Birth Defects

Data & Measures 2006-2008

MN EPHT
Environment, Exposure & Health
Minnesota
Environmental
Public Health
Tracking

MINNESOTA MDH DEPARTMENT of HEALTH

Protecting, maintaining and improving the health of all Minnesotans

December 2011

Dear Colleague:

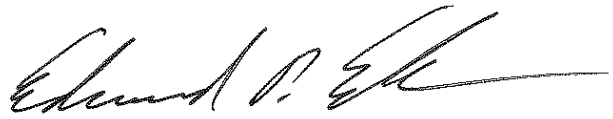
The Minnesota Department of Health (MDH) is pleased to present the first series of reports of the Minnesota Environmental Public Health Tracking (MN EPHT) program. The purpose of the report is to share environmental and health tracking data with the public, in accordance with Minnesota Statute 144.996, Subdivision 1.2.

Environmental public health tracking is a public health tool that uses a variety of existing data sources to provide information about environmental hazards, chemical exposures and population health in our state, as well as what preventative actions can be taken to protect the public. The value of environmental public health tracking increases with each year of data collection.

In 2009 MN EPHT became part of the National Environmental Public Health Tracking Network (Tracking Network) under a cooperative agreement grant, joining New York City and 21 other states in the Tracking Network. The grant from the Centers for Disease Control and Prevention (CDC) helps support ongoing data collection and the development of a web-based information system for the public to access MN EPHT data. Improved public access to current, accurate information will help inform individual decisions as well as public policy to prevent disease and promote health.

An electronic version of this report is available on the MN EPHT website: http://www.health.state.mn.us/tracking/. For more information about this report, please contact MN EPHT at 651-201-4987 (toll free: 1-800-205-4987) or health.tracking@state.mn.us.

Sincerely,



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Report on Birth Defects Data & Measures: 2006-2008

MN EPHT Report | December 2011

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Introduction to MN EPHT

The environment can mean many things to many people. For Environmental Public Health Tracking (EPHT), the environment is defined as our air, our water, our food, and our natural and man-made surroundings. The environment plays an important role in health and human development. The Minnesota Environmental Public Health Tracking (MN EPHT) system brings together existing data in the state about environmental hazards, population exposure, and health outcomes.

EPHT data may be used to:

- Recognize patterns and evaluate trends in environmental conditions, population exposure and rates of disease
- Measure impacts of public health interventions
- Identify populations most affected or most vulnerable
- Identify opportunities for research and/or public health interventions to reduce exposures to potential environmental health hazards and prevent disease

Minnesota Statutes, section 144.996, directs the Minnesota Department of Health (MDH) to establish an environmental health tracking program. The goal of MN EPHT is to provide information that can be used to plan and evaluate actions to prevent diseases and promote healthy environments in Minnesota. By making data on environmental hazards, exposures and health available in one place and by systematically monitoring those data, an environmental public health tracking program can create new opportunities for learning about the risks of environmental exposures and for understanding the relationships between the environment and health.

National Tracking Network Data and Measures

MN EPHT works in partnership with other states as part of the Centers for Disease Control and Prevention's (CDC) National Environmental Public Health Tracking Network (Tracking Network). Since MN EPHT began in 2007, the program has been collecting and analyzing data in 8 content areas that the Tracking Network has identified as priorities shown in the table below.

Current Tracking Network Content Areas		
Environmental Hazards	Exposures	Health Outcomes
Air quality	Childhood lead poisoning	Hospitalizations
Drinking water quality		Cancer
		Carbon monoxide poisoning
		Reproductive and birth outcomes
		Birth defects

Within each content area, tracking measures are used as indicators of population health with respect to environmental factors. These measures are summary characteristics or a statistic, such as a sum, percentage, or rate. Tracking measures are used to assess health, or a factor associated with health, in a population through direct or indirect measures. For example, because the amount of lead in paint in older homes is difficult to measure, MN EPHT uses blood lead measurements in children to indicate both the lead paint hazard and the risk for childhood lead poisoning. Similarly, MN EPHT measures levels of a pollutant in the environment as an indicator of possible exposure.

Nationally consistent data and measures (NCDMs) were developed by CDC in collaboration with national, state, and local environmental health partners. NCDMs allow for data from any state's EPHT system to be integrated into the Tracking Network, a national database of environmental hazards, environmental exposures, and health effects. Except where noted, MN EPHT has prepared Minnesota data and measures according to the NCDM standards.

Healthy People Objectives

Healthy People is a set of goals and objectives with 10-year targets designed to guide health promotion and disease prevention effects to improve the health of all Americans. The goals of Healthy People 2020 are: increase quality and years of healthy life, eliminate health disparities, create environments that promote good health, and promote health across all life stages. These goals are supported by objectives in 42 focus areas.[1]

Several of the Tracking Network's measures align with Healthy People 2020 objectives. Where applicable, Healthy People 2020 objectives are provided in order to provide context for how Minnesota compares in reaching national health targets.

MN EPHT Data and Measures Reports

This report is one in a series of first reports produced in 2009-2011 for MN EPHT and compiles available birth defects data from 2006-2008. MN EPHT is a growing program, and MN EPHT and the Tracking Network will be adding new content areas over time. Updates to the birth defects content area as well as new content area data will be reported and made available on our website. For more information about MN EPHT or the CDC Tracking Network, please visit:

MN EPHT: http://www.health.state.mn.us/tracking
National Tracking Network: http://ephtracking.cdc.gov

Birth Defects Data Highlights

- From 2006 to 2008, the highest rates among 12 specific birth defects in Hennepin and Ramsey Counties of Minnesota were for hypospadias (49.9 cases per 10,000 live male births) and Down syndrome (14.6 cases per 10,000 live births).
- From 2006-2008, there were 6 cases of anencephaly and 25 cases of spina bifida in Hennepin and Ramsey Counties of Minnesota. It is well established that folic acid reduces the risk of neural tube defects like spina bifida and anencephaly by up to 70% when taken regularly by women of childbearing age.
- Advanced maternal age is a known risk factor for Down syndrome. From 2006 to 2008 in Hennepin and Ramsey Counties, the rate of Down syndrome was 10.4 cases per 10,000 live births among women under 35 years of age and 33.9 cases per 10,000 live births among women 35 years and older.

Data Source Acknowledgement: The MN EPHT Program gratefully acknowledges the MDH Birth Defects Monitoring and Analysis Unit for providing the data on birth defects in Minnesota presented in this Tracking Report.

Birth Defects, Risk Factors and the Environment

Birth defects are estimated to affect over 2,000 babies in Minnesota and more than 120,000 children in the United States every year.[2] Birth defects are the leading cause of death in children less than one year of age causing one in every five deaths.[2] Babies born with birth defects have a greater chance of illness and long-term disability than babies without birth defects. Babies with birth defects are also more likely to be born preterm (before the 37th week of pregnancy) than babies without birth defects. Birth defects account for approximately 30% of all pediatric hospital admissions.[3]

The MDH Birth Defects Monitoring and Analysis Unit gathers information on the 44 National Birth Defects Prevention Network (NBDPN) nationally reported birth defects as well as one additional heart defect. The Tracking Network is concerned about pollution and other environmental exposures that may be related to birth defects. The following 12 birth defects were chosen by the Tracking Network based on consistency of diagnosis across states who submit data for the NBDPN annual report; public concern regarding possible environmental cause; and severity.

