

Appendix VII: Federal Activities Related to Pregnancy and Lactation, by Agency

Introduction

An array of federal agencies support research, health care and clinical practice, communications, and collaborative efforts that are directly applicable to the HHS Task Force on Pregnant and Lactating women. Federal activities for 12 key agencies were identified by Task Force agencies, supplemented by systematic searches of agency databases, websites, and publications. These agencies include:

1. Agency for Healthcare Research and Quality (AHRQ)
2. Centers for Disease Control and Prevention (CDC)
3. Department of Agriculture (USDA)
4. Department of Defense (DoD)
5. Department of Veterans' Affairs (VA)
6. Environmental Protection Agency (EPA)
7. Food and Drug Administration (FDA)
8. Health Resources and Services Administration (HRSA)
9. National Institutes of Health (NIH)
10. National Vaccine Program Office (NVPO)
11. Office of the Assistant Secretary for Health (OASH)
12. Substance Abuse and Mental Health Services Administration (SAMHSA)

Agency Activities: Agency for Healthcare Research and Quality (AHRQ)

Research

A key part of AHRQ's mission is to invest in research to improve safety and quality of health care (<https://www.ahrq.gov/research/ahrq-research.html>). AHRQ supports extramural and intramural research related to pregnant and lactating women, often using large population-based and claims data. AHRQ also provides research resources, including health services databases, that can be used to develop evidence about utilization and effectiveness of treatments and quality of care.

AHRQ supports some studies specifically related to the safety and effectiveness of medications and therapies in pregnant and lactating women. These studies address a variety of conditions that are common in pregnant women. Some examples include:

- Researchers supported by AHRQ are combining previously collected data on the management of lupus during pregnancy to yield new information about optimal medication therapies to control lupus and improve pregnancy outcomes. In addition, researchers will be obtaining information from community rheumatologists to identify better ways to integrate expert recommendations for lupus management into medical practice.
- AHRQ supports multiple projects on the safety and effectiveness of antidepressants in pregnancy. One of these projects is using a large population-based Medicaid claims database to conduct a comparative effectiveness study, incorporating both maternal and fetal outcomes. A two-stage cohort study, using a large claims database, is designed to assess whether treatment of depression during pregnancy reduces the risk of postpartum depression.

- Researchers are assessing risks of various asthma medications for the woman and the fetus when used during pregnancy. Asthma is one of the most common conditions requiring medication during pregnancy, yet there is insufficient information on safety of current asthma medications for pregnant women. A second demonstration project supported by AHRQ is combining data from multiple cohorts to identify the risks and relative safety of newly-introduced and older asthma medications with respect to relatively rare outcomes, including specific major birth defects.
- Using several large claims databases, researchers assessed the risk of adverse fetal outcomes following exposure to immunosuppressive drugs in pregnant women with chronic immune-mediated diseases.
- AHRQ-supported scientists are examining trends in the prevalence of pre-existing diabetes among pregnant women; assessing utilization and anti-diabetic drugs during pregnancy; and exploring the relative safety of three commonly utilized oral anti-diabetic drug classes in pregnant women.

AHRQ also has supported behavioral and educational intervention research in pregnant and lactating women. One AHRQ-funded project aims to help physicians encourage physical activity for pregnant women. Another team of AHRQ-supported researchers is developing a bilingual touch screen educational support program to promote breast feeding among Hispanics rural women living in rural Nebraska.

AHRQ's largest portfolio of research relevant to pregnant and lactating women is concerned with the quality, cost, and value of maternity and obstetric care. This portfolio includes research on variation across hospitals and providers in obstetric practice; acceptance and implementation of recommended therapies; matching the risks to mother and baby to higher levels of care; and risks and benefits of specific interventions such as cesarean section or labor induction. Specific examples of these research projects include:

