

CenteringPregnancy[®]: Reducing Infant Mortality with Group Prenatal Care - A Policy Recommendation

by

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Executive Summary

North Carolina's infant mortality rate remains high, largely as a result of preterm birth and persistent racial and ethnic disparities in health outcomes. It is incumbent upon all advocates of maternal, infant and child health to continue to develop and support evidence-based innovations that have the potential to make a difference. While the content and style of routine prenatal care has for the most part remained the same for several decades, CenteringPregnancy[®], a new creative model of prenatal care conducted in groups, has been growing in popularity.

The CenteringPregnancy[®] program satisfies all North Carolina Division of Public Health prenatal care and education requirements and recommendations. As programs are implemented across North Carolina and the whole of the United States, the benefits are becoming increasingly apparent through analysis of perinatal outcomes, and quantitative and qualitative research studies. Not only has this model of group prenatal care been shown to reduce the risk of preterm birth, lengthen gestation and increase birth weight of infants that are born preterm, increase the rate of breastfeeding initiation, and rate highly in terms of participant and provider satisfaction, but it also holds great promise for reaching the women at highest risk of poor outcomes by taking a life-course perspective, providing social support and encouraging community building, and therefore has the potential to reduce racial and ethnic disparities in infant mortality. In addition, CenteringPregnancy[®] compares favorably with individual prenatal care from a financial perspective.

This policy recommendation proposes that CenteringPregnancy[®] should be considered the new gold standard for prenatal care in North Carolina. Since its inception

in the 1990s, the Centering model has attracted supporters nationwide, including the March of Dimes. Given the growing body of research that suggests the rates of preterm birth and low birth weight, both significantly related to the high infant mortality rate in North Carolina, can be improved by the CenteringPregnancy[®] model of prenatal care, it is proposed that support and endorsement of the model by the North Carolina Division of Public Health would promote widespread adoption of the CenteringPregnancy[®] model across North Carolina, resulting in significant positive benefits for pregnant women, infants and families.

The Division of Public Health is therefore called upon to address the following six recommendations:-

1. Consider the existing and potential benefits of CenteringPregnancy[®] prenatal care to the women and children of North Carolina and include the program in the Division of Public Health's supported state initiatives.
2. Actively incentivize the provision of CenteringPregnancy[®] prenatal care at facilities that serve North Carolina's Medicaid population.
3. Encourage local health departments and clinics to budget funding specifically for program implementation and maintenance.
4. Develop resources that support CenteringPregnancy[®] program implementation, e.g., an informational booklet entitled 'How can you get CenteringPregnancy[®] started in NC?'
5. Provide grant funding for CenteringPregnancy[®] staff and training in basic and advanced group facilitation.
6. Support statewide monitoring of outcomes, evaluation and research.

1. Infant mortality, preterm birth and prenatal care in North Carolina

The United States has an infant mortality rate of 6.6 per 1000 live births¹, while North Carolina has an infant mortality rate of 7.9 per 1000 live births². These figures mask a stark racial and ethnic disparity: in North Carolina in 2006 the infant mortality rate was 6.4 per 1000 live births for white infants, 6.2 per 1000 for Hispanic infants, and 15.7 per 1000 for African-American infants³.

It is well documented that infants born prematurely are at greater risk for poor health outcomes⁴. Indeed, prematurity and low birth weight combined are the second leading cause of all infant deaths in the US, and the leading cause of infant death in North Carolina³. Preliminary data show that the US preterm birth rate fell from 12.3% in 2008 to 12.2% in 2009⁵, but although North Carolina's preterm birth rate fell from 13.3% in 2007 to 12.9% in 2008, it climbed back up to 13.0% in 2009⁵, and therefore remains unacceptably high. More detailed data from 2007 show that the preterm birth rate in NC is highest for African-American infants (18.7%), followed by Hispanic infants (12.2%) and white infants (11.9%)³.