Anencephaly is a defect of the central nervous system and a type of neural tube defect. The neural tube is a narrow channel that folds and closes during the third and fourth weeks of pregnancy to form the brain and spinal cord. Anencephaly occurs when the portion of the neural tube that forms the brain does not close. This results in the baby lacking parts of the brain, skull, and scalp.

Spina Bifida (without Anencephaly) is a defect of the central nervous system and a type of neural tube defect. The neural tube is a narrow channel that folds and closes during the third and fourth weeks of pregnancy to form the brain and spinal cord. Spina bifida happens if the portion of the neural tube that forms the spinal cord does not close completely during the first month of pregnancy.

Hypoplastic Left Heart Syndrome is a heart condition that is present at birth, and often is called a congenital heart defect. It is a group of related defects that, together, mean that the left side of the heart is underdeveloped.

Tetralogy of Fallot is a heart condition that is present at birth, and often is called a congenital heart defect. This defect changes the normal flow of blood through the heart. Tetralogy of Fallot is a combination of four defects: (1) a hole in the wall between the ventricles (two lower chambers of the heart), called a ventricular septal defect; (2) narrowing of the tube that carries blood from the heart to the lungs, called pulmonary stenosis; (3) the aorta (the tube that carries oxygen-rich blood to the body) grows from both ventricles, rather than from the left ventricle only; and (4) a thickened muscular wall of the right ventricle, called right ventricular hypertrophy.

Transposition of the Great Arteries is a heart condition that is present at birth, and often is called a congenital heart defect. Transposition of the great arteries occurs when the two main arteries going out of the heart—the pulmonary artery and the aorta—are switched in position, or "transposed".

Cleft Lip with or without Cleft Palate is a birth defect of the lip and roof of the mouth known as orofacial clefts. A cleft lip is an opening in the upper lip. The opening in the lip can be a small slit in the lip or a large opening that goes through the lip into the nose. A cleft palate is an opening in the roof of the mouth, called the palate. A cleft palate can occur when the two sides of the palate do not come together correctly.

Cleft Palate without Cleft Lip is a birth defect of the lip and roof of the mouth known as orofacial clefts. A cleft palate is an opening in the roof of the mouth, called the palate. A cleft palate can occur when the two sides of the palate do not come together correctly.

Hypospadias is a birth defect among boys in which the opening of the urethra is located somewhere along the underside of the penis instead of at the tip. The urethra is the tube that carries urine from the bladder to the outside of the body. This defect occurs when the urethra does not complete its development during the pregnancy.

Gastroschisis is a birth defect in which a portion of an infant's intestines protrude out of the body through a small hole in the body wall beside the umbilical cord. The body wall defect can be small or large and other organs such as the liver can be involved.

Upper Limb Deficiencies occur when a part of or the entire arm (upper limb) of a fetus fails to form completely during pregnancy. The defect is referred to as a "limb reduction" because a limb is reduced from its normal size or is missing.

Lower Limb Deficiencies occur when a part of or the entire leg (lower limb) of a fetus fails to form completely during pregnancy. The defect is referred to as a "limb reduction" because a limb is reduced from its normal size or is missing.

Down syndrome (Trisomy 21) is a condition in which a baby is born with an extra chromosome. Chromosomes are small "packages" of genes in the body. They determine how a baby's body forms during pregnancy and how, as the baby grows in the womb and after birth, the baby's body functions. Normally, a baby is born with 46 chromosomes. Babies born with Down syndrome have an extra copy of one of these chromosomes. This extra copy changes the body's and brain's normal development and causes developmental and physical problems for the baby.

Little is known about the actual causes of birth defects. Chemicals in the environment remain a source of great public concern. The fetus is developing along with critical organ systems during pregnancy, and there are critical windows of development where environmental exposures could damage growth and function. More research is needed to study the links between environmental hazards and birth defects, which is why birth defects are part of the Tracking Network.

Researchers are studying the role of various factors as causes of birth defects, but studies cannot always provide a definitive answer about whether a particular exposure or risk factor is causal. Some birth defects are caused by genetic factors, some are caused by maternal factors such as the use of alcohol, cigarettes, illicit drugs; obesity and diabetes. Other birth defects are caused by use or exposure of some medications, infectious diseases and chemicals. The cause of most birth defects is unknown.

Non-environmental risk factors

Genetics

Some genetic changes have been associated with an increased risk of having a child with a birth defect. Chromosomes are small "packages" of genes in the body. Missing, damaged, or extra chromosomes can affect normal development and cause developmental and physical problems for the baby, including birth defects. Down syndrome (trisomy 21) is a genetic condition in which a baby is born with an extra copy of chromosome 21. Heart defects and gastrointestinal defects occur in some children with Down syndrome. The risk of having a baby with Down syndrome increases with the mother's age.[4]

Maternal behavior

Alcohol consumed during pregnancy has been found to cause a range of developmental problems, including fetal alcohol syndrome (FAS). Since many pregnancies are unintended and women do not always realize they are pregnant for several weeks or more, women may expose their unborn baby to alcohol without realizing it.[5] There is no known safe amount of alcohol to drink during pregnancy. FAS can be completely prevented if women do not drink during pregnancy. Children with FAS have one or more physical, behavioral, or learning problems. FAS is not currently one of the 12 select birth defects reported on by MN EPHT.

Maternal smoking during pregnancy has been associated with orofacial clefts, which includes conditions such as cleft lip and cleft palate.[6,7] Maternal periconceptional smoking and smoking in the first trimester has been associated with some congenital heart defects.[8,9] Some associations with orofacial clefts and congenital heart defects were stronger for mother who reported heavier smoking during pregnancy.[8,7] Environmental tobacco smoke (ETS) exposure has not been found to impact on the occurrence of orofacial clefts[6] or congenital heart defects.[8]

Studies do not agree as to whether drug use causes birth defects. Increased rates have been reported for methamphetamine, cocaine, and marijuana use and central nervous system defects, congenital heart defects, orofacial clefts, and birth defects of the limbs.[10] Drug use has also been reported as a risk factor for gastroschisis.[11] It is difficult to access illicit drug use and exposure due to underreporting and unknowns in exposure, dose, and combination of drugs used. Drug users may also have other adverse health behaviors that could affect birth outcomes.[10]

Maternal health conditions

Maternal obesity at the start of pregnancy is associated with a higher risk for a pregnancy affected by certain birth defects including congenital heart defects,[12,13,14] hypospadias,[12] cleft lip with cleft palate,[13] and limb reductions[12,13] among others.[12] Obese women have an increased risk of serious birth defects of the brain and spine (neural tube defects) like spina bifida and anencephaly.[12,13, 15]