- Although neonatal and trauma care is typically defined in terms of increasing levels of care, obstetric care has not yet fully adopted this approach. A team of researchers is describing how levels of care vary across hospitals in California, and assessing how circumstances and hospital characteristics are associated with both obstetric levels of care and maternal and neonatal outcomes. Another similar study is assessing obstetric levels of care in Georgia, focusing on high risk pregnant women.
- Using a large-scale administrative database from a chain of hospitals with varying staffing ratios and organizations, researchers are evaluating the relationship between nursing staffing levels and maternal and fetal pregnancy outcomes.
- Because pregnant women typically have sufficient time and strong motivation to consider their choice of hospital, they may become highly interested consumers of hospital quality information and reporting. AHRQ-supported scientists are designing and testing an interactive website concerning material hospital delivery, tailored to individuals from diverse racial and ethnic groups and women with limited English proficiency.
- Although a Healthy People 2020 goal is to immunize 80% of pregnant women for pertussis, immunization rates remain significantly lower, especially among Medicaid recipients. AHRQ-supported researchers are using a large Louisiana Medicaid database to evaluate how factors such as language preference, race and ethnicity, and characteristics of birthing facilities are associated with immunization.

Other AHRQ-supported studies describe utilization of health care services among pregnant women and prevalence of specific health conditions among pregnant women. For example, researchers analyzed data from Colorado to document trends in accidental overdoses and suicides among pregnant and postpartum women.

In addition to supporting research directly, AHRQ supports large databases that can be used by independent researchers, and some of this research is applicable to pregnant and lactating women. The [Medical Expenditure Panel Survey \(MEPS\)](#), which began in 1996, is a set of large-scale surveys of families and individuals, their medical providers (doctors, hospitals, pharmacies, etc.), and employers across the United States. MEPS collects data on the specific health services that Americans use, how frequently they use them, the cost of these services, and how they are paid for, as well as data on the cost, scope, and breadth of health insurance held by and available to U.S. workers. The [Healthcare Cost and Utilization Project \(HCUP\)](#) is the nation's most comprehensive source of hospital care data, including information on in-patient stays, ambulatory surgery and services visits, and emergency department encounters. HCUP enables researchers, insurers, policymakers and others to study health care delivery and patient outcomes over time, and at the national, regional, State, and community levels.

Clinical Practice Information and Recommendations

AHRQ does not directly support clinical care, but the agency creates materials to teach and train health care systems and professionals to help them improve care for their patients. Although these services and materials cover a variety of areas, several are focused on or include information related to pregnancy and lactation.

AHRQ is the lead federal agency for the U.S. Preventive Services Task Force (USPSTF), an independent, volunteer panel of national experts in prevention and evidence-based medicine (<https://www.uspreventiveservicestaskforce.org/Page/Name/home>). The Task Force works to improve the health of all Americans by making evidence-based recommendations about clinical preventive services such as screenings, counseling services, and preventive medications. All recommendations are published on the Task Force's Web site and/or in a peer-reviewed journal. Task Force members come from the fields of preventive medicine and primary care, including internal medicine, family medicine, pediatrics, behavioral health, obstetrics and gynecology, and nursing. A total of 18 USPSTF recommendations are directly related to pregnancy and/or lactation, and 26 recommendations include a component related to pregnancy and/or lactation. USPSTF topics that relate most strongly to pregnancy and lactation include:

- [Hepatitis B Virus Infection in Pregnant Women: Screening](#)
- [Bacterial Vaginosis in Pregnancy to Prevent Preterm Delivery: Screening](#)
- [Breastfeeding: Primary Care Interventions](#)
- [Drug Use in Adolescents and Adults, Including Pregnant Women: Screening](#)
- [Elevated Blood Lead Levels in Childhood and Pregnancy: Screening](#)
- [Folic Acid for the Prevention of Neural Tube Defects: Preventive Medication](#)
- [Gestational Diabetes Mellitus, Screening](#)
- [Hepatitis B in Pregnant Women: Screening](#)
- [Human Immunodeficiency Virus \(HIV\) Infection in Pregnant Women: Screening](#)
- [Iron Deficiency Anemia in Pregnant Women: Screening and Supplementation](#)

- [Lead Levels in Childhood and Pregnancy: Screening](#)
- [Low-Dose Aspirin Use for the Prevention of Morbidity and Mortality From Preeclampsia: Preventive Medication](#)
- [Perinatal Depression: Interventions](#)
- [Preeclampsia: Screening](#)
- [Rh\(D\) Incompatibility: Screening](#)
- [Syphilis Infection in Pregnancy: Screening](#)
- [Tobacco Smoking Cessation in Adults, Including Pregnant Women: Behavioral and Pharmacotherapy Interventions](#)
- [Unhealthy Alcohol Use in Adolescents and Adults, Including Pregnant Women: Screening and Behavioral Counseling Interventions](#)

