The Texas Birth Defects

MONITOR

A Semi-Annual Data and Research Update

Volume 15, Issue 2 Winter 2009

INSIDE THIS ISSUE:

Recent Texas Publications	3
Focus On: Hypoplastic Left Heart Syndrome	4
Newborn Screening Settlement	4
Preconception Risk Factors: How Do Texas Women Fare?	6
CDC Folic Acid Border Outreach	6
BDES Rules Change: Chromosomal Test Results	7

Acculturation and NTDs

The "Hispanic Epidemiologic Paradox"

In recent decades, the phenomenon known as "The Hispanic Epidemiologic Paradox" has attracted increasing attention of public health practitioners and researchers. This paradox refers to positive health outcomes among ethnically Hispanic US populations which are unexpected, given this population's often less-favorable socioeconomic conditions. Findings have been mixed for birth outcomes such as low birth weight (LBW) and premature delivery, but studies have found that Mexican women have lower odds of having an LBW baby than non-Hispanic blacks and similar or lower rates than non-Hispanic whites, the latter having presumably better socioeconomic status and access to care. For premature delivery there have been mixed findings, with some groups of Hispanic mothers having similar, higher or lower rates compared to non-Hispanic whites.

Hispanic women, however, are a diverse group, and birth outcomes tend to be better among those who immigrated to the US and/or who are predominantly Spanish-speaking, despite even greater socioeconomic concerns and barriers to health care faced by these women. In some studies, in fact, foreign-born women have been found to be less likely to deliver premature or LBW infants than non-Hispanic US-born white women.

Language spoken, country of birth, and years in the US are proxy variables for acculturation, that is, the extent to which people who emigrate from one country to another adopt characteristics of the dominant culture into which they move. This apparent protective effect of lower acculturation may be due to greater levels of social support and positive attitudes toward the pregnancy, healthier diet, and lower use of cigarettes and alcohol. Furthermore, some researchers have found that less acculturated Hispanic women are less likely to be obese.

NTDs and Acculturation

Regarding birth defects, however, recent findings from the Texas Center for Birth Defects Research and Prevention and the National Birth Defects Prevention Study* indicate a dif-

(Continued on page 2)

(Continued from page 1)

ferent pattern for odds of having a baby with a neural tube defect. As shown in Table 1, Hispanic mothers who were born outside the US were more likely to have a baby with spina bifida or anencephaly than white non-Hispanics. For US-born Hispanic women though, only rates for anencephaly were higher compared with whites. Similar patterns emerged when using language spoken (English vs. Spanish) as the measure of acculturation.

These findings indicate that among Hispanics, both lower and higher acculturation levels pose increased risk for giving birth to a baby with anencephaly. This exemplifies the etiologic heterogeneity across these two neural tube defects, which has been previously noted and may indicate stronger environmental influence for spina bifida than for anencephaly.

Acculturation is not a straightforward variable to measure, and several approaches have been proposed. The model used to test association between acculturation and NTDs has the advantage that it looks at several measures of adoption of the "host culture" (i.e. language spoken and years in the US).

That NTDs appear to be an exception to the Hispanic epidemiologic paradox may provide important clues to the strength of associated risk factors for this defect. While several maternal characteristics associated with NTDs, such as obesity, diabetes, and stress, tend to increase with acculturation factors, women who are less acculturated are less likely to take multivitamins containing adequate folic acid, or to eat fortified grain products.

We next plan to study the association between acculturation and anotia/microtia, defects which also have been higher among births to Hispanic mothers.

Canfield MA et al. Anencephaly and spina bifida among Hispanics: maternal, sociodemographic, and acculturation factors in the National Birth Defects Prevention Study. Birth Defects Res A Clin Mol Teratol 2009;85(7):637-46. For more information on this study, please contact Mark Canfield, Ph.D. at mark.canfield@dshs.state.tx.us.

References for this article upon request: amy.case@dshs.state.tx.us.

