

Highlighted Birth Defects Resources — January 2009

Addressing Maternal Obesity as a Risk Factor for Birth Defects

The information and resources listed here are intended for educational use only and are provided solely as a service. The information provided should not be used for diagnosing or treating a health problem or disease, and is not a substitute for professional care. These resources do not constitute an endorsement of these organizations or their programs by the National Birth Defects Prevention Network (NBDPN) and none should be inferred. The NBDPN is not responsible for the content of the individual organization web pages/resources found at these links.

Highlighted Resources for Women and Health Care Professionals

What to Expect at your Prenatal Visits: <https://www.med.uvm.edu/vchip/Downloads/PrenatalCarePoster.doc>

This poster provides women with information about expectations at their prenatal visits to their physician. It was developed through funding from the March of Dimes and the Vermont Department of Health.

A Healthy Baby is Worth the Weight: <http://www.healthy-baby.org/HowMuchWeight.htm>

This is Colorado's Healthy Women Campaign website. It provides information for women about appropriate weight gain and what happens to the weight during pregnancy. It also has a Body Mass Index (BMI) calculator for women to use to track their BMI before and during pregnancy. Women can use the calculator to determine their BMI before they are pregnant. Then, women can use the BMI chart to figure out how much weight to gain during pregnancy.

Preconception Screening and Counseling Checklist:

http://www.marchofdimes.com/files/preconception_tool_ed.pdf

This March of Dimes one-page checklist can be used by health providers and providers to initiate discussions about preconception care. This list offers a series of essential questions that help providers develop good clinical management plans. Patients are given the checklist at the reception desk and are asked to fill it out before seeing the provider.

Preconception Check List-March of Dimes: http://www.marchofdimes.com/printableArticles/19583_4182.asp

This March of Dimes listed resource can assess preconception health with all female patients of childbearing age during routine checkups. It is a way of encouraging healthy habits that can affect pregnancy outcome. The March of Dimes, in conjunction with the Greater Adirondack Perinatal Network, has developed two unique screening and counseling tools for health care providers to use with their patients.

Nutrition Tools and Resources:

<https://www.med.uvm.edu/vchip/TB1+BL.asp?ContentItemID=10154&SiteAreaID=669>

This resource is produced by the Collaborating to Improve Maternal, Child, Youth, and Family Healthcare in Vermont through Innovation and Excellence by The University of Vermont College of Medicine. The web page contains nutritional resources for health professionals to use in their practice and patient education.

Fitness for Two-March of Dimes: http://www.marchofdimes.com/printableArticles/14332_1150.asp

This March of Dimes website provides health professionals and women about how to keep fit during pregnancy. It answers questions women have about keeping fit during their pregnancy.

Are you ready physically? http://www.marchofdimes.com/printableArticles/173_14005.asp

This March of Dimes web page provides women with the essential activities that they can do to get healthy before becoming pregnant. It includes "What you need to know before you get Pregnant" and "10 steps to getting healthy before pregnancy".

March of Dimes Product Catalog: http://www.marchofdimes.com/printableArticles/2222_2282.asp

This March of Dimes web page provides fact sheets for patients and health professionals. Additional fact sheets appear on the March of Dimes web site and on the Spanish web site. It also contains a link to the order form and product catalog. It is of particular interest for addressing preconception health and pregnancy related topics.

Healthy Pregnancy Resources—March of Dimes Product Catalog:

http://www.marchofdimes.com/professionals/2222_2262.asp

The March of Dimes complete line of prenatal materials covers everything expectant parents need to know about the growth and development of their baby and how to take good care of themselves during these special months. Two resources of particular interest are **Eating Healthy** (English and Spanish) and **I Want My 9 Months** (flyer/poster--English and Spanish).

Baby Your Baby: <http://www.babyyourbaby.org/duringpregnancy/weightgain.htm>:

Baby Your Baby is Utah Health Department's website which provides information to address weight gain during a woman's pregnancy and following the birth of the baby. The site has an online BMI calculator to assist a woman in determining the recommended amount of weight that she should gain during her pregnancy. Used by permission by the staff in the Maternal Child Health Division at the Utah Health Department.

BMI — Body Mass Index: <http://www.cdc.gov/nccdphp/dnpa/bmi/>

The Centers for Disease Control and Prevention provides this website for general information about the Body Mass Index (BMI) and links to BMI calculators for adults and children and teens. There is also information regarding the BMI number interpretation, nutrition and weight resources. Other topics such as nutrition, physical activity, overweight and obesity are available. The site content is through the Division of Nutrition, Physical Activity and Obesity, National Center for Chronic Disease Prevention and Health Promotion.