The North Carolina Institute of Medicine (NCIOM), North Carolina Division of Public Health, Office of Healthy Carolinians and Health Education, and the State Center for Health Statistics were tasked by the Governor's Task Force for Health Carolinians to develop the state's Healthy NC 2020 health objectives, which were released in January 2011⁶. Health objectives for 2020 are based on risk factors identified as contributing to the leading causes of death and disability in NC. In recognition of existing racial and ethnic health disparities, and of the importance of maternal health in improving infant health, the three maternal and infant health objectives for 2020 are⁶:

Objective 1: Reduce the infant mortality racial disparity between whites and African Americans

Objective 2: Reduce the infant mortality rate (per 1000 live births)

Objective 3: Reduce the percentage of women who smoke during pregnancy

Strategies to achieve these objectives include encouraging individuals to plan their pregnancies, begin their pregnancies healthy, and access prenatal care⁶.

The United States national strategy for health improvement over the next decade is laid out in the Healthy People 2020 initiative⁷. Elimination of health disparities is a primary and overarching goal of Healthy People 2020, while disparities in health status will be one of four foundational health measures used to monitor progress. Maternal, infant and child health category objectives include reducing the rate of fetal and infant deaths, reducing preterm births, low birth weight and very low birth weight, and increasing the number of pregnant women who receive early and adequate prenatal care⁷.

Women who begin prenatal care in the first trimester have been shown to have better outcomes than women who begin prenatal care later, or receive little or no care⁸. However, is the current model of prenatal care appropriately targeting and successfully impacting the women who need it the most, for example, those who are at greatest risk of preterm birth? This is not a new question. An expert panel on the content of prenatal care, commissioned by the NC Public Health Service in 1989, questioned the necessity and effectiveness of many of the routines of prenatal care, noting the lack of research evidence to support them, and proposed more individualized care composed of risk assessment, health promotion, and attention to the psychosocial dimension of childbearing⁹. Very little change occurred in prenatal care over the next decade, and in

2001, the Institute of Medicine reiterated many of the 1989 panel's sentiments as part of its call for innovative redesign of the provision of health care¹⁰.

2. Recommendation: Implementing a new model for prenatal care

With the Healthy NC and Healthy People 2020 objectives providing a mandate for action, it is time to think outside the box. New, evidence-based, creative strategies are needed if real change for North Carolina's women and infants is to be achieved. It is proposed that CenteringPregnancy[®], a new model for prenatal care that is conducted in groups, is that creative strategy. As well as increased participant and provider satisfaction with this model of care, there is a growing body of evidence demonstrating that CenteringPregnancy[®] results in improved birth outcomes when compared with individual care. CenteringPregnancy[®] has been shown to reduce the risk of preterm birth, and increase the gestational age and birth weight of infants that do deliver early¹¹⁻¹³. CenteringPregnancy[®] is a highly beneficial form of prenatal care, and should become the new gold standard.

Ten years ago the nonprofit organization March of Dimes was seeking evidence-based methods of lowering the infant mortality rate, with a specific focus on reducing the incidence of preterm birth and low birth weight. March of Dimes became aware of CenteringPregnancy[®], and began to make funds available for maternity care providers to implement the model across North Carolina and the US¹⁴. In addition to this vital support, in view of the growing body of research that suggests the rates of preterm birth and low birth weight can be improved by the CenteringPregnancy[®] model of prenatal care, it is proposed that support and endorsement of the model by the North Carolina Division of

Public Health would promote widespread adoption of the CenteringPregnancy® model across North Carolina, resulting in significant positive benefits for pregnant women, infants and families.

3. What is CenteringPregnancy®?

CenteringPregnancy® is a standardized model for group prenatal care that provides an alternative to individual, one-on-one prenatal care¹⁵. It integrates three main components: health assessment, education, and support. Groups are composed of between eight and twelve women with similar gestational ages, accompanied by a partner or support person as desired, and are facilitated by a health care provider and at least one co-facilitator (see Table 1 for examples of CenteringPregnancy® health care providers and co-facilitators).

Health Care Providers (Primary Facilitators)	Co-Facilitators
Certified Nurse-Midwife	Registered Nurse
OB/GYN	Medical/Nursing Assistant
Family Medicine MD	Maternal Support Services worker
Nurse Practitioner	Social worker
Physician’s Assistant	Registered dietitian
	Peer educator

Table 1: Examples of CenteringPregnancy® health care providers and co-facilitators

Each group meets for a series of ten, two-hour sessions, often including a postpartum reunion. Women participate in self-care activities and self-assessment, including taking their own blood pressure and weight, take part in facilitated discussions, and develop a support network with other group members, all in one room. The health care provider

completes standard prenatal maternal and fetal physical health assessments in a private corner of the group space. CenteringPregnancy[®] therefore combines routine prenatal care with childbirth education, while promoting empowerment and community building^{15,16}. CenteringPregnancy[®] groups are intended to be patient-centered, interactive, and fun¹⁵.