Table 1: Crude Odds Ratios for NTDs among Offspring Born to Hispanic Women, by Acculturation Status

	Spina Bifida cOR (95% CI)*	Anencephaly cOR (95% CI)*
Mother white, non-Hispanic	Referent	Referent
Mother Hispanic, US-born	1.23 (0.92-1.63)	**1.91 (1.33-2.75)**
Mother Hispanic, Mexico, Central America-born, 5+ years in US	**2.16 (1.56-3.00)**	**2.00 (1.21-3.29)**
Mother Hispanic, Mexico, Central America-born, <5 years in US	**1.92 (1.23-2.99)**	**2.05 (1.08-3.90)**

Research Center

New Roles

Peter Langlois, Ph.D., co-PI of the Texas Center and Senior Epidemiologist for our Branch, will serve as the Chair of the Coordinating Council for the National Birth Defects Prevention Study in 2010. The Coordinating Council makes decisions regarding how to run the Centers for Birth Defects Research and Prevention, primarily how to run and how to improve the National Birth Defects Prevention Study both in terms of data collection and data analysis. It is composed of the principal investigators from each funded Center as well as selected individuals from the Centers for Disease Control and Prevention (CDC).

Effective January 1, Karen Moffitt, M.P.H. became our new Data Linkage and Research Specialist. This is a new position funded by the CDC grant. Karen has a B.S. in Biostatistics and Applied Epidemiol-

(Continued on page 3)

ogy from California State University and a M.P.H. from UTSPH. Her most recent public health experience was as a senior epidemiologist and biostatistician for Maricopa County in Arizona, and she has served as the biostatistician for the City of Houston.

Recent Publications

Brender J, Felkner M, Suarez L, Canfield MA, Henry JP. Maternal pesticide exposure and neural tube defects in Mexican Americans. Annals of Epidemiology, 2009; 20(1): 16-22.

Canfield MA, Langlois PH, Nguyen LM, Scheuerle AE. Epidemiologic features and clinical subgroups of anotia/microtia in Texas. Birth Defects Res A Clin Mol Teratol. 2009; 85(11):905-13.

Case AP, Canfield MA. Methods for developing useful estimates of the costs associated with birth defects. Birth Defects Res A Clin Mol Teratol. 2009; 85(11):920-4.

Chiang P-W, Spector E, Scheuerle A. A case of Asian Indian OCA3 patient. Amer J Med Genet (Part A), 2009;149(7):1578-1580.

Collins JS, Canfield MA, Pearson K, Kirby RS, Case AP, Mai CT, Major J, Mulinare J for the National Birth Defects Prevention Network. Public Health Projects for Preventing the Recurrence of Neural Tube Defects in the United States. Birth Defects Res A Clin Mol Teratol, 2009; 85:935 – 938.

Felkner M, Suarez L, Canfield MA, Brender JD, Sum Q. Maternal serum homocysteine and risk for neural tube defects in a Texas-Mexico border population. Birth Defects Res A Clin Mol Teratol, 2009; 85 (6):574-581.

Fixler DE, Nembhard WN, Salemi JL, Ethen MK, Canfield MA. Mortality in first five years in infants with a functional single ventricle born in Texas, 1996-2003. [In Press]

Gallaway MS, Waller DK, Canfield MA, Scheuerle A and the National Birth Defects Prevention Study. The association between use of spermicides or male condoms and major structural birth defects. Contraception 2009; 80(5):422 – 429.

Gilboa SM, Correa A, Botto LD, Rasmussen SA, Waller DK, Hobbs CA, Cleves MA, Riehle-Colarusso TJ and the National Birth Defects Prevention Study. Association between pre-pregnancy body mass index and congenital heart defects. Am J Obstet Gynecol, 2009.

Langlois PH and Scheuerle A. Using registry data to suggest which birth defects may be more susceptible to artifactual clusters and trends. Birth Def Res (Part A), 2007; 79(11):798-805.

Langlois PH, Scheuerle A, Horel SA, Carozza SE. Urban versus rural residence and occurrence of septal heart defects in Texas. Birth Defects Research Part A, 2009; 85(9): 764 – 772.

Miller EA, Manning SE, Rasmussen SA, Reefhuis J, Honein MA, The National Birth Defects Prevention Study. Maternal exposure to tobacco smoke, alcohol and caffeine and risk of anorectal atresia — National Birth Defects Prevention Study 1997-2003. Paediatric and Perinatal Epidemiology, 2009; 23(1):9-17.