Adult BMI Calculator—Adults—English: www.cdc.gov/nccdphp/dnpa/bmi/

The Centers for Diseases Control and Prevention's website is an online calculator that provides BMI and corresponding BMI weight status categories for Adults who are 20 years of age and older. The content source is the Division of Nutrition, Physical Activity and Obesity, National Center for Chronic Disease Prevention and Health Promotion.

BMI for Children and Teens—English:

http://www.cdc.gov/nccdphp/dnpa/bmi/childrens_BMI/about_childrens_BMI.htm

The website provides information about the Body Mass Index (BMI) relating to children and adolescents. The BMI is used as a screening tool to identify possible weight problems for children. CDC and the American Academy of Pediatrics (AAP) recommend the use of BMI to screen for overweight in children beginning at 2 years old.

Learn about Body Mass Index (BMI): <http://www.nhlbi.nih.gov/health/public/heart/obesity/wecan/learn-it/bmi-chart.htm>.

The National Institutes of Health (NIH) provides information about various topics related to health. The Learn It looks at ways to enhance children's health and nutrition. The Learn about Body Mass Index (BMI) provides easy-to-read information for both adults and children regarding the BMI, its usefulness and how to calculate a BMI. It is also printable in a pdf for use by health professionals and families.

Resources Related to Obesity, Diabetes and Pregnancy

Healthy Eating During Pregnancy (You & Your Baby): Dr. Laura Riley and Stacey Nelson, MS, RD, LDN

This book provides women with a guide to eating well and staying fit during pregnancy. It is available in paperback.

Obesity, Diabetes, and Links to Congenital Defects: A Review of the Evidence and Recommendations for Intervention.

By E. Albert Reece. *The Journal of Maternal-Fetal & Neonatal Medicine*, Vol 21, Issue 3, 2008. This is a review of the literature, primarily epidemiologic studies, linking obesity and obesity-related metabolic disturbances in pregnant women to a range of birth defects. The author found that obesity and diabetes are a growing problem in the US population. It was noted that the problem is especially important among women of childbearing age since the dual effect of obesity along with diabetes impacts the unborn baby—although, each impacts it independently!

Screening for Gestational Diabetes Mellitus: U.S. preventive Services Task Force Recommendation Statement.

Annals of Internal Medicine. May 20, 2008 Vol 148, No. 10, pp 759-765. This is an update of the 2003 U.S. Preventive Services Task Force recommendations about screening for gestational diabetes. The task force concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for gestational diabetes mellitus, either before or after 24 weeks' gestation.

A Prospective Study on the Risk of Congenital Defects Associated with Maternal Obesity and Diabetes Mellitus.

By Lynn L. Moore, Martha R. Singer, Loring M. Bradlee, et al. In *Epidemiology*, 11 (6):689-694, November 2000. This study looked at the effects of maternal obesity and diabetes mellitus on the risk of congenital defects. The results suggest that obesity and diabetes mellitus may act synergistically in the pathogenesis of congenital anomalies. The defects were primarily craniofacial or musculoskeletal.

Advances in Understanding the Molecular Causes of Diabetes-Induced Birth Defects

By Mary R. Loeken. In *Journal of the Society for Gynecologic Investigation*, 2006; 13:2-10. This is a review article regarding the molecular causes of birth defects from diabetic pregnancy, with a focus on neural tube defects—using a mouse model. The conclusion is that excess glucose metabolism by embryos resulting from maternal hyperglycemia disturbs a complex network of biochemical pathways, leading to oxidative stress. Impaired embryo gene expression resulting from oxidative stress, and consequent apoptosis or disturbed organogenesis, and be a general mechanism to explain diabetic embryopathy. While this is an excellent review, the content requires a deeper level of understanding; and, as such, not useful for the non-medical reader.

Insensitivity to Insulin and Obesity: The Underlying Cause

By Robert Eckel and Scott Grundy. In *Diabetes Voice*, May 2006, Vol 51, Special Issue, pp 28-30. The authors examine the underlying causes of obesity and insensitivity to insulin. The report addresses the relationship between the level of obesity and its relating degree of impact on the body's insensitivity to insulin. Asians are reported to have a higher predisposition to abdominal obesity; thus, this population is at increased risk for diabetes and heart disease.

Resources for Education by Health Professionals

Risks of Being Overweight for Women of Reproductive Age:

<http://www.ci.minneapolis.mn.us/dhfs/reproductiveweight.pdf>

This is a Research Brief by the Minneapolis Department of Health and Family Support, dated January 2008. It provides easy to read information about weight, the Body Mass Index (BMI) and the impact of weight gain on women and the baby. It also provides strategies for health professionals. It can be found at.