AHRQ worked with OASH, HRSA, SAMHSA, and Ohio State University on an initiative called the Healthier Pregnancy (<https://www.ahrq.gov/professionals/prevention-chronic-care/healthier-pregnancy/index.html>). The purpose of this initiative is to increase screening and referral for six preventive services in pre- and perinatal care settings. The 6 areas of focus include tobacco use, alcohol use, depression, intimate partner violence, obesity, and breastfeeding. Continuing education modules are available for health professionals (<https://www.ahrq.gov/professionals/prevention-chronic-care/healthier-pregnancy/initiative/index.html>).

AHRQ's sponsors the development of various reports to assist public- and private-sector organizations in their efforts to improve the quality of health care in the United States. These reports provide comprehensive, science-based information on common, costly medical conditions and new health care technologies and strategies. The Evidence-Based Practice Reports review all relevant scientific literature on a wide spectrum of clinical and health services topics. For example, AHRQ supported and has made available the report "Antidepressant Treatment of Depression During Pregnancy and the Postpartum Period", which evaluates the benefits and harms of pharmacological therapy for depression in women during pregnancy or the postpartum period. (<https://www.ahrq.gov/research/findings/evidence-based-reports/er216-abstract.html>).

Communications

As described above, AHRQ focuses its communications efforts on providers and health service organizations, rather than the general public. However, AHRQ's web site does include facts sheets and infographics suitable for a broad public audience. For example, AHRQ uses infographics to describe information and statistics related to public health concerns, including the impact of substance abuse on pregnant women and infants (<https://www.ahrq.gov/sites/default/files/wysiwyg/research/data/data-infographics/images/neonatal-maternity.html>).

Other Collaborative Efforts

In addition to efforts noted above, AHRQ participates in the Federal Interagency Forum on Child and Family Statistics, an interagency group designed to improve both the quality and use of data on children and families by investigating questions of data quality, data measurement, and data integration and by coordinating the development and use of statistical data bases among Federal agencies (<http://childstats.gov>).

Agency Activities: Centers for Disease Control and Prevention

Research

CDC's mission involves fighting disease and promoting public health across populations, including pregnant and lactating women. CDC supports a large portfolio of extramural and intramural research related to pregnant and lactating women, often at the population level. CDC also provides research resources, including health services databases that can be used to develop evidence about public health needs for pregnant and lactating women.

CDC Research Assessing Risk Factors during Pregnancy and Lactation

CDC's National Center on Birth Defects and Developmental Disabilities funds several Centers for Birth Defects Research and Preventions across the United States to identify risk factors for birth defects and to answer questions about medications taken during pregnancy (<https://www.cdc.gov/ncbddd/birthdefects/cbdrp.html>). These centers collaborate on two large case-control studies: the National Birth Defects Prevention Study (NBDPS), which includes births from 1997–2011, and the Birth Defects Study To Evaluate Pregnancy exposureS (BD-STEPS), which began with births in 2014. Over the course of 14 years of NBDPS interviews, 43,000 women from 10 states took part in NBDPS. These maternal interview data are essential to establishing whether a woman actually took the prescribed or over the counter medication. Examples of recent findings include:

- A recent study of antibiotic use among pregnant women showed that certain antibiotics may be associated with specific birth defects.
- Another recent CDC study found that women who took NSAIDs and opioid pain medicines during early pregnancy were more likely to have babies affected with certain birth defects compared with women who took acetaminophen. In this study, slightly more than half of women reported taking pain medicine during early pregnancy. Taking both NSAIDs and opioids during early pregnancy may be related to these birth defects: gastroschisis, cleft palate, spina bifida and congenital heart defects.

CDC's epidemiological research addresses the impact of occupational and environmental exposures, exposures to medication, and other factors on the health of pregnant women and their offspring. CDC's National Institute for Occupational Safety and Health (NIOSH) works with other CDC Centers and supports several studies to make use of existing cohort data to analyze the long- and short-term effects of occupational exposures on maternal and child health.

