–29	20.0 (16.0, 24.7)	16.8 (15.3, 18.4)	15.1 (14.0, 16.2)	14.8 (14.5, 15.1)
30–34	18.5 (15.1, 22.4)	21.4 (19.7, 23.1)	21.0 (19.8, 22.2)	20.1 (19.7, 20.4)
35–39	18.6 (15.2, 22.4)	17.7 (16.4, 19.2)	21.2 (20.1, 22.4)	19.6 (19.2, 19.9)
40–44	20.6 (17.1, 24.6)	19.2 (17.8, 20.7)	25.6 (24.3, 26.8)	23.8 (23.5, 24.1)
Race‡				
Black	75.3 (70.2, 79.7)	38.1 (36.0, 40.3)	22.8 (21.5, 24.0)	14.8 (14.4, 15.1)
White	24.7 (20.3, 29.8)	61.9 (59.7, 64.0)	77.2 (76.0, 78.5)	85.2 (84.9, 85.6)
Marital status‡				
Never married	48.4 (43.2, 53.7)	32.2 (30.0, 34.4)	24.3 (23.0, 25.6)	28.1 (27.6, 28.5)
Divorced, separated or widowed	13.8 (11.0, 17.2)	12.8 (11.5, 14.1)	13.7 (12.7, 14.6)	10.2 (9.9, 10.4)
Unmarried Couple	3.9 (2.3, 6.6)	2.2 (1.6, 3.2)	2.0 (1.6, 2.4)	4.9 (4.7, 5.1)
Married	33.9 (29.3, 38.8)	52.8 (50.6, 55.0)	60.1 (58.6, 61.6)	57.0 (56.5, 57.4)
Employment‡				
Employed for wages	53.3 (48.0, 58.5)	62.6 (60.4, 64.7)	63.2 (61.7, 64.6)	65.8 (65.3, 66.2)
Homemaker	9.1 (6.7, 12.4)	14.1 (12.7, 15.6)	17.6 (16.5, 18.7)	15.0 (14.7, 15.3)
Unemployed	15.8 (12.0, 20.4)	8.8 (7.6, 10.2)	5.8 (5.2, 6.6)	6.5 (6.3, 6.8)
Unable to work	9.7 (7.0, 13.2)	5.1 (4.3, 6.1)	5.1 (4.5, 5.8)	3.4 (3.2, 3.6)
Student or retired	12.1 (8.7, 16.6)	9.4 (8.0, 11.1)	8.3 (7.4, 9.2)	9.4 (9.0, 9.7)
Income ($)‡				
<15,000	16.7 (12.8, 21.5)	8.5 (7.3, 9.9)	6.3 (5.6, 7.1)	4.4 (4.2, 4.6)
15,000–24,999	41.2 (35.9, 46.6)	29.8 (27.6, 32.0)	23.6 (22.3, 25.0)	16.4 (16.0, 16.8)
25,000–49,999	23.4 (19.3, 28.0)	27.4 (25.4, 29.4)	30.5 (29.1, 32.0)	26.6 (26.2, 27.0)
≥50,000	18.7 (14.9, 23.3)	34.3 (32.3, 36.4)	39.5 (38.0, 41.0)	52.6 (52.1, 53.0)

*Data from combined 2005, 2007 and 2009 from 14 Mississippi Delta counties (Washington, Humphreys, Issaquena, Panola, Quitman, Bolivar, Coahoma, Leflore, Sunflower, Sharkey, Tunica, Tallahatchie, Holmes, Yazoo), remainder of MS, Mississippi Delta states (LA, AR, TN), and remainder of U.S. (minus MS, LA, AR, TN)

†Weighted

‡Chi square p value < 0.0001

Table 3

Prevalence, crude prevalence ratio (cPR) and adjusted prevalence ratio (aPR) of preconception care indicators by Region among 171,462 black and white women 18–44 years of age*, Behavioral Risk Factor Surveillance System, 2005, 2007, 2009

