

Maternal and Child Health

Context for Health

The well-being of a community's mothers, infants and children are not only signs of their current health status, but also predictors of the health of the rising generation.¹ Thus, maternal and child health (MCH) represents an important sector of the public health system in Pennsylvania.

Indicators such as preterm birth, low birth weight (LBW) and infant mortality often serve as benchmarks for the health of a population, as well as for the health care access and quality.² Efforts to promote early initiation of prenatal care and advances in the field of biomedicine have led the U.S. infant mortality rate to decline from 12.6 deaths per 1,000 live births in 1980 to 6.1 per 1,000 live births in 2010,³ and Pennsylvania's infant mortality rate to drop from 13.2 deaths per 1,000 live births to 7.3 deaths per 1,000 live births over the same period.^{4,5} Still, the U.S. infant mortality rate exceeds those of most other developed countries.^{6,7}

In fact, in recent years, U.S. infant mortality rates have been highest among the 30 developed countries that comprise the Organization for Economic Cooperation and Development (OECD).⁸ Disproportionately high rates of preterm births and low birth weight infants, relative to the other OECD nations, may affect infant mortality trends.⁹

Preterm births and LBW prevalence have been on the rise over the last 30 years, leading to a growing consensus that improving coverage, content and use of prenatal care is a necessary step in reducing the risk of adverse pregnancy outcomes. However, at the same time, many experts agree that focusing solely on the prenatal period is inadequate and attention must be paid to improving "preconception health," the health of women of reproductive age before they become pregnant.^{7,10,11}

As noted in a report from a committee of the Centers for Disease Control and Prevention (CDC) that focused on preconception health and health care,¹² diabetes, hypertension, obesity and sexually transmitted infections are among the medical conditions that can cause adverse pregnancy outcomes among women of reproductive age. In addition, women can unknowingly increase the risk of adverse pregnancy outcomes through use of medications, alcohol, tobacco and other substances. Outreach and education can help reduce these risks, as can preconception care which includes interventions aimed to identify and modify biomedical, behavioral and social risks to a woman's health and future pregnancies.¹³

Topics in this section include:

- Risk factors (i.e., unintended pregnancy, adolescent pregnancy and childbearing, postpartum depression)
- Protective factors (i.e., contraception, breastfeeding, newborn and childhood screening)
- Adverse birth outcomes (i.e., preterm birth, low birth weight, infant mortality)
- Children with special health care needs
- Emotional health of children

Endnotes

¹ Pincus, H. A., Thomas, S. B., Keyser, D. J., Castle, N., Dembosky, J. W., Firth, R., ... Scholle, S. (2005). *Improving maternal and child health care: a blueprint for community action in the Pittsburgh region*. Retrieved from http://www.rand.org/content/dam/rand/pubs/monographs/2005/RAND_MG225.pdf

² Taylor, Y. J. & Nies, M. A. (2013). Measuring the impact and outcomes of maternal child health federal programs. *Maternal and Child Health Journal*, 17, 886-896. doi: 10.1007/s10995-012-1067-y

- ³ Hamilton, B. E., Hoyert, D. L., Martin, J. A., Strobino, D. M., & Guyer, B. (2013). Annual summary of vital statistics: 2010-2011. *Pediatrics*, *131*, 548-558. doi:10.1542/peds.2012-3769
- ⁴ US Census Bureau. (2011). Table 116 Infant mortality rates by race, states, and island areas: 1980-2007. *Statistical Abstract of the United States: 2012* (131st Ed.) Washington, DC, 2011. Retrieved from <http://www.census.gov/compendia/statab/2012/tables/12s0116.pdf>, <http://www.census.gov/compendia/statab/2012/tables/12s0116.pdf>, and <http://www.census.gov/compendia/statab/2012/tables/12s0116.pdf>
- ⁵ Murphy, S. L., Xu, J., & Kochanek, K. D. (2013). Deaths: Final data for 2010. *National Vital Statistics Reports*, *61*(4). Retrieved from www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_04.pdf
- ⁶ Atrash, H., Jack, B. W., Johnson, K., Coonrod, D. V., Moos, M., Stubblefield, P. G., et al. (2008). Where is the “W”oman in MCH? *American Journal of Obstetrics & Gynecology*, *199* (Suppl 2), S259-S265. doi: 10.1016/j.ajog.2008.08.059
- ⁷ Lu, M. (2010). We can do better: Improving perinatal health in America. *Journal of Women’s Health*, *19*, 569-574. doi: 10.1089/jwh.2009.1415
- ⁸ Hamilton, B. E., Hoyert, D. L., Martin, J. A., Strobino, D. M., & Guyer, B. (2013). Annual summary of vital statistics: 2010-2011. *Pediatrics*, *131*, 548-558. doi:10.1542/peds.2012-3769
- ⁹ Lau, C., Ambalavanan, N., Chakraborty, H., Wingate, M. S., & Waldemar, A. C. (2013). Annual summary of vital statistics: 2010-2011. *Pediatrics*, *131*, 855-860. doi:10.1542/peds.2012-2471
- ¹⁰ ACOG Preconception Work Group. (2005). The importance of preconception care in the continuum of women’s health care. *Obstetrics and Gynecology*, *106*, 665-666.
- ¹¹ CDC. (2006). Recommendations to improve preconception health and health care - United States: A report of the CDC/ATSDR Preconception Care Work Group and the Select Panel on Preconception Care. *MMWR*, *55* (RR-6), 1-21.
- ¹² Preconception Health and Health Care Steering Committee (PCHHC), Centers for Disease Control and Prevention. (2011). *Action plan for the national initiative on preconception health and health care 2012-2014: a report of the PCHHC steering committee*. Retrieved from <http://www.cdc.gov/preconception/documents/actionplannationalinitiativepchhc2012-2014.pdf>
- ¹³ Posner, S. F., Johnson, K., Parker, C., Atrash, H., & Biermann, J. (2006). The National summit on preconception care: a summary of concepts and recommendations. *Maternal and Child Health Journal*, *10* (5 Suppl), S197-S205.

Unintended Pregnancy

The term “unintended pregnancy” typically includes both unwanted pregnancies (i.e., occur to a woman who does not want a child, or more children, at this or any future point in her life) and mistimed pregnancies (i.e., occur to a woman who does want a child, or more children, but at some point in the future).⁸ This definition has some limitations. Notably, it relies on the assumption that pregnancy is a conscious decision, when it sometimes may not be.¹ In addition, a lack of desire for pregnancy is not necessarily indicative of a woman’s reaction to an unintended pregnancy or her feelings at the time of her baby’s birth.² Still, if a pregnancy is unplanned and unintended, the woman may not be in optimal health for childbearing.

About half of all U.S. pregnancies are unintended.³ According to estimates based on the National Survey of Family Growth (NSFG) from 1982 and 2006-2010, the proportion of births that are unintended has remained relatively stable over time.⁴

Unintended pregnancy has been associated with late initiation of prenatal care; inadequate use of prenatal care; high-risk behaviors (e.g., alcohol use, tobacco use) during pregnancy;^{2,5,6} increased risks for preterm birth, low birth weight,⁷ and postpartum depression;⁸ decreased breastfeeding initiation and continuation;³ and increased medical costs.^{9,10} The U.S. Department of Health and Human Services has identified a Healthy People 2020 goal for the nation of increasing the proportion of intended pregnancies to 56 percent. Implicitly, this goal means reducing the proportion of unintended pregnancies to 44 percent.

Data Sources

Estimates of pregnancy intention in this report are based on data from the Pennsylvania Pregnancy Risk Assessment Monitoring System (PA PRAMS). First developed by the Centers for Disease Control and Prevention (CDC) in 1987, PRAMS collects state-specific, population-based data on maternal attitudes and experiences before, during and shortly after pregnancy for the purpose of improving the health of mothers and infants by reducing adverse outcomes (e.g., low birth weight, infant morbidity and mortality, maternal morbidity). Currently, 37 states and New York City participate in PRAMS, representing about 75 percent of all U.S. births.¹¹ Pennsylvania has collected PRAMS data since 2007.

PRAMS’ population is selected randomly from the state registry of birth certificates and includes only women whose pregnancies result in live births. Those whose pregnancies end in miscarriage, stillbirth, or abortion are not included. As a result, “unintended pregnancy” data is likely underestimated.

Between 2007 and 2010, PA PRAMS randomly selected 5,981 women who had given birth within the previous two to nine months for possible participation. Paper questionnaires were mailed to the women; if they didn’t return it, PRAMS staff attempted to reach them and complete the questionnaire by phone. In total, 65 percent of the nearly 6,000 women completed the questionnaire. PRAMS data are weighted for sample design, non-response and non-coverage using the official population data provided by the state’s Vital Statistics department.¹²

PRAMS Results

To gauge pregnancy intention and whether it was wanted, PRAMS participants are asked: “Thinking back to just before you got pregnant with your new baby, how did you feel about becoming pregnant?” Response options include: “I wanted to be pregnant sooner”; “I wanted to be pregnant later”; “I wanted to be pregnant then”; “I didn’t want to be pregnant then or at any time in the future”; and “I don’t know.”

For the assessment of intention, responses of “sooner” and “then” are classified as intended pregnancies at time of conception; responses of “later” and “never” are classified as unintended pregnancies at time of conception.

For the assessment of wantedness, responses of “sooner,” “then” and “later” are classified as wanted pregnancies at time of conception; responses of “never” are classified as unwanted pregnancies at time of conception.

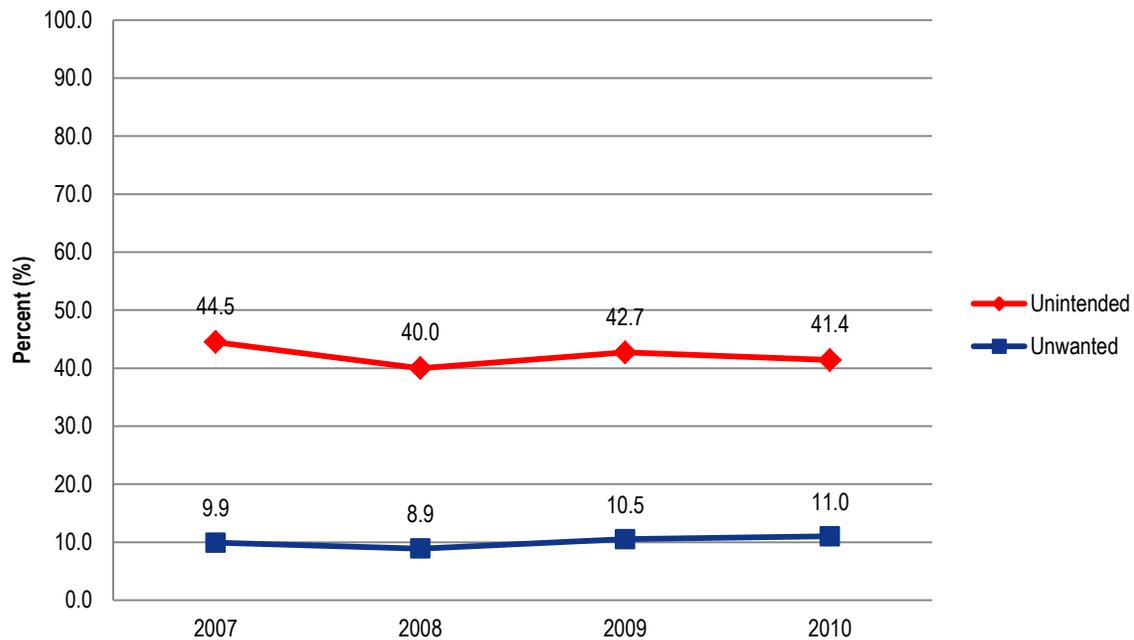
In both cases, the response “I don’t know” is not included in assessment.

An examination of aggregate PRAMS data for Pennsylvania from 2007 to 2010 shows that 41.9 percent (95% CI [40.1%, 43.7%]) of participants indicated their pregnancy was unintended. Despite slight variations in annual rates, the

proportion of pregnancies that were unintended remained relatively stable from 2007 to 2010. The respective rates of unintended pregnancy in each of these years were 44.5 percent, 40.0 percent, 42.7 percent and 41.4 percent. By comparison, in 2008, the most recent year for which PRAMS estimates are available for other states, unintended pregnancy rates ranged from a low of 29.6 percent (95% CI [26.3%, 33.2%]) in New York to a high of 58.3 percent (95% CI [55.1%, 61.5%]) in Mississippi.¹³

The proportion of aggregated 2007-2010 Pennsylvania PRAMS participants who indicated their pregnancy was unwanted at the time of conception was considerably lower than the proportion who said it was unintended: 10.1 percent (95% CI:9.0-11.3%). The annual unwanted pregnancy rates from 2007 to 2010 did not differ significantly; these rates were 9.9 percent, 8.9 percent, 10.5 percent and 11.0 percent, respectively.

Figure 7.1 Estimated Unintended and Unwanted Pregnancies, Pennsylvania, 2007 to 2010¹⁴



Risk and Protective Factors

All women of childbearing age (15 to 44 years old) are at risk for an unintended pregnancy. However, the most recent estimates suggest that the rates of unintended pregnancy for women who are 18 to 24 years old, economically disadvantaged, or cohabitating are two to three times higher than the national rate.¹

The majority of unintended pregnancies can be attributed to inconsistent use, or nonuse, of contraceptives.¹⁵ Programs designed to increase knowledge about the array of effective modern contraceptive options, and those to support consistent and correct use of contraceptive methods among sexually-active individuals interested in delaying or avoiding pregnancy can help to decrease the rate of unintended pregnancies.

The high rate of unintended pregnancy highlights the importance of healthy behaviors for all women of childbearing age, to ensure that they are in optimal health should they become pregnant regardless of their pregnancy intention. Recommended behaviors^{16,17} include:

- Folic acid supplementation, of 400 micrograms daily
- Healthy diet and weight maintenance
- Regular physical activity
- Preventive health services, on a routine basis
- Care for chronic health conditions (e.g., asthma, diabetes, hypertension, thyroid disease)

Intervention Strategies

The Department of Health has undertaken several initiatives to reduce the pregnancy rate in the commonwealth. The Bureau of Family Health (BFH) is in receipt of the Federal Personal Responsibility Education Program (PREP) funds. The BFH uses the PREP funds to implement two evidence-based teen pregnancy prevention curricula, Street Smart and Rikers Health Advocacy Program (RHAP). These curricula are used to educate high risk youth at residential and partial drug and alcohol treatment facilities, residential and partial mental health treatment facilities, and facilities for dependent and delinquent youth on how to prevent pregnancy, sexually transmitted diseases (STDs) and HIV. The BFH is also in receipt of the Title V State Abstinence Education Grant. These funds are used to implement abstinence only education programs for youth ages 9-14.

Funds from the Maternal and Child Health Services Block Grant (MCHSBG) are utilized for the four family planning councils in the commonwealth to provide reproductive health services to teens 17 years of age and younger. MCHSBG funds are also used to support Health Resource Centers (HRCs) in schools in Philadelphia, Chester City and Bucks County. HRC services include: counseling and education around abstinence, health, decision making and sexuality; availability of safer sex materials; and referrals to school and community-based resources inclusive of sexual and reproductive health care. In the western part of the state MCHSBG funds are used to support the implementation of three evidence-based programs: Focus on Kids, Reducing the Risk, and Promoting Health Among Teens: Comprehensive Abstinence and Safer Sex Intervention for middle and high school students. The BFH also supports the Safe Teens website: www.safeteens.org. This website provides reliable health information, including self-esteem and bullying. The website also includes a parent and educator section.

The Department of Health, in collaboration with the Department of Education and community partners developed the Teen Game Plan. This tool was developed as part of an Action Learning Collaborative (ALC) sponsored by the Association of Maternal and Child Health Programs (AMCHP) and Association of State and Territorial Health Officials (ASTHO). The goal of the ALC was to increase awareness of the life course perspective and to inform parents and healthcare providers about the stages of adolescent development. The Teen Game Plan was designed to encourage youth to think about the future and how the decisions they make now impact their ability to reach their goals. The Teen Game Plan addresses: career choices, personal health habits, sexual health, vaccines, emotional health, and financial planning. Additionally, there is an accompanying adult guide for parents, teachers, coaches, school nurses or any adult who has a relationship with a teenager. The adult guide is designed to be used with the Teen Game Plan and to give trusted adults the communication skills needed to talk about life planning and help provide information and support for youth to make healthy decisions. Both the Teen Game Plan and the adult guide are available on the Department of Health website.

Endnotes

¹ Santelli, J., Rochat, R., Hatfield-Timajchy, K., Gilbert, B. C., Curtis, K., Cabral, R., ... Schieve, L. (2003). The measurement and meaning of unintended pregnancy. *Perspectives on Sexual and Reproductive Health, 35*, 94–101.

² Trussell, J., Vaughan, B., & Stanford, J. (1999). Are all contraceptive failures unintended pregnancies? Evidence from the 1995 National Survey of Family Growth. *Family Planning Perspectives, 31*, 246–247, 260.

³ Finer, L. B. & Zolna, M. R. (2011). Unintended pregnancy in the United States: Incidence and disparities, 2006. *Contraception, 84*, 478–485.

⁴ Mosher, W. D., Jones, J., & Abma, J. C. (2012, July 24). Intended and unintended births in the United States: 1982–2010. *National Health Statistics Reports, 55*, 1–28. Hyattsville, MD: National Center for Health Statistics. Retrieved from <http://www.cdc.gov/nchs/data/nhsr/nhsr055.pdf>

⁵ Cheng, D., Schwarz, E. B., Douglas, E., & Horon, I. (2009). Unintended pregnancy and associated maternal preconception, prenatal and postpartum behaviors. *Contraception, 79*, 194–198.

- ⁶ Brown, S. S., Eisenberg, L., & Institute of Medicine Committee on Unintended Pregnancy. (1995). *The best intentions: unintended pregnancy and the well-being of children and families*. Retrieved from http://www.nap.edu/catalog.php?record_id=4903
- ⁷ Shah, P. S., Balkhair, T., Ohlsson, A., Beyene, J., Scott, F., & Frick, C. (2011). Intention to become pregnant and low birth weight and preterm birth: A systematic review. *Maternal and Child Health Journal, 15*, 205-216.
- ⁸ Mercier, R., Garrett, J., Thorp, J., & Siega-Riz, A. (2013 May 8). Pregnancy intention and postpartum depression: Secondary data analysis from a prospective cohort. *BJOG: An International Journal of Obstetrics and Gynecology*.
- ⁹ Messer, L. C., Dole, N., Kaufman, J. S., & Savitz, D. A. (2005). Pregnancy intendedness, maternal psychosocial factors and preterm birth. *Maternal and Child Health Journal, 9*, 403-412.
- ¹⁰ Trussell, J. (2007). The cost of unintended pregnancy in the United States. *Contraception, 75*, 168-170.
- ¹¹ Centers for Disease Control and Prevention. (2012, Jan 20). Prepregnancy contraceptive use among teens with unintended pregnancies resulting in live births — Pregnancy Risk Assessment Monitoring System (PRAMS), 2004-2008. *MMWR, 61*, 25-29. Retrieved from <http://www.cdc.gov/mmwr/pdf/wk/mm6102.pdf>
- ¹² Shulman, H. B., Gilbert, B. C., Msphbrenda, C. G., & Lansky, A. (2006). The Pregnancy Risk Assessment Monitoring System (PRAMS): Current methods and evaluation of 2001 response rates. *Public Health Reports, 121*, 74-83.
- ¹³ Center for Disease Control, On-line Data for Epidemiologic (CPONDER). (2013). *Data for all states - 2008 pregnancy intention*. [Data file]. Retrieved from <http://apps.nccd.cdc.gov/cPONDER/default.aspx?page=DisplayAllStates&state=0&year=9&category=17&variable=16>
- ¹⁴ Pennsylvania Department of Health, Bureau of Family Health. (2007-2010). *Pennsylvania Pregnancy Risk Assessment Monitoring System*. [Data file]. Retrieved from <http://www.portal.state.pa.us/portal/server.pt/community/prams/14276>
- ¹⁵ Finer, L. B. & Henshaw, S. K. (2006). Disparities in rates of unintended pregnancy in the United States, 1994 and 2001. *Perspectives on Sexual and Reproductive Health, 38*, 90-96.
- ¹⁶ Jack, B. W., Atrash, H., Coonrod, D. V., Moos, M., O'Donnell, J., & Johnson, K. (2008). The clinical content of preconception care: An overview and preparation of this supplement. *American Journal of Obstetrics & Gynecology, 199* (Suppl 2), S310-S327. doi: 10.1016/j.ajog.2008.07.067
- ¹⁷ Dunlop, A. L., Jack, B. W., Bottalico, J. N., Lu, M. C., James, A., Shellhaas, C. S., ... Prasad, M.R. (2008). The clinical content of preconception care: Women with chronic medical conditions. *American Journal of Obstetrics & Gynecology, 199* (Suppl 2), S310-S327.

Contraceptive Use

Family planning programs are a cost-effective investment. Each dollar spent on family planning saves \$3.74 in Medicaid expenses that otherwise would be spent on unintended pregnancies.¹ In 2012, just over half of those who received care from family planning services were uninsured.²

Data from family planning providers show changes in patterns of contraceptive use by Pennsylvania residents from 2010 to 2012, particularly in terms of number and age of female family planning users and the contraceptives they chose.

Table 7.1 Family Planning Users, Females, Pennsylvania, 2010 to 2012²

Year	Female Users	Change from Previous Year Percent (%)
2010	287,126	--
2011	271,433	-5.46%
2012	247,784	-8.71%

Data on females who use publicly-funded family planning services in Pennsylvania are drawn from the Family Planning Annual Reports (FPAR) for the state, mandatory reporting of the state's four family planning councils that receive Title X funding.

Age

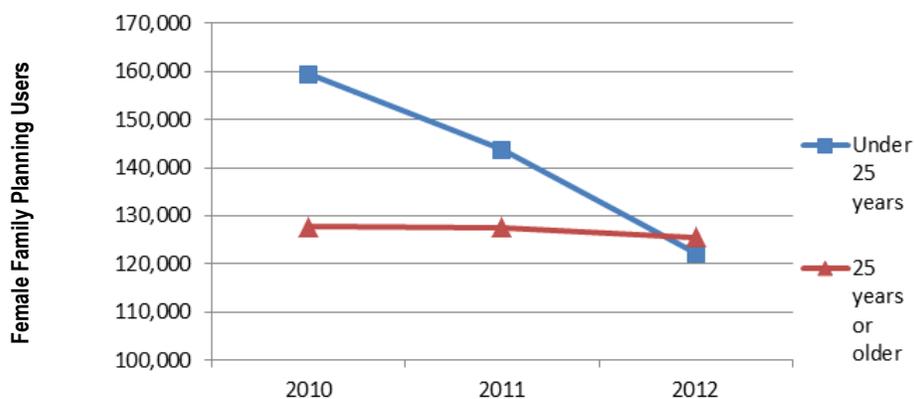
As Table 7.1 shows, the number of females who sought services at publicly-funded family planning clinics in Pennsylvania decreased nearly 40,000 between 2010 and 2012, a drop of 13.7 percent. Additional data, shown in Table 7.2, suggest that although there were decreases in nearly all age groups, the extent of this trend is almost completely attributable to a decline in services among teens and young adults.

Table 7.2 Family Planning Users by Age Groups, Females, Pennsylvania, 2010 to 2012³

	2010	Female Patients 2011	2012	Change 2010 to 2012 Percent (%)
17 and Under	36,671	32,720	24,600	-32.9%
18 to 19	34,164	30,660	26,940	-22.5%
20 to 24	88,571	80,435	71,075	-19.8%
25 to 29	54,942	54,534	52,767	-4.0%
30 to 34	29,197	29,927	30,178	+3.4%
35 to 39	16,954	16,420	16,291	-3.9%
40 to 44	11,354	11,411	11,238	-1.0%
45+	15,273	15,326	15,145	-0.8%

Figure 7.2 illustrates the decline in use of family planning services among females younger than 25, compared to those 25 and older.