Other epidemiological research from CDC documents the use of medication during pregnancy and describes the impact of both medication exposure and disease on developing infants. For example, CDC researchers analyzed a large state database and found that women with gestational diabetes (GD) had a higher risk than women without GD of serious complications, including preterm birth and macrosomia. In another study, CDC researchers developed a method to identify pregnant women in health insurance databases, and find important information about their pregnancies and their use of antidepressants during pregnancy. Researchers identified nearly 490,000 pregnancies in 2013 health insurance claims data, and found that one in 16 pregnant women filled a prescription for an antidepressant during pregnancy.

The Study to Explore Early Development (SEED) is a multi-year research study funded by CDC. It is currently the largest study in the United States to help identify factors that may put children at risk for autism spectrum disorder (ASD) and other developmental disabilities. Through SEED, CDC is evaluating many possible risk factors that seem to be associated with or related to ASD, including the mother's exposure to certain medications during pregnancy.

CDC Research Regarding Specific Illnesses and Treatments

CDC supports research on health care delivery, as related to public health interventions. Much of this research is focused on immunizations.

- The Pregnancy Vaccine Effectiveness Network (PREVENT) was established in April 2016 to: i) estimate incidence of influenza and vaccination rates; ii) describe epidemiologic characteristics associated with illness; and iii) estimate influenza vaccine effectiveness in preventing acute respiratory or febrile hospitalizations during pregnancy associated with influenza confirmed by real-time reverse transcription polymerase chain reaction assay. It includes sites in Australia, Canada, Israel and the United States.
- CDC is currently funding a study on immunization delivery in obstetrics and gynecology settings, to promote administration of vaccines to women in preconception period and in pregnancy.
- The Internet Panel Survey of Pregnant Women, another CDC effort, is conducted in November and April of each year to monitor vaccination trends in pregnant women, and includes topical questions on current areas of special interest, such as Zika Virus (<https://www.cdc.gov/flu/fluview/pregnant-women-nov2013.htm>).
- CDC's New Vaccine Surveillance Network conducts surveillance and evaluation activities for acute respiratory illness to assess the burden of currently vaccine-preventable and potentially vaccine-preventable childhood diseases, and to evaluate the impact of new and upcoming vaccines and other strategies. With respect to pregnant women, sites are collecting self-reported data related to influenza vaccination during pregnancy and verifying vaccination status using state registries and medical records. Information on breastfeeding practices is also collected. (<https://www.cdc.gov/surveillance/nvsn>)
- Influenza Hospitalization Surveillance Network (FluSurvNet) conducts surveillance for influenza related hospitalizations. FluSurv-NET plans to pilot the use of data for estimation of influenza vaccine effectiveness among pregnant women during the upcoming 2017-2018 influenza season in the United States. CDC is also using data from FluSurv-Net to model the burden of hospitalizations and cases averted by vaccination among pregnant women.
- The Pregnancy and Influenza Multinational Epidemiologic (PRIME) study is following pregnant women in low- and middle-income country to evaluate effect of influenza during pregnancy, estimate incidence, and describe clinical spectrum of illness. Zika virus and hMPV/RSV sub-studies will be included at some sites.
- Developing pandemic protocols for rapid deployment of research studies during future pandemics.
- CDC researchers are addressing gaps in knowledge about racial disparities and preterm birth by examining maternal vitamin D status and vitamin D receptor genetic variation.

CDC also has supported behavioral and educational intervention research in pregnant and lactating women. Examples include:

- CDC is working with scientists from an NIH clinical research network to support a clinical trial of a brief screening and educational intervention to prevent CMV infection;

- As many as one in five pregnant women experience depression, which poses significant, ongoing risks for both the woman and her child. Researchers are now evaluating the efficacy of their low-cost, comprehensive intervention for these women in the “real-world” setting of obstetrics/gynecology clinics, where referrals and consultations and access to appropriate levels of psychiatric care are offered in conjunction with pregnancy-related clinical services.

CDC supports a range of efforts relating to opioid use during pregnancy:

- In a systematic review of previous studies on opioid use during pregnancy and risk for birth defects, CDC researchers found that use of opioids during pregnancy may be linked to various birth defects such as oral clefts, congenital heart defects, and clubfoot. However, many of the studies reviewed had issues with study methods and quality.
- Opioid use during pregnancy can also lead to neonatal abstinence syndrome (NAS). CDC is supporting two pilot projects to better understand the incidence, severity, and long-term developmental and educational outcomes associated with NAS.
- CDC is tracking trends in prescription opioid use among pregnant and reproductive aged women to monitor the opioid epidemic and progress towards the goal of reducing opioid use in these women.