Preconception Health Indicator	MS Delta* n = 625	MS non-Delta* n = 3049			Non-MS Delta states* n = 8060			Non-Delta US states* n = 159,728		
	% (SE)†	% (SE)†	cPR (95 % CI) †	aPR (95 % CI) †‡	% (SE)†	cPR (95 % CI) †	aPR (95 % CI) †‡	% (SE)†	cPR (95 % CI) †	aPR (95 % CI) †‡
General Health excellent, very good or good§	81.2 (2.4)	86.9 (0.7)	**1.07 (1.01,1.14)**	0.99 (0.96, 1.02)	87.5 (0.5)	**1.08 (1.02, 1.14)**	0.99 (0.96, 1.02)	91.4 (0.1)	**1.13 (1.06, 1.19)**	1.01 (0.09, 1.04)
≥ High School education§	82.6 (2.0)	88.9 (0.8)	**1.08 (1.02, 1.13)**	1.00 (0.98, 1.03)	91.9 (0.4)	**1.11 (1.06, 1.17)**	1.01 (0.99, 1.04)	94.1 (0.1)	**1.14 (1.09, 1.20)**	1.03 (1.00, 1.05)
Have health care coverage§	73.2 (2.4)	74.6 (1.0)	1.02 (0.95, 1.09)	0.96 (0.92, 1.00)	79.5 (0.6)	**1.09 (1.02, 1.16)**	0.97 (0.94, 1.01)	85.1 (0.2)	**1.16 (1.09, 1.24)**	1.01 (0.97, 1.05)
Had checkup in past year§	74.0 (2.3)	63.3 (1.1)	0.85 (0.80, 0.92)	0.94 (0.86, 1.03)	72.8 (0.7)	0.98 (0.92, 1.05)	1.08 (1.00, 1.18)	66.8 (0.2)	0.90 (0.85, 0.96)	1.00 (0.92, 1.08)
Did not smoke every day or some days§	77.8 (2.5)	76.5 (1.0)	0.98 (0.92, 1.05)	0.97 (0.92, 1.03)	73.7 (0.7)	0.95 (0.89, 1.01)	0.95 (0.89, 1.00)	77.2 (0.2)	0.99 (0.93, 1.06)	0.97 (0.92, 1.02)
Did not drink heavily (>1 drink daily) in past month§	97.0 (1.5)	97.2 (0.4)	1.00 (0.97, 1.03)	0.99 (0.97, 1.00)	96.6 (0.3)	1.00 (0.97, 1.03)	0.98 (0.97, 1.00)	94.4 (0.1)	0.97 (0.94, 1.00)	**0.96 (0.95, 0.98)**
Did not binge drink (≥4 drinks on ≥1 day) in past month§	90.7 (2.0)	91.0 (0.7)	1.00 (0.96, 1.05)	1.01 (0.96, 1.07)	90.8 (0.4)	1.00 (0.96, 1.05)	1.02 (0.96, 1.07)	83.3 (0.2)	**0.92 (0.88, 0.96)**	0.95 (0.90, 1.00)
Consumed ≥5 fruits and vegetables per day§	13.9 (1.7)	18.6 (0.9)	**1.34 (1.04, 1.73)**	**1.32 (1.01, 1.72)**	22.6 (0.6)	**1.63 (1.27, 2.08)**	**1.54 (1.19, 1.99)**	25.2 (0.2)	**1.82 (1.43, 2.31)**	**1.72 (1.34, 2.21)**
18.5 kg/m^2 ≤ BMI < 25.0 kg/m^2§¶	23.0 (2.3)	39.1 (1.2)	**1.70 (1.39, 2.09)**	**1.21 (1.02, 1.44)**	43.0 (0.8)	**1.87 (1.54, 2.28)**	**1.27 (1.08, 1.50)**	50.4 (0.2)	**2.19 (1.81, 2.67)**	**1.37 (1.16, 1.61)**
Met recommended weekly physical activity§	33.5 (2.6)	42.0 (1.1)	**1.25 (1.07, 1.47)**	1.06 (0.92, 1.22)	41.0 (0.8)	**1.23 (1.05, 1.43)**	1.01 (0.88, 1.16)	53.9 (0.2)	**1.61 (1.38, 1.87)**	**1.26 (1.11, 1.45)**
Poor mental health <14 of past 30 days§	84.0 (2.3)	83.0 (0.9)	0.99 (0.93, 1.05)	**0.95 (0.91, 0.98)**	86.5 (0.5)	1.03 (0.97, 1.09)	0.98 (0.94, 1.01)	86.8 (0.2)	1.03 (0.98, 1.09)	0.97 (0.94, 1.00)
Adequate social and emotional support§	58.4 (2.7)	74.7 (1.0)	**1.28 (1.16, 1.41)**	1.05 (1.00, 1.12)	79.6 (0.6)	**1.36 (1.24, 1.49)**	**1.08 (1.02, 1.14)**	82.6 (0.2)	**1.41 (1.29, 1.55)**	**1.09 (1.03, 1.15)**
No diabetes (including gestational diabetes)§	93.5 (1.1)	96.5 (0.3)	**1.03 (1.01, 1.06)**	1.01 (0.99, 1.02)	96.1 (0.3)	1.03 (1.00, 1.05)	1.00 (0.99, 1.02)	97.5 (0.1)	**1.04 (1.02, 1.07)**	1.01 (0.99, 1.02)
No hypertension (including during pregnancy)§	76.4 (2.2)	84.0 (0.8)	**1.10 (1.04, 1.17)**	1.01 (0.97, 1.05)	84.6 (0.6)	**1.11 (1.05, 1.17)**	1.01 (0.97, 1.05)	90.4 (0.1)	**1.18 (1.12, 1.25)**	**1.05 (1.01, 1.09)**
No current asthma§	89.4 (1.8)	92.1 (0.6)	1.03 (0.99, 1.07)	1.02 (0.98, 1.06)	91.5 (0.4)	1.02 (0.98, 1.07)	1.01 (0.97, 1.05)	88.6 (0.2)	0.99 (0.95, 1.03)	0.98 (0.94, 1.01)

Preconception Health Indicator	MS Delta* n = 625	MS non-Delta* n = 3049			Non-MS Delta states* n = 8060			Non-Delta US states* n = 159,728		
	% (SE)†	% (SE)†	cPR (95 % CI) †	aPR (95 % CI) †‡	% (SE)†	cPR (95 % CI) †	aPR (95 % CI) †‡	% (SE)†	cPR (95 % CI) †	aPR (95 % CI) †‡
Had influenza vaccination in past year	18.7 (2.1)	22.6 (0.9)	1.21 (0.96, 1.52)	1.00 (0.80, 1.26)	25.0 (0.7)	**1.34 (1.07, 1.67)**	1.08 (0.87, 1.34)	23.8 (0.2)	**1.27 (1.02, 1.58)**	0.97 (0.79, 1.20)

Bolded prevalence ratios indicate significant difference from the MS Delta

*Data from combined 2005, 2007 and 2009 from 14 Mississippi Delta counties (Washington, Humphreys, Issaquena, Panola, Quitman, Bolivar, Coahoma, Leflore, Sunflower, Sharkey, Tunica, Tallahatchie, Holmes, Yazoo), remainder of MS, Mississippi Delta states (LA, AR, TN), and remainder of U.S. (minus MS, LA, AR, TN)

†Weighted

‡Adjusted for age, race, marital status, employment, and income

§Chi square p value < 0.05 for homogeneity of regional prevalence estimates

¶Compared to overweight and obese women (BMI >25 kg/m^2)