Certified nurse-midwife Sharon Schindler Rising developed the Centering model, and piloted CenteringPregnancy[®] groups in Connecticut in 1993-1994¹⁷. Rising is now the Executive Director of the Centering Healthcare Institute (CHI). The mission of the

CHI is to promote group health care services throughout the life cycle¹⁵. The CHI provides consultation, training, support, and materials to prenatal care providers that wish to implement CenteringPregnancy[®] group prenatal care programs. In addition, the CHI supports the

Box 1: The 13 Essential Elements of the Centering Model of Care¹⁵

1. Health assessment occurs within the group space
2. Participants are involved in self-care activities
3. A facilitative leadership style is used
4. The group is conducted in a circle
5. Each session has an overall plan
6. Attention is given to the core content, although emphasis may vary
7. There is stability of group leadership
8. Group conduct honors the contribution of each member
9. The composition of the group is stable, not rigid
10. Group size is optimal to promote the process
11. Involvement of support people is optional
12. Opportunity for socializing with the group is provided
13. There is ongoing evaluation of outcomes

implementation of CenteringParenting[®] groups, where mother-infant dyads meet for 8 to 10 well-baby sessions with a pediatric provider through the infant's first birthday, and the use of the Centering model in other areas of health care, e.g., CenteringDiabetes[®]. The

CHI is committed to ensuring that Centering practice sites adhere to all components of the Centering model. It conducts site visits, granting site approval to facilities that successfully demonstrate the 13 essential elements of Centering¹⁵ (see Box 1).

In order to maintain consistently high standards and quality of CenteringPregnancy[®] programs, and to enable meaningful analysis of outcomes for research and evaluation purposes, it is important that sites build and maintain standardized programs that adhere to the essential elements, and that they work towards site approval.

Rising's innovation and passion for the redesign of prenatal care have led to national recognition. She received the highest honor of the American College of Nurse-Midwives, the annual Hattie Hemschemeyer award, in June 2010, and was named an "Edge Runner" by the American Academy of Nursing in February 2010¹⁵. In 2008, Rising was awarded a Purpose Prize by Civic Ventures, which invests in extraordinary social contribution and innovation¹⁸. In addition, Rising earned the Centering Healthcare Institute the 18th Annual Monroe E. Trout Premier Cares Award in January 2010, which recognizes outstanding work that non-profit organizations have undertaken to improve the health of populations at need¹⁵.

4. How does CenteringPregnancy[®] meet prenatal care and education requirements and recommendations?

- **Prenatal Care**

CenteringPregnancy[®] demonstrably meets all prenatal care requirements and recommendations as stipulated by the annually updated North Carolina state prenatal care

agreement addendum¹⁹. In every facility with a CenteringPregnancy[®] program, all women attend an initial appointment when they first register as pregnant where they are offered the choice between individual and group prenatal care. At this, or a subsequent appointment, medical and obstetric histories are taken, and women undergo a physical examination. This enables identification of any medical or obstetric condition that could potentially affect the pregnancy, and that therefore require closer monitoring.

When CenteringPregnancy[®] group prenatal care is chosen, one-on-one time with a licensed health care provider at each session enables an ongoing assessment of maternal and fetal wellbeing, therefore satisfying the state agreement addendum required components of “routine scheduled visits”^{19 (p.5)}. As one health care provider and one co-facilitator aim to attend every session of each group, women who opt for CenteringPregnancy[®] are more likely to experience continuity of provider than in individual prenatal care in large practices. Group discussions during the session can also help to bring important problems or symptoms to the surface. Arrangements are made for all recommended laboratory testing throughout pregnancy, e.g., HIV, syphilis, Hgb/Hct and GBS. If the health care provider suspects or diagnoses a high risk condition, the patient is appropriately referred.