CDC’s National Center on Birth Defects and Developmental Disabilities conducts research and implements programs to reduce the risk and impact of Zika virus infection in pregnant women, infants, and children. Data are used to update recommendations for clinical care; plan for services for pregnant women, their infants and families affected by Zika; and improve prevention of Zika infection during pregnancy. Activities include:

- The Zika Pregnancy and Infant Registries, which are enhanced national surveillance efforts coordinated by CDC in collaboration with state, tribal, territorial, and local health departments. CDC also established rapid birth defects surveillance to identify all infants with Zika-associated birth defects, regardless of whether there was Zika virus exposure or laboratory evidence of Zika.
- Enhanced surveillance of pregnant women with Zika in Colombia has been established in collaboration with Colombia’s Instituto Nacional de Salud (INS). Additionally, CDC collaborates with Colombia’s INS on a cohort study to identify risk factors for Zika virus transmission; the full spectrum of adverse maternal, fetal, and infant health outcomes associated with Zika virus infection; and risk factors for occurrence of these outcomes.
- A prospective cohort study “Persistence of Zika Virus in Pregnant Women and Infants in Puerto Rico,” aims to estimate the prevalence and duration of persistent Zika virus RNA in pregnant women and congenitally infected infants.
- The Local Health Department Initiative was launched to reduce the effect of Zika on mothers, their babies, and their communities, by placing highly skilled local field assignees in local health departments. Field assignees work to increase pregnancy and birth defects surveillance, participate in community events, partner with local and national professional organizations, and provide outreach to healthcare systems and providers in their local communities.

CDC Research to Improve Outcomes around the World

CDC is conducting research to improve pregnancy outcomes around the world. Examples include:

- In Kenya, CDC supports an influenza vaccine demonstration project, using an inactivated influenza vaccine already licensed in Kenya to vaccinate pregnant women in a high HIV prevalence and malaria-endemic setting in western Kenya.
- Through the Partnership for Influenza Vaccine Introduction (PIVI), CDC has multiple efforts to expand the use of seasonal influenza vaccines in countries outside the US, and many of these efforts target pregnant women.
- In Morocco, CDC is supporting efforts to enhance surveillance for severe acute respiratory disease among pregnant women.
- In Thailand, CDC and NIH are supporting a large, randomized placebo-controlled trial, where 6 percent to 7 percent of adults are chronically infected with hepatitis B virus (HBV). Researchers will test the safety and efficacy of a short course of antiviral therapy to prevent pregnant women with HBV from passing the infection along to their babies.
- In China, CDC is supporting a randomized controlled clinical trial among HIV-HBV co-infected women. This study will test the safety of tenofovir during pregnancy with regards to the infant bone mineral density, as well as other potential toxicities.
- In Swaziland, CDC-supported scientists are implementing a quality improvement intervention utilizing patient feedback from a clinical visit satisfaction survey in order to improve retention of HIV-infected pregnant and lactating women receiving antenatal or postpartum care services.
- In multiple countries, CDC-supported scientists are conducting operational research supported through the PEPFAR Implementation Science initiative. Specifically, CDC-supported scientists are conducting research designed to improve the quality of care and patient outcomes, including research on:
 - establishing a surveillance system for major external birth defects among all live and still births delivered or registered as being born in order to assess the maternal risk factors associated with major external birth defects among newborns in Uganda;
 - the readiness of pregnant women to begin lifelong HIV treatment (ART) and an enhanced ART adherence package of care for pregnant and lactating women in Zambia;
 - the effectiveness of an intervention to enhance outreach worker capacity to increase the uptake and adherence to prevention of mother-to-child transmission of HIV (PMTCT) services among pregnant women in India;
 - the feasibility, acceptability, and impact of point-of-care systems to facilitate earlier identification and treatment of HIV-exposed and HIV-infected infants in Zambia;
 - improved HIV case identification and care for lactating women and their infants, as well as the optimal points for assessing HIV viral load during lactation in South Africa; and
 - the impact of an enhanced service package for adolescents living with HIV in Zimbabwe.
- As partners in the Child Health and Mortality Prevention Surveillance Network (CHAMPS), CDC-supported scientists are providing technical assistance to design and implement pregnancy surveillance. Routine health and demographic information will be obtained from all consenting pregnant women in the surveillance catchment area. The goal is to facilitate timely and accurate detection of stillbirths and neonatal deaths, and to classify pregnancy outcomes within 24 hours of delivery. Expansion to four additional pregnancy surveillance sites within the CHAMPS network is planned from 2018-2025. This platform may serve as a foundation for additional implementation science studies to reduce maternal or neonatal mortality, or to prepare for future maternal immunization clinical trials.