Figure 7.2 Trends in Family Planning Users by Age Groups, Females, Pennsylvania, 2010 to 2012⁴



The number of female family planning users younger than 25 years of age declined by 23.4 percent between 2010 and 2012, from 159,406 to 122,165. During the same time, the number of female family planning users age 25 years and older decreased by just 1.6 percent.

According to U.S. Census estimates, the state’s population of youth between the ages of 15 and 24 is relatively unchanged, at 14 percent of the overall state population in 2000 and 13 percent in 2010.^{5,6} Therefore, the decrease in family planning service usage cannot be attributed to changes in population.

Although it may be that the need for such services by females 15 to 24 years old decreased during this timeframe, but we have no data to substantiate that. A national survey suggests that the rate of adolescent intercourse declined from 46 to 43 percent between 2002 and 2010.⁷ Pennsylvania has run only one iteration of the CDC’s Youth Risk Behavior Surveillance System (YRBSS) survey, so no conclusions can be drawn about trends of intercourse among the state’s youth.

Race and Ethnicity and Uninsured

Table 7.3 provides demographic detail about females who sought care at family planning services in Pennsylvania from 2010 to 2012, by race and ethnicity.

Table 7.3 Family Planning Users by Race and Ethnicity, Females, Pennsylvania, 2010 to 2012⁸

	Percent (%) of Total Female Users			Percent (%) of State Population
	2010	2011	2012	
Asian	3.4%	2.2%	2.5%	2.7%
Black	32.5%	31.6%	31.1%	10.8%
Hispanic	8.4%	8.4%	8.7%	5.7%
White	55.6%	55.5%	53.3%	85.4%

As this table shows, family planning clinics are serving racial and ethnic minorities at significantly greater proportions than they are represented in the population. For example, the share of black women among family planning users (31.1 percent in 2012) is three times higher than the percent in the general population (10.8 percent). Similarly, the percent of Hispanic women among family planning users is higher than the percent in the general population (8.7 percent in 2012 and 5.7 percent, respectively).

In 2012, 51 percent of family planning users were uninsured.

¹Guttmacher Institute. (May 2012). *Facts on publicly funded contraceptive services in the United States*. Retrieved from http://www.guttmacher.org/pubs/fb_contraceptive_serv.html

² United States Department of Health and Human Services, Office of Population Affairs. (2010-2012). *Family planning annual reports, Pennsylvania*. Retrieved from <http://www.hhs.gov/opa/title-x-family-planning/research-and-data/fp-annual-reports/>

³ United States Department of Health and Human Services, Office of Population Affairs. (2010-2012). *Family planning annual reports, Pennsylvania*. Retrieved from <http://www.hhs.gov/opa/title-x-family-planning/research-and-data/fp-annual-reports/>

⁴ United States Department of Health and Human Services, Office of Population Affairs. (2010-2012). *Family planning annual reports, Pennsylvania*. Retrieved from <http://www.hhs.gov/opa/title-x-family-planning/research-and-data/fp-annual-reports/>

⁵ United States Census Bureau. (2000). *Profile of general demographic characteristics: Pennsylvania*. Retrieved from http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_00_SF2_DP1&prodType=table

⁶ United States Census Bureau. (2010). *Profile of general demographic and housing characteristics: Pennsylvania*. Retrieved from http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_DP_DPDP1

⁷ Centers for Disease Control and Prevention. (2011, October). *Teenagers in the United States: sexual activity, contraceptive use, and childbearing, 2006-2010 national survey of family growth*, 23(31). Washington DC: Martinez G., Copen C. E., Abma J. C.

⁸ United States Department of Health and Human Services, Office of Population Affairs. (2010-2012). *Family planning annual reports, Pennsylvania*. Retrieved from <http://www.hhs.gov/opa/title-x-family-planning/research-and-data/fp-annual-reports/>

Adolescent Pregnancy and Childbearing

Although there have been declines in rates of adolescent childbearing for the nation and some states, a significant number of teens still experience unintended, often unwanted, pregnancies each year, yielding negative outcomes for the teen parents, the child and their community. Teen mothers are more likely to drop out of high school, have lower academic achievement and have babies born at a low birth weight; if female, the child is more likely to become a mother as an adolescent too.^{1,2}

Table 7.4 Teen Pregnancies by Outcomes and Age Groups, Females, Pennsylvania, 2010³

Age Group	Reported Pregnancies	Live Births	Fetal Deaths	Induced Abortions
< 15 years	340	153	2	185
15 to 17	5,326	3,562	42	1,722
18 to 19	12,205	8,367	106	3,732

Adolescent Births

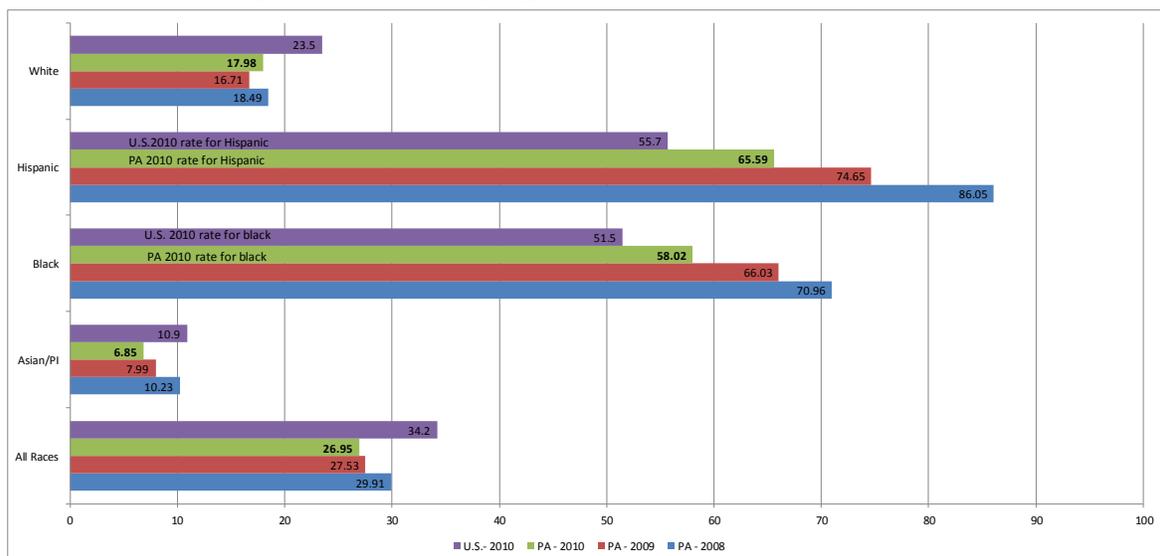
In 2011, the U.S. rate of adolescent childbearing fell to a record low of 31.3 births per 1,000 females aged 15 to 19 years old, an 8 percent decrease from the 2010 rate. State rates ranged from 13.7 births per 1,000 females aged 15 to 19 in New Hampshire to 50.7 birth per 1,000 females 15 to 19 years old in Arkansas.

Pennsylvania’s birth rate was 24.9 births for every 1,000 females aged 15 to 19 in 2011, a decrease from 27.0 per 1,000 females ages 15 to 19 in 2010.⁴ The state’s adolescent birth rate has decreased steadily since 1970, when it was 53.2 births per 1,000 females ages 15 to 19.⁵

The most likely explanation for this decrease is that fewer teens are engaging in sexual intercourse, and that more effective contraception is being used by those who do.

While the overall teen birth rate for the state is lower than those for the nation, birth rates among blacks and Hispanics exceed U.S. rates. The 2010 adolescent birth rate for black females ages 15 to 19 years old was 58.0 per 1,000 in Pennsylvania, compared with 51.5 per 1,000 for the U.S. Among Hispanic females, the rate was 65.6 per 1,000 females 15 to 19 years old in Pennsylvania, compared with 55.7 nationally. From 2008 to 2010, adolescent birth rates increased slightly among whites, from 16.71 per 1,000 females 15 to 19 years old to 17.98 per 1,000 females in this age group, even as they decreased among non-white females.^{6,7}

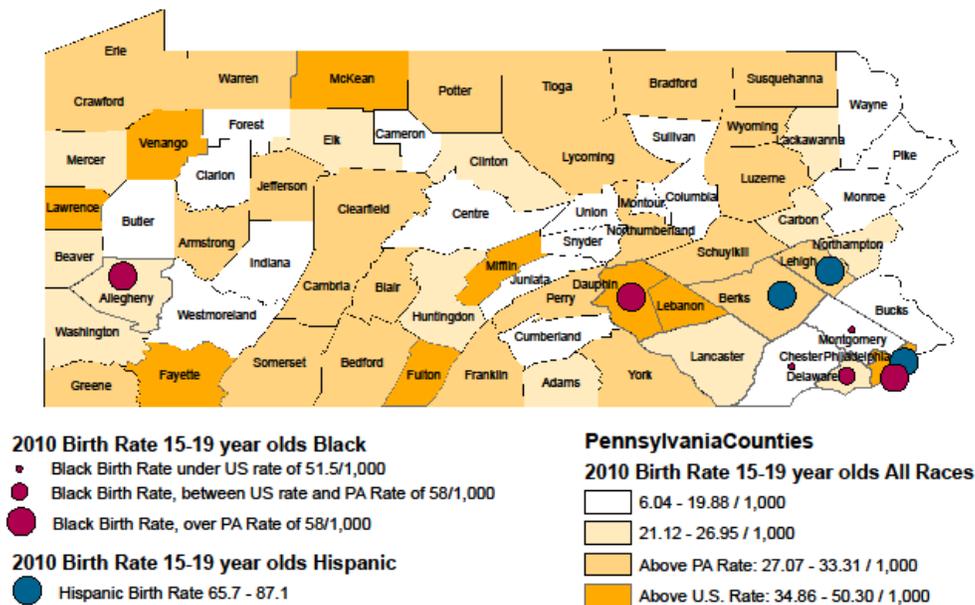
Figure 7.3 Teen Birth Rates by Race and Ethnicity, Ages 15 to 19, Females, Pennsylvania, 2008 to 2010^{8,9}



Geographic Distribution

In 2010, just over half of all Pennsylvania counties had adolescent birth rates that exceeded the state's rate of 27.0 per 1,000 females aged 15 to 19 years old. The highest rates were in Philadelphia County, with a rate of 50.3 per 1,000 females aged 15 to 19 years; Fulton with 49.4 per 1,000 females aged 15 to 19 years old; and Fayette with 44.9 per 1,000 females of this age group.

Figure 7.4 Geographic Distribution of Teen Births, Females Ages 15 to 19, Pennsylvania 2010¹⁰



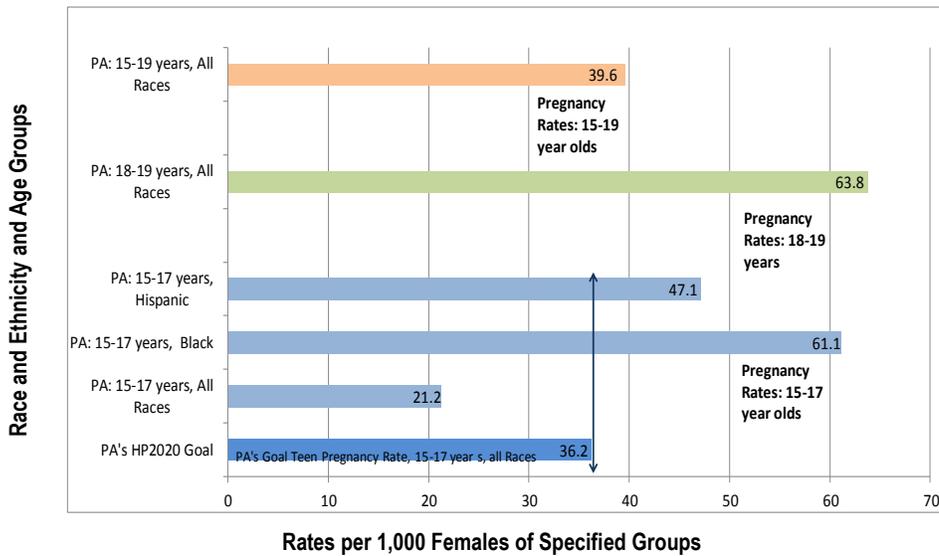
Adolescent Pregnancies

The U.S. Department of Health and Human Services has set the Healthy People 2020 goal for pregnancy rate of females aged 15 to 17 at 36.2 per 1,000 population, a decrease of 10 percent below the 2005 baseline of 40.2 per 1,000 population. The Healthy People 2020 goal for pregnancies among females aged 18 to 19 is 105.9 per 1,000 females of this age category, a 10 percent decrease from the 2005 rate of 117.7 per 1,000 females 18 and 19 years old.¹¹

In Pennsylvania, the 2010 pregnancy rate for teens aged 15 to 17 was 21.2 per 1,000 females of this age range, well below the Healthy People 2020 goal for the nation, and 13.1 percent lower than it had been in 2008. At the same time, the pregnancy rate among 18 and 19 year old Pennsylvania females decreased 10 percent to 63.8 per 1,000 females 18 and 19 years old, and the rate for 15 to 19 year olds dropped 10.5 percent to 39.6 percent.⁴

However, blacks and Hispanics are disproportionately affected by adolescent pregnancy. As shown in Figure 7.5, the rate for blacks aged 15 to 17 was 61.1 per 1,000 females of this age range in 2010; for Hispanics, the rate was 47.1 per 1,000 females aged 15 to 17 years old. These rates far exceed both state and national levels.

Figure 7.5 Teen Pregnancy by Race and Ethnicity and Age Groups, Females, Pennsylvania, 2010^{12,13}

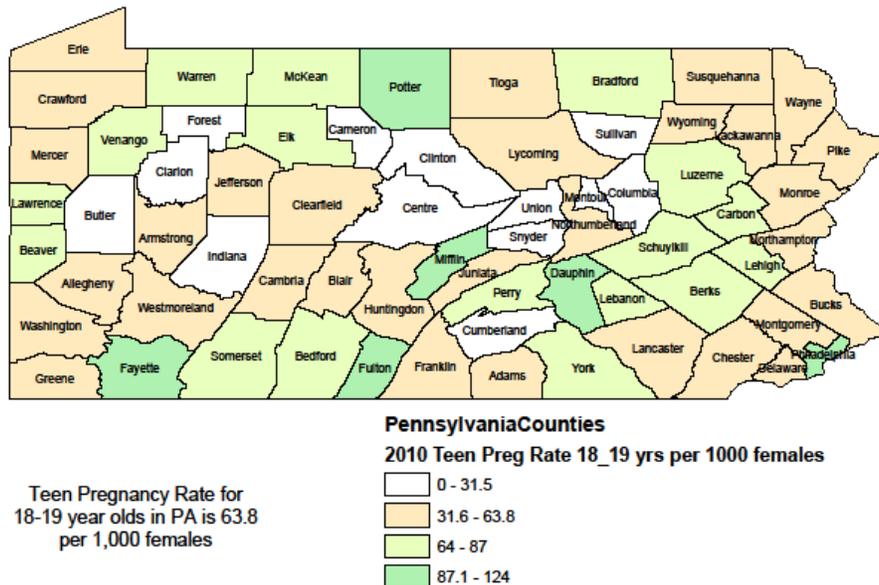


Geographic Distribution

Looking at 2010 data, the 15 to 19 year old adolescent pregnancy rates of 11 counties exceed the state rate of 39.6 per 1,000 females 15 to 19 years old. Of these 11, the highest rate, 90.8 per 1,000 females of this age group, was seen in Philadelphia; the lowest of the 11 was 39.9 per 1,000 females 15 to 19 years old in McKean County.¹⁴

The rates of pregnancy for females aged 18 and 19 exceed the state rate in many counties, as shown in Figure 7.6.

Figure 7.6 Geographic Distribution of Teen Pregnancy, Females Ages 18 and 19, Pennsylvania 2010¹⁵



Characteristics of Adolescent Childbearing

First Trimester Prenatal Care

Initiating prenatal care in the first trimester of pregnancy is important to ensure positive health outcomes for both the mother and her baby. In 2010, 71.3 percent of all births in Pennsylvania were to mothers who sought prenatal care during the first trimester of pregnancy. However, only 54.6 percent of mothers aged 15 to 19 years old sought prenatal care in the first trimester, a figure significantly lower than the Healthy People 2020 goal of 77.9 percent.¹⁶

Smoking during Pregnancy

In 2010, slightly more than 84 percent of mothers reported that they did not smoke during pregnancy. However, smoking among mothers younger than 20 years old ranged from 0 to 64.7 percent. Six counties had 50 percent or more report smoking during pregnancy, even though it is a leading cause of low birth weight babies: Elk, Forest, McKean, Montour, Potts and Warren.

Sexually Transmitted Diseases in Pregnancy

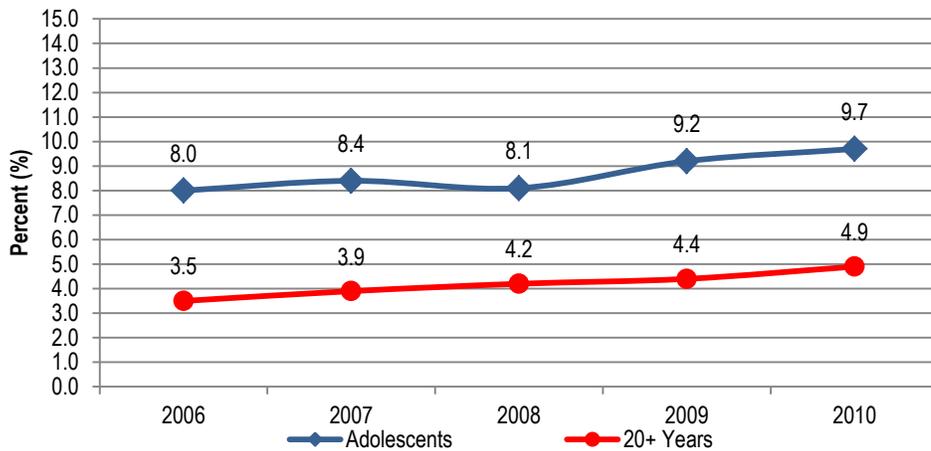
Undiagnosed and inadequately treated sexually transmitted diseases (STDs) in pregnancy are associated with an increased risk of adverse maternal and infant health outcomes. For the mother, these include early onset of labor, premature rupture of the membranes (PROM) and uterine infection following delivery.^{17,18,19} For the infant, the risks include stillbirth, low birth weight, conjunctivitis (eye infection), pneumonia, neonatal sepsis (infection in the blood stream), acute hepatitis, meningitis and chronic liver disease.^{20,21,22,23} Fortunately, most of these risks can be avoided with early detection and appropriate treatment of the problem.

The most recent version of the U.S. Standard Birth Certificate captures information about the presence and/or treatment of the following infections during the prenatal period: chlamydia, gonorrhea, hepatitis B, hepatitis C and syphilis.²⁴ A comparison of prenatal STD trends for adolescent females aged 15 to 19 and females age 20 and older who gave birth in Pennsylvania between 2006 and 2010 illustrates the higher risk faced by adolescents with regards to this risk factor for maternal and child health.²⁵

As shown in Figure 7.7, prenatal rates for STDs among teens who gave birth have been about double the rates of women 20 years and older. For both groups, the percentage of mothers with STDs has increased since 2006, but for adolescent mothers, the percent with STDs now approaches 10 percent; the percent has increased over 21.3 percent since 2006. While it is difficult to know whether this trend is due to increases in infections, changes in screening practices, or a combination of these factors, the data suggest that pregnant teens and their infants are at higher risk of adverse outcomes associated with undiagnosed and inadequately treated STDs in the perinatal period.²⁶

Consistent and correct use of condoms substantially reduces the risk of STD transmission.²⁷ In addition, routine prenatal screening for STDs provides a unique opportunity to identify females with undiagnosed disease, initiate timely treatment and prevent mother-to-child transmission. Although the factors underlying persistent racial and ethnic disparities in STD prevalence are not well understood, screening in the perinatal period is especially important for women of color, who have a disproportionate rate of STDs.

Figure 7.7 Births with Maternal STD Infection Present or Treated and Age Group, Pennsylvania, 2006 to 2010²⁸



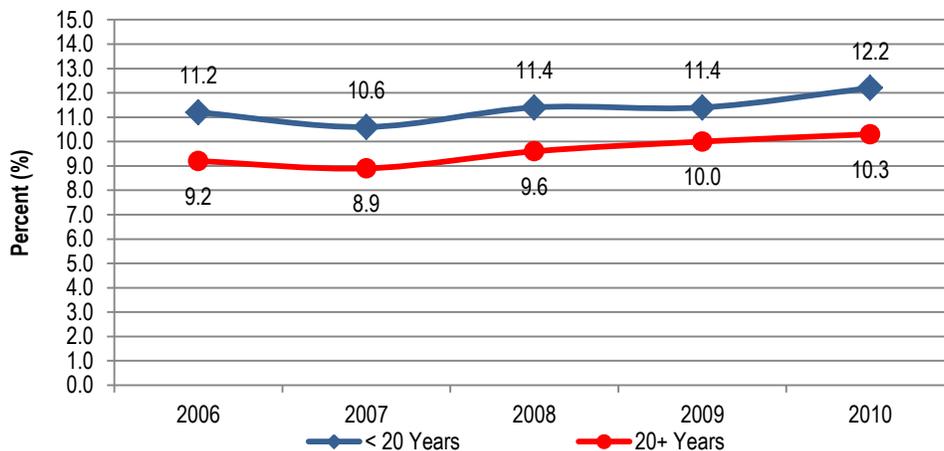
Infant health

Across mothers of all ages, 6.7 percent of babies born in Pennsylvania during 2010 were low birth weight (1,500 to 2,499 grams) and 1.6 percent were very low birth weight (<1,500 grams). Rates of low birth weight and very low birth weight babies were higher for teen mothers, however; 8.2 percent of babies born to mothers 15 to 19 years old were low birth weight, and 2.3 percent were very low birth weight.²⁹

In 2010, Pennsylvania recorded 1,261 low birth weight babies to mothers younger than 20 years old, about 10.5 percent of adolescent births in the state.³⁰ Of the total births to adolescent mothers in Pennsylvania, 63.4 percent received Medicaid.³¹

Birth certificate data are available for five abnormal health conditions more common to infants who are born preterm (less than 37 weeks gestation) and/or low birth weight: assisted ventilation immediately following delivery, assisted ventilation for 6 or more hours, admission to the neonatal intensive care unit (NICU), surfactant replacement therapy and antibiotic therapy for suspected sepsis.^{32,33,34} Figure 7.8 compares the data for these conditions among babies of mothers 15 to 19 and those 20 and older.

Figure 7.8 Births with Abnormal Conditions in the Newborn Period by Maternal Age Group, Pennsylvania, 2006 to 2010³⁵



Data Note

The primary sources of data for adolescent pregnancy and childbearing were retrieved from the Pennsylvania Department of Health's Epidemiologic Query and Mapping System (EpiQMS). Birth certificate dataset is the source for adolescent childbirth in EpiQMS. Birth certificate, fetal death certificate and induced abortion datasets are the source for teen pregnancy in EpiQMS. The Pennsylvania Department of Health reports adolescent pregnancies in three-year age categories: younger than 15 years old, 15 to 17 years old and 18 to 19 years old. The latter two categories are often combined to provide an overall picture of adolescent pregnancy. As there are very small numbers of pregnancies among females younger than 15 years of age, this section is limited to reporting on pregnancies in the 15 to 17, 18 to 19 and 15 to 19 categories.