Every woman who joins a CenteringPregnancy[®] group receives a “Mom’s Notebook” in English or Spanish, which she is responsible for bringing to each session. The notebook, designed and published by the Centering Healthcare Institute, is a folder with educational and engaging content for 10 sessions from the end of the first trimester to the early postpartum period, including a weight chart and pregnancy progress record, and topical Self-Assessment Sheets (see Appendix A for topics included in “Mom’s

Notebook”). The contents of this notebook provide written evidence that CenteringPregnancy® addresses all prenatal care requirements and recommendations, with the additional benefit that women not only reflect on the information during the sessions, but also take their notebook home with them, where they can refer back to it and share it with partners, family members and friends as they wish. The notebooks are at an appropriate reading level for patient education materials, and undergo regular revisions to meet the changing needs of participants across the US.

- **Prenatal Education**

CenteringPregnancy® easily meets the minimum standard of prenatal education required by the state prenatal care agreement addendum, e.g., schedule of visits, adverse signs and symptoms to report during pregnancy, healthy and safe eating, healthy behaviors, importance and benefits of breastfeeding, safe sleeping, and family planning¹⁹. In 2005, the North Carolina State Infant Mortality Collaborative held focus groups to attempt to uncover some of the reasons why women do and do not adopt healthy behaviors and use preventative health care services²⁰. One of their primary findings was that knowledge was insufficient to change behaviors. The Centering Healthcare Institute describes CenteringPregnancy® groups as:-

“...a dynamic atmosphere for learning and sharing that is impossible to create in a one-to-one encounter. Hearing other women share concerns which mirror their own helps the woman to normalize the whole experience of pregnancy. Groups also are empowering as they provide support to the members and also increase individual motivation to learn and change.”¹⁵

Following the principles of adult learning theory, CenteringPregnancy[®] provides an environment of varied learning experiences¹⁶, largely through facilitated discussions during which women gain knowledge from both health care providers and their peers, and become motivated and empowered to make positive behavioral change.

5. CenteringPregnancy[®]: Reducing infant mortality rates with group prenatal care

CenteringPregnancy[®] has been shown to reduce the risk of preterm birth, and increase gestational age and birth weight of infants that do deliver early. For a randomized controlled trial, 1047 young pregnant women aged 14-25 were recruited from two large obstetric clinics in New Haven, Connecticut and Atlanta, Georgia, and randomly assigned to individual or group prenatal care¹¹. The majority of women were African-American (80%), and most were low-income. Women in group care were significantly less likely to have a preterm delivery (9.8% vs. 13.8%; OR 0.67, 95% CI 0.44-0.99), and, when analyzed separately, the difference was even greater for African-American women (10% vs. 15.8%; OR 0.59, 95% CI 0.38-0.92). In addition, time to preterm birth was delayed for women in group care. This delay began at 26 weeks of gestation, and the largest differences were seen in the late preterm period¹¹.

A prospective matched cohort study found that preterm infants of women who participated in CenteringPregnancy[®] were born an average of two weeks later than preterm infants of women in individual care, and therefore had significantly increased birth weights¹². A study comparing outcomes of adolescents in CenteringPregnancy[®] and individual prenatal care also found significantly lower rates of preterm delivery and low birth weight following group care¹³.

March of Dimes has recently completed a 3-year quantitative and qualitative study of the 16 CenteringPregnancy® sites it provides funding for in Texas. Preliminary results show that whereas in 2007 13.7% of babies born in Texas were preterm, only 6.5% of babies born to Centering participants during the study were preterm²¹.

Other studies comparing CenteringPregnancy® with individual care have also noted fewer preterm deliveries, and of the preterm deliveries that do occur, later gestation and increased average birth weight, but have been unable to reach statistical significance due to small sample sizes²².

Birth defects are the leading cause of infant mortality in the US as a whole, and the second leading cause in North Carolina³. CenteringPregnancy® emphasizes the importance of a healthy diet during pregnancy and 400 micrograms of folic acid daily. Although CenteringPregnancy® groups usually begin after the time during pregnancy when there is a risk of neural tube defect, women are being provided with information and health advice that they can potentially take forward as preconception knowledge for future pregnancies.