Parker SE, Mai CT, Strickland MJ, Olney RS, Rickard R, Marengo L, Wang Y, Hashmi SS, Meyer RE, National Birth Defects Prevention Network. Multistate study of the epidemiology of clubfoot. Birth Def Res Part A 2009; 85(11):897-904.

Ramadhani TR, Short V, Canfield MA, Waller DK, Kim Waller, Correa A, Royle MH, Scheuerle A, and the National Birth Defects Prevention Study (NBDPS). Are birth defects among Hispanics related to maternal country of nativity or maternal number of years lived in the United States? Birth Defects Res A Clin Mol Teratol, 2009; 85(9): 755–763.

Scheuerle A, Vannappagari VX, Miller MK. Measurements of birth defect prevalence: Which is most useful as a comparator group for pharmaceutical pregnancy registries? Birth Defects Res A Clin Mol Teratol., 2009; 85(7): 611 – 620.

Simpson MA, Scheuerle A, Hurst J, Patton MA, Stewart H, Crosby AH. Mutations in FAM20C also identified in non-lethal osteosclerotic bone dysplasia. Clin Genet. 2009 Mar;75(3):271-276.

Wen S, Lu W, Zhu H, Yang W, Shaw GM, Lammer EJ, Islam A, Finnell RH. Genetic polymorphisms in the thioredoxin 2 (TXN2) gene and risk for spina bifida. Am J Med Genet A, 2009; 149A(2): 155 – 160.

(Continued on page 4)

From the Registry

Focus on: Hypoplastic Left Heart Syndrome

Hypoplastic left heart syndrome (HLHS) is characterized by several cardiac malformations. These include hypoplasia or underdevelopment of the left ventricle, atresia or hypoplasia of the aortic valve, atresia or hypoplasia of the mitral valve, and atresia or hypoplasia of the aorta. Due to these defects, the heart is not able to maintain systemic circulation.

The severity of this defect can vary; but most often the condition is fatal unless treated. Some HLHS cases are associated with chromosomal abnormalities. This defect does not appear to be among the heart defects commonly associated with the 22q11 microdeletion linked to DiGeorge syndrome and velocardiofacial anomaly. This defect can also be associated with biliary atresia, a condition in which the bile ducts are obstructed or absent.

Over the past several decades, ultrasonography and fetal echocardiography have allowed HLHS to be identified prenatally.

Etiology

There have been several suggested causes for the manifestation of hypoplastic left heart syndrome. An early study indicated that there was an immunoreactive response by the heart tissues to specific growth factors as the heart tissues were under- or overreacting to the presence of growth factors. Further research has indicated that there is a genetic component to this defect. Families with other known cardiac defects are more likely to have offspring with HLHS. This defect is also associated with the CATCH 22 (cardiac defects, abnormal facies, thymic hypoplasia, cleft palate, hypocalcemia) syndrome, caused by a 22q11chromosomal deletion.

Risk Factors

Various parental characteristics or exposures have been observed to be associated with higher likelihood of having a child with HLHS, although the strength of the evidence for these associations varies. These include:

- Urban/rural residence compared to suburban
- Older maternal and paternal age
- Paternal occupation involving paint stripping
- Maternal and paternal exposure to solvents
- Maternal respiratory infection
- Untreated maternal phenylketonuria
- First-trimester use of antifungal drugs
- Family history of HLHS in first degree relative
- Oral contraceptive use early in pregnancy

In Texas, HLHS occurs in about two pregnancies for every 10,000 live births, which is somewhat lower than national estimates. It tends to be more common in the offspring of mothers over 40 and among males (Figure 1, p.5). White women's pregnancies are more likely to be affected by the heart defect than those of Hispanics (Figure 2). Geographically, Health and Human Services Region 2 (which contains Abilene and Wichita Falls) has significantly higher rates of HLHS (Figure 3).

Wen, S., Zhu, H., Lu, W., Mitchell, L.E., Shaw, G.M., Lammer, E.J. and Finnell, R.H. 2010. Planar cell polarity pathway genes and risk for spina bifida. Am. J. Med. Genet., 2010. [In Press]

Newborn Screening Settlement

The Texas Department of State Health Services today issued the following statement regarding the recent settlement of a lawsuit about the storage of dried bloodspots from the state's newborn screening program:

DSHS believes settling this lawsuit is in the best interest of this program's core mission to screen all newborn babies in Texas for life-threatening disorders. Newborn screening saves children's lives, and settling this lawsuit allows us to continue operating this critical program.