Women with diabetes are at increased risk for having a baby born with a birth defect. One study using national birth defects data found pre-existing (type 1 or type 2) diabetes was more common among mothers of children born with central nervous system defects, congenital heart defects, orofacial clefts, hypospadias and limb deficiencies.[16] Mothers with gestational diabetes (diagnosed during pregnancy) are also at increased risk for having a baby born with a birth defect, but only those who are overweight or obese before pregnancy.[16]

Medications and Supplements

Little information is available about the safety of most medications during pregnancy because pregnant women are usually excluded from tests for drug safety for fear of harming the unborn baby. Pregnancy exposure registries, studies that collect health information from women who take medicines and vaccines when they are pregnant, are a way to learn about how medicines could affect a woman and her fetus.[17]

Some medications are known to cause birth defects. Medications that are known to interfere with fetal development and cause birth defects are called "teratogens." Examples of teratogens include thalidomide, one of the first drugs recognized to cause birth defects in humans;[18] Accutane® (generic name isotretinoin), a medication used to treat severe nodular or cystic acne that has not responded to other treatments;[19] and certain drugs used for the treatment of cancer and some types of arthritis such as methotrexate.[20] Accutane® (isotretinoin) is a synthetic form of vitamin A. High dietary intake of vitamin A through supplements has also been linked to birth defects,[21] and for this reason the National Academy of Science recommends a daily intake of vitamin A from food and supplements of 2,565 IU (770 mcg) for pregnant women. The Tolerable Upper Limit Intake Level, the highest level of daily intake that is likely to pose no risk of adverse health effects, is set at 10,000 IU (3,000 mcg) for pregnant women.[22]

A recent study found that treatment with opioid analgesics (prescription medications used to treat severe pain) was linked to birth defects including spina bifida, other central nervous system defects, gastroschisis, and congenital heart defects.[23] Two common opioid analgesic medications are codeine and oxycodone. Lower doses of opioids also might be included in some cough medicines.

Women with epilepsy who are treated with antiepileptic drugs during pregnancy are at increased risk of bearing children with a range of birth defects. The development of spina bifida is specifically associated with infants of women taking valproic acid and carbamazepine.[24,25] Antiepileptic drugs may cause neural tube defects by reducing folic acid or interfering with folic acid production.[26] The use of valproic acid has also been associated with other birth defects.[24]

Infections

Infections that occur during pregnancy may be passed to the fetus before or during birth. Some infectious diseases can cause birth defects.

- Cytomegalovirus (CMV) is a herpes virus that is spread through direct contact with body fluids of infected people. CMV is a common infection, but about half of pregnant women in the United States have never been infected with CMV.[27] For pregnant women, the two most common exposures to CMV are through sexual contact and through contact with the urine of young children with CMV infection.[27] If transmitted to the fetus, CMV infection can cause birth defects and other long-term health problems and disabilities.[28]
- Toxoplasmosis is an infection caused by the parasite *Toxoplasma gondii*. People can become infected with the parasite by eating raw or undercooked contaminated meat, or food contaminated by contact with raw or undercooked contaminated meat. Cats become infected after eating infected rodents or other infected material and can pass the parasite in feces for many weeks. Contact with material contaminated by an infected cat (litter boxes, soil or water) that results in the accidental ingestion of the parasite can also cause infection in people. If transmitted to the fetus, toxoplasmosis infection can cause problems with the nervous system, eyes, or other organs.[29]
- Lymphocytic choriomeningitis virus (LCMV) is a virus carried by wild mice and pet rodents. People can be infected with LCMV through contact with urine, blood, saliva, droppings, or nesting materials of infected rodents. LCMV can cause an infection that if passed to the fetus can cause severe birth defects of the nervous system or eyes.[30]
- Chicken pox (varicella) is a viral infection that is highly contagious and spreads from person-to-person. Chickenpox during the first half of pregnancy can cause congenital varicella syndrome, characterized by birth defects of the limbs, eye and brain damage, as well as skin lesions.[31] Chickpox is a vaccine-preventable disease.
- Rubella, also known as German measles, is a virus that causes mild infection in children and severe problems for a fetus whose mother is infected during the first trimester. Congenital rubella syndrome involves multiple organs and can cause birth defects of the eyes, heart, and central nervous system as well as hearing problems.[32] Rubella is a vaccine-preventable disease (rubella vaccine is contained in the measles-mumps-rubella (MMR) vaccine).

Some studies have shown that hyperthermia (abnormally high body temperature) during early pregnancy is associated with birth defects such as neural tube defects[33] and oral clefts.[34] Hyperthermia often occurs from a fever associated with illness, and increased risks may be due to the infectious disease, the fever, or medications used to treat the infectious disease and/or fever. Other causes of hyperthermia include extreme exercise or prolonged exposure to saunas, hot tubs, and electric blankets.[35]

<u>Environmental risk factors</u>

Compared to other risk factors for birth defects, our knowledge of environmental factors is even more limited. However, epidemiological data has shown that a few environmental contaminants cause birth defects, including some heavy metals, some solvents, and radiation. For most hazardous substances, a pregnant woman has to be exposed to them in large amounts and for a long time in order for them to harm her baby.[36]

Heavy metals

There is evidence from severe poisoning events that very high doses of organic mercury (methylmercury) in food can cause birth defects.[37] However, such events were caused by mercury levels that most people will likely not encounter in their diet or environment. Regardless, nearly all fish and shellfish contain mercury and some fish and shellfish contain levels of mercury that may harm an unborn baby or young child's developing nervous system.[38] Exposure to lead has not been found to cause birth defects,[39] but exposure to high levels of lead during pregnancy may cause miscarriage, premature birth, low birth weight, and developmental delays.[40]

Solvents

Solvents are a diverse group of chemicals used in paints, inks, dry cleaning, stain removers and in personal care products like detergents, perfumes and nail polish removal. Solvents are very common and low level exposure to solvents is widespread. The effects of consuming the solvent ethyl alcohol during pregnancy are well established: alcohol consumed during pregnancy has been found to cause a range of developmental problems, including fetal alcohol syndrome (FAS). Very high levels of solvent exposure, typical of inhalant abuse of toluene-containing paint or glue and higher than in an occupational setting, can result in birth defects and facial features similar to those seen in FAS.[41]

Radiation

Because cells that quickly divide are especially sensitive to radiation, radiation has the potential to harm a developing fetus. Radiation absorbed dose, or rad, depends on the procedure and the distance of the fetus from the radiation field. Gestational age and radiation dose determine potential health effects on the fetus.[42] Radiation risks are most significant during the early fetal period (weeks 2-18 of pregnancy) when organs and the brain are under rapid development.[43] Babies who receive a small dose of radiation (equal to 500 chest x-rays or less) at any time during pregnancy do not have an increased risk for birth defects.[43] When a fetus is exposed to large doses of radiation (above the dose received from 500 chest x-rays), especially during the early fetal period, the health consequences can be severe.[43] Based on animal studies, the dose of radiation to result in an increased incidence of birth defects in the human fetus is above 20 rad, higher than what is reached in most diagnostic procedures.[42]

<u>Environmental factors with suggestive evidence of causing birth defects</u>

There is concern among the public and health professionals about exposure to chemicals in air, water, food, soil, and consumer products during pregnancy. This concern is based more on the potential for harm from exposure during the critical time period of pregnancy rather than on the evidence of harm. Evidence linking birth defects to these chemicals is suggestive, and more research is needed.