Sudden Infant Death Syndrome (SIDS) is the third leading cause of infant mortality in the US and North Carolina³. As described above, the CenteringPregnancy® curriculum includes safe sleeping and SIDS prevention. In addition, women can reference their notebook at home if they need a reminder of the actions they can take to safeguard their infant.

Studies comparing CenteringPregnancy® with individual prenatal care have found, in women who participated in group care, significantly higher levels of breastfeeding initiation^{11,22} and exclusive breastfeeding at hospital discharge²². Considering infant

mortality and morbidity from a broader perspective, it is exciting to see the impact that CenteringPregnancy[®] has had on breastfeeding rates, and to realize the enhanced potential group prenatal care has for improving the health of infants, women and families in North Carolina.

6. Reducing racial and ethnic health disparities with CenteringPregnancy[®]

North Carolina's striking racial disparities in birth outcomes, primarily between white and African-American women, translate to persistently poor grades in the North Carolina Racial and Ethnic Health Disparities Report Card for 2010, including a "D" for infant mortality and a "C" for low birth weight²³.

It is widely acknowledged that these disparities cannot be fully explained by differences in socioeconomic status and other demographic factors²⁴⁻²⁶. Current theories that attempt to explain disparities stem from the concept of "weathering"^{24 (p.17)}, defined as cumulative stress over the life-course^{24,27}. This is thought particularly to affect disadvantaged, low-income African-American women, and lived experiences of this chronic stress were described during several of the North Carolina State Infant Mortality Collaborative focus groups mentioned above²⁰.

In order to tackle these disparities, Lu and Halfon propose a life-course perspective of reproductive health²⁴, which takes into account early fetal programming of reproductive potential and the long-term health consequences of chronic exposure to stress. They call for integrative methods of addressing the issues that have an impact on this life-course, such as long-term socioeconomic status, behaviors, stress, and health care. Lu and colleagues have subsequently compiled a 12-point plan intended to reduce

disparities through a multi-level, life-course approach²⁸ (see Box 2 for Lu et al.'s 12-point plan).

Box 2: Lu et al.'s 12-point plan to reduce disparities in birth outcome between whites and African-Americans using a life-course approach²⁸ (*emphasis added*)

1. Provide interconception care to women with prior adverse pregnancy outcomes
2. Increase access to preconception care to African American women
3. ***Improve the quality of prenatal care***
4. Expand healthcare access over the life course
5. ***Strengthen father involvement in African American families***
6. Enhance coordination and integration of family support services
7. ***Create reproductive social capital in African American communities***
8. Invest in community building and urban renewal
9. Close the education gap
10. Reduce poverty among African American families
11. Support working mothers and families
12. Undo racism

CenteringPregnancy[®] prenatal care has the potential to incorporate several components of the 12-point plan, but the following three points are particularly relevant:

- **Improve the quality of prenatal care**
 - CenteringPregnancy[®] has specifically been identified by Lu as a promising example of a more comprehensive form of prenatal care that should be a component of the care of pregnant women across the US, citing a growing demand for more creative, comprehensive prenatal care that "...emphasizes not only risk reduction during pregnancy but also health promotion and optimization across the life course."²⁵ (p.569)

- **Strengthen father involvement in African American families**
 - CenteringPregnancy[®] involves partners; usually men, in prenatal care - men assist their pregnant partners with self-care activities, remain with them for maternal and fetal physical health assessments, and are often active participants in the facilitated discussions.

- **Create reproductive social capital in African American communities**
 - Reproductive social capital during pregnancy is defined as the extent to which women feel socially connected to their community²⁸. An important part of CenteringPregnancy[®] is provision of time and space for women and their partners to bond with and befriend other members of their community within the group and to identify support systems.