A Call to Action: Obesity and Pregnancy—Women's Health Policy Brief

By Laura Riley, MD, Massachusetts General Hospital Winter/Spring 2006 It was prepared by the Women's Health Coordinating Council at Massachusetts General Hospital. It includes awareness and education for obesity in women.

January is Birth Defects Prevention Month...but any month is the month to prevent birth defects

By Hema Joshi and Debra L. Thompson. *Georgia Epidemiology Report*. January 2006, Vol 22, No. 01. Published by the Georgia Department of Human Resources, Division of Public Health.

WEBTREATS: Diet, Weight Management and Obesity.

This list, prepared by ACOG Resource Center Librarians from other sources, is provided for information only. Referral to these sites does not imply the endorsement of The American College of Obstetricians and Gynecologists of the organization or their contents, expressed views, programs, or political activities. Refer to the WEBTREAT on [Exercise and Physical Fitness](#) for related links. pvh/mash 3/19/2008. For further information, contact Mary Hyde, Pamela Van Hine, or Jean Riedlinger at resources@acog.com

Pregnancy-Related Nutrition

By Geraldine S. Berry, Colette L. Zyrkowski, Linda D. Clark, and Stella Yu. Reproductive Health of Women is a part of From *Data to Action* and CDC's *Public Health Surveillance for Women, Infants, and Children*. This report addresses the nutritional issues for women during pregnancy from a public health perspective. The demonstrated use of data provides readers with insight of data interpretation and use.

Resources Related to Obesity and Prepregnancy

Prepregnant Obesity and Risks of Selected Birth Defects in Offspring

Brief Report. By Gary M. Shaw and Suzan L. Carmichael. Found in *Epidemiology*, 19 (4):616-620, July 2008. Copyright 2008 Lippincott Williams & Wilkins, Inc. This study examined the impact of prepregnant obesity on several birth defects, especially neural tube defects. The conclusion indicated that the data did not fully support earlier findings with respect to the relationships of obesity with anencephaly and spina bifida.

Trends in pre-pregnancy obesity in nine states, 1993-2003

By Shin Y. Kim, Patricia M. Dietz, Lucinda England, Brian Morrow, and William M. Callaghan. *Obesity*. Vol. 15, April 2007, pp. 986-993.

Prevalence of Overweight and Obesity in the United States, 1999-2004: <http://jama.ama-assn.org/cgi/content/full/295/13/15490>

By Cynthia L. Ogden, Margaret D. Carroll, Lester R. Curtin; et al. *Journal of American Medical Association*, April 5, 2006, Vol 295, No. 13, pp. 1549-1555.

Prepregnancy Obesity as a Risk Factor for Structural Birth Defects

By Kim D. Waller, Gary M. Shaw, et al.—National Birth Defects Prevention Study in *Archives of Pediatric & Adolescent Medicine*. Vol 161 (No. 8), August 2007: 745-750. This population-based study describes the relation between maternal obesity, overweight and underweight status, and sixteen categories of structural birth defects. The results involving nearly 15,000 women from eight states found abnormalities of the spine, heart, arms, legs and abdomen, building on previous research that showed heart and spine defects. The greatest risk was for spina bifida.

Obese women faced double the risk of having babies with spina bifida than women of healthy weight. With spina bifida, the most common disabling birth defect in the United States, the spinal column fails to close properly. That often leads to leg paralysis, learning difficulties and other serious problems. Very heavy women also were 60 percent more likely to have babies born with a rare defect in which abdominal organs protrude through the belly button; 40 percent more likely to have heart defects; 36 percent more likely to have shortened arms or legs; and at least 20 percent more likely to have any of several gastrointestinal deformities. The research is part of the National Birth Defects Prevention Study, involving women who were pregnant between October 1997 and December 2002.

Weight Control: Eating Right and Keeping Fit: [ACOG Education Weight Control Eating Right and Keeping Fit.mht](http://www.acog.org/education/weight_control_eating_right_and_keeping_fit.mht) [ISSN 1074-8601]

This ACOG site promote this educational pamphlet addressing maintaining a healthy weight and the factors affecting weight. To order Patient Education Pamphlets in packs of 50, call 800-762-2264 or order online at sales.acog.org. Requests for authorization to make photocopies should be directed to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

Resources Related to Obesity and Pregnancy

Maternal Obesity and Risk of Neural Tube Defects: A Metaanalysis

By Sonja A. Rasmussen, Susan Y. Chu, Shin Y. Kim, et al. *American Journal of Obstetrics & Gynecology*, June 2008, pp 611-619. This is a metaanalysis of published evidence on the relationship between maternal obesity and the risk of neural tube defects (NTDs). The findings support that maternal obesity is associated with an increased risk for an NTD-affected pregnancy.