Air pollution

Evidence linking air pollution exposure to birth defects is limited. Although toxicology studies have shown that maternal exposure to air pollution can cause birth defects in animals, recent epidemiology studies have found inconsistent results.[44,45,46]

Pesticides

There is much public concern about birth defects and pesticides, but studies on the effects of pesticides during pregnancy are not conclusive. Most animal studies on commonly used pesticides have not shown associations with birth defects.[47] The interaction between pesticides and birth defects in humans is not clear, but because pesticides are toxic chemicals used to kill or control pests they can be dangerous if not used properly.

Plastic Additives

Plastic additives, including phthalates and bisphenol A (BPA), are chemicals that give plastics useful properties such as strength, color or flexibility. Phthalates and BPA are two of a number of chemicals that have been implicated as endocrine disrupting chemicals.[48] Endocrine disrupting chemicals are a group of synthetic and natural chemicals that have the ability to alter or affect the endocrine system in animals and humans. The National Toxicology Program (NTP), a branch of the U.S. Department of Health and Human Services, reported on the toxicity of BPA and indicated negligible concern for birth defects and malformations.[49] For phthalates, the NTP indicates concern for adverse effects on development of the reproductive tract in male infants, but only for pregnant women undergoing certain medical procedures that result in high exposures to a certain phthalate. [50] Studies are continuing to look at the possible health effects of chemicals in plastic.

Preventing Causes of Birth Defects

Although the causes of many types of birth defects are unknown, some types of birth defects are preventable. Spina bifida and anencephaly, the two most common types of neural tube defects (NTDs), may be prevented if women have sufficient folic acid in their diet prior to becoming pregnant and during the pregnancy. Women need 400 micrograms of folic acid every day. Folic acid prevents 50-70% of NTDs, but it needs to be taken before becoming pregnant, as well as during pregnancy. Vitamin supplements are recommended because most women do not meet the minimum daily requirement through diet alone, and folic acid from dietary supplements is more easily absorbed in the body than naturally occurring forms of this essential vitamin. Fetal alcohol syndrome (FAS) can be completely prevented if women do not drink alcohol during pregnancy.

Not all birth defects can be prevented, but a woman can take some actions to increase her chance of having a healthy baby. The CDC recommends the following guidelines to prevent birth defects:[51]

- Take 400 micrograms (mcg) of folic acid every day for at least 1 month before getting pregnant and during pregnancy to help prevent neural tube defects (NTDs).
- Don't drink alcohol.
- Stop smoking.
- Don't use illegal drugs.
- If you have a medical condition, be sure it is under control. Reach and maintain a healthy weight.
- Talk to a health care professional about any medicines you are taking. This includes over-the-counter medicines and dietary or herbal supplements.
- Prevent infections by washing your hands and avoiding contact with materials that could cause infection like raw meat, dirty cat litter and rodent droppings.[52] Also, be sure that your vaccinations are up to date.
- See a health care professional regularly and get prenatal care as soon as possible. Keep all prenatal appointments.

Not all of the environmental agents that can harm a developing fetus are known but given the serious consequences of birth defects, a precautionary approach is warranted to protect women and their babies during pregnancy. Pregnant women should avoid exposure to heavy metals, high levels of solvents, and high doses of radiation. Pregnant women can limit their exposure to air pollution by limiting outdoor activities, especially exercise, on days when there's poor air quality. Because all pesticides are to some extent poisonous, pregnant women should reduce contact with pesticides when possible. Legislation has been put into place to reduce young children's exposure to plastic additives, such as the 2009 federal ban on the use of some phthalates from toys and any product children age 3 and younger use for sleeping, feeding, sucking or teething,[53] and the 2011 Minnesota ban of the sale of baby bottles and sippy cups with BPA.[54] MDH recommends that plastic food containers be treated with special care to avoid the possibility that significant quantities of BPA could be transferred from the plastic to the bottle contents.[55]

There are several Healthy People 2020 objectives in the Maternal, Infant, and Child Health (MICH) Topic Area that address birth defects, including a reduction in neural tube defects as well as preconception and pregnancy health behaviors that reduce and prevent birth defects.

Reduce neural tube defects (NTDs):

- Reduce the occurrence of spina bifida to 30.8 live births and/or fetal deaths per 100,000 live births *(MICH objective 28.1)*
- Reduce the occurrence of anencephaly to 22.1 live births and/or fetal deaths per 100,000 live births. *(MICH objective 28.2)*

For births from 2006 to 2008 to residents of Hennepin and Ramsey Counties, there were 34 live birth cases of spina bifida per 100,000 live births and 8 live birth anencephaly cases per 100,000 live births. The MDH Birth Defects Monitoring and Analysis Unit does not collect birth defects data from fetal deaths. With only 3 years of data and small numbers, there is not enough data to say whether Minnesota NTD rates are increasing or decreasing.

Preconception health behaviors that reduce and prevent birth defects:

- Increase the proportion of women delivering a live birth who took multivitamins or folic acid every day in the month prior to pregnancy to 33.1%. *(MICH objective 16.2)*
- Increase the proportion of women delivering a live birth who did not smoke prior to pregnancy to 85.4%. *(MICH objective 16.3)*
- Increase the proportion of women delivering a live birth who did not drink alcohol prior to pregnancy to 56.4%. *(MICH objective 16.4)*
- Increase the proportion of women delivering a live birth who had a healthy weight prior to pregnancy to 53.4%. *(MICH objective 16.5)*

MDH monitors multivitamin use, weight, alcohol use and smoking as part of the Pregnancy Risk Assessment Monitoring System (PRAMS), a CDC initiative that collects information on selected maternal experiences and behaviors before, during and after pregnancy. The most recently available data for Minnesota is from 2008.

- PRAMS data shows that among Minnesota mothers who had a live birth in 2008, almost 35% took a multivitamin daily before becoming pregnant.[56] Mothers who were younger, Hispanic, unmarried, or lower income were less likely to have reported using a pre-pregnancy vitamin daily.[56]
- Almost 53% of Minnesota mothers reported a body mass index in the normal range (BMI of 18.5-24.9).[56] Mothers who were older or Hispanic were less likely to have reported being in the normal range for BMI.[56]
- PRAMS data on prenatal substance exposures show that about 78% of Minnesota mothers reported that they did not smoke 3 months prior to pregnancy and about 36% of mothers reported that they did not drink alcohol 3 months prior to pregnancy.