Endnotes

¹ Centers for Disease Control and Prevention. (2012). *About teen pregnancy*. Retrieved from <http://www.cdc.gov/teenpregnancy/aboutteenpreg.htm>

² Weiss, D. (2012). (2010). *Pregnancy and childbearing among U.S. teens. Fact Sheet*. New York, NY: Planned Parenthood Federation of America Inc. Retrieved from http://www.plannedparenthood.org/files/PPFA/pregnancy_teens_2010-01.pdf

³ Pennsylvania Department of Health. (2008-2010). *Epidemiologic query and mapping system*. [Data file]. Retrieved from <http://apps.health.pa.gov/epiqms/Asp/ChooseDataset.asp>

⁴ Pennsylvania Department of Health. (2011). *Vital Statistics 2011*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=596032&mode=2>

⁵ Pennsylvania Department of Health. (2010). *Pennsylvania vital statistics 2010 births. Table b-3, resident live births by age of mother, number and rate. Pennsylvania, 2010, 2000, 1990, 1980, 1970*. [Data file]. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=596032&mode=2>

⁶ Pennsylvania Department of Health. (2008-2010). *Epidemiologic query and mapping system*. Retrieved from <http://apps.health.pa.gov/epiqms/Asp/ChooseDataset.asp>

⁷ Hamilton, B.E. & Ventura, S.J. (2012) *Birth rates for U.S. teenagers reach historic lows for all age and ethnic groups*. NCHS data brief, no 89. Hyattsville, MD: National Center for Health Statistics.

⁸ Pennsylvania Department of Health. (2008-2010). *Pennsylvania certificates of live birth*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=596553&mode=2>.

⁹ Hamilton, B.E. & Ventura, S.J. (2012) *Birth rates for U.S. teenagers reach historic lows for all age and ethnic groups*. NCHS data brief, no 89. Hyattsville, MD: National Center for Health Statistics.

¹⁰ Pennsylvania Department of Health. (2010). *Pennsylvania certificates of live birth*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=596553&mode=2>

¹¹ U.S. Department of Health and Human Services. *Healthy People 2020, Family Planning Objectives*. Retrieved from <http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=13>

¹² Pennsylvania Department of Health. (2010). *Pennsylvania certificates of live birth, Pennsylvania Fetal Death Certificate Dataset, and Pennsylvania Induced Abortion Dataset*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=596553&mode=2>

- ¹³ Pennsylvania Department of Health. *Healthy People 2020, State Level Statistics: Topic Area FP – Family Planning, Objective FP-8.1*. Retrieved from http://www.portal.state.pa.us/portal/server.pt/community/health_statistics/14136/healthy_people/590079
- ¹⁴ Pennsylvania Department of Health. (2008- 2010). *Epidemiologic query and mapping system*. [Data file]. Retrieved from <apps.health.pa.gov/epiqms/Asp/ChooseDataset.asp>
- ¹⁵ Pennsylvania Department of Health. (2010). *Pennsylvania certificates of live birth, Pennsylvania fetal death certificate dataset, and Pennsylvania induced abortion dataset*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=596553&mode=2>
- ¹⁶ Pennsylvania Department of Health. (2013). *Healthy People 2020, topic area MICH – maternal, infant, and child health, objective MICH-10.1 % Births to mothers beginning prenatal care in first trimester*. Retrieved from http://www.portal.state.pa.us/portal/server.pt/community/health_statistics/14136
- ¹⁷ Blas, M. M., Canchihuaman, F. A., Alva, I. E., & Hawes, S. E. (2007). Pregnancy outcomes in women infected with *Chlamydia trachomatis*: A population-based cohort study in Washington State. *Sexually Transmitted Infections*, 83, 314–318.
- ¹⁸ Mann J. R., McDermott, S., & Gill, T. (2010). Sexually transmitted infection is associated with increased risk of preterm birth in South Carolina women insured by Medicaid. *Journal of Maternal-Fetal and Neonatal Medicine*, 23, 563-568.
- ¹⁹ Reddick, K. L., Jhaveri, R., Gandhi, M., James, A. H., & Swamy, G. K. (2011, February 8). Pregnancy outcomes associated with viral hepatitis. *Journal of Viral Hepatitis*, 18, e394-8.
- ²⁰ Borges-Costa, J., Matos, C., & Pereira, F. (2011, July 29). Sexually transmitted infections in pregnant adolescents: Prevalence and association with maternal and fetal morbidity. *Journal of the European Academy of Dermatology and Venereology*, 26, 972-975.
- ²¹ Centers for Disease Control and Prevention. (2012). *Sexually transmitted disease surveillance 2011*. Retrieved from www.cdc.gov/std/stats11/Surv2011.pdf
- ²² Connell, L. E., Salihi, H. M., Salemi, J. L., August, E. M., Weldeselasse, H., & Mbah, A. K. (2011). Maternal hepatitis B and hepatitis C carrier status and perinatal outcomes. *Liver International*, 31, 1163-1170.
- ²³ Johnson, H.L., Ghanem, K. G., Zenilman, J. M., & Erbeling, E. J. (2011). Sexually transmitted infections and adverse pregnancy outcomes among women attending inner city public sexually transmitted diseases clinics. *Sexually Transmitted Diseases*, 38, 167-171.
- ²⁴ National Center for Health Statistics. (2001). *Report of the panel to evaluate the U.S. Standard Certificates*. Retrieved from http://www.cdc.gov/nchs/data/dvs/panelreport_acc.pdf
- ²⁵ Weinstock, H., Berman, S., & Cates, W. (2004). Sexually transmitted diseases among American youth: Incidence and prevalence estimates, 2000. *Perspectives on Sexual and Reproductive Health*, 36, 6-10.
- ²⁶ Centers for Disease Control and Prevention. (2012). *Sexually transmitted disease surveillance 2011*. Retrieved from www.cdc.gov/std/stats11/Surv2011.pdf
- ²⁷ Koumans, E. H. A., Rosen, J., van Dyke, M. K., Zell, E., Phares, C. R., Taylor, A., ... Schrag, S. (2012). Prevention of mother-to-child transmission of infections during pregnancy: Implementation of recommended interventions, United States, 2003-2004. *American Journal of Obstetrics & Gynecology*, 206, 158.e1-11.
- ²⁸ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *State/county health statistics*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=590070&mode=2>
- ²⁹ Pennsylvania Department of Health. (2010). *Pennsylvania Vital Statistics 2010 Births. Table B-5, Resident Live Births by Age of Mother and Birth Weight, Number and Percent. Pennsylvania, 2010*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=596032&mode=2>

- ³⁰ Landau, E. (March 17, 2009). *Study: Average preemie costs \$49,000 in first year*. CNNhealth.com. Retrieved from www.cnn.com/2009/HEALTH/03/17/premature.babies
- ³¹ Pennsylvania Department of Health. (2008-2010). *Epidemiologic query and mapping system*. [Data file]. Retrieved from apps.health.pa.gov/epiqms/Asp/ChooseDataset.asp
- ³² Chen, X., Wen, S. W., Fleming, N., Demissie, K., Rhoads, G. G., & Walker, M. (2007). Teenage pregnancy and adverse birth outcomes: A large population based retrospective cohort study. *International Journal of Epidemiology*, 36, 368-373.
- ³³ Darling, R. D., & Atav, A. S. (2012, May 14). Risk factors for low birth weight in New York state counties. *Policy, Politics, & Nursing Practice*, 13(1), 17-26.
- ³⁴ Fraser, A.M., Brockert, J. E., & Ward, R. H. (1995). Association of young maternal age with adverse reproductive outcomes. *New England Journal of Medicine*, 332, 1113-1117.
- ³⁵ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *State/county health statistics. (2006-2010)*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=590070&mode=2>

Preterm Birth and Low Birth Weight

Second only to pneumonia as a leading cause of death globally for children under five, preterm birth has been recognized as a worldwide health epidemic.¹ An estimated 70 percent of neonatal deaths occurring within the first 28 days of life and 36 percent of infant deaths within the first year are attributable to preterm birth. An estimated fifteen million preterm births occur worldwide each year; about half a million of those occurring in the U.S. With about 12 percent of births nationwide preterm, the U.S. has the second highest incidence of industrialized countries.^{2,3}

The risk of infant death is highest among the infants born earliest; in other words, the longer the pregnancy, the lower the risk. In the U.S., the rate of death for infants born at 37 weeks' gestation or later is 2.36 per 1,000 live births. For those born at 34 to 36 weeks of gestation, the rate is 7.13 per 1,000 live births. Among babies born at 32 to 33 weeks of gestation, the rate is 16.07 per 1,000 live births. Among babies born at less than 32 weeks, the rate is 172.15 per 1,000 live births. The incidence and severity of infant morbidities such as neurodevelopmental disorders and chronic lung disease are also directly related to gestational age at delivery.⁴

Low birth weight (LBW) means a birth weight of less than 2,500 grams and is typically used to refer to those between 1,500 and 2,499 grams. Very low birth weight (VLBW) is defined as a birth weight of less than 1,500 grams. Birth weight is closely tied with gestational age at delivery and is therefore an important predictor of infant health outcomes. Among VLBW infants born in the U.S. in 2008, 24 percent died within the first year of life, compared with 1.4 percent of LBW babies and 0.2 percent of infants with a birth weight of 2,500 grams or more.⁵ The primary cause of LBW in the U.S. is preterm birth.

While the causes of preterm birth are not clearly understood, several risk factors are well established. The strongest risk factor is a history of preterm birth⁶; other factors include pregnancy with more than one fetus, malformation of the uterus and short interval between pregnancies (i.e., less than 18 months).⁷ Inflammatory processes, such as periodontal disease and genitourinary tract infection, have also been associated with preterm birth,⁸ as have hypertension, diabetes, lupus and kidney disease, especially if poorly controlled. Obesity may contribute to preterm birth by increasing the likelihood of medical complications such as hypertension, diabetes, and preeclampsia.⁹ Maternal demographic characteristics, such as race and ethnicity, socioeconomic status, and age may also be risk factors. Behaviors such as smoking, substance abuse, and late or no prenatal care may contribute to the risk.^{10,11}

Health care costs for preterm infants are significant. Although preterm and low birth weight infants accounted for only 8 percent of total infant hospitalizations in the U.S. in 2001, they accounted for 47 percent of the costs for this group.¹² Beyond the first year of life, babies born preterm or LBW can require care for chronic conditions, early intervention services and special education; their care can also result in indirect costs, such as lost household income and labor market productivity. In 2005, the estimated economic burden due to preterm births was at least \$26.2 billion.¹³

Healthy People 2020: Preterm Births

The U.S. Department of Health and Human Services assesses preterm birth according to four subcategories:

- less than 37 weeks' gestation (overall preterm birth rate)
- 34 to 36 weeks' gestation (late preterm birth)
- 32 to 33 weeks' gestation
- less than 32 weeks' gestation (very preterm birth)

The Healthy People 2020 goal for overall preterm birth rate is equal to or less than 11.4 percent of live births. Pennsylvania's rate both met this goal from 2006 to 2010 and decreased by 4.8 percent during this time, as shown in Table 7.5. The improvement is attributable to a decrease in the rate of late preterm births from 7.3 percent in 2006 to 6.9 percent in 2010. The rate of very preterm births hovers at the Healthy People 2020 goal of 1.8 percent.

Table 7.6 shows preterm rates for the U.S. population, for purposes of comparison.

Table 7.5 Preterm Birth Rates by Gestational Age, Pennsylvania, 2006 to 2010¹⁴

	2006	2007	Percent (%) of Live Births		2010	Healthy People 2020 Goals
			2008	2009		
Total preterm births	10.4	10.2	10.3	10.1	9.9	11.4
34 to 36 weeks <i>Late preterm births</i>	7.3	7.2	7.2	7.0	6.9	8.1
32 to 33 weeks	1.3	1.3	1.2	1.2	1.2	1.4
< 32 weeks <i>Very preterm births</i>	1.8	1.7	1.8	1.8	1.8	1.8

Table 7.6 Preterm Birth Rates by Gestational Age, United States, 2007 to 2010¹⁵

	2007	2008	Percent (%) of Live Births		2010	Healthy People 2020 Goals
			2009			
Total preterm births	12.7	12.3	12.2		12.0	11.4
34 to 36 weeks <i>Late preterm births</i>	9.0	8.8	8.7		8.5	8.1
32 to 33 weeks	1.6	1.6	1.5		1.5	1.4
< 32 weeks <i>Very preterm births</i>	2.0	2.0	2.0		2.0	1.8

Healthy People 2020: Low Birth Weight and Very Low Birth Weight

According to data from the Department of Health, Pennsylvania has not yet met the Healthy People 2020 goals for LBW and VLBW, or 7.8 percent of live births and 1.4 percent of live births, respectively. From 2006 to 2010, the LBW rate decreased from 8.5 percent to 8.3 percent, most likely due to the decrease in preterm births during the same period. In spite of the relationship between preterm birth and LBW, the decrease in LBW was not as great as the 4.8 percent reduction in late preterm delivery during this period.

Nationally, Pennsylvania ranked 27 out of 50 states for LBWs in 2010.¹⁶ Tables 7.7 and 7.8 show LBW/VLBW statistics for Pennsylvania and the U.S., respectively. Note that the discrepancy between the state's favorable performance on improving the rate of preterm birth and its unfavorable performance in LBW/VLBW suggests that significant contributions to Pennsylvania's LBW rate come from the extremes of gestational age (i.e., greater than 37 weeks, less than 32 weeks) and that other causes for LBW aside from preterm birth contribute to these figures.

Table 7.7 Low Birth Weight and Very Low Birth Weight Birth Rates, Pennsylvania, 2006 to 2010¹⁷

	2006	2007	Percent (%) of Live Births		2010	Healthy People 2020 Goals
			2008	2009		
Low birth weight	8.5	8.4	8.3	8.4	8.3	7.8
Very low birth weight	1.6	1.6	1.6	1.6	1.6	1.4

Table 7.8 Low Birth Weight and Very Low Birth Weight Birth Rates, United States, 2007 to 2010¹⁸

	Percent (%) of Live Births				Healthy People 2020 Goals
	2007	2008	2009	2010	
Low birth weight	8.2	8.2	8.2	8.1	7.8
Very low birth weight	1.5	1.5	1.5	1.4	1.4

Risk Factors

Race/ethnicity: Race/ethnicity is a demographic risk factor for preterm birth. Although the preterm birth rate for all births decreased from 2006 to 2010, rates of births to black mothers remained above the Healthy People 2020 goals for each category of gestational age.

Figure 7.9 Preterm Births by Race and Ethnicity, Pennsylvania, 2006 to 2010¹⁹

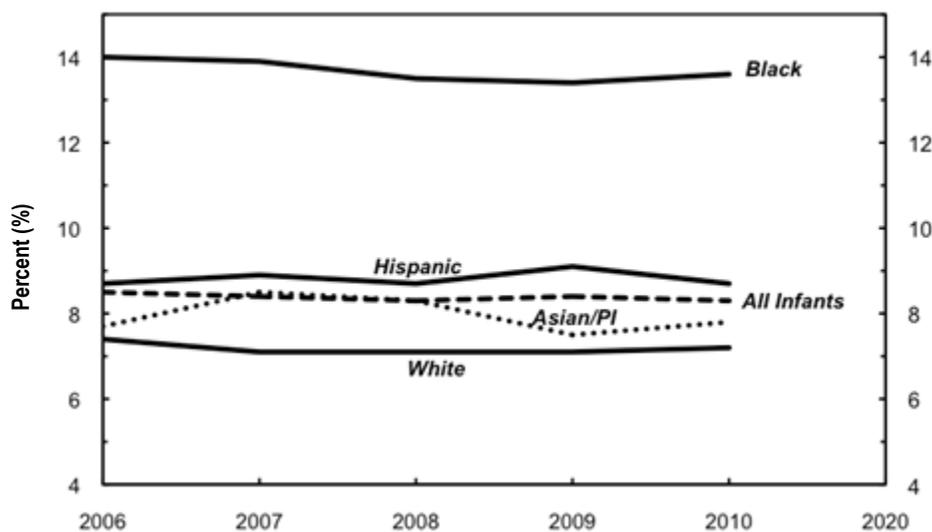


Table 7.9 Preterm Birth Rates by Gestational Age, and Race and Ethnicity, Pennsylvania, 2006 to 2010²⁰

	Percent (%) of Live Births					
	< 32 Weeks		32 to 33 Weeks		34 to 36 Weeks	
HP 2020 Goals:	1.8 percent (%)		1.4 percent (%)		8.1 percent (%)	
	2006	2010	2006	2010	2006	2010
White Mother	1.4	1.4	1.2	1.1	7.0	6.6
Black Mother	3.7	3.3	2.1	2.0	9.0	8.4
Hispanic Mother	1.6	2.0	1.3	1.2	7.5	7.0
Asian/Pacific Islander Mother	1.3	1.2	0.7	0.8	6.2	5.7

Similarly, black mothers had the highest rates of LBW and VLBW infants for 2006 to 2010, reflecting the high preterm rate. The following figures summarize this data.

Figure 7.10 Low Birth Weight Birth Rates by Race and Ethnicity, Pennsylvania, 2006 to 2010²¹

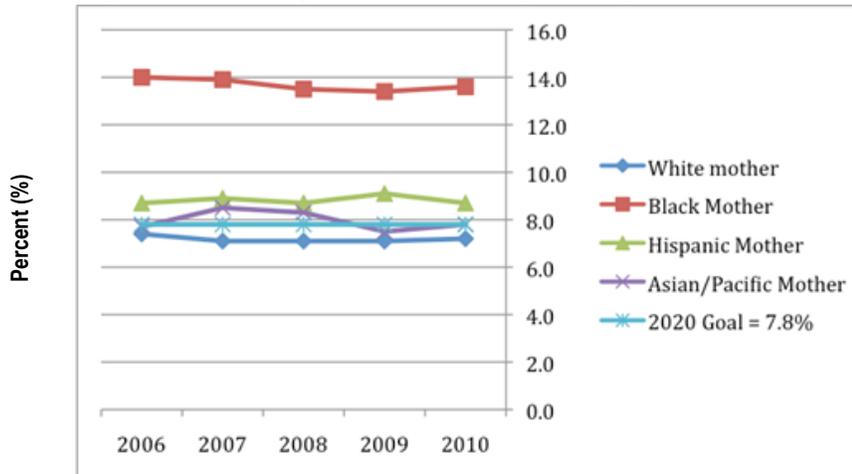
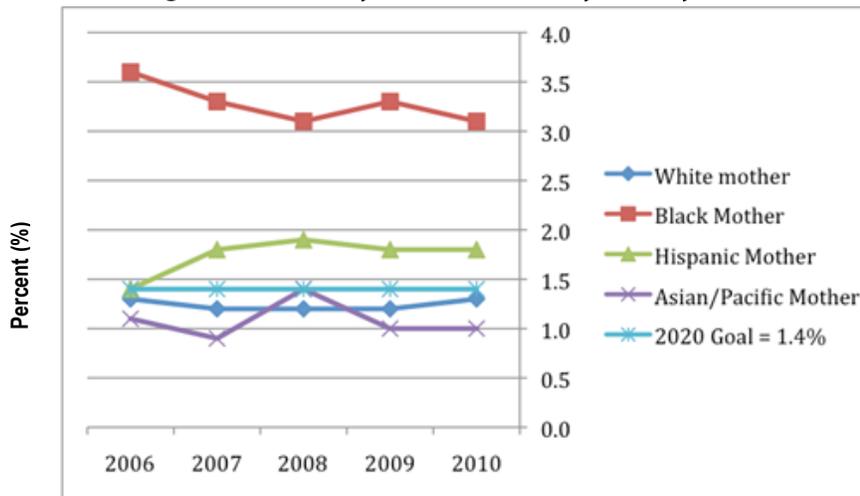


Figure 7.11 Very Low Birth Weight Birth Rates by Race and Ethnicity, Pennsylvania, 2006 to 2010²²



Extreme maternal age: Mothers at the extremes of age at pregnancy (i.e., younger than 20 years old, older than 35 years old), had higher rates of preterm birth and LBW infants. Given the trend for U.S. women to delay childbearing, the “older than 35” demographic becomes increasingly important. Women aged 30 to 34 years old had significantly lower rates of preterm delivery in 2010, as did 25 to 29 year olds, who also had the lowest rate of LBW infants. The following two figures summarize this data.

Figure 7.12 Preterm Birth Rates by Maternal Age, Pennsylvania, 2006 to 2010²³

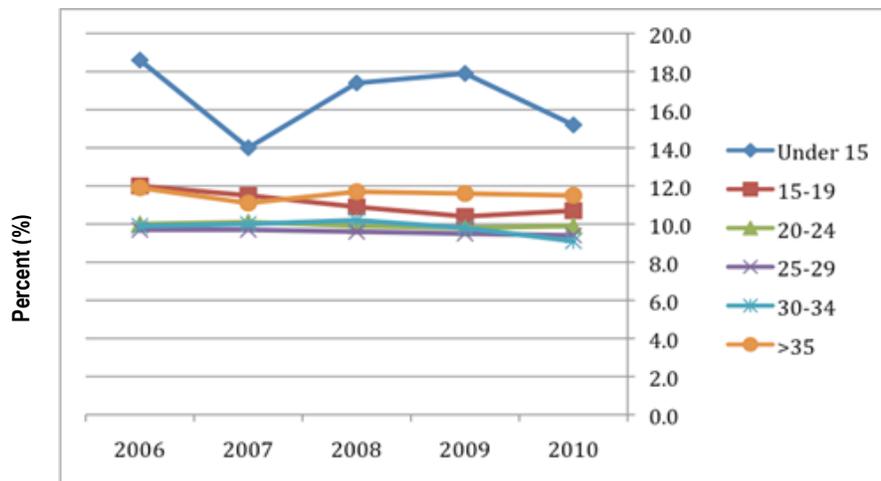
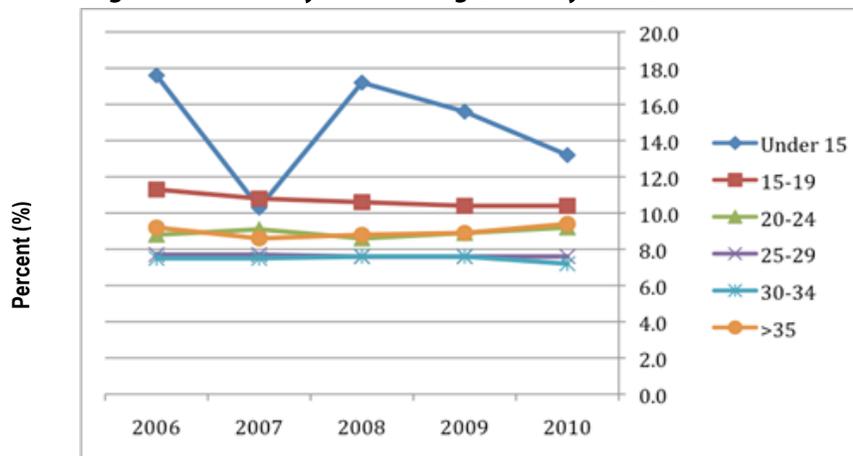


Figure 7.13 Low Birth Weight Birth Rates by Maternal Age, Pennsylvania, 2006 to 2010²⁴



Smoking: Adverse health consequences of tobacco use are well documented. The negative impact on fetal/infant health includes pregnancy loss, preterm delivery, premature rupture of membranes (PROM), placental abruption, placenta previa, low birth weight, ectopic pregnancy and sudden infant death syndrome (SIDS). Smoking cessation is most effective before conception or in the first trimester. All adults, including pregnant women, should be provided with tobacco cessation interventions.²⁵

The Healthy People 2020 goal for pregnancy and smoking is: 98.6 percent of mothers do not smoke during pregnancy. Pennsylvania's 2010 rate of 84.1 percent was far below the Healthy People 2020 goal but showed incremental annual improvement from the 2006 baseline of 82.4 percent. In 2010, mothers who were Asian/Pacific Islanders were most likely to abstain from smoking (98.4 percent), followed by Hispanic mothers (90.2 percent), black mothers (85.9 percent) and white mothers (82.2 percent).²⁶

Obesity: Increased risk of preterm birth associated with obesity is primarily due to the increased risk of obesity-associated medical disorders, such as diabetes, hypertension and preeclampsia.²⁷ Weight management, key to resolution of these problems and prevention of preterm birth, must be addressed before pregnancy.