7. Does CenteringPregnancy[®] meet the needs of patients and providers?

The North Carolina State Infant Mortality Collaborative focus groups highlighted key factors that affect decisions to access health care and modify unhealthy behaviors, several of which are fundamental issues that CenteringPregnancy[®] aims to address or achieve: consistent support within the community; dissatisfaction with the current structure of health care in the US; a desire for health care options; preference for health care programs that consider the whole person; and relationships with health care providers based on trust and mutual respect²⁰. Indeed, the state prenatal care agreement addendum requires that prenatal care promote:-

“...customer friendly services that meet the needs of populations that are underserved.”¹⁹ (p.4)

A focus group of African-American, Medicaid-eligible CenteringPregnancy® participants in an urban public health clinic reported high levels of satisfaction with care and good relationships with providers²². Women enjoyed sharing their pregnancy with other women, building friendships, and learning by sharing experiences and concerns, and felt well prepared for pregnancy and birth²². In addition, a survey using a ‘satisfaction with prenatal care’ scale showed increased satisfaction with group care in comparison with individual care, and clinic data showed that women attended significantly more prenatal visits when they were part of a Centering group²². Other studies of CenteringPregnancy® have reported similarly high levels of participant satisfaction with care and readiness for labor and delivery^{11,13}.

The Centering Healthcare Institute states that groups give health care providers renewed satisfaction in delivering prenatal care¹⁵. All nurse-midwives in another focus group held by Klima et al. expressed that CenteringPregnancy® groups provided more opportunities to educate and support women than individual prenatal care appointments²². They described observing an increase in women’s motivation to attend prenatal care, and that women particularly appreciated no longer having to wait to be seen during busy prenatal clinics²².

8. Financial implications of CenteringPregnancy®

In their randomized controlled trial comparing individual and group prenatal care using the CenteringPregnancy® model, Ickovics et al.¹¹ found no significant difference in cost of prenatal or delivery care. Given the benefits of Centering, in particular decreased preterm birth rate, increased birth weight in preterm infants, and increased breastfeeding

rate, CenteringPregnancy[®] group prenatal care need not be a lower-cost alternative in order to reduce short and long-term health care costs. Indeed, it is estimated that the cost of one preterm infant is equivalent to the implementation cost of one CenteringPregnancy[®] program²⁹.

However, there is growing evidence that CenteringPregnancy[®] can be considered a cheaper alternative to individual care, regardless of cost-saving as a result of improved outcomes. In a report to March of Dimes, Cox et al. detail the results of their comparison of productivity, costs and quality of care provided in CenteringPregnancy[®] groups versus individual appointments in a health department in Maryland, serving an uninsured, largely Hispanic and African-American population³⁰. They found that CenteringPregnancy[®] allowed the clinic to provide prenatal care to up to twice as many women in the same amount of time, and with significant labor and resource cost-savings. With no waiting time before or during sessions, and a philosophy of starting and finishing on time, Centering maximizes the time available, which should be appreciated by participants, health care providers, and clinic administrators everywhere. Participants of Centering groups also receive more contact time with their health care provider during their pregnancy, suggesting a higher quality of care³⁰. The authors of the study summarize their findings by stating that:-

“Centering offers an efficient model that could help lower costs without lowering the quality of care.”³⁰ (p.1)

9. Where has CenteringPregnancy[®] been implemented in North Carolina to date?

There is increasing support for, and implementation of, the CenteringPregnancy[®] model across North Carolina. Twenty counties and health care facilities in NC that have so far received funding from March of Dimes to implement CenteringPregnancy[®] programs, and whose health care providers and staff have received training through Centering Healthcare Institute workshops, are listed in Appendix B.

10. Conclusions and Recommendations

Innovative, evidence-based solutions are required in order to lower rates of infant mortality and preterm birth, and reduce racial and ethnic health disparities in North Carolina. CenteringPregnancy[®] is already making an impact and significantly improving outcomes for pregnant women, infants and families in North Carolina and across the US. As part of demonstrating commitment to achieving real change for those who need it most, the North Carolina Division of Public Health is called upon to address the following six recommendations:-

1. Consider the existing and potential benefits of CenteringPregnancy[®] prenatal care to the women and children of North Carolina and include the program in the Division of Public Health's supported state initiatives.
2. Actively incentivize the provision of CenteringPregnancy[®] prenatal care at facilities that serve North Carolina's Medicaid population.
3. Encourage local health departments and clinics to budget funding specifically for program implementation and maintenance.

4. Develop resources that support CenteringPregnancy[®] program implementation, e.g., an informational booklet entitled ‘How can you get CenteringPregnancy[®] started in NC?’
5. Provide grant funding for CenteringPregnancy[®] staff and training in basic and advanced group facilitation.
6. Support statewide monitoring of outcomes, evaluation and research.