Pregnancy health behaviors that reduce and prevent birth defects:

- Increase the proportion of pregnant women who abstain from alcohol to 98.3%. *(MICH objective 11.1)*
- Increase the proportion of pregnant women who abstain from smoking cigarettes during pregnancy to 98.6%. *(MICH objective 11.3)*

PRAMS data shows that during the last 3 months of pregnancy, almost 93% of Minnesota mothers reported abstaining from alcohol and about 88% reported abstaining from smoking cigarettes.[56] Mothers who were older, non-Hispanic, married, and have more education were more likely to have reported having any alcoholic drinks during the last 3 months of pregnancy. Mothers who were younger, non-Hispanic, unmarried, have less education, or lower income were more likely to have reported having smoked during the last 3 months of pregnancy.

Where to find more information:

The MDH Birth Defects Monitoring and Analysis Unit gathers data about babies born each year with certain health conditions diagnosed within the first year of life into the Birth Defects Information System (BDIS), as authorized by State of Minnesota statutory language (MS144.2215-2219). The mission of the Birth Defects Monitoring and Analysis Unit is to help children thrive, grow, and be as healthy as possible. The 2009 BDIS Annual Report includes birth defect rates for Minnesota based on active surveillance data and is available at www.health.state.mn.us/birthdefects.

The MDH Minnesota Children and Youth with Special Health Needs Program (MCYSHN) is the MDH program accountable for the performance of core public health functions for children with special health needs. MCYSHN has developed a series of fact sheets for over 40 of the most common birth defects, including most the 12 defects selected for inclusion into the Tracking Network. The fact sheets provide information such as a general description of the condition, prevalence, common associated conditions, short and long-term treatment and outcomes, common complications and implications for children's development. MCYSHN factsheets are available at http://www.health.state.mn.us/divs/fh/mcshn/bd.htm.

The parents of each baby with a birth defect in BDIS are sent a letter with information on the MDH Birth Defects Monitoring and Analysis Unit and on the MCYSHN program. The goal is to ensure appropriate public health resources are provided to the affected families. Families contacting MCYSHN receive advice on available/appropriate public health services and referrals to agencies and programs. Families needing assistance finding the right resources to meet the special needs of their child can contact the MCYSHN Information and Assistance Line at 651-201-3650 or toll free 1-800-728-5420.

Folic Acid

The MDH Birth Defects Monitoring and Analysis Unit created guidelines for physicians to use as a tool in determining the correct dose of folic acid a woman needs daily. The guidelines can be found at http://www.health.state.mn.us/divs/eh/birthdefects/doc/faguidelines.pdf/. In 2007 the Birth Defects Monitoring and Analysis Unit contracted with the Emergency and Community Health Outreach (ECHO) organization to produce a 20-minute television segment on the benefits of using folic acid to prevent birth defects. Each segment was developed in Cambodian, English, Hmong, Lao, Somali, Spanish and Vietnamese. The show was broadcast during January 2008, and continues to be available on the ECHO Web site and via DVD format from MDH. Call 651-201-3960 to order a DVD that includes all seven languages.

Tobacco

The MDH Tobacco Prevention and Control Office connects both the public and health professionals to valuable resources related to tobacco prevention including smoking cessation, information on the effects of tobacco use, educational materials to prevent tobacco use, and guidance on community-based tobacco prevention programs. More on the MDH Tobacco Prevention and Control Office can be found at http://www.health.state.mn.us/divs/hpcd/tpc/index.html

QUITPLAN Services is a free, professional counseling service that has helped over 17,000 Minnesotans successfully quit tobacco. Support is available to anyone who lives or works in Minnesota. ClearWay Minnesota, an independent, nonprofit organization, launched QUITPLAN Services in 2001. ClearWay Minnesota works to raise people's awareness of the dangers of tobacco use and to improve the health of all Minnesotans by reducing tobacco use and exposure to secondhand smoke through research, action and collaboration. More on QUITPLAN Services can be found at https://www.quitplan.com/ or by calling the QUITPLAN Helpline at 1-888-354-PLAN (7526). More on ClearWay Minnesota can be found at http://www.clearwaymn.org/

Medications

The CDC recently launched a Medications and Pregnancy website with research-based information on medication use and pregnancy, found at http://www.cdc.gov/ncbddd/pregnancy_gateway/meds/index.html. The Organization of Teratology Information Specialists (OTIS) provides fact sheets on exposures during pregnancy and breastfeeding that can be found at http://www.otispregnancy.org/. OTIS also answers questions through their toll-free hotline: 866-626-OTIS.

Mercury and Fish Consumption Advice

MDH provides advice on how often fish can safely be eaten by pregnant women and women who may become pregnant in order to reduce exposure to mercury, found at http://www.health.state.mn.us/divs/eh/fish/eating/safeeating.html

Air Quality

MN EPHT is working with the Minnesota Pollution Control Agency (MPCA) Air Quality Monitoring Program to track particulate matter and ozone pollution in Minnesota and to measure the public health impacts of these two pollutants. MPCA provides information on the quality of outdoor air, called the Air Quality Index (AQI). The MPCA uses four pollutants to calculate the AQI: ground level ozone, sulfur dioxide, carbon monoxide, and fine particulate matter. The AQI uses a number scale to tell Minnesotans how polluted the outdoor air is and possible effects on human health. Air quality alerts are issued when the AQI is elevated. An elevated AQI in Minnesota is commonly the result of high levels of either ozone or particulate matter. When an air quality alert is issued, the MPCA also provides Minnesotans with protective steps. For more information on the AQI or to sign up for air pollution health alerts, go to http://aqi.pca.state.mn.us/.

Consumer Products

Many people are concerned about chemicals in consumer products. To address this, MN EPHT's Biomonitoring Pilot Program is working closely with the MDH Public Health Laboratory to develop new state capacity for monitoring chemical exposure. One pilot project will measure pregnant women's exposure to a class of chemicals called environmental phenols, which are found in certain plastics, cosmetics and toiletries, and to cotinine, which is a metabolite of nicotine and an indicator of exposure to secondhand smoke. These chemicals were selected because of concerns that they may affect fetal development. For more information on this biomonitoring pilot project, visit http://www.health.state.mn.us/divs/hpcd/tracking/biomonitoring/projects/riverside.html.

MDH has also developed information to help people in making choices about bisphenol A (BPA) in the home to protect their families: http://www.health.state.mn.us/divs/eh/risk/chemhazards/bisphenola.html. MDH has a factsheet on BPA and breastfeeding, found at http://www.health.state.mn.us/divs/fh/mchatf/documents/bpafactsheet.pdf . More from MDH on endocrine disrupting chemicals can be found at http://www.health.state.mn.us/divs/eh/eissues/edc.html.