As a result of this settlement, DSHS will destroy all bloodspot cards received by the department before May 27, 2009, the date legislation expressly authorized the storage and specified uses of the samples.

DSHS is complying with all the requirements of that legislation, including the provision allowing parents to have bloodspots from their infants destroyed rather than stored. We will continue to be very sensitive to the privacy concerns of parents and the confidentiality of all

(Continued on page 5)

Figure 1: Hypoplastic left heart syndrome by age of mother and sex of infant/fetus, Texas, 1999-2006

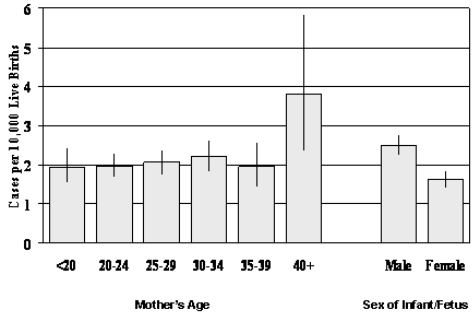


Figure 2: Hypoplastic left heart syndrome by mother's ethnicity and border residence, Texas, 1999-2006

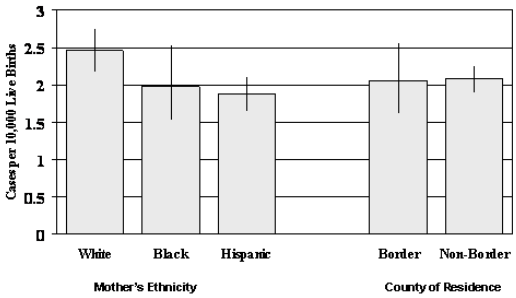
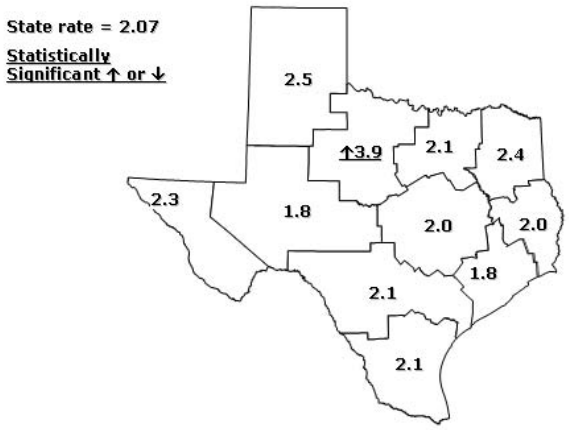


Figure 3: Hypoplastic left heart syndrome by region, Texas, 1999-2006



medical information.

If parents don't object, the department saves the samples for uses allowed under the new legislation – primarily quality assurance and control purposes to ensure accuracy in lab testing and because the samples could provide an invaluable resource in researching new or more effective ways to prevent, diagnose and treat serious medical conditions that affect Texas children, including leukemia and birth defects.

DSHS screens approximately 800,000 newborn specimens annually.

Information about the DSHS Newborn Screening Program is available online at www.dshs.state.tx.us/newborn/default.shtm.

*(**Contact:** Allison Lowery, DSHS Assistant Press Officer, 512-458-7400.)*

Prevention

Preconception Risk Factors: How Do Texas Women Fare?

Prematurity, low birth weight and congenital malformations (birth defects) account for two-thirds of infant deaths in Texas (nearly 1,800 babies annually). It is often said that everything is bigger in Texas, and unfortunately this is true of the scope of the problem of poor pregnancy outcomes: in 2006, there were 54,398 preterm births in Texas. This represents 13.6% of live births or 1 in 7 babies; and 17,395 babies were born with one or more birth defects. The Texas prematurity rate is higher than the national rate of 12.7% and has been increasing since 1995.

A growing body of research indicates that the optimal time to address conditions associated with poor pregnancy outcomes is *before* conception. This is especially true for birth defects; since most major malformations arise very soon after conception, before even the earliest prenatal care visit. Thus, it is essential that interventions aimed at improving birth outcomes also occur before conception.