In 2007, only 48.5 percent of first-time mothers in the U.S. were normal weight prior to pregnancy. Data describing the proportion of women with live births who had a normal weight prior to pregnancy is a developmental objective, and therefore not yet available to Pennsylvania.²⁸ However, 2011 data for non-pregnant Pennsylvania women aged 20 to 39

found 45 percent to be healthy weight and 24 percent obese. The data reflect the obesity problem in the country and the state.²⁹

Early Prenatal Care: The major goals of prenatal care are to identify women at risk for complications, establish accurate due dates, provide ongoing evaluation of maternal and fetal health, and provide the necessary education and interventions. Timely and adequate prenatal care has been associated with a reduction in preterm birth.³⁰

Prenatal care provides the opportunity for the following assessments and interventions, which may reduce the risk for preterm birth and LBW infants:

- Smoking cessation
- Screen for a history of spontaneous preterm birth
- Screen for and treat genitourinary tract infections
- Recognize and optimize maternal medical disorders, preferably prior to conception.³¹

The Healthy People 2020 goal for mothers beginning prenatal care for the first trimester is 77.9 percent. Pennsylvania did not meet this goal in any year from 2006 to 2010. Black mothers and Hispanic mothers had the lowest rates of prenatal care, at about 55 and 56 percent, respectively, in 2010. White mothers had the highest rate of prenatal care, at 76.6 percent.

The rate of first trimester prenatal care varies with age; mothers younger than 15 years old have the lowest rate, at 30.8 percent. Older mothers have the highest rates, at 78.7 percent for mothers 30 to 34 years old and 76.9 percent for mothers 35 and older.³² Overall, in 2010, 71.3% of mothers in Pennsylvania received prenatal care during the first trimester.

A Healthy People 2020 goal currently in development is to increase the proportion of women who receive preconception care services and practice key recommended preconception health behaviors. Data on this objective would assist providers in identifying and optimizing medical, reproductive, nutritional and lifestyle problems prior to pregnancy.

Summary

- Pennsylvania's 2010 rate of preterm birth meets the Healthy People 2020 goal of 11.4 percent of live births, but not the year 2020 goal of 9.6 percent set by the March of Dimes.³³ The rate did decrease by 4.8 percent between 2006 and 2010.
- 2010 LBW and VLBW rates of 8.3 and 1.6 percent of live births, respectively, did not meet Healthy People 2020 goals.
- Black mothers remain disproportionately affected by preterm birth and LBW infants.
- An inspection of risk factors for preterm birth and LBW shows that Pennsylvania does not meet the Healthy People 2020 goals for smoking abstinence in pregnancy or initiation of early prenatal care. The percent of female residents of reproductive age who are obese is significant.

Intervention Strategies

- **Reduce the preterm delivery rate at < 34 weeks of gestation.** This would translate into a reduction of the LBW rate and a decrease in the neonatal mortality rate as well.
- **Improve preconception care.** Preconception care provides an opportunity to address chronic medical issues (e.g., obesity, hypertension, diabetes) and behavioral issues (e.g., smoking).
- **Improve early and adequate prenatal care.** Early prenatal care provides an opportunity to assess medical and reproductive risks, and provide primary prevention and secondary prevention.
- **Focus on black mothers.** Efforts to improve preconception and prenatal care are particularly important for these mothers.
- **Focus on gestational age.** Preterm and LBW risks are greatest for the youngest mothers and the oldest. Support teen pregnancy prevention efforts, and continue to address LBW data in light of gestational age.

- **Support development of MICH-16 Healthy People 2020 objective.** Information about preconception care and behaviors provides key information for addressing preterm birth and LBW risk behavior.

Endnotes

- ¹ World Health Organization. (2012). *Born too soon: the global action report on preterm birth*. Retrieved from http://www.who.int/pmnch/media/news/2012/preterm_birth_report/en/
- ² Martin J. A., Hamilton B. E., Ventura S. J., et al. (2012). Births: Final data for 2010. *National Vital Statistics Reports*, 61(1). Retrieved from http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_01.pdf
- ³ Save the Children. (2013). *Surviving the first day: state of the world's mothers 2013*. Retrieved from <http://www.savethechildrenweb.org/SOWM-2013>
- ⁴ Mathews T. J., & MacDorman M. F. (2013). Infant mortality statistics from the 2009 period linked birth/infant death data set. *National Vital Statistics Reports*, 61(8). Retrieved from http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_08.pdf
- ⁵ Mathews T. J., & MacDorman M. F. (2012). Infant mortality statistics from the 2008 period linked birth/infant death data set. *National vital statistics reports*, 60(5). Retrieved from http://www.cdc.gov/nchs/data/nvsr/nvsr60/nvsr60_05.pdf
- ⁶ McManemy, J., Cooke, E., Amon, E., & Leet, T. (2007). Recurrence risk for preterm delivery. *American Journal of Obstetrics and Gynecology*, 196(6), 576.e1–576.e7.
- ⁷ Conde-Agudelo, A., Rosas-Bermúdez, A., & Kafury-Goeta, A. C. (2006). Birth spacing and risk of adverse perinatal outcomes. *JAMA*, 295(15), 1809–1823.
- ⁸ Jarjoura, K., Devine, P. C., Perez-Delboy, A., Herrera-Abreu, M., D'Alton, M., & Papapanou, P. N. (2005). Markers of periodontal infection and preterm birth. *American Journal of Obstetrics and Gynecology*, 192(2), 513–519.
- ⁹ McDonald, S. D., Han, Z., Mulla, S., & Beyene, J., on behalf of the Knowledge Synthesis Group. (2010). Overweight and obesity in mothers and risk of preterm birth and low birth weight infants: systematic review and meta-analyses. *BMJ (Clinical research ed.)*, 341(jul20 1), c3428–c3428.
- ¹⁰ Bhattacharya, S., Raja, E. A., Mirazo, E. R., Campbell, D. M., Lee, A. J., Norman, J. E., & Bhattacharya, S. (2010). Inherited predisposition to spontaneous preterm delivery. *Obstetrics & Gynecology*, 115(6), 1125–1133.
- ¹¹ Krueger, P. M., & Scholl, T. O. (2000). Adequacy of prenatal care and pregnancy outcome. *The Journal of the American Osteopathic Association*, 100(8), 485–492.
- ¹² Russell R. B., Green N. S., Steiner C. A., Meikle S., Howse J. L., Poschman K., Dias T., Potetz L., Davidoff M. J., Damus K., & Petrini J.R. (2007). The costs of hospitalization for preterm and low birth weight infants in the United States. *Pediatrics*, 120(1), e1-9.
- ¹³ Behrman R. E., & Butler A. S. Societal Costs of Preterm Birth. (2007). *Preterm birth: causes, consequences, and prevention*. chapter 12. Retrieved from http://www.nap.edu/openbook.php?record_id=11622
- ¹⁴ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *Pennsylvania family health statistics*. Retrieved from www.health.state.pa.us/stats
- ¹⁵ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *Pennsylvania family health statistics*. Retrieved from www.health.state.pa.us/stats
- ¹⁶ America's Health Rankings. (2010). Retrieved from <http://www.americashealthrankings.org/CustomReport>

- ¹⁷ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *Pennsylvania family health statistics*. Retrieved from www.health.state.pa.us/stats
- ¹⁸ United States Department of Health and Human Services. (2010). Healthy People 2020, Maternal, Child and Infant Health. Retrieved from <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicId=26>
- ¹⁹ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *Pennsylvania family health statistics*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=596010&mode=2>
- ²⁰ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *Pennsylvania family health statistics*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=596010&mode=2>
- ²¹ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *Pennsylvania family health statistics*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=596010&mode=2>
- ²² Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *Pennsylvania family health statistics*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=596010&mode=2>
- ²³ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *Pennsylvania family health statistics*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=596010&mode=2>
- ²⁴ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *Pennsylvania family health statistics*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=596010&mode=2>
- ²⁵ United States Preventive Services Task Force. (2009). Counseling and interventions to prevent tobacco use and tobacco-caused disease in adults and pregnant women: U.S. Preventive Services Task Force reaffirmation recommendation statement. *Annals of Internal Medicine*, 150. Retrieved from <http://annals.org/article.aspx?articleid=744446>
- ²⁶ America's Health Rankings. (2010). Retrieved from <http://www.americashealthrankings.org/CustomReport>
- ²⁷ Torloni, M. R., Betrán, A. P., Daher, S., Widmer, M., Dolan, S. M., Menon, R., et al. (2009). Maternal BMI and preterm birth: A systematic review of the literature with meta-analysis. *Journal of Maternal-Fetal and Neonatal Medicine*, 22(11), 957–970.
- ²⁸ United States Department of Health and Human Services. (2010). *Healthy people 2020, maternal, child and infant health*. Retrieved from <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicId=26>
- ²⁹ United States Department of Health and Human Services. (2010). *Healthy people 2020, maternal, child and infant health*. Retrieved from <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicId=26>
- ³⁰ American Congress of Obstetricians and Gynecologists. Retrieved from <http://www.acog.org>
- ³¹ Nour, N. M. N. (2012). Premature delivery and the millennium development goal. *Reviews in obstetrics and gynecology*, 5(2), 100–105.
- ³² United States Department of Health and Human Services. (2010) *Healthy people 2020, maternal, child and infant health*. Retrieved from <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicId=26>
- ³³ March of Dimes, Peristats. (2013). Retrieved from <http://www.marchofdimes.com/peristats>

Infant Mortality

The infant mortality rate is the number of deaths prior to first birthday per 1,000 live births. In the United States, about 25,000 infants die each year.¹ Neonatal mortality, a subset of infant mortality, is the number of deaths in the first 28 days of life for every 1,000 births. Neonatal mortality is the largest component of infant mortality, accounting for approximately 65 to 70 percent of all infant deaths.²

Complications of preterm delivery are the leading cause of death in the first year of life. Fifty percent of all infant deaths and 70 percent of all neonatal deaths are due to complications of prematurity.^{3,4} Birth defects and Sudden Infant Death Syndrome (SIDS) are also significant contributors to infant death, at 17.6 and 7.0 percent, respectively.

In Allegheny County, which includes the city of Pittsburgh and a nationally-ranked women's hospital, between 50 and 70 percent of infant deaths related to prematurity occur in babies born at less than 23 weeks of gestation. Most clinicians consider this to be too early for survival outside of the mother's uterus and these newborns are neither actively resuscitated nor provided with aggressive neonatal intensive care.⁵

Although neonatal and infant deaths are vital outcome measures of maternal and child health, they do not provide an overall perspective on pregnancy outcomes. A complete assessment must also account for fetal losses, particularly those that occur before the fetus is viable, or able to survive outside of the mother's body. In many cases, the only difference between a fetal loss and a neonatal death is that the baby exhibited signs of life briefly, for perhaps minutes. Otherwise, the outcome of the pregnancy is the same. Fetal losses are not included in the calculation of neonatal and infant mortality, which may cause the numbers, based on a relatively low number of instances, to be dramatically affected by small changes.

In order to effectively reduce the rate of infant death while controlling health care costs, the causes of poor pregnancy outcomes must be identified and treated, especially those related to early delivery. It is vital to understand the cause of continuing racial disparities and provide ways to improve comprehensive services that prolong pregnancies among black women, bringing their infants to term, or closer to term, before delivery.

Healthy People 2020

The U.S. Department of Health and Human Services has targeted a 10 percent reduction in the infant mortality rate as its Healthy People 2020 objective for this health topic. In the 2006 baseline year, the national rate was 6.7; in 2010, the rate had reached a record low of 6.1 per 1,000 live births, approaching the national goal of 6.0 per 1,000 live births.⁶

However, disparities persist among infants belonging to racial and ethnic minority groups. As shown in Figures 7.14, 7.15 and 7.16, the 2006 Pennsylvania rates of infant mortality, neonatal mortality and post-neonatal mortality for black infants far exceeded rates among white infants, Hispanic infants and Asian/Pacific Islander infants.

Figure 7.14 Infant Mortality Rates by Race and Ethnicity, Pennsylvania, 2006 and Healthy People 2020 Goal⁷

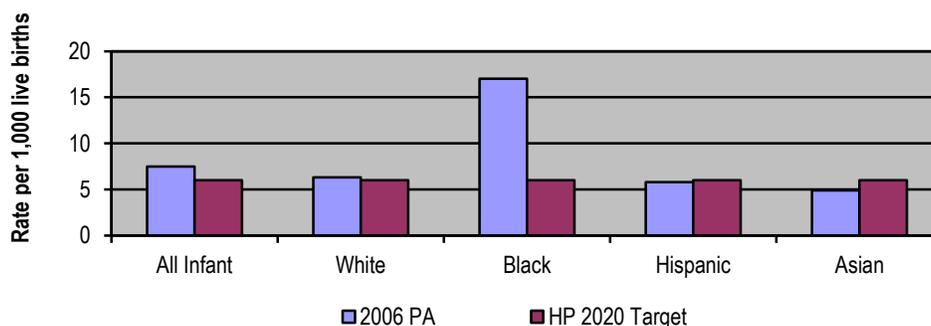


Figure 7.15 Neonatal Mortality Rates by Race and Ethnicity, Pennsylvania, 2006 to 2010⁸

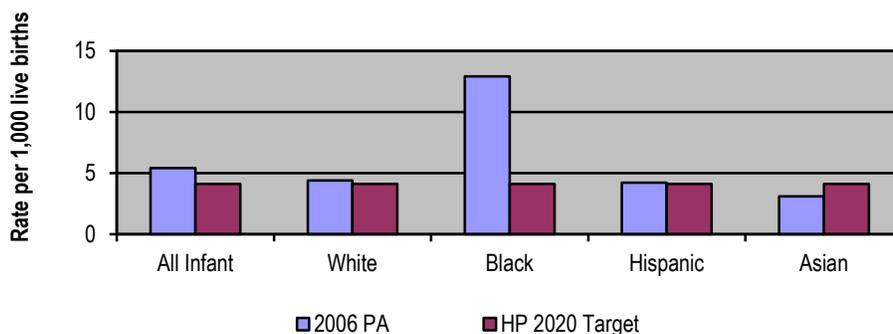
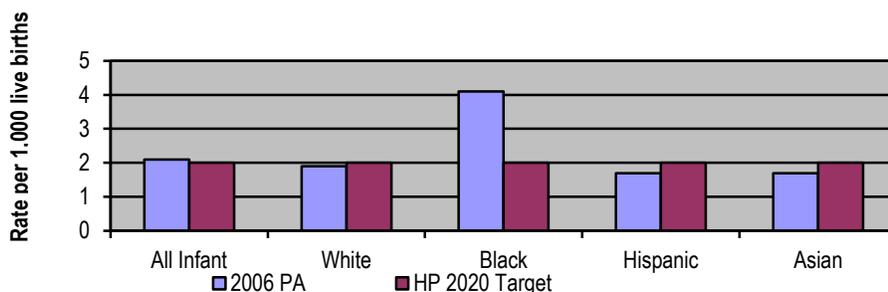


Figure 7.16 Post-neonatal Mortality Rates by Race and Ethnicity, Pennsylvania, 2006 to 2010⁹



Infant mortality

Despite declines in infant mortality, disturbing trends continue. The rate of preterm delivery, the leading cause of infant mortality, has not significantly changed over the last 20 years, especially for VLBW infants. Therefore, the improvement in the infant mortality rate cannot be considered a result of fewer infants at risk but in improved care by neonatal intensive care units (NICUs). In addition, racial disparities continue to exist, particularly with those dying from prematurity and sleep-related deaths (e.g., suffocation, asphyxia, entrapment). Finally, the U.S. continues to have higher infant mortality rates than other industrialized countries, including most of Europe, Canada and Japan.¹⁰

Table 7.10 Infant Mortality Rates by Race and Ethnicity, Pennsylvania, 2006 to 2010^{11,12,13}

	Pennsylvania		United States	
	2006	2010	2006	2010
All infants	7.5	7.3	6.7	6.1
White	6.3	6.4	5.7	5.2
Black	17.0	14.4	13.4	11.6
Hispanic	5.8	8.4	5.6	5.5
Asian/Pacific Islander	4.9	3.0	4.6	4.3
HP 2020 Goal:	6.0 per 1,000 Live Births			

The rate of infant mortality in Pennsylvania decreased from 7.5 per 1,000 live births in 2006 to 7.3 per 1,000 live births in 2010, but it remains higher than the national average of 6.1 per 1,000 live births. The rate of mortality for black infants is about twice the rate for all infants in the state, although the rate for black infants decreased between 2006 and 2010, while the rate for white infants remained relatively unchanged. During the same period, the infant mortality rate for Hispanic babies unexpectedly climbed from 5.8 per 1,000 live births to 8.4 per 1,000 live births.

Of the 1,035 infant deaths that occurred in Pennsylvania in 2010, 736 were neonatal deaths (71.1 percent), while 299 occurred after the neonatal period (28.9 percent). The primary causes of death are shown in Table 7.11.

Table 7.11 Leading Causes of Infant Death, Pennsylvania, 2010¹⁴

Cause	Number	Percent (%)
Perinatal conditions (most commonly, prematurity)	559	54.0
Congenital anomalies	182	17.5
Sudden Infant Death Syndrome (SIDS)	72	7.0

Prematurity seems to have a stronger effect on infant mortality in Pennsylvania than is shown in the national data, which has about 34 to 36 percent of infant deaths related to prematurity. However, even nationally, the percent is higher for both blacks and Hispanics. Higher numbers of premature infant deaths in Pennsylvania may represent the fact that blacks are overrepresented in Pennsylvania infant mortality compared to the country as a whole. It may also, however, reflect that pre-viable births (occurring before 23 weeks of gestation) may be more commonly identified as live births in Pennsylvania and less likely to be identified as such elsewhere. Therefore, they would be included in Pennsylvania infant mortality statistics.

As noted earlier in this section, 50 to 70 percent of all neonatal deaths in Allegheny County are pre-viable. For an in-depth review of factors that may lead to international and state variations in infant mortality, the reader is referred to “The U.S. Infant Mortality Rate: International Comparisons, Underlying Factors, and Federal Programs”, published by the Congressional Research Services in 2012.¹⁵

Neonatal mortality

Neonatal mortality trends closely mirror infant mortality trends.

Table 7.12 Neonatal Mortality Rates by Race and Ethnicity, Pennsylvania, 2006 to 2010^{16,17,18}

	Pennsylvania		United States	
	2006	2010	2006	2010
All infants	5.4	5.2	4.5	4.0
White	4.4	4.6	3.7	3.5
Black	12.9	9.5	8.7	7.5
Hispanic	4.2	6.1	3.7	3.7
Asian/Pacific Islander	3.1	2.8	3.1	3.1
HP 2020 Goal:	4.1 per 1,000 Live Births			

As with infant mortality rates, the overall decline in Pennsylvania’s neonatal mortality rate was not consistent across racial and ethnic groups. However, the decrease among black infants was significantly greater than the decrease in neonatal mortality for all infants. White infants remained relatively unchanged.

Infant and neonatal mortality rates in Pennsylvania are slowly declining, but overall have not mirrored nationwide improvement. There appears to be a greater racial disparity in Pennsylvania's rates than the national rates. More work must be done to address the infant and neonatal rates and racial disparities.

Intervention Strategies

Based on these trends, the following approaches are recommended to reduce infant and neonatal mortality in Pennsylvania:

- **Review infant death records.** Correctly identify underlying conditions contributing to these deaths. Each county in the state has a Child Death Review team, and the data gathered by them can help identify areas in which potentially preventable deaths are occurring.
- **Promote safe sleep recommendations.** Pennsylvania's legislature has mandated that parents receive safe sleep education in the hospital before the newborn is discharged. This education must be reinforced after discharge by home care agencies, primary care physicians, the media and others.
- **Address "toxic stress."** Evidence now suggests that stress can have an adverse impact on pregnancy outcomes, the leading cause of infant mortality. The effect may be felt more in Pennsylvania than elsewhere,^{19,20} and improving pregnancy outcome will require a coordinated and collaborative effort among medical professionals, community agencies, insurers and families. Efforts to enhance collaboration will increase access to community-based programs available to women in need.
- **Alter reimbursement structures.** Changes in payment mechanism to physicians and hospitals should reward healthier pregnancy outcomes and decrease the profit from poor outcomes.
- **Continue research.** Funding must be made available to identify the underlying mechanisms of early labor and develop interventions that will prolong pregnancy.

Endnotes

¹ Centers for Disease Control and Prevention. (2013). *Reproductive health, maternal and infant health*. Retrieved from <http://www.cdc.gov/reproductivehealth/MaternalInfantHealth/InfantMortality.htm>

² Mathews, T.J. & MacDorman, M. F. (2010, April 30). Infant mortality statistics from the 2006 period linked birth/infant death data set. [Data file]. *National Vital Statistics Report*, 58(17). Retrieved from http://www.cdc.gov/nchs/data/nvsr/nvsr58/nvsr58_17.pdf

³ Pennsylvania Department of Health. (2012, September). *Pennsylvania 2012 child death review annual report*. Retrieved from http://www.childdeathreview.org/Reports/PA_CDR2012.pdf

⁴ Allegheny County Health Department, Office of Epidemiology and Biostatistics, Maternal and Child Health Program. (n.d.). *Allegheny county child death review, 2005-2008*. Retrieved from http://www.achd.net/childhth/pubs/pdf/2005-2008_AC_Child_Death_Review_final.pdf

⁵ Allegheny County Health Department, Office of Epidemiology and Biostatistics, Maternal and Child Health Program. (n.d.). *Allegheny county child death review, 2005-2008*. Retrieved from http://www.achd.net/childhth/pubs/pdf/2005-2008_AC_Child_Death_Review_final.pdf

⁶ Centers for Disease Control and Prevention. (2012, July). *Death in the United States, 2010*. *NCHS data brief*, 99. Retrieved from <http://www.cdc.gov/nchs/data/databriefs/db99.htm>

⁷ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *Pennsylvania family health statistics*. Retrieved from <http://www.health.state.pa.us/stats>

- ⁸ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *Pennsylvania family health statistics*. Retrieved from <http://www.health.state.pa.us/stats>
- ⁹ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *Pennsylvania family health statistics*. Retrieved from <http://www.health.state.pa.us/stats>
- ¹⁰ Heisler E. J. (2012, April 4). *The U.S. infant mortality rate: international comparisons, underlying factors, and federal programs*. Congressional Research Service Report for Congress. Retrieved from <http://www.fas.org/sgp/crs/misc/R41378.pdf>
- ¹¹ Pennsylvania Department of Health, Bureau of Health Statistics and Research. *Pennsylvania family health statistics. (2006-2010)*. Retrieved from <http://www.health.state.pa.us/stats>
- ¹² National Vital Statistics Report. (2010). *Infant mortality statistics from the 2006 period linked birth/infant death data set*. Retrieved from http://www.cdc.gov/nchs/data/nvsr/nvsr58/nvsr58_17.pdf
- ¹³ National Vital Statistics Report. (2010). *Deaths: preliminary data for 2010*. Retrieved from http://www.cdc.gov/nchs/data/nvsr/nvsr60/nvsr60_04.pdf
- ¹⁴ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2010). *Pennsylvania vital statistics*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=596032&mode=2>
- ¹⁵ Heisler E. J. (2012, April 4). *The U.S. infant mortality rate: international comparisons, underlying factors, and federal programs*. Congressional Research Service Report for Congress. Retrieved from <http://www.fas.org/sgp/crs/misc/R41378.pdf>
- ¹⁶ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *Pennsylvania family health statistics*. Retrieved from <http://www.health.state.pa.us/stats>
- ¹⁷ National Vital Statistics Report. (2010). *Infant mortality statistics from the 2006 period linked birth/infant death data set*. Retrieved from http://www.cdc.gov/nchs/data/nvsr/nvsr58/nvsr58_17.pdf
- ¹⁸ National Vital Statistics Report. (2010). *Deaths: preliminary data for 2010*. Retrieved from http://www.cdc.gov/nchs/data/nvsr/nvsr60/nvsr60_04.pdf
- ¹⁹ Kramer M. R., & Hogue C. R. (2009, May 28). What causes racial disparities in very preterm birth? A biosocial perspective. *EpidemiologicReviews*, 31, 84-98.
- ²⁰ Lu M. C., Kotelchuck M., Hogan V., Jones L., Wright K., & Halfon N. (2010). Closing the black-white gap in birth outcomes: a life-course approach. *Ethnicity and Disease Journal*, 20. Retrieved from <http://www.ishib.org/journal/20-1s2/ethn-20-01s2-s62.pdf>

Breastfeeding

Before 1900, all babies were breastfed by their mother or a wet nurse. During the early 1900s, physicians began prescribing mixtures that mothers could use to feed their babies. Infant mortality was high among infants receiving these mixtures.¹ To improve the quality and reduce the need for wet nurses, doctors developed the first commercial mixture, or “formula.” The medicalization and commercialization of infant care made formula seem both acceptable and necessary to many mothers. Infant mortality due to formula feeding declined with the release of the new formulas, as did breastfeeding rates.²

By 1965, the U.S. breastfeeding initiation rate had dropped to just 30 percent.³ In 1972, eligible low-income, non-breastfeeding mothers began to receive formula products through the federal government’s Special Supplemental Nutrition Program for Women, Infants and Children (WIC). Around the same time, new evidence of the health benefits of human milk consumption for mothers and babies sparked a small breastfeeding revival. By this time, however, social and community support for breastfeeding had disappeared.⁴

In the 1990s, national and international initiatives for breastfeeding support began to emerge. New evidence showed the relationship between breastfeeding and health. The rate of breastfeeding initiation rose, from about 47 percent to 59 percent, at the end of the decade.⁵

Today, breastfeeding is recognized widely as an important public health issue.⁶ The challenge remains to remove individual and social barriers and return to a culture that supports breastfeeding.