Birth Defects Data and Measures

The Tracking Network birth defects measures are prevalence rates of 12 selected birth defects per 10,000 live births aggregated over a 3-year period. However, because Minnesota does not have valid birth defects data before 2006, all MN EPHT birth defects measures are for birth years 2006 to 2008. When there are sufficient numbers, birth defects NCDMs will be stratified by maternal race/ethnicity, infant sex, and maternal age. Data are only available on children whose mothers were residents of Hennepin and Ramsey counties at the time of birth.

Birth defect data for the measures are from the Minnesota Birth Defects Information System (BDIS). BDIS collects information on 45 defects from 14 facilities that represent all birthing hospitals and neonatal intensive care units (NICUs) in Hennepin and Ramsey counties plus Mayo Clinic, with an estimated capture of approximately 50% of all births in Minnesota. BDIS data are linked to Minnesota birth certificate data to determine maternal race, maternal ethnicity, and maternal county of residence at birth. Diagnosis of cases may be made up to one year of age. The number of live-born infants in the geographic region of interest is from birth certificates filed with the MDH Office of the Registrar for calendar years 2006-2008. Birth certificate data are collected from various sources including the mother, clinic, and hospital.

Residency is determined by address at time of birth as listed on the birth certificate. Birth certificates with an unknown address were excluded. Race and ethnicity categories for births are based on the race and ethnicity of the mother as reported on the birth certificate. Hispanic ethnicity includes anyone indicating they are of Hispanic descent regardless of race. Race categories include persons of non-Hispanic origin.

Because birth defect rates include only three years of data, the rates may vary considerably compared with data from other states that have been collecting birth defects information for a longer time period. Rates may vary depending upon the type of surveillance system that each state uses to collect data. In Minnesota, an active surveillance system is used to collect data from hospitals in Hennepin and Ramsey counties. Another type of surveillance used by some states is passive surveillance, which relies on hospital reporting and may have bias due to under- or over-reporting.

When the number of cases within a group is small or the population from which the cases are determined is small, the risk of allowing a specific individual to be identified may be deemed too large to be acceptable. MN EPHT and BDIS suppress numbers of birth defects less than 5 to protect data privacy. Rates based on numbers less than 5 are not calculated. In addition, rates based on numbers shown as less than 10 are not calculated. Rates have been rounded to the nearest tenth of a percent.

Prevalence of Birth Defects in Minnesota

Figure 1 shows counts for the 12 selected birth defects for Hennepin and Ramsey counties, aggregated from 2006 to 2008. In 2006 through 2008, there were 6 cases of anencephaly, 25 cases of spina bifida without anencephaly, 16 cases of hypoplastic left heart syndrome, 38 cases of Tetrology of Fallot, 34 cases of transposition of great arteries, 46 cases of cleft palate without cleft lip, 75 cases of cleft lip with and without cleft palate, 185 cases of hypospadias, 34 cases of gastroschisis, 11 cases of upper limb reduction deformity, 5 cases of lower limb reduction deformity, and 107 cases of Down syndrome among live births to Minnesota mothers residing in Hennepin and Ramsey counties. MDH collects information about additional birth defects which are not shown in this report.

Figure 1: *Counts of select birth defects per 10,000 live births, Hennepin and Ramsey counties, Minnesota, aggregated from 2006 to 2008.*

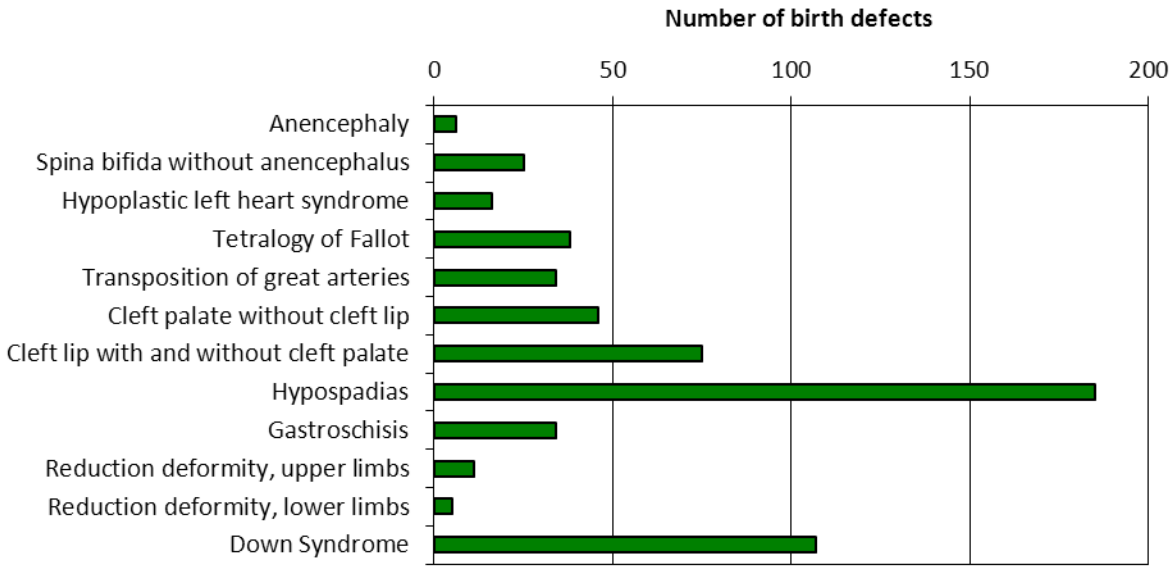

Table 1 shows counts and prevalence rates for the 12 selected birth defects by race and ethnicity for Hennepin and Ramsey counties, aggregated from 2006 to 2008 per 10,000 live births. For data aggregated from 2006 to 2008, the highest rates of birth defects were for hypospadias, followed by Down syndrome. There were 49.9 cases of hypospadias per 10,000 live male births and 14.6 cases of Down syndrome per 10,000 live births. Rates for counts <5 are not calculated. Counts are shown as <10 for certain defects because the individual counts by race and ethnicity could be calculated if counts of 5-9 were shown in the table. Because of the small numbers of defects observed in this dataset, it is difficult to draw conclusions about the differences in birth defect rates between race and ethnicity categories. More extensive interpretation will be possible in future years when greater numbers of children with birth defects will be available for aggregate analysis.