Important potentially modifiable pre- and periconceptional maternal behaviors and conditions that have been associated with a higher chance of having a baby with a birth defect are suboptimal dietary nutrition, obesity, diabetes, smoking, alcohol consumption and weight loss products and behaviors.

The table below, Selected Preconception Behaviors, presents a snapshot of statistics available from public databases and indicate that Texas women, in general, are more likely to have lifestyles that are associated with birth defects than women in the US as a whole (with the notable exceptions of being less likely to have had alcohol binge drinking episodes or currently smoke).

References upon request: amy.case@dshs.state.tx.us.

CDC-Sponsored Folic Acid Outreach Focuses on the Texas Border

Migrant Health Promotion (Brownsville) is in the final year of a CDC-funded cooperative agreement project aimed at increasing folic acid awareness, knowledge, and consumption among Latinas living in migrant communities in Hidalgo and Cameron counties. In this final year, they will also be expanding their efforts to reach women in Starr and Willacy counties. Through the "*Nuestro Futuro*" program, promotoras or lay health outreach workers, conduct small group and one-on-one outreach to women in these areas to educate them about the importance of folic acid. The project has conducted outreach primarily through local agencies, local radio stations, and local newspapers in each county, as well as through health fairs and hosting events such as walks. A further component of the project incorporates outreach to health care providers who serve the target population.

For more information, contact Alina L. Flores, MPH, CHES, Health Education Specialist
Centers for Disease Control and Prevention
National Center on Birth Defects and Developmental Disabilities at 404-498-3869 or ail5@cdc.gov.

Selected Preconception Health Behaviors		
	Texas	US
Adult Women Age 18-44		
Women who report binge drinking*	11.9%	14.2%
Alcohol consumption >1 drink/day*	4.6%	4.6%
Doctor has diagnosed diabetes*	5.2%	2.8%
Current smoker*	18.1%	19.8%
Obese*	27.3%	23.5%
Food insecurity**	21.7%	18.7%
Not taking folic acid daily‡	59.3%	55.4%
Female High School Students		
Trying to lose weight‡	60.0%	60.3%
Recently fasted to lose weight‡	16.5%	16.3%
Recently used laxatives/vomiting to lose weight‡	7.2%	6.4%
Recently used diet pills to lose weight‡	8.3%	7.5%

Sources:
*Texas 2007 BRFSS **Texas 2004 BRFSS †Economic Research Service, USDA
‡Texas Youth Risk Behavior Survey 2007. Retrieved from database http://apps.nccd.cdc.gov/yrbss/index.asp 01/05/2010

Continuing Education Opportunities: Folic Acid

Computer- and print-based resources for keeping professional understanding of the importance of an recommendations regarding folic acid intake can be found at www.nbdpn.org/current/resources/ntd_resources.html. Many of these offer official continuing education units for various professions. Toolkits and resources for educating patients are also available.

Announcements

Rule Change Allows Reporting of Chromosomal Test Results to Birth Defects Registry

The Texas Administrative Code was recently amended to clarify that information related to the diagnosis of birth defects may be collected from clinical and medical laboratories. Additionally, the Texas Health and Safety Code, Chapter 87, was changed several years ago to allow for passive reporting when needed to supplement the active surveillance by the Texas Birth Defects Registry. Beginning in 2010, we are implementing a pilot for the passive reporting by medical and clinical laboratories of chromosomal analyses (karyotype and fluorescence in situ hybridization) among infants and fetuses in Texas. This amendment is necessary because important testing often takes place outside the hospital setting and, therefore, outside the ascertainment facilities typically covered by the Texas Birth Defects Registry.

The ICD 9-CM codes relevant to the Birth Defects Registry are in the 740-760 range. Both positive and negative chromosomal results among fetuses and infants (less than 1 year of age) will become a notifiable condition through the National Electronic Disease Surveillance System (NEDSS). Chromosome microarray analysis (CMA) and array Comparative Genome Hybridization (aCGH) results will not be reportable at this time, but will continue to be collected during active surveillance.

For more information about lab reporting, contact Lisa Marengo at 512-458-7232 or lisa.marengo@dshs.state.tx.us.