Healthy People 2020

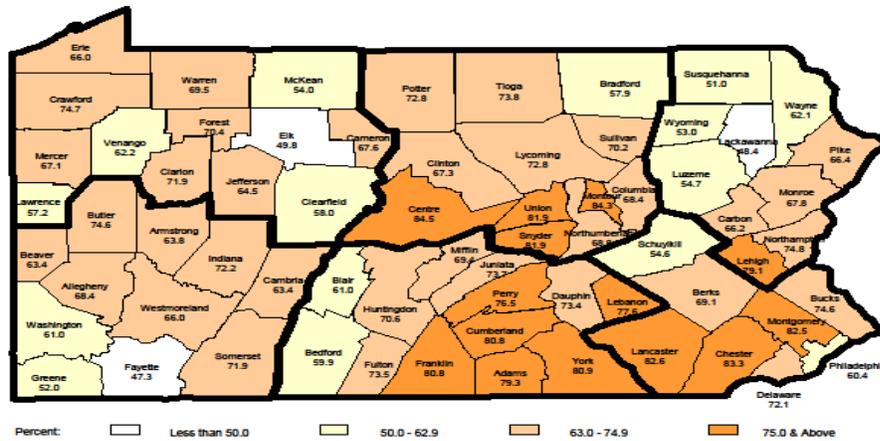
In its Healthy People 2020 guidance, the U.S. Department of Health and Human Services sets objectives for any breastfeeding, as well for exclusive breastfeeding. For the former, measures include infants who “are ever breastfed,” “are breastfed at 6 months,” and “are breastfed at 1 year.” For the latter, objectives measure those who “are breastfed exclusively through 3 months” and “are breastfed exclusively through 6 months.”

Healthy People 2020 also includes objectives to support the breastfeeding mother, by “increas[ing] the proportion of employers who have worksite lactation support programs,” “reduc[ing] the proportion of breastfed newborns who receive formula supplementation within the first 2 days of life,” and “increase[ing] the proportion of live births that occur in facilities that provide recommended care for lactating mothers and their babies.”

The proportion of Pennsylvania’s infants who are ever breastfed continues to increase, based on birth certificate data. In 2010, approximately 70 percent of newborns in the state were breastfed, compared with 61 percent in 2003. However, the state has yet to meet the Healthy People 2020 objective of 81.9 percent. Based on data from the Centers for Disease Control and Prevention (CDC), Pennsylvania’s rank is 39 of the 50 states. By comparison, Idaho ranked first with 91.8 percent of infants ever breastfed, and Mississippi ranked last with just over half of its infants ever breastfed (50.5 percent).⁷

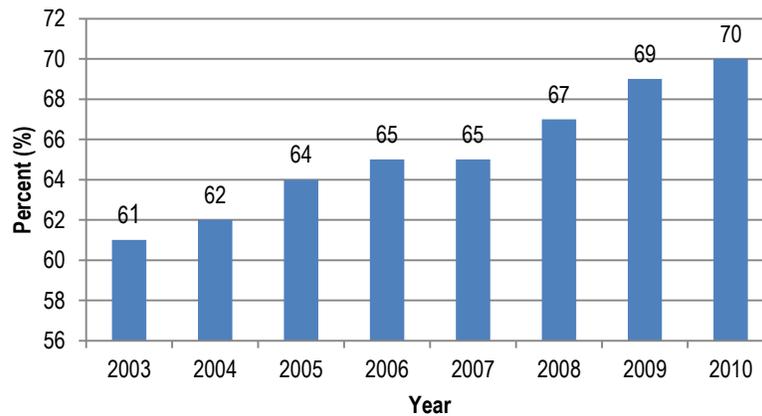
As shown in Figure 7.17 rates of breastfeeding in Pennsylvania vary widely by county. In 2010, several counties met the objective for “ever breastfed.” Rates are of Pennsylvania resident live births; unknowns are excluded in the calculation for percent breastfed.

Figure 7.17 Infants Ever Breastfed, by County, Pennsylvania, 2010⁸



Breastfeeding initiation: Since 2003, the birth certificate has included the question “Is newborn being breastfed?” Data from this source show a steady increase in breastfeeding initiation rates. Note that responses to this question are Yes/No and cannot be taken as an indication of exclusive breastfeeding.

Figure 7.18 Infants Ever Breastfed, Pennsylvania, 2003 to 2010



Breastfeeding duration and exclusivity: Rates of breastfeeding duration and exclusivity are captured by the National Immunization Survey and reported via the CDC’s Breastfeeding Report Card. According to this data, Pennsylvania lags behind the nation in breastfeeding at 6 months and 12 months, as well as exclusive breastfeeding at 6 months. The state’s rate for exclusive breastfeeding at 3 months is slightly higher than the national rate.

Table 7.13 Breastfeeding Duration and Exclusivity, Pennsylvania and United States, 2008⁹

Measure	Percent (%) of National Immunization Survey Responses		
	Pennsylvania	United States	Healthy People 2020 Goals
Breastfeeding at 6 months	42.3	47.2	60.6
Breastfeeding at 12 months	21.6	25.5	34.1
Exclusive breastfeeding at 3 months	37.2	36.0	46.2
Exclusive breastfeeding at 6 months	14.1	16.3	25.5

Specific populations: In 2010, breastfeeding initiation rates were highest for mothers in the 30 to 34 year old age group, although the greatest increases between 2006 and 2010 occurred for mothers 15 to 19, 20 to 24 and 25 to 29. Rates were also higher for Asian mothers than those of other racial or ethnic groups. Initiation rates were highest for babies born at or after 37 weeks of gestation.

Table 7.14 Breastfeeding Initiation Rates by Maternal Age, Pennsylvania, 2006 to 2010¹⁰

	Percent (%)				
	2006	2007	2008	2009	2010
Under 15 Years	36	38	36	43	37
15 to 19	48	48	50	54	54
20 to 24	56	57	59	60	62
25 to 29	67	68	69	71	73
30 to 34	71	72	73	76	77
35 to 39	72	73	73	75	76
40 to 44	74	73	74	75	75
45 and Older	77	75	75	74	70

Figure 7.19 Breastfeeding Initiation Rates by Race and Ethnicity, Pennsylvania, 2003 to 2010¹¹

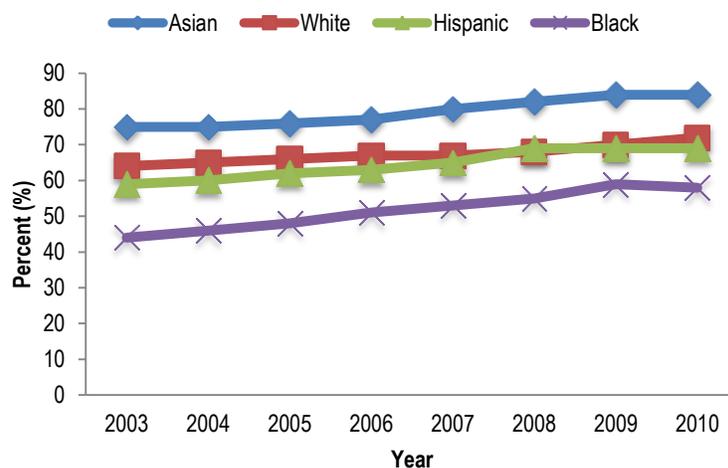


Table 7.15 Breastfeeding Initiation Rates by Gestational Age, Pennsylvania, 2006 to 2010¹²

	2006	2007	Percent (%) 2008	2009	2010
< 37 Weeks	54	55	56	60	62
37 Weeks or More	66	67	68	70	71

Table 7.16 Breastfeeding Initiation Rates by Birth Weight, Pennsylvania, 2006 to 2010¹³

	2006	2007	Percent (%) 2008	2009	2010
Very Low Birth Weight <i>0 to 1,499 grams</i>	40	44	44	49	53
Low Birth Weight <i>1,500 to 2,499 grams</i>	53	54	55	59	60
Normal Birth Weight <i>2500+ grams</i>	66	67	68	70	71

Pregnancy Risk Behaviors

Pennsylvania's Pregnancy Risk Assessment Monitoring System (PA PRAMS) is a joint research project between the Pennsylvania Department of Health and the CDC. Its purpose is to find out why some babies are born healthy and others are not. To do this, new mothers are asked about their behaviors and experiences around the time of their pregnancy. The following highlights are from the PA PRAMS report in June 2012:¹⁴

- **Pregnancy intention:** Whether women intended to get pregnant appears to significantly affect breastfeeding. Pennsylvania mothers with intended pregnancies are about 1.4 times as likely as those with unintended pregnancies to report breastfeeding or pumping their milk for their babies after delivery. Mothers with unintended pregnancies who received WIC services are twice as likely as non-WIC mothers with unintended pregnancies to report breastfeeding or pumping breast milk for eight or more weeks.
- **Maternal age:** Mothers 25 to 34 years of age were most likely to report breastfeeding or pumping their milk for their babies, compared with mothers in other age groups (e.g., younger than 20 years old age, 20 to 24 years of age and 35 and older). Mothers 25 to 34 are about 1.2 times as likely as teen mothers to report ever breastfeeding or pumping their milk to feed their baby after delivery.
- **Education:** Mothers with more than 12 years of education are approximately 1.2 times more likely than mothers with 12 or fewer years of education to indicate ever breastfeeding or pumping their milk to feed their babies.
- **Pregnancy history:** Those with no previous live births are approximately 1.1 times as likely as those with previous live births to report ever breastfeeding or pumping their milk for their babies after delivery.

Health Effects

The influence of breastfeeding on maternal and child health has been well-reported in the literature and was the subject of a Surgeon General's report in recent years.¹⁵ Babies who breastfeed have fewer ear infections and diarrhea while formula fed infants are at higher risk for some serious infections and diseases, including lower respiratory infections, leukemia, Sudden Infant Death Syndrome (SIDS), type 2 diabetes, asthma and childhood obesity. Breastfeeding also reduces a mother's risks for certain health outcomes such as breast cancer and ovarian cancer. The information in Table 7.17 is drawn from the 2011 Surgeon General's Call to Action to Support Breastfeeding.¹⁶

According to the American Academy of Pediatrics (AAP), the evidence for breastfeeding and health is strong enough to warrant a change in perspective and policy. In its strongly worded statement on breastfeeding, the nation's leading professional pediatric organization noted that "[b]reastfeeding and human milk are the normative standards for infant

feeding and nutrition. Given the documented short- and long-term medical and neurodevelopmental advantages of breastfeeding, infant nutrition should be considered a public health issue and not only a lifestyle choice.”¹⁷

The multidisciplinary Academy of Breastfeeding Medicine (ABM) finds that “[i]ncreasing breastfeeding rates is one of the most important behaviors that can decrease infant death and illness worldwide. In times of disaster or food insecurity, infants who are not breastfed have a markedly higher risk of infant mortality and morbidity from infectious diseases. Long-term consequences of not breastfeeding have become apparent such as a higher risk of sudden infant death syndrome, necrotizing enterocolitis (a gastrointestinal disease), elevated blood pressure and cholesterol, obesity, diabetes and cancers.”¹⁸

Table 7.17 Excess Health Risks Associated with Not Breastfeeding, Surgeon General’s Call to Action, 2011

Outcome	Excess Risk
Among full-term infants	
Acute ear infections (otitis media)	100%
Eczema (atopic dermatitis)	47%
Diarrhea and vomiting (gastrointestinal infection)	178%
Hospitalization for lower respiratory tract diseases in the first year	257%
Asthma, with family history	67%
Asthma, with no family history	35%
Childhood obesity	32%
Type 2 diabetes mellitus	64%
Acute lymphocytic leukemia	23%
Acute myelogenous leukemia	18%
Sudden Infant Death Syndrome	56%
Among preterm infants	
Necrotizing enterocolitis (NEC)	138%
Among mothers of full-term infants	
Breast cancer	4%
Ovarian cancer	27%

Note: Excess risk is approximated based on odds ratios in referenced studies.

Intervention Strategies

- Support of health care providers:** Health care providers are often the first contacts many modern women have with the subject of breastfeeding, so they must understand how to support breastfeeding. Health care organizations must be designed to support breastfeeding mothers, as well. The Pennsylvania Department of Health assists health care providers in this effort by making small grants (up to \$5,000) available to hospitals and by providing a training model for use with pediatric office staff. Grant-funded projects include assisting with breastfeeding needs in the NICU, providing education for nursing staff and more. EPIC-BEST, Educating Practices In Their Communities—Breastfeeding Education Support and Training is a joint venture between the Department of Health and the Pennsylvania chapter of AAP that provides more than 100 office practices with 60 to 90 minutes of training for office staff, as well as reference materials, technical assistance and follow-up.
- Provision of data:** A dedicated breastfeeding page within the Department of Health’s web site provides state residents and others with a variety of information on breastfeeding. State and national data provide a clear picture of breastfeeding rates. The Pennsylvania Breastfeeding Awareness and Support State Plan is available as well, explaining many ways partner groups can support breastfeeding and sharing handouts for parents. The Pennsylvania Breastfeeding Referral Guide provides a list of local breastfeeding resources, by county.
- Support of community efforts:** Pennsylvania has seen an increase in the number of local breastfeeding coalitions over the last year. Currently, 21 meet regularly to represent 28 (of 67) counties. While each coalition has its own mission and activities, all are focused on increasing breastfeeding rates in the state. Ongoing communications and technical assistance continue to increase the strength and number of coalitions. Lactation support in the workplace is also an area for intervention. Using the Business Case for Breastfeeding materials

from the Health Resources and Service Administration (HRSA), staff work with local employers to discuss the economic impact of supporting employee breastfeeding and become breastfeeding-friendly workplaces.

Endnotes

- ¹ Lawrence, P.A., & Lawrence, R. M. (2005). *Breastfeeding: a guide for the medical professional (6th ed.)*. St. Louis, Missouri: Mosby, 171-214, 239-244, 461.
- ² Apple, R. D. (1987). *Mothers and medicine: a social history of infant feeding, 1890-1950*. Madison, Wisconsin: University of Wisconsin Press.
- ³ Ross Products Division and Abbott Laboratories. (2003). *Mothers survey*. Columbus, Ohio: Ross Products.
- ⁴ Apple, R. D. (1987). *Mothers and medicine: a social history of infant feeding, 1890-1950*. Madison, Wisconsin: University of Wisconsin Press.
- ⁵ Ross Products Division and Abbott Laboratories. (2003). *Mothers survey*. Columbus, Ohio: Ross Products.
- ⁶ U.S. Department of Health and Human Services. (2011). *The surgeon general's call to action to support breastfeeding*. Retrieved from <http://www.surgeongeneral.gov/library/calls/breastfeeding/index.html>
- ⁷ Centers for Disease Control and Prevention. (2013) *Breastfeeding report card, United States, 2013*. Retrieved from <http://www.cdc.gov/breastfeeding/pdf/2013BreastfeedingReportCard.pdf>
- ⁸ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2010). *Certificates of live birth*. [Data file]. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=809799&mode=2>
- ⁹ Centers for Disease Control and Prevention. *National immunization survey. (2008 provisional data)*. [Data file].
- ¹⁰ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2006-2010). *Certificates of live birth*. [Data file]. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=809799&mode=2>
- ¹¹ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2003-2010). *Certificates of live birth*. [Data file]. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=809799&mode=2>
- ¹² Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2003-2010). *Certificates of live birth*. [Data file]. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=809799&mode=2>
- ¹³ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2003-2010). *Certificates of live birth*. [Data file]. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=809799&mode=2>
- ¹⁴ Pennsylvania Department of Health. (June 11, 2012). *Report: breastfeeding*. Pennsylvania Pregnancy Risk Assessment Monitoring System. [Data file]. Retrieved from <http://www.health.state.pa.us/paprams>
- ¹⁵ U.S. Department of Health and Human Services. (2011). *The surgeon general's call to action to support breastfeeding*. Washington, DC: U.S. Department of Health and Human Services. Retrieved from <http://www.surgeongeneral.gov/library/calls/breastfeeding/index.html>
- ¹⁶ U.S. Department of Health and Human Services. (2011). *The surgeon general's call to action to support breastfeeding*. Retrieved from <http://www.surgeongeneral.gov/library/calls/breastfeeding/index.html>
- ¹⁷ Eidelman A. I., & Schanler R. J. (2012). Breastfeeding and the use of human milk. *Pediatrics*, 129(3), e827-e841.
- ¹⁸ Academy of Breastfeeding Medicine. (2008). Position on breastfeeding. *Breastfeeding Medicine* 3(4); 267-270.

Postpartum Depression

Depression is more than just feeling “blue” or “down in the dumps” for a few days. It’s a serious illness involving the brain in which sad, anxious, or “empty” feelings linger, interfering with day-to-day life and routines. Depression can be mild to severe. Most people with depression get better with treatment.

Perinatal depression encompasses a wide range of mood disorders that can affect a woman during pregnancy and after the birth of her child, including prenatal depression, the “baby blues,” postpartum depression and postpartum psychosis.¹

Depression with onset after childbirth, but within the first year postpartum, is called postpartum depression. Most often, onset occurs within four weeks of delivery, and this is the timeframe used in the definition of the Diagnostic and Statistical Manual of Mental Disorders (DSM IV), although the DSM V updates may extend this period to six months. The diagnosis of postpartum depression is based not only on the length of time between delivery and onset, but also on the severity of the symptoms.²

According to the National Institute of Mental Health (NIMH), women are particularly vulnerable to depression after giving birth, when hormonal and physical changes and the new responsibility of caring for a newborn can be overwhelming.³ Hormonal changes may trigger symptoms of postpartum depression. Within the first 24 to 48 hours after childbirth, estrogen and progesterone hormone levels quickly return to normal. Researchers think this rapid drop in hormone levels may lead to depression in some women. Low levels of thyroid hormones can also cause symptoms of depression and can be diagnosed by a simple blood test.

The Centers for Disease Control and Prevention (CDC) notes that symptoms of postpartum depression are similar to those of depression unrelated to childbirth, but may also include:

- Difficulty sleeping even when the baby is asleep
- Sense of disconnectedness from the baby
- Feelings of over-attachment to the baby
- Scary, unwanted, intrusive, negative thoughts about the baby (ex., thinking someone will take away the baby, or hurt the baby)
- Worry about hurting the baby
- Feelings of guilt about not being a “good mom”

Findings from a CDC survey suggest that between eight and 19 percent of new mothers experience frequent postpartum depressive symptoms.⁴ Although depression can be hard to recognize, those in contact with new mothers—health care providers, family, friends—should support mothers in seeking professional help.⁵

Healthy People 2020

The U.S. Department of Health and Human Services has identified several objectives for the primary goal of “improving mental health through prevention and by ensuring access to appropriate, quality mental health services.”

One objective is to reduce the proportion of persons who experience major depressive episodes (MDEs). Mental Health/Mental Disorder (MHMD) objective 9.2 is to increase the proportion of adults aged 18 years and older with major depressive episodes who receive treatment. The baseline for this objective is the 68.3 percent of adults aged 18 years and older with major depressive episodes who received treatment in 2008. The target for this is a 10 percent improvement to 75.1 percent.

Another objective is to increase depression screening by primary care providers. MHMD objective 11.1 is to increase the proportion of primary care physicians who screen adults aged 19 years and older for depression during office visits. The baseline for this objective is 2.2 percent of primary care physicians who screened adults aged 19 years and older for depression during office visits in 2007. The target is a 10 percent increase to 2.4 percent.⁶

One of Pennsylvania’s 2011 Maternal and Child Health Services Title V Block Grant Program State Priorities is to increase behavioral health (mental health and substance abuse) screening, diagnosis and treatment for pregnant women and mothers (this includes postpartum depression).

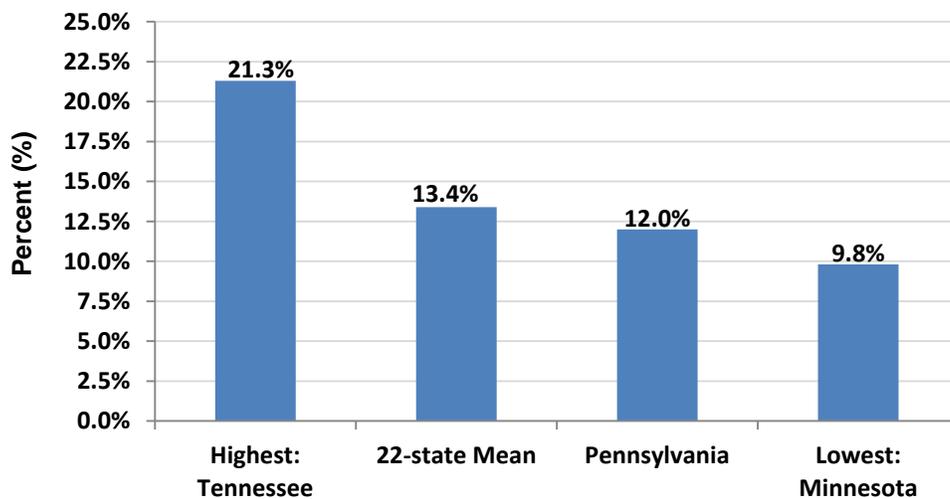
Pregnancy Risk Factors

Pennsylvania’s Pregnancy Risk Assessment Monitoring System (PA PRAMS) is an ongoing, population-based surveillance project between the Pennsylvania Department of Health and the CDC. Forty states and New York City participate in PRAMS, representing about 78 percent of all U.S. live births.

Its purpose is to find out why some babies are born healthy and others are not. To do this, a sample of new mothers is asked about their behaviors and experiences around the time of their pregnancy; several questions serve to identify postpartum prevalence and intervention.