Table 1: *Counts and prevalence rates of select birth defects per 10,000 live births by race/ethnicity, Hennepin and Ramsey counties, Minnesota, aggregated from 2006 to 2008.*

		Non-Hispanic White	Non-Hispanic Black or African	Hispanic	Asian or Pacific Islander	American Indian or Alaskan Native	Other/ Unknown	Total
Anencephaly	Count	<5	<5	<5	<5	<5	<5	6
	Rate	**	**	**	**	**	**	*0.8*
Spina bifida without anencephalus	Count	17	<5	<5	<5	<5	<5	25
	Rate	*4.4*	**	**	**	**	**	*3.4*
Hypoplastic left heart syndrome	Count	12	<5	<5	<5	<5	<5	16
	Rate	*3.1*	**	**	**	**	**	*2.2*
Tetralogy of Fallot	Count	21	8	<5	5	<5	<5	38
	Rate	*5.4*	*6.0*	**	*5.9*	**	**	*5.2*
Transposition of great arteries	Count	16	6	<5	7	<5	<5	34
	Rate	*4.1*	*4.5*	**	*8.2*	**	**	*4.7*
Cleft palate without cleft lip	Count	23	5	9	<5	<5	<5	46
	Rate	*5.9*	*3.8*	*10.3*	**	**	**	*6.3*
Cleft lip with and without cleft palate	Count	40	10	13	7	<5	<5	75
	Rate	*10.3*	*7.5*	*14.8*	*8.2*	**	**	*10.3*
Hypospadias*	Count	109	34	13	8	0	21	185
	Rate	*55.3*	*50.2*	*29.3*	*18.3*	*0*	*77.0*	*49.9*
Gastroschisis	Count	11	6	7	8	<5	<5	34
	Rate	*2.8*	*4.5*	*8.0*	*9.4*	**	**	*4.7*
Reduction deformity, upper limbs	Count	<5	<5	<5	<5	<5	<5	11
	Rate	**	**	**	**	**	**	*1.5*
Reduction deformity, lower limbs	Count	<5	<5	<5	<5	<5	<5	5
	Rate	**	**	**	**	**	**	*0.7*
Down syndrome	Count	44	27	15	<10	<10	12	107
	Rate	*11.3*	*20.3*	*17.1*	‡	‡	*44.0*	*14.6*

*Hypospadias rate is per 10,000 MALE live births.

**Rate is not calculated when based on a count <5.

‡Count is shown as <10 because the individual counts could be calculated if counts of 5-9 were shown in the table. Rate is not calculated when count is shown as <10.

Table 2 shows counts and prevalence rates for selected birth defects by infant sex for Hennepin and Ramsey counties, aggregated from 2006 to 2008 per 10,000 live births. Counts are shown as <10 for certain defects because the individual counts by sex could be calculated if counts of 5-9 were shown in the table. Data from other states and national studies show that certain birth defects are more common in one sex versus the other. However, the relatively small numbers of defects in this dataset preclude drawing any conclusions about the differences in birth defect rates between male and female children. More extensive interpretation will be possible in future years when greater numbers of children with birth defects will be available for aggregate analysis.

Table 2: *Counts and prevalence rates of select birth defects per 10,000 live births by infant sex, Hennepin and Ramsey counties, Minnesota, aggregated from 2006 to 2008.*

Defect		Female	Male	Total
Anencephalus	Count	<5	<5	6
	Rate	***	***	*0.8*
Spina bifida without anencephalus	Count	10	15	25
	Rate	*2.8*	*4.0*	*3.4*
Hypoplastic left heart syndrome	Count	8	8	16
	Rate	*2.2*	*2.2*	*2.2*
Tetralogy of Fallot	Count	16	22	38
	Rate	*4.5*	*5.9*	*5.2*
Transposition of great arteries	Count	9	25	34
	Rate	*2.5*	*6.7*	*4.7*
Cleft palate without cleft lip	Count	32	14	46
	Rate	*8.9*	*3.8*	*6.3*
Cleft lip with and without cleft palate	Count	20	55	75
	Rate	*5.6*	*14.8*	*10.3*
Hypospadias*	Count	N/A	185	185
	Rate	*N/A*	*49.9*	*49.9*
Gastroschisis	Count	21	13	34
	Rate	*5.8*	*3.5*	*4.7*
Reduction deformity, upper limbs‡	Count	<10	<10	11
	Rate	*‡*	*‡*	*1.5*
Reduction deformity, lower limbs‡	Count	<10	<10	5
	Rate	*‡*	*‡*	*0.7*
Down syndrome	Count	52	55	107
	Rate	*14.5*	*14.8*	*14.6*

*Hypospadias total rate is per 10,000 MALE live births.

**Rate is not calculated when based on a count <5.

‡Counts are shown as <10 because the individual counts could be calculated if counts of 5-9 were shown in the table. Rate is not calculated when count is shown as <10.

Table 3 shows Down syndrome (Trisomy 21) counts and prevalence rates by maternal age for Hennepin and Ramsey counties, aggregated from 2006 to 2008 per 10,000 live births. A large number of studies have shown that advanced maternal age is a known risk factor for Down syndrome. The data for Hennepin and Ramsey counties in 2006-2008 support that observation.

Table 3: *Counts and prevalence rates of Down syndrome (Trisomy 21) per 10,000 live births by maternal age, Hennepin and Ramsey counties, Minnesota, aggregated from 2006 to 2008.*

Defect		Maternal age <35 Years	Maternal age 35 Years or Greater	Total
Down syndrome	Count	63	44	107
	Rate	*10.4*	*33.9*	*14.6*

Strengths and Limitations of Data Source and Measures

Ideally, incidence rates would be used instead of prevalence to measure birth defects occurrence. The numerator of the incidence would be the number of new cases of a particular birth defect in an area and time period and the denominator would be the number of conceptions at risk of developing that particular birth defect in that area and time period. Because both the number of conceptions is unknown and the number of cases "lost" through spontaneous abortions (as well as terminations and later fetal losses depending on the source of ascertainment for the specific surveillance system), incidence cannot be calculated. Prevalence is the only appropriate measure that can be reported for birth defects occurrence.

These data cannot tell us what causes birth defects, or factors that lead to changes in birth defect rates. Environmental exposure-related causes of birth defects are only one potential piece of a puzzle that includes many other factors such as access to and quality of health care, maternal characteristics, genetic factors, and behavioral factors. Little is known about the actual causes of most birth defects.

MN EPHT birth defects measures are for birth years 2006 to 2008 because Minnesota does not have valid birth defects data before 2006. Because birth defect rates are based on only three years of aggregated data, the rates may vary considerably when compared with data from other states that have been collecting birth defects information for a longer time period.

Although the Minnesota Birth Defects Information System (BDIS) collects information from facilities estimated to capture approximately 50% of all births in Minnesota, population-based surveillance is only possible in Hennepin and Ramsey counties. About one-third of all births in the state are among residents of these two counties.

There are small differences between data found in this report and data reported in the 2009 Birth Defects Surveillance Report published by MDH's Birth Defects Monitoring and Analysis Unit. This report uses a more accurate way of grouping defects into the appropriate categories, developed by Birth Defects Monitoring and Analysis Unit staff, with the implementation of a new birth defects database in 2010. Future Birth Defects Surveillance Reports will utilize this new way of categorizing birth defects as well.

In Minnesota, an "opt-out" clause that allows a parent to exclude their child from the system and remove any personally identifying information on that child from the system makes it impossible to generate population-based measures in areas smaller than counties.