References

1. Minino AM, Xu J, Kochanek KD. Deaths: Preliminary Data for 2008 (CDC: National Center for Health Statistics). *National Vital Statistics Reports*. 2010;59(2). Available at: http://www.cdc.gov/nchs/data/nvsr/nvsr59/nvsr59_02.pdf [Accessed February 1, 2011].
2. North Carolina Department of Health & Human Services State Center for Health Statistics. 2009 North Carolina Infant Mortality Report (Table 2). 2010. Available at: <http://www.schs.state.nc.us/SCHS/deaths/ims/2009/fiveyear.html> [Accessed January 24, 2011].
3. March of Dimes. PeriStats. 2011. Available at: <http://www.marchofdimes.com/peristats/> [Accessed January 24, 2011].
4. Centers for Disease Control and Prevention. Premature Birth. 2010. Available at: <http://www.cdc.gov/features/prematurebirth/> [Accessed January 24, 2011].
5. Hamilton BE, Martin JA, Ventura SJ. Births: Preliminary Data for 2009 (CDC: National Center for Health Statistics). *National Vital Statistics Reports*. 2010;59(3). Available at: http://www.cdc.gov/nchs/data/nvsr/nvsr59/nvsr59_03.pdf [Accessed February 1, 2011].
6. North Carolina Institute of Medicine. *Healthy North Carolina 2020: A Better State of Health*. Morrisville, NC; 2011. Available at: http://riversdeveloper.com/wp-content/uploads/2010/10/HNC2020_Final_2-16-11.pdf [Accessed February 28, 2011].
7. United States Department of Health and Human Services. Healthy People 2020. 2011. Available at: <http://www.healthypeople.gov/2020/topicsobjectives2020/default.aspx> [Accessed February 28, 2011].
8. Moos M-K. Prenatal Care: Limitations and Opportunities. *JOGNN*. 2006;35:278-285.

9. Public Health Service. *Caring for our future: The content of prenatal care*. Washington, DC; 1989.
10. Institute of Medicine. *Crossing the quality chasm: A new health care system for the 21st century*. Washington, DC; 2001.
11. Ickovics JR, Kershaw TS, Westdahl C, et al. Group prenatal care and perinatal outcomes: a randomized controlled trial. *Obstetrics & Gynecology*. 2007;110(2 Pt 1):330-339.
12. Ickovics JR, Kershaw TS, Westdahl C, et al. Group prenatal care and preterm birth weight: results from a matched cohort study at public clinics. *Obstetrics & Gynecology*. 2003;102(5):1051-1057.
13. Grady MA, Bloom KC. Pregnancy outcomes of adolescents enrolled in a CenteringPregnancy program. *Journal of Midwifery & Women's Health*. 2004;49(5):412-420.
14. Brown AB. Personal Communication. 2010.
15. Centering Healthcare Institute. *Centering: A better way to give and receive health care*. 2009. Available at: www.centeringhealthcare.org [Accessed March 14, 2011].
16. Rising SS, Kennedy HP, Klima CS. Redesigning prenatal care through CenteringPregnancy. *Journal of Midwifery & Women's Health*. 2004;49(5):398-404.
17. Rising SS. Centering pregnancy: An interdisciplinary model of empowerment. *Journal of Nurse-Midwifery*. 1998;43(1):46-54.
18. Civic Ventures. *Encore Careers: The Purpose Prize*. 2008. Available at: <http://www.encore.org/prize/nominate?ref=candidatepage.cfm?candidateid=3526> [Accessed March 1, 2011].