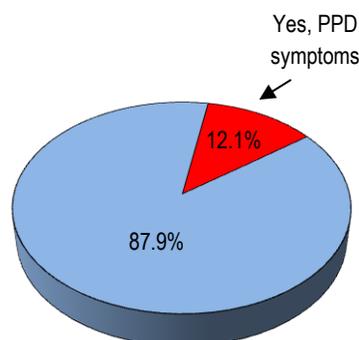
Data from the PA PRAMS reveal that 12.0 percent (95% Confidence Interval (CI)=9.7-14.7) of Pennsylvania’s new mothers experience frequent postpartum depressive symptoms, which is not significantly different from the 22-state mean of 13.4 percent for PRAMS participating sites.⁷

Figure 7.20 Rates of Frequent Postpartum Depressive Symptoms, Self-Report by Mothers, 2007 and 2008⁸



The PA PRAMS questionnaire captures responses to how sampled mothers felt since delivery. Survey participants are asked: “Since your new baby was born, how often have you felt down, depressed, or hopeless?” (Always, Often, Sometimes, Rarely, Never) and “Since your new baby was born, how often have you had little interest or little pleasure in doing things?” (Always, Often, Sometimes, Rarely, Never). Responses of “Always” and “Often” are coded as reports of PPD symptoms.

Figure 7.21 Rates of Frequent Postpartum Depression Symptoms, Pennsylvania, 2007 and 2008⁹



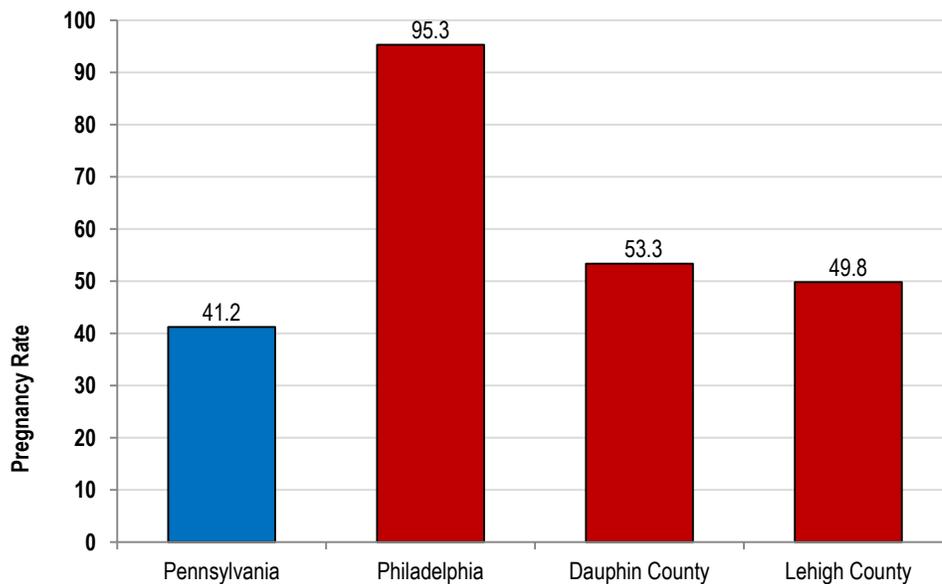
While PA PRAMS utilizes a statewide sample large enough to produce scientifically valid, weighted data representative of Pennsylvania, it was not designed for facilitating analysis at the county level. However, in describing Pennsylvania’s unique geographic profile indirectly through proxy indicators and risk factors, it is possible to establish counties likely to contain high rates of postpartum depression.

Sociodemographic factors: Hobfoll, et al¹⁰ found higher rates of postpartum depression among low income, inner-city women. In that study, a sample of 192 financially impoverished inner city women was assessed for clinical depression twice during pregnancy and once postpartum. Postpartum depression was found among 23.4 percent of participants. At the time of that study, the percentage was approximately double the percentage realized for middle-class samples.

Pennsylvania is a large state with significant differences in county population size across its 67 counties. According to 2011 estimates of the U.S. Census Bureau, Philadelphia is the fifth most populated city in the nation. There were 62,513 births in its county, also called Philadelphia, from 2008 to 2010 (three-year sum). The next largest county in the state, Allegheny, had 42 percent as many births (36,411) during that time period. By comparison, 56 of Pennsylvania’s counties, or 84 percent of them, had fewer than 10,000 births.

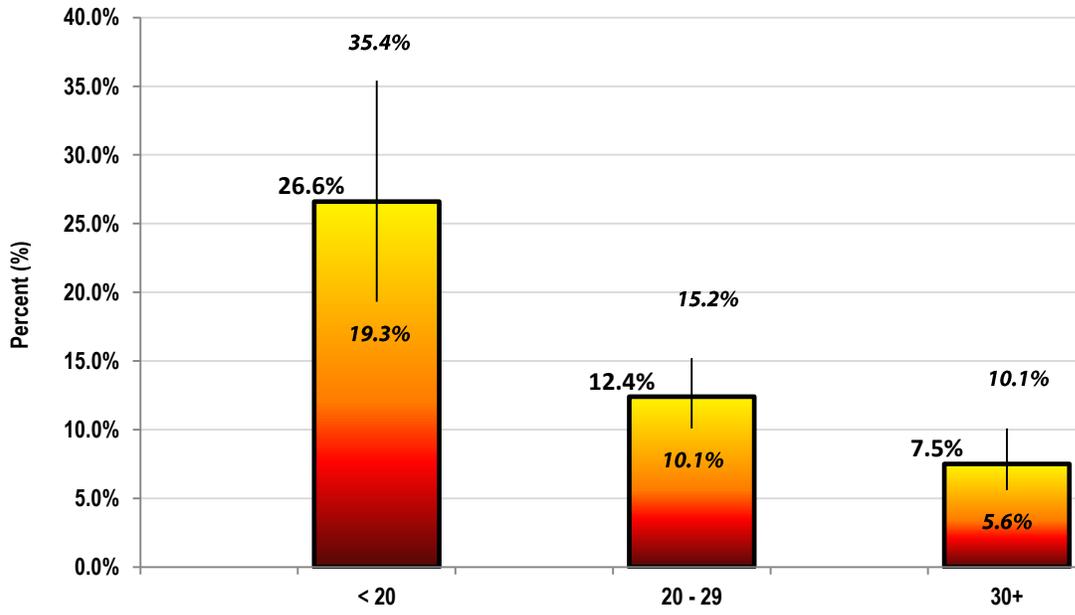
Adolescent childbearing: Chen¹¹ and Sierra Manzano, et al.¹² found a higher incidence of postpartum depression in teenage or adolescent mothers. Chen found that among 21 symptoms of depression, adolescent mothers exhibited significantly higher cognitive-affective symptoms than adult mothers. Utilizing the Edinburgh Postnatal Depression Scale (EPDS)¹³ in a study of 306 women, Manzano and co-investigators found that the age of the mother was one of the independent variables associated with postpartum depression. More details about this risk factor can be found in the “Adolescent Pregnancy and Childbearing” portion of this report, on page 7-10.

Figure 7.22 Pregnancy Rates, Females Ages 15 to 19, Pennsylvania, 2008 to 2010¹⁴



Maternal Age: Considering PA PRAMS survey responses in light of maternal age, the highest percent of respondents reporting postpartum depressive symptoms (PPD) is younger than 20 years old, at 26.6% (CI=19.3-35.4). While the sample size is low and the confidence interval is wide, the percent indicating PPD symptoms in the age group of adolescent mothers is 3.5 times greater than the 7.5 percent in the 30 and older population (CI=5.6-10.1).

Figure 7.23 Rates of Postpartum Depression by Maternal Age, Pennsylvania, 2007 and 2008¹⁵

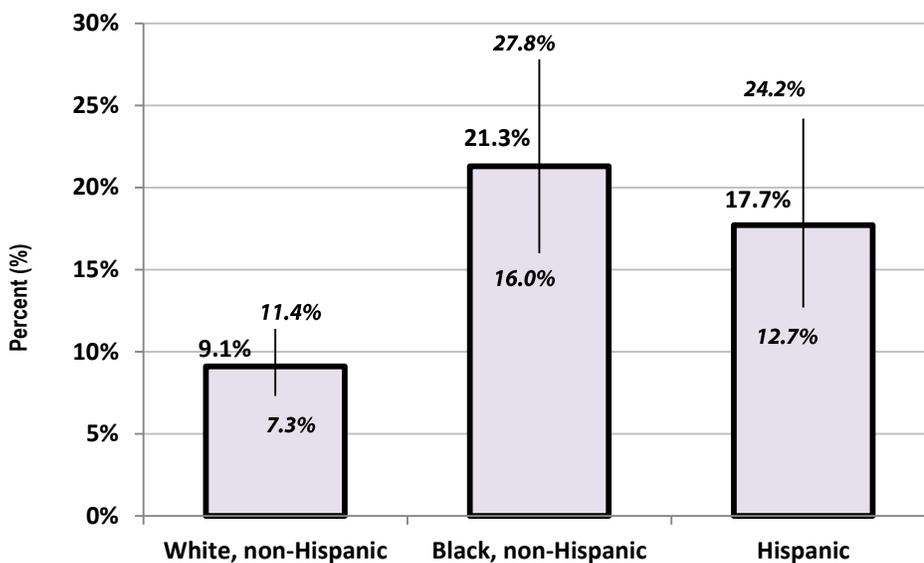


Race and ethnicity: Using the PA PRAMS data to draw conclusions about postpartum depression with regard to race and ethnicity is problematic due to the relatively low sample response rates among persons from some racial and ethnic groups, as well as low sample sizes with the PPD variable. Therefore, caution should be taken in interpreting these results.

About 21.3 percent (CI=16.0-27.8) of black, non-Hispanic respondents reported symptoms of PPD, compared with Hispanic respondents at 17.7 percent (CI=12.7-24.2), and white, non-Hispanic respondents at 9.1 percent (CI=7.3-11.4).

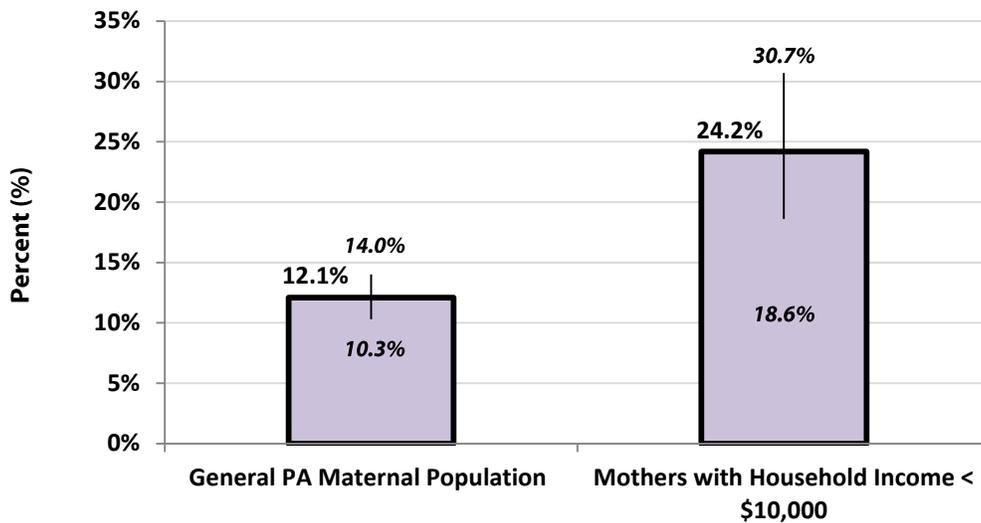
Although the sample size was low, the data do support a conclusion that Pennsylvania mothers in the white, non-Hispanic population are reporting postpartum depressive symptoms significantly less often than mothers in the Black, non-Hispanic and Hispanic populations.

Figure 7.24 Rates of Postpartum Depression by Race and Ethnicity, Pennsylvania, 2007 and 2008¹⁶



Income: Based on the PA PRAMS 2007 and 2008 data, mothers with household incomes less than \$10,000 (before taxes) report symptoms of PPD with a relatively high frequency of 4.2 percent (CI=18.6-30.7) compared to 12.1 percent in the general maternal population (CI=10.3-14.0).

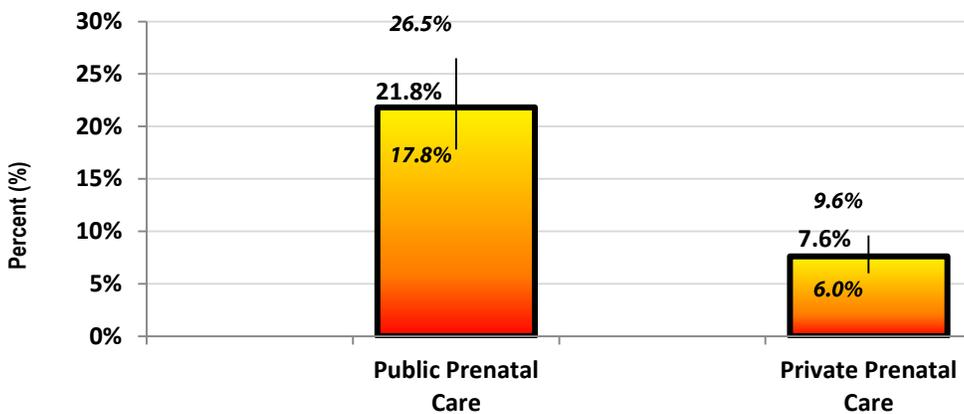
Figure 7.25 Rates of Postpartum Depression by Household Income Below \$10,000, 2007 and 2008¹⁷



Prenatal Care: Identifying and comparing postpartum depression frequency within two subpopulations, based on whether prenatal care was obtained within a public or private care facility, has revealed that those mothers having obtained prenatal care within a public care facility were significantly more likely to report postpartum depressive symptoms.

Sampled mothers were asked to identify where they attended prenatal care visits most of the time. Hospital and health department clinics and community health centers were categorized as public, and doctors' offices, HMO clinics and midwife practices were categorized as private. Of those mothers who visited public care facilities, 21.8 percent indicated PPD symptoms (CI=17.8-26.5). Of those mothers who visited private care facilities or practices, 7.6 percent indicated PPD symptoms (CI=6.0-9.6). This difference is significant.

Figure 7.26 Rates of Postpartum Depression by Prenatal Care Type, 2007 and 2008¹⁸



Education: Mothers who completed the PRAMS survey and had fewer than 12 years of education had the highest percentage of PPD symptoms. Respondents in that group were approximately three times more likely to indicate PPD symptoms as mothers who had more than 12 years of education.

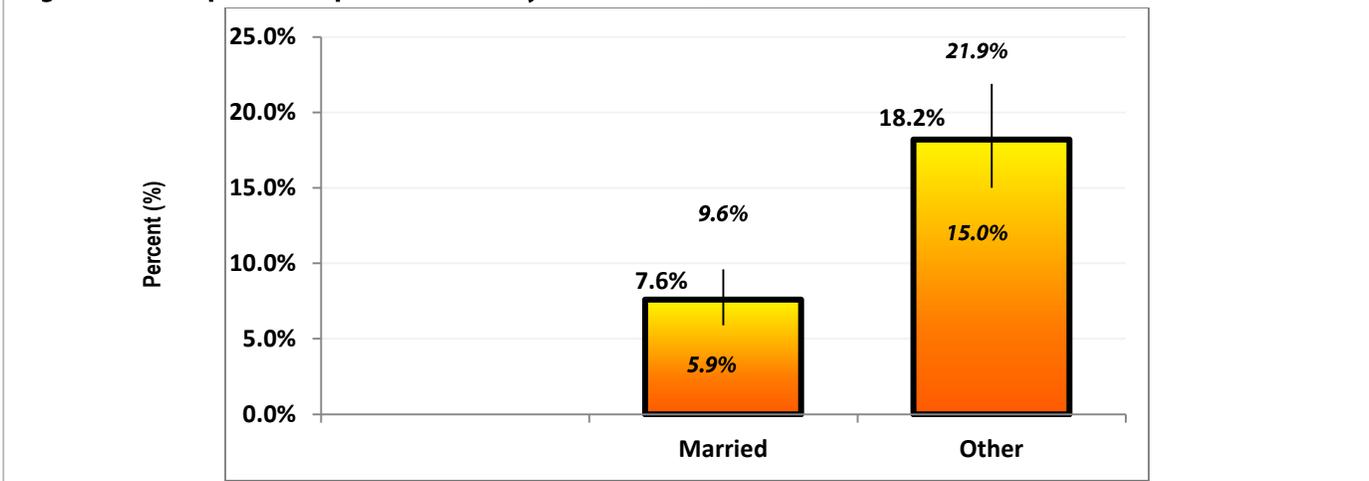
Table 7.18 Postpartum Depression by Education, Pennsylvania, 2007 and 2008¹⁹

	Number	PPD Symptoms	
		Percent (%)	95% CI
< 12 years education	60	20.9%	15.4-27.7%
12 years education	90	18.2%	14.3-22.8%
> 12 years education	87	6.8%	5.3-8.8%
Total	237	12.1%	10.4-14.1%

Marital Status: Some studies have suggested that unmarried women are more likely than their married counterparts to experience postpartum depression. Pfost, et al. found in a 1990 study of 69 white women that marital status was a significant predictor of postpartum depression. The strength of this correlation was second only to that of preexisting depression.²⁰

An examination of the weighted 2007 and 2008 PA PRAMS data reveals a significant association between marital status and postpartum depressive symptoms. As defined within the PA PRAMS dataset, mothers' marital status is derived from the vital records birth certificate file with two possible values: "married" and "other." Mothers identified as "other [than married]" were 2.4 times as likely to self-report postpartum depressive symptoms.

Figure 7.27 Postpartum Depression Rates by Marital Status, 2007 and 2008²¹



Other Risk Factors: In a study published in 2006, research faculty from the Oklahoma State University College of Osteopathic Medicine in Tulsa conducted a study to describe possible correlations between postpartum depression and various characteristics. Their results indicated that a history of depression, formula feeding in place of breastfeeding and cigarette smoking were all significant risk factors for an Edinburgh Postnatal Depression Scale of 13 or higher, indicating probable postpartum depression.²²

Intervention Strategies

There is no single cause of postpartum depression. Physical, emotional and lifestyle factors may all play a role. However, certain factors have been identified as possibly increasing one's risk of depression after pregnancy:

- Depression during pregnancy
- Personal history of depression or another mental illness
- Family history of depression or another mental illness
- Lack of support from family and friends
- Anxiety or negative feelings about the pregnancy
- Unplanned or unwanted pregnancy
- Problems with a previous pregnancy or birth
- Marriage or money problems
- Stress, such as from life events or childcare
- Young age
- Substance abuse
- Cigarette smoking
- Infant temperament
- Unmarried status
- Lower socioeconomic status
- Formula feeding

Targeting populations at risk for postpartum depression and implementing effective programs to minimize its impact on maternal and infant health is key, including:

- **Enhance prenatal awareness.** Educate pregnant women about postpartum depression during the third trimester, with information about risks, symptoms and how to get help.²³
- **Screen pregnant and postpartum women.** Obstetricians/gynecologists should screen patients during prenatal care visits, birth and obstetrical postpartum appointments, well-baby visits, and postpartum internal medicine/family practice visits.^{24,25}
- **Train health care providers.** Training should be specialized and focus on particulars of PPD.²⁶
- **Develop connections for referral** among health care organizations that serve pregnant and postpartum women.²⁷
- **Share resources about PPD.** The Office of Mental Health or its designee should update and widely distribute resources in multiple formats for diverse audiences, to ensure accurate listings for referral agencies.²⁸
- **Provide home-based “mobile” therapy.**²⁹
- **Develop and evaluate pilot projects.** Ensure that the range of available treatment services align with the level of need for mothers who have perinatal depression.³⁰
- **Increase public awareness** of perinatal depression coverage through an education campaign.³¹
- **For teens, implement policy changes to build upon school-behavioral health infrastructure.** Improve systemic detection, screening, referrals and treatment; provide training for school counselors and contracted social service providers.
- **For teens, increase awareness about perinatal depression among child behavioral health providers.** Include training explicitly focused on differentiating between perinatal depression symptoms and situational stressors or developmental behaviors associated with adolescence.

The Pennsylvania Department of Health supports initiatives designed to raise awareness about postpartum depression, decrease stigma associated with it and increase screening. The department has funded training of practitioners, medical personnel and community social service providers in an effort to advance this goal. Additionally, the department provides information and referral on resources for postpartum depression through the Healthy Baby Line (800-986-BABY).

Potential barriers to accessing mental health care include health insurance, childcare, transportation, stigma, language, awareness and resources. These represent ideal focal points for addressing postpartum depression and thus improving the health of mothers and babies.

Resources

Pennsylvania Department of Health, Maternal and Child Health Services—Contact: Giselle Hallden, Public Health Program Administrator, (717) 772-2762

Pennsylvania Pregnancy Risk Assessment Monitoring System (PA PRAMS)—Contact: Tony Norwood, PA PRAMS Coordinator, (717) 772-2762. Available at <http://www.health.state.pa.us/paprams>

Centers for Disease Control and Prevention (CDC) PRAMS web site—<http://www.cdc.gov/PRAMS>

Centers for Disease Control and Prevention (CDC) PRAMS and Postpartum Depression Fact Sheet—<http://www.cdc.gov/reproductivehealth/ProductsPubs/PubsPRAMS.htm>

Centers for Disease Control and Prevention (CDC) PRAMS ONline Data for Epidemiologic Research (CPONDER), a web-based public query system created to access data collected through PRAMS surveys—<http://www.cdc.gov/prams/cponder.htm>

National Women’s Health Information Center, U.S. Department of Health and Human Services, Office of Women’s Health. Frequently Asked Questions on Depression and Pregnancy—<http://www.womenshealth.gov/faq/depression-pregnancy.cfm#a>

Endnotes

¹ New York State Department of Health. (May 2005). *Understanding maternal depression, a fact sheet for care providers*. Retrieved from http://www.health.ny.gov/community/pregnancy/health_care/perinatal/maternal_factsheet.htm

² Depression Health Center, WebMD. (2013). *Postpartum depression*. Retrieved from <http://www.webmd.com/depression/default.htm>

³ The National Institute of Mental Health. (2013). *Women and depression: discovering hope, postpartum depression*. Retrieved from <http://www.nimh.nih.gov/health/publications/women-and-depression-discovering-hope/what-causes-depression-in-women.shtml>

⁴ Centers for Disease Control and Prevention. (2013). *Depression among women of reproductive age and postpartum depression*. Retrieved from <http://www.cdc.gov/reproductivehealth/Depression>

⁵ German Institute for Quality and Efficiency in Health Care. (2012, July 18). *Fact sheet: Depression after childbirth – what can help*. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0005000>

⁶ Centers for Disease Control and Prevention. (2013). *National Ambulatory Medical Care Survey (NAMCS)*. Retrieved from <http://www.cdc.gov/nchs/ahcd.htm>

⁷ Pennsylvania Department of Health. (2012). *Pennsylvania Pregnancy Risk Assessment Monitoring System, Report: Breastfeeding*. [Data file]. Retrieved from <http://www.health.state.pa.us/paprams>

⁸ Centers for Disease Control and Prevention. (2008). *CPONDER*. [Data file]. Retrieved from <http://www.cdc.gov/prams/cponder.htm>