Birth Defects Research: <http://www.cdc.gov/ncbddd/bd/research.htm>

This CDC website contains updated information regarding birth defects and overviews of related research. It discusses the National Birth Defects Prevention Study, U.S.-China Collaborative Project and other CDC Specific Research.

Is Maternal Obesity a Risk Factor for Anencephaly and Spina Bifida?

Margaret L. Watkins, Kelley S. Scanlon, Joseph Mulinare and Muin J. Khoury. *Epidemiology*, September 1996, Vol 7, No. 5, pp. 507-512.

Obesity during Pregnancy Threatens Health of Both Mother and Fetus, March of Dimes Says:

http://www.marchofdimes.com/printableArticles/10651_12183.asp

WHITE PLAINS, N.Y., JUNE 9, 2004— The rising obesity rate in the United States is a risk to the health of pregnant women and their babies, the March of Dimes said today. The report is published by the March of Dimes Task Force on Nutrition and Optimal Human Development.

Maternal Obesity and Risk for Birth Defects

By Margaret L Watkins, Sonjy A. Rasmussen, Margaret Honein, Lorenzo D. Botto and Cynthia Moore. In *Pediatrics* 2003;111;1152-1158. This is a research study sponsored by the Division of Birth Defects and Developmental Disabilities, National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, Atlanta, GA. Contact MWatkins@cdc.gov. PMID: 12728129 (Pub Med—indexed for MEDLINE). This study was based on data from births in a five-county area of Atlanta from January 1993 to August 1997. Results indicated that obese women were more likely to have babies with spina bifida, omphalocele, heart defects, or multiple anomalies. Women who were overweight were more likely to have babies with heart defects or multiple anomalies.

Risk of Neural Tube Defect-affected Pregnancies among Obese Women:

<http://www.cbdmp.org/pdf/ntdsobesity.pdf>.

By Shaw, GM, Velie, EM, and Schaffer, D. *Journal of American Medical Association* 1996; 275(14): 1093-1096. Also, noted in *Neural Tube Defects and Obesity* from California Birth Defects Monitoring Program, April 1999. This study was done by the California Birth Defects Monitoring Program to examine the impact of obesity on the occurrence of babies born in California with neural tube defects. The results found that neural tube defects are more common in pregnancies to obese women.

Maternal Obesity and Pregnancy: Weight Matters:

http://www.marchofdimes.com/files/MP_MaternalObesity040605.pdf.

(Medical Perspective on Prematurity) Prepared by the Office of the Medical Director April 6, 2005. This March of Dimes document discusses the fact that obesity impacts a woman's pregnancy; however, it is a modifiable risk factor which could improve birth outcomes.

Overview of Clinical Perspectives and Mechanism of Obesity

In *Birth Defects Research Part A-Clinical and Molecular Teratology* 73 (7): 470-471. (2005 July).

Maternal Obesity and Neonatal Mortality According to Subtypes of Preterm Birth.

By Ellen A. Nohr, Michael Vaeth, Bodil H. Bech, et al. *Obstetrics & Gynecology*, 2007; 110:1083-1090. This article evaluates the association between pre-pregnancy body mass index (BMI) and neonatal mortality while accounting for the timing of delivery and subtypes of preterm birth.

Teratology Public Affairs Committee Position Paper: Maternal Obesity and Pregnancy

By the Public Affairs Committee of the Teratology Society. Published in *Birth Defects Research (Part A): Clinical and Molecular Teratology* 76: 73-77 (2006). Copyright by 2006 Wiley-Liss, Inc. This article has a list of references by condition. See Table 2 on page 74.

The Implications of Maternal Overweight and Obesity on the Course of Pregnancy and Birth Outcomes

Anna-Maria Siega-Riz and Barbara Laraia. *Maternal Child Health Journal* (2006). 10:S153-S156. This article is an overview of the complications associated with maternal overweight and obesity including diabetes, pre-eclampsia,

c-section, and birth defects. Included also is an overview of weight trends among women and prevention studies targeting adolescents and women prior to pregnancy.

Resources about Medication Related Risk of Birth Defects

Popular blood pressure drugs may increase risk of birth defects

By Jan Friedman. *New England Journal of Medicine*. 2006; Vol X: pp xx (June 9, 2006).

Major Congenital Malformations after First-Trimester Exposure to ACE Inhibitors

By William O. Cooper, Sonia Hernandez, Patrick G. Arbogast, et al. *New England Journal of Medicine*, 2006, 354; 23, 2443-2451. The use of angiotensin-converting-enzyme (ACE) inhibitors during the second and third trimesters of pregnancy was already known for their association with increased risk of birth defects. This study demonstrates the association between exposure to ACE inhibitors during the first trimester of pregnancy only and the risk of congenital malformations, especially those of the cardiovascular system and central nervous system.