CDC Surveillance and Data Collection Efforts

In addition to supporting research directly, CDC supports surveys and large-scale data collection efforts, and these resources can be used by independent researchers to conduct studies applicable to pregnant and lactating women. Key efforts in this area include:

- CDC's Pregnancy Risk Assessment Monitoring System (PRAMS) (<https://www.cdc.gov/prams/index.htm>). PRAMS collects state-specific, population-based data on maternal attitudes and experiences before, during, and shortly after pregnancy. PRAMS surveillance currently covers about 83% of all U.S. births. PRAMS provides data not available from other sources. These data can be used to identify groups of women and infants at high risk for health problems, to monitor changes in health status, and to measure progress towards goals in improving the health of mothers and infants. PRAMS data are used by researchers to investigate emerging issues and by state and local governments to plan and review programs and policies aimed at reducing health problems among mothers and babies. PRAMS includes core questions asked in every state and optional questions available to states and localities. Core PRAMS questions cover areas including flu shots; gestational diabetes; preeclampsia; depression; tobacco use; alcohol use; violence; breastfeeding; and infant sleep positions. Optional questions expand available information about breastfeeding; vitamin use; other vaccines; medication for thyroid, epilepsy, and mental health conditions; substance use and abuse, and environmental health, among other topics.
- Maternity Practices in Infant Nutrition and Care (mPINC) Survey: CDC has developed and supported the mPINC survey since 2007. Every other year, all facilities in the United States that provide maternity care are invited to participate. Nationwide, 82% of facilities contribute data on practices and policies in seven dimensions of medical and nursing care that support breastfeeding. <https://www.cdc.gov/breastfeeding/data/mpinc/index.htm>
- CDC's National Biomonitoring Program (NBP) uses measurements in blood and urine (biomonitoring) to help identify harmful environmental exposures or nutrition deficiencies among the U.S. population. CDC measures more than 300 chemicals and nutrition indicators in participants of the National Health and Nutrition Examination Survey (NHANES) and publishes findings in a summary report, the National Report on Human Exposure to Environmental Chemicals (National Exposure Report). In addition, CDC collaborates on more than 75 studies each year that examine exposures among vulnerable populations, including pregnant and/or lactating women, or investigates the relationship between exposure levels and adverse health effects. For these investigations, CDC provides unique, high-quality measurements for environmental chemicals or nutrition indicators.

Through the National Center for Health Statistics, CDC spearheads the development of new questions and methods to obtain key information about public health issues related to maternal health, pregnancy, and breastfeeding. CDC is developing new questions for NCHS surveys and the National Vital Statistics to better capture contemporary practices in breastfeeding, and to rigorously test new questions to ensure their validity and reliability. Other examples include:

- National Vital Statistics System – information on whether the mother breastfed her newborn prior to discharge from the hospital is available from birth certificates for varying numbers of states from 2009 on (https://www.cdc.gov/nchs/data_access/vitalstatsonline.htm). These data can be analyzed by numerous maternal (e.g., age, education, race) and infant (gestational age, NICU admission, birthweight) characteristics. A recent study assessing the quality of this and other new items from the birth certificate found high agreement between breastfeeding data

reported on the birth certificate and information recorded in hospital medical records https://www.cdc.gov/nchs/data/nvsr/nvsr62/nvsr62_02.pdf.