- ⁹ Pennsylvania Department of Health, Bureau of Family Health. (2007 and 2008). *Pennsylvania Pregnancy Risk Assessment Monitoring System*. [Data file]. Retrieved from <http://www.health.state.pa.us/paprams>
- ¹⁰ Hobfoll S. E., Ritten C., Lavin J., Hulsizer M. R., & Cameron R. P. (1995). Depression prevalence and incidence among inner-city pregnant and postpartum women. *Journal of Consulting and Clinical Psychology*, *63*. 445–53.
- ¹¹ Chen C.H. (1996). Postpartum depression among adolescent mothers and adult mothers. *Kaohsiung Journal of Medical Science*, *1*. 104–113.
- ¹² Sierra Manzano J.M., Carro Garcia T., Ladron Moreno E. (2002). Variables associated with the risk of postpartum depression. Edinburgh Postnatal Depression Scale [in Spanish]. *Aten Primaria*. *30*. 103–111.
- ¹³ Sierra Manzano J.M., Carro Garcia T., Ladron Moreno E. (2002). Variables associated with the risk of postpartum depression. Edinburgh Postnatal Depression Scale [in Spanish]. *Aten Primaria*. *30*. 103–111.
- ¹⁴ Pennsylvania Department of Health, Bureau of Health Statistics and Research. (2008-2010). EpiQMS. [Data file]. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=596553&mode=2>
- ¹⁵ Pennsylvania Department of Health, Bureau of Family Health. (2007 and 2008). *Pennsylvania Pregnancy Risk Assessment Monitoring System*. [Data file]. Retrieved from <http://www.health.state.pa.us/paprams>
- ¹⁶ Pennsylvania Department of Health, Bureau of Family Health. (2007 and 2008). *Pennsylvania Pregnancy Risk Assessment Monitoring System*. [Data file]. Retrieved from <http://www.health.state.pa.us/paprams>
- ¹⁷ Pennsylvania Department of Health, Bureau of Family Health. (2007 and 2008). *Pennsylvania Pregnancy Risk Assessment Monitoring System*. [Data file]. Retrieved from <http://www.health.state.pa.us/paprams>
- ¹⁸ Pennsylvania Department of Health, Bureau of Family Health. (2007 and 2008). *Pennsylvania Pregnancy Risk Assessment Monitoring System*. [Data file]. Retrieved from <http://www.health.state.pa.us/paprams>
- ¹⁹ Pennsylvania Department of Health, Bureau of Family Health. (2007 and 2008). *Pennsylvania Pregnancy Risk Assessment Monitoring System*. [Data file]. Retrieved from <http://www.health.state.pa.us/paprams>
- ²⁰ Pfof K. S., Stevens M. J., Lum C. U. (1990). The relationship of demographic variables, antepartum depression, and stress to postpartum depression. *Journal of Clinical Psychology*, *46*. 588–592.
- ²¹ Pennsylvania Department of Health, Bureau of Family Health. (2007 and 2008). *Pennsylvania Pregnancy Risk Assessment Monitoring System*. [Data file]. Retrieved from <http://www.health.state.pa.us/paprams>
- ²² Breese S. J., McCoy, M. J., Beal J. M., Miller Shipman, S. B., Payton, M. E., Watson, G. H. (2006). Risk factors for postpartum depression: a retrospective investigation at 4-weeks, as referenced in: risk factors for postpartum depression: a retrospective investigation at 4-weeks postnatal and a review of the literature. *The Journal of the American Osteopathic Association*, *106* (4). 193-198. Retrieved from <http://www.jaoa.org>
- ²³ American Academy of Pediatrics. (2002). Guidelines for perinatal care, 5th edition. *American Academy of Pediatrics and American College of Obstetricians and Gynecologists*. Retrieved from <http://www2.aap.org/sections/perinatal/publications.html>
- ²⁴ American Academy of Pediatrics. (2002). Guidelines for perinatal care, 5th edition. *American Academy of Pediatrics and American College of Obstetricians and Gynecologists*. Retrieved from <http://www2.aap.org/sections/perinatal/publications.html>
- ²⁵ Barnes-Higgs, K. (2012). *Behavioral health care for maternal mental health in Philadelphia: barriers to care, recommendations for change*. [White paper]. Retrieved from <http://maternitycarecoalition.org/wp-content/uploads/2012/02/Perinatal-Depression-Barriers-and-Recommendations.pdf>

²⁶ Barnes-Higgs, K. (2012). *Behavioral health care for maternal mental health in Philadelphia: barriers to care, recommendations for change*. [White paper]. Retrieved from <http://maternitycarecoalition.org/wp-content/uploads/2012/02/Perinatal-Depression-Barriers-and-Recommendations.pdf>

²⁷ Barnes-Higgs, K. (2012). *Behavioral health care for maternal mental health in Philadelphia: barriers to care, recommendations for change*. [White paper]. Retrieved from <http://maternitycarecoalition.org/wp-content/uploads/2012/02/Perinatal-Depression-Barriers-and-Recommendations.pdf>

²⁸ Barnes-Higgs, K. (2012). *Behavioral health care for maternal mental health in Philadelphia: barriers to care, recommendations for change..* [White paper]. Retrieved from <http://maternitycarecoalition.org/wp-content/uploads/2012/02/Perinatal-Depression-Barriers-and-Recommendations.pdf>

²⁹ Barnes-Higgs, K. (2012). *Behavioral health care for maternal mental health in Philadelphia: barriers to care, recommendations for change*. [White paper]. Retrieved from <http://maternitycarecoalition.org/wp-content/uploads/2012/02/Perinatal-Depression-Barriers-and-Recommendations.pdf>

³⁰ Barnes-Higgs, K. (2012). *Behavioral health care for maternal mental health in Philadelphia: barriers to care, recommendations for change*. [White paper]. Retrieved from <http://maternitycarecoalition.org/wp-content/uploads/2012/02/Perinatal-Depression-Barriers-and-Recommendations.pdf>

³¹ Barnes-Higgs, K. (2012). *Behavioral health care for maternal mental health in Philadelphia: barriers to care, recommendations for change*. [White paper]. Retrieved from <http://maternitycarecoalition.org/wp-content/uploads/2012/02/Perinatal-Depression-Barriers-and-Recommendations.pdf>

Childhood Screening

In Pennsylvania, mandated childhood health screenings in the school setting are typically carried out by school nurses or their designees. Other screenings are performed in the primary care setting by pediatricians, family practitioners or their designees. These primary care screenings follow American Academy of Pediatrics (AAP) preferred practice patterns. Through these and other community based screening opportunities, children are screened for various medical issues. Recommended and required screenings are outlined below and efficacy described.

National Initiative for Screening

The American Academy of Pediatrics (AAP), through its Bright Futures national initiative, recommends various screening in the “medical home,”¹ typically the usual pediatric office the child visits. Measurements of length, height and weight are performed throughout infancy, and at 12 months, 15 months, 18 months, 24 months, 30 months and 36 months; thereafter, they can be assessed every year through childhood and adolescence. Calculation of body mass index (BMI) is to begin at 24 months, and continue at 30 months, 36 months and yearly. Risk assessment for high blood pressure should be performed up to 30 months of age, with blood pressure monitoring yearly from age three.

Before a child is three years old, the AAP recommends that signs of vision or eye problems be evaluated and appropriate referrals made. For children age three and older, acuity is also to be assessed; children are to be referred if there is poor acuity or signs of eye or vision abnormalities.

Hearing screening risk assessment is to be performed throughout infancy, at 12 months, 15 months, 18 months, 24 months, 30 months, 36 months, 7 years, 9 years and 11 years; then, it is to be assessed yearly. Hearing testing is to be performed in the newborn and at ages 4, 5, 6, 8 and 10 years old.

Vision Screening

The 2002 Department of Health’s “Procedures for the Vision Screening Program for Pennsylvania’s School-Age Population” prescribes how vision screening is to be carried out in Pennsylvania’s schools,² noting that the Public School Code of 1949 requires every school-age child to be given a vision test. The test should be administered by a certified school nurse, medical technician (health room aide), or teacher, using a Snellen chart or other screening device approved by the Department of Health. Test requirements include the following:

Table 7.19 Vision Screening Test Requirements, Pennsylvania³

Test Requirements	Condition	Grade Levels
Far Visual Acuity Test	Amblyopia, Astigmatism, Myopia	All students yearly
Near Visual Acuity Test	Astigmatism, Focusing problems, Hyperopia	All students yearly
Convex Lens Test (Plus Lens)	Excessive hyperopia	1st grade students meeting criteria, new students not previously screened
Color Vision Test	Color discrimination	1st or 2nd, new students not previously screened
Stereo/Depth Perception Test	Binocularity, Strabismus	1st or 2nd, new students not previously screened

Although it is mandated that every child receive a vision screening yearly with a minimum of both near and far vision, there appears to be recognition that this may not be possible and that resources should be focused on those children at

the highest risk. It is mandated that parents must be notified whether a child passes or fails the vision screening. For children who fail a screening, follow up with an eye specialist is mandatory. The physician must provide a written report. If this is not returned to the school within four to six weeks, the school must contact the parents or guardians, and conduct a home visit, if necessary. Each school district is required to submit aggregate information to the Pennsylvania Department of Health by September 30 of each year.

Hearing Screening

Pennsylvania state regulations require students in kindergarten; grades 1, 2, 3, 7 and 11; and those in special, ungraded classes to be given a sweep hearing test. Testing is also recommended for all new children entering the school without documented audiometric hearing test results. This is required for:

- Any students in any grades who are known to have a hearing loss which meets or exceeds the criteria for otologic referral established by the Department of Health.
- Any students who present a history of recurrent upper respiratory infection or who may evidence other possible ear, nose and throat pathology.
- Any students who show, by classroom behavior, speech pattern, or both, that a hearing difficulty may exist.

State guidelines stipulate that the “[s]chool nurse and school nurse practitioners trained in the use of an otoscope are to examine the ears of all pupils failing the pure-tone hearing test. School nurses/school nurse practitioners are responsible for referring any pupil found to have failed the threshold test for further evaluation. Referrals are to be made by personal contact with a parent, followed by written notification. A report from the physician or the hearing specialist should be completed on the Physician/Hearing Specialist Report and returned to the school nurse.” All school districts are required to report yearly to the Pennsylvania Department of Health by September 30.

Growth Screening

The Department of Health also provides guidance on the minimum growth screening each school district must provide, and information for performing proper measures of height and weight, as well as revised growth charts and information about plotting Body Mass Index (BMI).⁴

Figure 7.28 Pennsylvania Growth Screening Regulations⁵

28 Pennsylvania Code Section 23.7. Height and weight measurements

- (a) Height and weight measurements shall be conducted at least once annually and preferably twice annually. Every effort shall be made to determine the pattern of growth for each child so that his weight and height can be interpreted in light of his own growth patterns rather than those of his classmates.
- (b) Height and weight measurements shall be conducted by a nurse or teacher.

The Department of Health recommends that schools provide information about the growth screening program, and BMI in particular, to parents and guardians in advance of children’s screening; this has been shown to prompt a more positive response from parents. Notifications of screening results are to be sent home for all children, even if the measurements fall within the normal range. Children with a BMI-for-age of less than five percent are considered at risk for malnutrition; those with a BMI-for-age greater than 85 percent are at risk for overweight; those with a BMI-for-age greater than 95 percent are considered overweight.

For children who measure below the fifth percentile, schools are recommended to:

- Send the notification letter home in a timely manner. If an eating disorder is suspected, school staff should communicate directly with the parent or guardian.
- Recommend evaluation of the student’s nutritional status by the primary care provider.
- Provide educational materials with the notification letter.
- Provide a list of community-based food supplementation programs in the area, if under-nutrition may be related to inadequate food supply, including: local food pantries, WIC program, county cooperative extension agencies

and local programs offering education to low-income families about minimizing costs while maximizing nutrition.

For children who measure at or above the 85th percentile, schools are recommended to:

- Send the notification letter home in a timely manner. Communicate directly with parent or guardian, if needed.
- Recommend health evaluation by the primary care provider, for: blood pressure, total cholesterol, family history, exogenous causes of overweight and obesity (e.g., Prader-Willi Syndrome), Type II diabetes in children.
- Encourage healthy eating behaviors and regular physical activity.
- Provide age-appropriate educational materials on nutrition, physical activity and weight management with the notification letter.
- Refer to a school-based healthy lifestyle program, if offered.
- If BMI between the 85th and 95th percentiles, encourage or monitor a weight maintenance plan if implemented by the primary care provider.
- If BMI \geq 95th percentile, support implementation of a treatment plan, if recommended by the primary care provider.

Although school districts must report yearly to the Department of Health about screening completion, there is no requirement to return a reporting form from follow-up with a primary care provider. Table 7.20 shows little change in screening or obesity rates between 2006 and 2011.

Table 7.20 Childhood BMI Screening, Pennsylvania, 2006 to 2011⁶

Grade	Academic Years					
	2006 to 2007	2007 to 2008	2008 to 2009	2009 to 2010	2010 to 2011	
K-6	Students screened	998,308	982,238	979,048	975,692	975,256
	BMI < 5 th percentile	22,280 (2.23%)	23,580 (2.40%)	22,946 (2.34%)	24,082 (2.47%)	25,777 (2.64%)
	BMI 5 th to 85 th percentile	649,585 (65.07%)	649,987 (65.87%)	593,567 (60.63%)	635,273 (65.11%)	631,685 (64.77%)
	BMI > 85 th and < 95 th percentile	160,056 (16.03%)	148,602 (15.13%)	147,835 (15.10%)	152,314 (15.61%)	155,115 (15.92%)
	BMI \geq 95 th percentile	166,387 (16.67%)	163,069 (16.60%)	160,700 (16.41%)	164,023 (16.81%)	162,679 (16.68%)
7-12	Students screened	Not required	865,969	839,298	844,461	823,433
	BMI < 5 th percentile	Not required	18,156 (2.10%)	17,486 (2.08%)	19,098 (2.26%)	19,185 (2.32%)
	BMI 5 th to 85 th percentile	Not required	560,462 (64.72%)	540,575 (64.41%)	533,480 (63.17%)	526,904 (63.60%)
	BMI > 85 th and < 95 th percentile	Not required	138,503 (15.99%)	137,139 (16.34%)	137,323 (16.26%)	136,129 (16.43%)
	BMI \geq 95 th percentile	Not required	148,848 (17.19%)	144,098 (17.17%)	154,001 (18.24%)	146,221 (17.65%)

Scoliosis Screening

The Department of Health guidelines address how scoliosis screening should be carried out in Pennsylvania schools. Each student in grades 6 and 7, and those ages 11 and 12 in ungraded classes must be screened for scoliosis. As with other school-based screening programs, schools are to send letters of notification to parents or guardians of children who are to be screened. The screening can involve an initial screening by school personnel or other community health facility personnel. A second screening of those who are assessed to have abnormal results is to be performed by a second, different screener (e.g., community personnel, school nurse, school physician). Following the re-screening, students with findings positive for scoliosis are to be referred for evaluation by a physician. A "Parent-Physician Letter" should reflect the screener's findings. Each school district must provide aggregate data about scoliosis screening programs to the Department of Health.

Conclusion

State recommendations are available for performing childhood vision, hearing, BMI and scoliosis screening, and reporting results to parents so they can obtain medical care for children who have abnormal screening results. However, there are no requirements for data collection about the effectiveness of the screening programs. It does not appear that most of the relevant data are currently available in Pennsylvania, although its collection and analysis could identify trends; provide a picture of the health of Pennsylvania's school students, districts and the state; and enhance understanding of health-related activities in the schools.

Endnotes

¹ The American Academy of Pediatrics. (2013) *Bright futures*. Retrieved from <http://www.brightfutures.aap.org>

² Pennsylvania Department of Health. (2002). *Procedures for the vision screening program for Pennsylvania's school-age population*. Retrieved from http://www.portal.state.pa.us/portal/server.pt/community/schools/14130/screening_programs/556700

³ Pennsylvania Department of Health. (2002). *Procedures for the vision screening program for Pennsylvania's school-age population*. Retrieved from http://www.portal.state.pa.us/portal/server.pt/community/schools/14130/screening_programs/556700

⁴ Pennsylvania Department of Health. (2004). *Procedures for the growth screening program for Pennsylvania's school-age population*. Retrieved from http://www.portal.state.pa.us/portal/portal/server.pt/community/schools/14130/mandated_school_health_program_%28exams_screens%29/556692

⁵ Pennsylvania Department of Health. (2004). *Procedures for the growth screening program for Pennsylvania's school-age population*. Retrieved from http://www.portal.state.pa.us/portal/portal/server.pt/community/schools/14130/mandated_school_health_program_%28exams_screens%29/556692

⁶ Pennsylvania Department of Health. (2006-2011). *Growth screens and BMI-for-age percentiles*. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=556724&mode=2>

Children and Youth with Special Health Care Needs

There are two criteria for identifying children and youth with special health care needs (CYSHCN):

- They have or are at increased risk for one or more chronic physical, developmental, behavioral, or emotional conditions.
- They require health and related services beyond that required by most children.

The broad definition of CYSHCN allows for the inclusion of children with a variety of ongoing health, developmental and behavioral conditions throughout their lifespan. Despite variations in diagnoses, many of these children have similar health, educational and other service needs. As a result, it is useful to consider them as a group rather than by each specific condition.¹ The 2009-2010 National Survey of Children with Special Health Care Needs (NS-CSHCN) indicates that nearly half a million children in Pennsylvania ages 17 and younger have a special health care need (469,906 children). Seventeen percent of children statewide meet the criteria of this definition, compared to 15.1% nationally. Special health care needs are more common among older children.²

National and State Goals

The Pennsylvania Department of Health receives funding from the United States Department of Health and Human Services through the Title V Maternal and Child Health Block Grant (MCHBG). Several specific goals and objectives identified in the context of this grant align with measures from the National Survey of Children with Special Health Care Needs (NS-CSHCN).³

Table 7.21 Goals for Children with Special Health Care Needs, Pennsylvania and United States⁴

National Performance Measures	2010		2011	
	Results Percent (%)	Goal Percent (%)	Results Percent (%)	Goal Percent (%)
NPM 02: The percent of children with special health care needs age 0 to 18 years whose families partner in decision making at all levels and are satisfied with the services that they receive.	60.6	60.6	73.1	60.6
NPM 03: The percent of children with special health care needs age 0 to 18 who receive coordinated, ongoing, comprehensive care within a medical home.	45.8	45.8	48.0	45.8
NPM 05: The percent of children with special health care needs age 0 to 18 whose families report that community-based service systems are organized so they can use them easily.	89.5	89.5	69.4	89.5
NPM 06: The percentage of youth with special health care needs who received the services necessary to make transitions to all aspects of adult life, including adult health care, work and independence.	46.0	46.0	40.0	46.0

NPM 02: Pennsylvania exceeded the 2011 objective for children with special health care needs whose families partner in decision making and feel satisfied with the services their child receives, with 73.1 percent. The Pennsylvania Department of Health strives to further increase its success with this measure.

NPM 03: The Pennsylvania Medical Home Program (PA MHP) utilizes parent partners to help medical practices offer guidance, participate in decision making and improve the quality of the practice for families. Key accomplishments include developing community resources such as flyers and bulletin boards, planning resource nights, mentoring other parents, working with practices to facilitate referrals and developing pre-visit contact questions.

Pennsylvania’s goal is that all CSHCN receive care in a family centered, comprehensive and coordinated system and within a medical home. The number of CSHCN in Pennsylvania has risen from 430,640 in 2005-2006 to 469,906 in 2009-2010. Pennsylvania’s percentage of CSHCN receiving medical home care increased from 45.8 to 48.0 percent in the same period. This represents increased access to medical home care. The 2009-2010 Pennsylvania data for CSHCN receiving

medical home care was 48%, compared to 43% nationally. To date, 156 primary care practices have been trained in medical home principles through the PA MHP. In addition, 39 practices received funding for care coordination, a service often desired by families. Service coordination includes sharing resources with parents, improving efficiency in the management of CYSHCN and improving communication with specialists.

NPM 05: The Department of Health works with many partnering organizations to raise awareness of community-based service systems for the families of CSHCN. Data for this objective come from the NS-CSHCN. In the most recent survey, there were revisions to wording, order and number of questions used to generate this indicator from the 2009-10 survey. Therefore, the indicator percentage for 2011 is not comparable to previous years.

NPM 06: Data for evaluating this objective also come from the NS-CSHCN, making it impossible to compare 2011 data with that from previous years. Forty percent of Pennsylvania youth with special health care needs receive the services necessary to make appropriate transition to adult health care, work and independence. Pennsylvania's average is on par with the national average.⁵

In 2011, the Department of Health received a federal grant, "Innovative Evidence Based Models for Improving the System of Services for CYSHCN" from the U.S. Health Resources and Services Administration (HRSA) to focus on the transition process within the PA Medical Home Program. The grant focuses on expanding transition efforts; creating a Transition Advisory Committee comprised of practices, youth, parents and agencies; developing a transition care coordination learning module; and collaborating with the Pennsylvania chapter of the American College of Physicians to engage adult clinicians in transition efforts.

In Pennsylvania, postsecondary school transition is a shared responsibility across agencies that are parties to the Individuals with Disabilities Education Act Memorandum of Understanding (IDEA-MOU). Ten offices from four state agencies: Education, Public Welfare, Labor & Industry, and Health comprise the IDEA-MOU partnership. Through this partnership, the Pennsylvania State Leadership Team on Transition has agreed to work together in supporting youth/young adults with disabilities transitioning into adult life in the achievement of their desired post-secondary goals, including education/training, employment, independent living and healthy lifestyles. The Pennsylvania State Leadership Team on Transition in collaboration with YSHCN and their families and caregivers work together in advancing this shared agenda, the foundation of which depends on steadfast leadership, cross-system policy development and fidelity to evidence-based, quality-driven practices.

In 2005-06, Healthy People 2020 added a goal to increase the proportion of youth with special health care needs whose health care provider has discussed transition planning from pediatric to adult health care. Nationally during this period, transition planning from pediatric to adult health care was discussed with 41.2 percent of youth with special health care needs.⁶

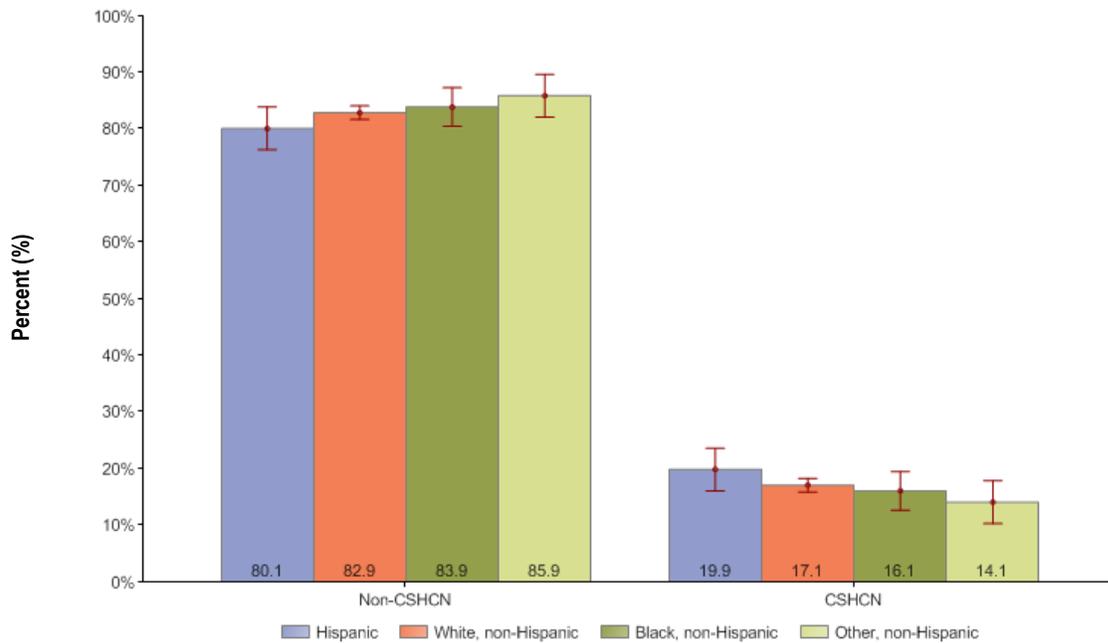
Characteristics

Age and Sex: Comparing state and national data from the 2009-10 NS-CSHCN, Pennsylvania has a higher prevalence of CSHCN than nationally in all age categories except ages 0 to 5 years old. While 8.9 percent of Pennsylvania children ages 0 to 5 meet the definition, 9.3 percent of children nationally do. For ages 6 to 11 years old, 20.7 percent of Pennsylvania children are CYSHCN, compared to 17.7 percent nationally. Among children ages 12 to 17, 20.9 percent in Pennsylvania and 18.4 percent nationwide are CYSHCN.