CDC Launches New FASD Website

The Centers for Disease Control and Prevention (CDC) has launched a new web site focused on fetal alcohol spectrum disorders (FASD) that is research-based, user-friendly and up-to-date: www.cdc.gov/ncbddd/fasd/partners.html.

Preclinical Tests on Devices for Children with Congenital Heart Defects

The National Heart, Lung, and Blood Institute (NHLBI), part of the National Institutes of Health, has awarded four contracts begin preclinical testing of devices to help children born with congenital heart defects or those who develop heart failure. The four-year program is called Pumps for Kids, Infants, and Neonates (PumpKIN). The program's goal is to complete the needed animal studies and other tests in artificial environments for the most promising devices in order to gain approval from the FDA to begin clinical testing.

Each year in the United States, nearly 1,800 infants die as a result of congenital heart defects and another 350 develop heart disease, which leads to heart failure for many. Approximately 60 infants and children under 5 years old who are placed on the heart transplant waiting list die each year before receiving one. Mechanically assisted circulatory support could be used to sustain these young patients as they seek to recover or wait to receive a heart transplant.

Options for chronic circulatory support devices for infants and young children are limited, and all have substantial risks for serious adverse events such as infection, stroke, and device failure. With this in mind, in 2004 the NHLBI funded the development of five novel circulatory support devices for infants and young children with congenital and acquired cardiovascular disease.

Devices in the program will provide suitable circulatory support for newborns, older infants, and children under 55 pounds with heart failure due to congenital and acquired cardiovascular disease. The program will test ventricular assist devices (VADs) and advanced extracorporeal membrane oxygenator (ECMO) devices. The contractors will conduct all preclinical animal testing and analysis in the first three years of the contract. During the third year, they will partner with a data coordinating center to complete the necessary activities to seek FDA approval to begin the clinical trial.

To arrange an interview with an NHLBI spokesperson, please contact the NHLBI Communications Office at (301) 496-4236 or email nhlbi_news@nhlbi.nih.gov nhlbi_news@nhlbi.nih.gov.

The Monitor is published twice a year by the Birth Defects Epidemiology and Surveillance Branch, Texas Department of State Health Services:

Glenda Rubin Kane, Chair, Texas Department of State Health Services Council

David L. Lakey, M.D., Commissioner, Texas Department of State Health Services

Adolfo Valadez, M.D., M.P.H., Assistant Commissioner for Prevention and Preparedness Services

Lucina Suarez, Ph.D., Acting Director, Environmental Epidemiology and Disease Registries Section

Mark A. Canfield, Ph.D., Manager, Birth Defects Epidemiology and Surveillance Branch

EDITOR: Amy Case, M.A.H.S., Program Specialist, Birth Defects Epidemiology and Surveillance Branch

Please visit the BDES website for updated information: www.dshs.state.tx.us/birthdefects.

Request for additional copies or back issues may be made to birthdefects@dshs.state.tx.us.

DSHS Pub. No. 58-10955

Calendar

2010

- March 8-10: National Birth Defects Prevention Network Annual Meeting. National Harbor, MD. Contact: Cara Mai 404-398-4918, cwm7@cdc.gov.
- March 28-30: Texas Advanced Leadership and Advocacy Conference. Austin. Contact: 979-845-1884, talac@tamu.edu. http://talac.tamu.edu/
- April 21-23: Texas Public Health Association 2010 Annual Education Conference. Contact: txpha@aol.com, www.texaspha.org/Default.aspx?pageId=470173
- May 9-15: National Women's Health Week
- May 27-28: Fifth Annual Texas Conference on Health Disparities: Focus on Women's Health. www.hsc.unt.edu/HealthDisparities/Index.html.
- June 27-29: TxHIMA Annual Meeting & Convention. San Marcos. www.txhima.org/events_annualmeeting.htm
- October: Texas Biennial Birth defects research Symposium. Austin. Contact: Amy Case 512-458-7232 Ext 2814, amy.case@dshs.state.tx.us.
- November 10-11: Texas Rural Health Forum. Austin. www.trha.org/conferences.htm

This publication was funded in part by the Office of Title V & Family Health, Texas Department of State Health Services, using Title V Maternal and Child Health Block Grant Funds.