19. Division of Public Health. *Prenatal Care Agreement Addendum FY 2010-2011*. Raleigh, NC; 2010.
20. North Carolina State Infant Mortality Collaborative. *Women's Health: Attitudes and Practices in North Carolina.*; 2005.
21. March of Dimes. Texas March of Dimes CenteringPregnancy Project. 2010. Available at: https://www.marchofdimes.com/texas/36755_61612.asp [Accessed January 24, 2011].
22. Klima C, Norr K, Vonderheid S, Handler A. Introduction of CenteringPregnancy in a public health clinic. *Journal of Midwifery & Women's Health*. 2009;54(1):27-34.
23. Office of Minority Health and Health Disparities. *Racial and Ethnic Health Disparities in North Carolina Report Card 2010*. North Carolina Department of Health and Human Services; 2010. Available at: http://www.epi.state.nc.us/SCHS/pdf/MinRptCard_WEB_062210.pdf [Accessed February 28, 2011].
24. Lu MC, Halfon N. Racial and ethnic disparities in birth outcomes: a life-course perspective. *Maternal and child health journal*. 2003;7(1):13-30.
25. Lu MC. We can do better: improving perinatal health in America. *Journal of Women's Health*. 2010;19(3):569-574.
26. Kington RS, Nickens HW. Racial and Ethnic Differences in Health: Recent Trends, Current Patterns, Future Directions. In: Smelser NJ, Wilson WJ, Mitchell F, eds. *America Becoming: Racial Trends and Their Consequences (Volume II)*. Washington, D.C. National Academy Press; 2001:253-310.

27. Geronimus AT. Black/white differences in the relationship of maternal age to birthweight: a population-based test of the weathering hypothesis. *Social science & medicine* (1982). 1996;42(4):589-597.
28. Lu MC, Kotelchuck M, Hogan V, et al. Closing the Black-White Gap in Birth Outcomes: A Life-Course Approach. *Ethnicity & Disease*. 2010;20(Supplement 2):S2-62-76.
29. Centering Healthcare Institute. *Centering Pregnancy: Cost Benefit Analysis*; 2009.
30. Cox R, Obichere T, Knoll F, Baruwa EM. *A Study to Compare the Productivity and Cost of the CenteringPregnancy Model of Prenatal Care with a Traditional Prenatal Care Model*; 2006.

Appendix A: Topics covered in CenteringPregnancy[®] Mom's Notebook (2008)

Session one

- Skills for self-care: weight, blood pressure, calculating gestational age
- Prenatal testing
- Nutrition in pregnancy (including foods to avoid)
- Oral health
- Sexual health
- Avoiding toxic habits (alcohol, smoking, drugs)

Session two

- Common problems of pregnancy
- Common discomforts of pregnancy
- Goal setting

Session three

- Relaxation/stress management
- Breastfeeding/infant feeding
- Relationship of relaxation to labor

Session four

- Contraceptive use/STI protection
- Menstrual cycle, sexuality
- Personal safety issues (domestic violence)
- Family and parenting issues
- Preterm labor

Session five

- Birth experience: stages of labor, signs of labor
- Options in birth
- Overview of breathing/relaxation measures

Session six

- Comfort measures in labor
- More about options in birth
- Epidural anesthesia
- Vaginal birth after cesarean

Session seven

- Infant care/infant safety
- SIDS prevention
- Infant oral health
- Circumcision
- Early postpartum period
- Finding a pediatrician
- Thoughts about siblings

Session eight

- Relaxation measures
- Support systems
- Blues and postpartum depression

Session nine

- Reflection on thoughts/concerns about birth and early postpartum
- Stress management in immediate postpartum period
- Infant development/milestones
- Infant massage

Session ten

- Newborn care
- Danger signs in newborn
- Infant bathing/feeding/safety
- Shaken baby syndrome
- Breastfeeding

**Appendix B: Prenatal care facilities in North Carolina whose health care providers/
staff have attended CenteringPregnancy® workshops**

- Alamance County Health Department
- All Women's Health Care, Pittsboro
- Brunswick County Health Department
- Cabarrus Health Alliance, Kannapolis
- Duplin County Health Department
- Durham County Health Department
- Forsyth County Department of Public Health
- Gaston County Health Department
- Harmony Center for Women's Health & Vitality, Appalachian Regional Healthcare System
- Henderson County Department of Public Health
- Jackson County
- Mountain Area Health Education Center
- Pardee Nurse-Midwives, Women & Children's Center, Hendersonville
- Piedmont Women's Healthcare, Lexington
- Pitt County Health Department
- Southside United Health & Wellness Center, Winston Salem
- Wake Forest University Baptist Medical Center, Winston Salem
- Wake County Human Services
- Womack Army Medical Center - Department of OB/GYN, Fort Bragg
- Women's Health Alliance, Cary