More Pennsylvania males are CYSHCN than females, with rates of 19.4 percent and 14.5 percent, respectively.⁷

Race and Ethnicity: Looking at race and ethnicity in the 2009-2010 NS-CSHCN, the highest percentage of CSHCN in Pennsylvania is among Hispanic persons, with 19.9 percent of youth 0 to 17 years. The next highest percentage is among whites, with 17.1 percent of youth identified as CSHCN, followed by blacks with 16.1 percent and "other" with 14.1 percent.

Figure 7.29 Children Ages 0 to 17 by Special Health Care Needs Status, and Race and Ethnicity, Pennsylvania, 2009-2010⁸



Income and Education: The percent of CSHCN in Pennsylvania living below the federal poverty level is significantly higher than the national rate. In 2009-2010, roughly 20 percent of Pennsylvania CSHCN fell within 0 to 99 percent of the Federal Poverty Level, putting this population at greater need for assistance in access to health care and more inclined to be Medicaid dependent. The prevalence of CSHCN in Pennsylvania by federal poverty level in all other categories also exceeds the national rate.⁹

In 2009-2010, the level of educational attainment of parents in households of CSHCN in Pennsylvania with more than a high school education is 17.4 percent, which is higher than the national level. Households of CSHCN with parents who have less education than a high school degree and those who are high school graduates in Pennsylvania are also higher than nationally at 15.8 percent and 18 percent, respectively.¹⁰

Figure 7.30 Children Ages 0 to 17 with Special Health Care Needs, by Household Income, Pennsylvania and United States, 2009 to 2010¹¹

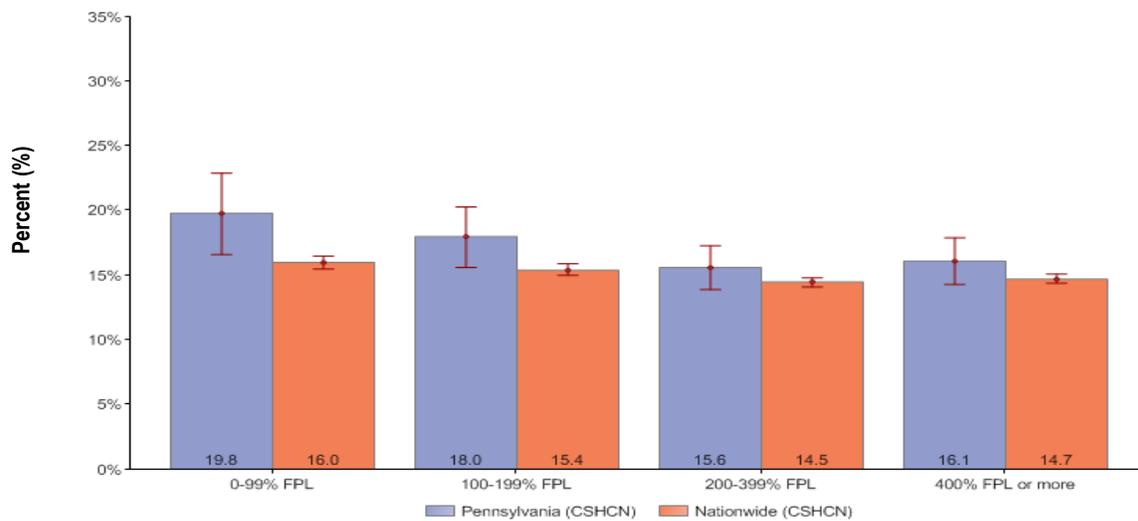
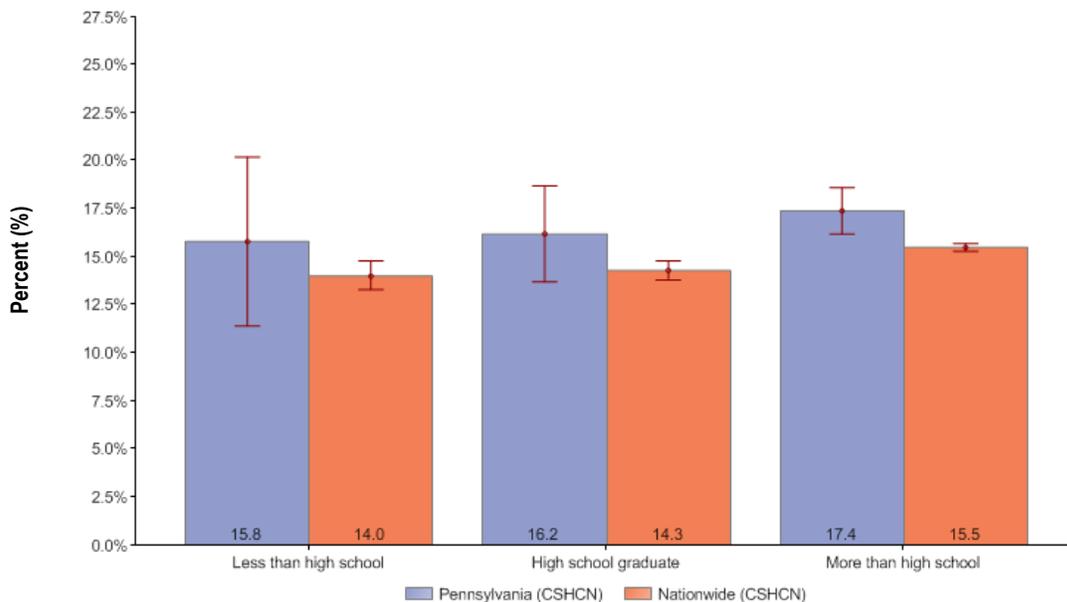


Figure 7.31 Children Ages 0 to 17 with Special Health Care Needs, by Highest Education Level in Household, Pennsylvania and United States, 2009 to 2010¹²



Measures of Impact and Burden

Access to Care: According to 2009-2010 NS-CSHCN, CSHCN in Pennsylvania have consistently better access to care than CSHCN nationally. In Pennsylvania, 19.8 percent of CSHCN had any unmet need for specific healthcare services, compared with 23.6 percent nationally; 5.2 percent of CSHCN in Pennsylvania had any unmet need for family support

services, compared with 7.2 percent nationally; 17.2 percent of CSHCN needed a referral and had difficulty getting it, compared with 23.4 percent nationally; 7.3 percent of CSHCN did not have a usual source of care when sick (or relied on the emergency room), compared to 9.5 percent nationally; and, 5 percent of CSHCN were without any personal doctor of nurse, compared with 6.9 percent nationally.¹³

Every five years, the Pennsylvania Department of Health’s Bureau of Family Health engages stakeholders who have an interest in improving the health of maternal and child populations in discussions to learn what is working and what needs to be improved. In the 2010 needs assessment, one of three areas of concern identified for CYSHCN was families needing access to comprehensive information about available services and programs. When attempting to obtain information and services for their CYSHCN, families often face challenges finding the necessary resources and information or, if identified, knowing how to utilize those resources to meet the needs of their children across the lifespan.

Impact on Families: A comparison of data from the 2005-2006 and 2009-2010 NS-CSHCN shows fairly minor changes in the reported impact of having a CSHCN, with one exception. The percent of families who reported they experienced financial problems due to CSHCN decreased by 1.7 percent.

Table 7.22 Impact of CYSHCN on Families, Pennsylvania, 2005-2006 and 2009-2010¹⁴

	2005-2006 Percent (%)	2009-2010 Percent (%)	Percent (%) Change 2005-2006 to 2009-2010
CSHCN whose families pay \$1000 or more out of pocket in medical expenses per year for the child	16.8	16.9	+ 0.1
CSHCN whose conditions cause financial problems for the family	18.2	16.5	-1.7
CSHCN whose families spend 11 or more hours per week providing or coordinating child’s health care	11.0	11.8	+0.8
CSHCN whose condition cause family members to cut back or stop working	24.4	23.7	-0.7

Children’s Health: All children are entitled to fully participate within their communities and schools, regardless of whether they have special health care needs. Legislation provides protection for such inclusion. In spite of this, CYSHCN and family members can experience challenges to participation, including misperceptions of their needs, prejudice, reluctance of facility or organization to be inclusive, or inability of group to be inclusive. According to the 2009-2010 NS-CYSHCN, 25 percent of Pennsylvania CYSHCN reported their conditions affect activities “usually,” “always,” or “a great deal.”

Intervention Strategies

CYSHCN can benefit from early diagnosis and access to a variety of medical, community, social and school services. While CYSHCN use more health and other community services than those without special needs, they also are more likely to report unmet health care needs. Assuring that families have access to quality, comprehensive, coordinated systems of services for CYSHCN and their families is a must. Programs should be family-centered, community-based and culturally competent to help ensure the best outcomes for all children.

- **Special Kids Network System of Care (SKN SOC)** has been connecting families, providers and CYSHCN to services through the SKN SOC Helpline (1-800-986-4550) since 1996. Today, the organization addresses the needs of CYSHCN and families through three components:
 - Information on health care resources, respite care, advocacy, assistive technology, inclusive recreation and leisure activities, and more through the Helpline or an online database at www.gotoskin.state.pa.us

- Service coordination assistance through a partnership of SKN SOC and the Pennsylvania Elks Home Service Program. With permission from the family, an Elks Home Service Nurse will make a home visit to determine needs, identify a plan to meet those needs and guide the family as necessary to implement the plan.
- Assist communities in understanding and identifying service gaps, and developing partnerships with organizations and agencies to address the unique challenges of a local service system, through the effort of Regional Coordinators (CYSHCN parents).
- **Pennsylvania Medical Home Program (MHP)** is managed by the Pennsylvania chapter of the American Academy of Pediatrics (AAP) through a grant with the Department of Health. The organization implements the Educating Physicians In Community Integrated Care (EPIC IC) model to educate primary care pediatric practices about the concept of a “medical home” that is accessible, continuous, comprehensive, family-centered, coordinated, compassionate and culturally competent. The PA MHP is the largest medical home program in the nation focused exclusively on CYSHCN. Attention to “medical home” has increased due to the Patient Protection and Affordable Care Act.
 - Statewide, 156 pediatric primary care practices have been trained in medical home principles and remain actively engaged with the PA MHP. Forty-seven counties; all six health districts; urban, suburban and rural settings; and patients of multiple racial and ethnic groups are all represented.
 - Practices have identified 842,736 CYSHCN. Patient registries have enabled practices to identify 26,204 CYSHCN. This has resulted in more than 473,000 children having access to enhanced care coordination in a medical home practice. Currently, practices can receive three years of funding to develop sustainable care coordination practices.
 - Parent Partners have involved 156 parents or caregivers in medical home teams. Parent Partners agree to serve on a medical home team and provide guidance based on their personal experience to help the practice achieve the tenets of family-centered care.
 - The “Especially for Parent, Caregivers and Youth” social networking web site at www.pamedicalhome.org has attracted 563 members.
- **Medical Home Family Survey**, developed by the PA MHP, collects responses about health care utilization, satisfaction, unmet needs, care coordination, usual sources of care, family-centered care, cultural competency and health status. Over 2,550 surveys have been completed by daily caregivers of CYSHCN and entered into the PA MHP database. So far, results indicate:
 - Access: 73 percent report primary care provider (PCP) office hours are very or extremely convenient.
 - Care coordination: 77 percent report care coordination at the PCP’s is always or usually helpful, while 71 percent report not needing help in addition to what they typically received.
 - Communication: 71 percent report communication between PCP and specialists is good or excellent.
 - Health care: 80 percent report that the care provided by the PCP is above average or excellent.
 - Trust: 90 percent report trusting the child’s PCP much or very much.
- **Transition from Pediatric to Adult Health Care** is the focus of a three-year federal innovation grant awarded to the Pennsylvania Department of Health in 2011. Grant funds are being used to replicate evidence-based models that are improving services for YSHCN transitioning to adult health care. The overarching goals for PA include engaging pediatric practices to expand their transition protocols and policies; strengthening youth and family leadership presence and partnerships with pediatric practices and community partners; and engaging new and existing community partners in the medical home effort to address transition. Pennsylvania’s initiative builds on the strong partnerships that exist between the Department and key collaborators, such as the Pennsylvania chapter of the AAP, family and youth leaders, adult health care providers, the Parent Education Advocacy Leadership (PEAL) Center/Pennsylvania’s Family to Family Health Information Center grantee, other state agencies, and federal policies.

The PA MPH’s database identifies 1,332 (six percent) of the 22,208 active users aged 18 years or older in practices that have submitted a registry of their special needs population. In collaboration with the Pennsylvania Academy of Family Physicians (PAFP), practice dyads of pediatric and adult practices have been identified. The

PAFP membership is being surveyed to determine their knowledge level, willingness and capacity to serve these youth, as well as to identify supportive services that may be needed. Information is being provided through newsletter articles and presentations at medical education conferences. State funding is being used to expand transition services statewide.

- **Respite Care for CYSHCN** is the short term, temporary care provided to people with disabilities to give their families a break from daily caregiver role, and relieve the stress they may experience while providing care to a family member or friend with a disability. Respite care may help reduce the risk of abuse or neglect while supporting a sense of family unity.

In 2010, Pennsylvania was awarded the Lifespan Respite Care grant from the U.S. Administration on Aging, which called for the formation of a Lifespan Respite Advisory Council to lead, support and monitor the development of a lifespan respite care system for the state. Pennsylvania has established a diverse Lifespan Respite Advisory Council which has administered small grant opportunities for the provision of emergency and unplanned respite care to caregivers statewide through building collaborative local systems of respite care. Respite care for children and youth with special health care needs is an unmet need that was identified through the 2010 Maternal and Child Health Needs Assessment and, the state Department of Health has developed a Respite Care Program to provide a train-the-trainer model for faith and community-based organizations to assist in expanding respite care for CYSHCN statewide.

Endnotes

¹ Jessop, D. J., & Stein, R. E. (1988). Essential concepts in the care of children with chronic illness. *Pediatrician*, 15(1-2), 5-12.

² Data Resource Center for Child and Adolescent Health. (2009/10). *National survey of children with special health care needs*. [Data file]. Retrieved from <http://www.childhealthdata.org/browse/snapshots/cshcn-profiles?rpt=9&geo=40>

³ Maternal and Child Health Block Services Title V Block Grant Program. (2013). *2012 application/2010 annual report*.

⁴ Child and Adolescent Health Measurement Initiative. (2012). *Data resource center for child & adolescent health*. Retrieved from <http://www.childhealthdata.org/browse/snapshots/cshcn-profiles?rpt=9&geo=40>

⁵ Data Resource Center for Child and Adolescent Health. (2009/10). *National survey of children with special health care needs*. Retrieved from <http://www.childhealthdata.org/browse/snapshots/cshcn-profiles?rpt=9&geo=40>

⁶ National Center for Health Statistics. (2013). *Health indicators warehouse*. [Data file]. Retrieved from <http://www.healthindicators.gov>

⁷ Data Resource Center for Child and Adolescent Health. (2009/10). *National survey of children with special health care needs*. Retrieved from <http://www.childhealthdata.org/browse/snapshots/cshcn-profiles?rpt=9&geo=40>

⁸ Child and Adolescent Health Measurement Initiative. (2013). *Data resource center for child & adolescent health*. [Data file]. Retrieved from <http://www.childhealthdata.org/browse/snapshots/cshcn-profiles?rpt=9&geo=40>

⁹ Data Resource Center for Child and Adolescent Health. (2009/10). *National survey of children with special health care needs*. Retrieved from <http://www.childhealthdata.org/browse/snapshots/cshcn-profiles?rpt=9&geo=40>

¹⁰ Data Resource Center for Child and Adolescent Health. (2009/10). *National survey of children with special health care needs*. Retrieved from <http://www.childhealthdata.org/browse/snapshots/cshcn-profiles?rpt=9&geo=40>

¹¹ Child and Adolescent Health Measurement Initiative. (2013). *Data resource center for child & adolescent health*. Retrieved from <http://www.childhealthdata.org/browse/snapshots/cshcn-profiles?rpt=9&geo=40>

¹² Child and Adolescent Health Measurement Initiative. *Data resource center for child & adolescent health*. Retrieved from <http://www.childhealthdata.org/browse/snapshots/cshcn-profiles?rpt=9&geo=40>

¹³ Data Resource Center for Child and Adolescent Health. (2009/10). *National survey of children with special health care needs*. Retrieved from <http://www.childhealthdata.org/browse/snapshots/cshcn-profiles?rpt=9&geo=40>

¹⁴ Child and Adolescent Health Measurement Initiative. (2013). *Data resource center for child & adolescent health*. Retrieved from <http://www.childhealthdata.org/browse/snapshots/cshcn-profiles?rpt=9&geo=40>

Children’s Emotional Development

Healthy People 2010 addressed the earliest stages of childhood in its maternal, infant and child health goals, but failed to address the rest childhood emotional development. Healthy People 2020 sought to correct this by including “Early and Middle Childhood” and “Adolescence” among its topics.¹

To understand the continuity of emotional development, consider the physical body. It begins at birth with certain capacities, but lacks many others. As it goes through predictable stages, it gains capacities, changes size and form and, if all goes well, reaches adult form and function. Similarly, the mind (consider it “the emotional body”) begins with certain capacities and grows in predictable stages. If all goes well, it attains the capacity for autonomy, the ability to be a productive member of society and have a range of interpersonal relationships, regulate and manage personal and public affairs, and compassionately and effectively take responsibility for the development of the next generation.

The continuities in these developments can be recognized, for example, by the intergenerational transmission of child abuse. About one-third of children who were abused during their own childhood will go on to abuse their children; another one-third of abused children are at risk of becoming abusive in their parenting role, dependent upon the stress they experience.²

Another example is the effect of services that aid mothers of newborns in high risk populations are effective and efficient in preventing delinquency, high school dropout, teen pregnancy and illicit drug use in the “newborn’s” later adolescence.³

A focus on continuity is about more than parenting in the newborn period or providing services to members of disadvantaged populations. It is also about optimizing children’s emotional growth so they can reach their full potential. An example is Parens’ work with a curriculum for teaching students in kindergarten through twelfth grade how to be effective parents.⁴

Within the last decade, both mental health and pediatric care providers have become more sensitive to children’s emotional growth and difficulties, including those on the autistic spectrum. Although there is much to discover, we already know a great deal about healthy emotional development in children and how to support it.

Assessment

The goal of healthy emotional development is a contented, productive life. In children, this can be measured by success completion of developmental challenges and avoidance of deleterious conditions that leave children unable to participate in society.

One general measure can be seen in Kids Count data for persons aged 18 to 24 years who are either attending school, working, or completing a degree beyond high school. In 2011, Pennsylvania ranked 16th of the 50 states, with 85 percent of this cohort engaged in such efforts. Another measure is one-time high school graduation; for this, Pennsylvania is ranked ninth in the nation, with an 84 percent graduation rate.⁵

Similar and more detailed data can be found at the National Center for Higher Education Management Systems (NCHEMS). Data in the Pennsylvania state profile show high school graduation rates of 79.1 percent in 2009, according Pennsylvania a rank of twelfth nationally. Among adults age 25 and older, 87.9 percent had earned high school diplomas, placing the state in 22nd place nationwide for this indicator.⁶

Measures of contentment can be discerned by considering children free of anxiety and depression. The Centers for Disease Control and Prevention’s Youth Risk Behavior Surveillance System (YRBSS) includes information about whether the respondent “felt sad or hopeless within the past 12 months,” as well as questions about participation in violent activities. In 2009, 23.5 percent of Pennsylvania’s survey participants said they felt so sad or hopeless almost every day for two weeks or more in a row during the past year that they stopped doing some usual activities, compared with 26.1 youth respondents nationally.^{7,8}

The YRBSS also asks youth whether they have thought of suicide in the past year, a measure of poor well being for children and adolescents. In Pennsylvania in 2009, 13.5 percent of students responded that they seriously considered attempting suicide over the past 12 months, about the same as the U.S. rate of 13.8 percent.^{9,10}

Pennsylvania ranks poorly in terms of youth involved with the juvenile justice system, at 45th of the fifty states. Nearly 12.8 million youth were involved with the system in 2011. Pennsylvania ranked 44th in youth residing in juvenile detention and correctional facilities in 2010, with a rate of 316 per 100,000 youth compared to the U.S. rate of 278 per 100,000 youth.¹¹

The teen birth rate is another indicator of the difficulty in addressing developmentally appropriate challenges. In 2010, Pennsylvania ranked eleventh across the country, with an average of 27 births per 1,000 female teens 15 to 19 years old, compared with the national average of 34 per 1,000 female teens ages 15 to 19.

Parents' ability to provide a nurturing environment for the emotional growth of their children is also important to youth emotional development. Child abuse can serve as a surrogate measure. In 2010, Pennsylvania ranked the lowest in the country for investigated child abuse, with a rate of just 8 in 1,000 cases compared to a national average of 40 in 1,000. It also ranked lowest for confirmed cases, with a rate of just 1 in 1,000 cases compared with 10 in 1,000 nationally. While these rates may indicate a low frequency of child abuse, it may also be an indicator of poor surveillance.¹²

Intervention Strategies

Education and services to expectant and new parents, such as those provided by hospitals, obstetricians and pediatricians can help address issues related to children's emotional development. Parents of older children and adolescents can also benefit from such education, which can be led by child protective services, mental health services, or juvenile justice systems that address troubled parents, children and adolescents.

Resources

National Center for Higher Education Management Systems (NCHEMS)—<http://www.higheredinfo.org>

KIDS COUNT, Annie E. Casey Foundation annual data reports—<http://www.kidscount.org>

Endnotes

¹ U.S. Department of Health and Human Services (2010). *Healthy People 2020, early and middle childhood topics and objectives*. Retrieved from <http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=10>

² Oliver, J. E. (1993). Intergenerational transmission of child abuse: rates, research, and clinical implications. *American Journal of Psychiatry*, 150(9), 1315-24. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/8352342>

³ National Nursing Centers Consortium. (2013). *Nurse-family partnership*. Retrieved from <http://www.nncc.us/site/index.php/program-center/improving-health-through-early-action/16-nurse-family-partnership>

⁴ Parens, H. (Director). (2010). *Parenting for emotional growth* [DVD, CD]. (Available from Thomas Jefferson University, Philadelphia, PA)

⁵ The Annie E. Casey Foundation. (2013). *KIDS COUNT Data Center*. [Data file]. Retrieved from <http://datacenter.kidscount.org/data/acrossstates/Rankings.aspx?loct=2&by=v&order=a&ind=5063&dtm=11485&tf=867>

⁶ National Center for Higher Education Management Systems (NCHEMS) Information Center. (2008-2011). *State profile report, Pennsylvania state profile, years: 2011, 2010, 2009, 2008*. Retrieved from <http://www.higheredinfo.org/stateprofile/index.php>

- ⁷ Pennsylvania Department of Health. (2013). *2009 Youth Risk Behavior Surveillance System Report (YRBSS), behaviors that result in unintentional injuries and violence*. [Data file]. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=590084&mode=2>
- ⁸ Centers for Disease Control and Prevention. (2013). *2009 Youth Risk Behavior Surveillance System Report (YRBSS), behaviors that result in unintentional injuries and violence*. [Data file]. Retrieved from <http://www.cdc.gov/HealthyYouth/yrbs/index.htm>
- ⁹ Pennsylvania Department of Health. (2013). *2009 Youth Risk Behavior Surveillance System Report (YRBSS), behaviors that result in unintentional injuries and violence*. [Data file]. Retrieved from <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=590084&mode=2>
- ¹⁰ Centers for Disease Control and Prevention. (2013). *Youth Risk Behavior Surveillance System (YRBSS)*. [Data file]. Retrieved from <http://www.cdc.gov/HealthyYouth/yrbs/index.htm>
- ¹¹ Centers for Disease Control and Prevention. *Youth Risk Behavior Surveillance System (YRBSS)*. [Data file]. Retrieved from <http://www.cdc.gov/HealthyYouth/yrbs/index.htm>
- ¹² The Annie E. Casey Foundation. (2013). *KIDS COUNT Data Center*. [Data file]. Retrieved from <http://datacenter.kidscount.org/data/acrossstates/Rankings.aspx?loct=2&by=v&order=a&ind=5063&dtm=11485&tf=867>