Timeliness is a limitation of BDIS. Because diagnosis of cases may be made up to one year of age and data must be validated and checked for completeness, the final birth file for a particular calendar year takes about a year and a half after the end of the calendar year to be available for epidemiological use.

Residential information is very important when examining environmental exposures that occur before birth. A limitation of the data source is that the place of residence during pregnancy may not be represented by maternal residence at time of birth. Address data at conception would be a more relevant time period for birth defects-related exposure than address data at delivery. Adoption replaces demographic characteristics of the birth mother (including mother's race/ethnicity) with those of the adoptive mother. Replacement of birth mother address with adoptive mother address further biases the place of residence data element.

Acronyms

AQI	Air Quality Index
BDIS	Birth Defects Information System
CDC	Centers for Disease Control and Prevention
EPHT	Environmental Public Health Tracking
FAS	Fetal alcohol syndrome
ETS	Environmental tobacco smoke
MDH	Minnesota Department of Health
MN EPHT	Minnesota Environmental Public Health Tracking
MCYSHN	Minnesota Children and Youth with Special Health Needs
MPCA	Minnesota Pollution Control Agency
NCDM	Nationally Consistent Data and Measures
NTD	Neural tube defect
PRAMS	Pregnancy Risk Assessment Monitoring System

Glossary

Active surveillance: with respect to birth defects, active surveillance means actively seeking and abstracting medical records at birthing hospitals, neonatal intensive care units, and other data sources to determine whether suspected birth defects cases meet all case criteria

Air Quality Index (AQI): an index for reporting daily air quality, ranging from 0 to 500, focusing on how clean or polluted the air is and the health effects that might result within a few hours or days after breathing; EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act (ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide)

Birth Defects Information System (BDIS): established at MDH in 2005, the information system collects data on 45 birth defects at all birthing hospitals in Hennepin and Ramsey Counties to monitor prevalence trends in birth defects and provide information on the risks for birth defects

CDC: the Centers for Disease Control and Prevention, a part of the U.S. Department of Health and Human Services, is the national public health agency that works to ensure protection of human health

Congenital: present at birth

Environmental Public Health Tracking (EPHT): the ongoing collection, integration, analysis, interpretation, and dissemination of data from environmental hazard monitoring, and from human exposure and health effects surveillance

Environmental tobacco smoke (ETS): also known as secondhand smoke; includes smoke from burning cigarettes, cigars, or pipes and exhaled mainstream smoke; contains at least 250 chemicals known to be toxic and more than 50 possible carcinogens

Folic acid: a B vitamin that is a key factor in the synthesis (the making) of nucleic acid (DNA and RNA) and can be found in vitamin pills and some enriched foods, like cereals or pastas. Lack of folic acid during pregnancy has been found to increase the risk for neural tube defects (NTDs)

Gestational age: the age of a fetus since conception or since the first day of the last menstrual period; expressed in completed weeks and categorized as term (after 37 weeks gestation), preterm (less than 37 weeks gestation), and very preterm (less than 32 weeks gestation)

Healthy People 2020: a set of goals and objectives with 10-year targets designed to guide health promotion and disease prevention effects to improve the health of all Americans; contains objectives in 28 focus areas to establish benchmarks and monitor progress

Incidence: the number of new cases of a condition, symptom, death, or injury that arise during a specific period of time, often expressed as a percentage of a population; shows the likelihood that a person in that population will be affected by the condition

Infant death: the death of a live-born child before his or her first birthday

Measure: for tracking, a measure is a specific way to calculate a value from the data describing population health, hazard or exposure; measures should be clearly and uniquely defined such that, given the appropriate data, the value of the measure could be calculated in a consistent fashion (like a statistic)

Minnesota Children and Youth with Special Health Needs (MCYSHN): the MDH program accountable for the successful performance of core public health functions for children and youth with special health needs, their families and communities

Minnesota Department of Health (MDH): the state government agency in Minnesota that focuses on protecting, maintaining and improving the health of all Minnesotans; consists of seven major divisions, including Community and Family Health, Compliance Monitoring, Environmental Health, Health Policy, Health Promotion and Chronic Disease, Infectious Disease Epidemiology Prevention and Control, and Public Health Laboratory

Minnesota Environmental Public Health Tracking Program (MN EPHT): As defined in Minnesota Statutes, section 144.995, a state program for the ongoing collection, integration, interpretation, and dissemination of environmental hazard, exposure, and health effects data. MN EPHT produces a network or system of integrated data in the state about environmental hazards, population exposure, and health outcomes; MN EPHT works in partnership with other states as part of CDC's National Environmental Public Health Tracking Network (Tracking Network)

Minnesota Pollution Control Agency (MPCA): monitors environmental quality, offers technical and financial assistance, and enforces environmental regulations to continue moving Minnesota toward environmental excellence, consists of offices in eight cities across Minnesota

National Environmental Public Health Tracking Network (Tracking Network): a web-based, secure network of standardized health and environmental data; the Tracking Network is a product of CDC's National Environmental Public Tracking Program, drawing data and information from state and local tracking networks as well as national-level and other data systems; it provides the means to identify, access, and organize hazard, exposure, and health data from these various sources and to examine and analyze those data on the basis of their spatial and temporal characteristics

Nationally Consistent Data and Measures (NCDM): a single set of national standards for data collection, analysis and reporting to enable CDC to compile a core set of nationally consistent data and measures across multiple states

Neural tube: a narrow channel that folds and closes during the third and fourth weeks of pregnancy to form the brain and spinal cord

Neural tube defect (NTD): birth defects of the brain and spinal cord; the two most common neural tube defects are spina bifida and anencephaly

Passive surveillance: with respect to birth defects, passive surveillance means receiving and tracking birth defects case reports from birthing hospitals, neonatal intensive care units, or other data sources without validation

Preterm birth: a baby born before full term (<37 weeks gestation)

Prevalence: the number of new and pre-existing cases of a condition, symptom, death, or injury among persons alive on a certain date; a function of both the incidence of the condition and survival

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CDC: http://www.cdc.gov
NIH: http://www.nlm.nih.gov and http://www.niehs.nih.gov
EPA: http://www.epa.gov

Birth Defects Resources

Minnesota Environmental Public Health Tracking
http://www.health.state.mn.us/tracking/

Minnesota Department of Health, Birth Defects Program
http://www.health.state.mn.us/birthdefects

Minnesota Department of Health, Minnesota Children with Special Health Needs (MCSHN)
http://www.health.state.mn.us/divs/fh/mcshn/

The Minnesota Department of Health does not endorse any opinion, report, product or service described in the following links.

National Environmental Public Health Tracking Network
http://ephtracking.cdc.gov

CDC Reproductive Health
http://www.cdc.gov/reproductivehealth/

CDC Birth Defects
http://www.cdc.gov/ncbddd/bd/

National Birth Defects Prevention Network
http://www.nbdpn.org/

March of Dimes
http://www.marchofdimes.com/

Minnesota Organization on Fetal Alcohol Syndrome (MOFAS)
http://www.mofas.org/

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