- The National Health and Nutrition Examination Survey (NHANES) is a program of studies designed to assess the health and nutritional status of adults and children in the United States. The survey is unique in that it combines interviews, physical examinations, and biomonitoring. Data from NHANES has been used for studies of pregnant women and nutrition and exposures (<https://www.cdc.gov/nchs/nhanes/index.htm>).
- The National Survey of Family Growth (NSFG) is a household-based, nationally representative survey of reproductive aged women and men (<https://www.cdc.gov/nchs/nsfg/index.htm>). Since 1973, the survey has included questions on breastfeeding initiation and duration, as part of the full pregnancy and birth history collected from all female respondents. NSFG is co-funded by NIH.
- The National Health Interview Survey (NHIS) is a population-based national household survey. CDC has included questions to determine influenza vaccination among women pregnant during the influenza season, and is working to develop new questions to determine tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap) vaccination during pregnancy among women having live births in the past 12 months.
- Since July 2001, breastfeeding questions were included on the NIS to assess the population's breastfeeding practices. The parent or guardian is asked about breastfeeding, formula feeding, and first time feeding of something other than breast milk or formula (https://www.cdc.gov/breastfeeding/data/nis_data/index.htm). These data help to inform CDC's Breastfeeding Report Card (<https://www.cdc.gov/breastfeeding/data/reportcard.htm>), which is released every other year. CDC estimates alcohol use among pregnant women using the Behavioral Risk Factor Surveillance System (BRFSS). This telephone survey tracks national and state-specific health risk behaviors of adults, aged 18 years and older, in the United States. The BRFSS is administered and supported by the Division of Adult and Community Health, National Center for Chronic Disease Prevention and Health Promotion, CDC.

In addition to these efforts, CDC's Data Hub acquires and manages external data sources that complement the information obtained from data collected by CDC. Below are a few examples of these acquired external data that provide information not available otherwise to public health surveillance:

- American Hospital Association (AHA) Annual Survey database, a comprehensive census of United States hospitals that is a reliable resource for health services research and trends analyses. That includes obstetric care services provided to pregnant women.
- Centers for Medicare and Medicaid (CMS) claims, specifically Medicaid claims, and IBM/Truven Health Analytics' MarketScan commercial claims databases including encounters, admission and discharge data, and beneficiary enrollment data that can be used to estimate cost and rates of healthcare utilization during pregnancy and postpartum.
- Healthcare Cost and Utilization Project (HCUP) databases, and related software tools and products, are developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ).

Clinical Practice Information and Recommendations

CDC does not directly support clinical care, but the agency creates materials that can help inform health care systems, patients, and providers. Although these services and materials cover a variety of areas, several are focused on or include information related to pregnancy and lactation.

CDC's Treating for Two initiative, which involves collaboration with a range of partners and other federal agencies, is designed to address the need for clinical information. Treating for Two is working to expand and accelerate research to fill knowledge gaps; evaluate available evidence to facilitate reliable guidance; and deliver up-to-date information to support decision making among prescribers, pharmacists and consumers (<https://www.cdc.gov/treatingfortwo>).

- Through a small business grant, CDC is testing whether delivering information through mobile devices can improve knowledge and communication of data on drug safety to pregnant women.
- CDC, in collaboration with the March of Dimes and RTI, conducted a research project to triangulate findings from formative research with women (recently pregnant or planning pregnancy), prescribers, and pharmacists to develop an understanding of shared challenges and opportunities in improving medication safety during pregnancy.

The *U.S. Medical Eligibility Criteria for Contraceptive Use, 2016* are evidence-based, clinical guidelines provide information for healthcare providers on the safety of contraceptive methods for women with certain characteristics or medical conditions, including pregnant, postpartum, and lactating women (<https://www.cdc.gov/reproductivehealth/contraception/mmwr/mec/summary.html>).

Environmental exposure information for providers is another important area for CDC:

- The Prenatal Assessment of Environmental Risk (PEAR) is an online environmental exposure assessment toolkit to help providers assist patients to lower environmental exposure risk.
- Pediatrics Environmental Health Specialty Units are a source of medical information providing advice on the prevention, diagnosis, management and treatment of environmentally-related health effects in adults and children;
- CDC provides guidelines for identifying and managing lead exposure in pregnant and lactating women (<https://www.cdc.gov/nceh/lead/publications/leadandpregnancy2010.pdf>).
- Handouts and fact sheets about environmental exposures are also available for providers.

The Advisory Committee on Immunization Practices (ACIP) develops recommendations on the use of vaccines, including for pregnant women (<https://www.cdc.gov/vaccines/acip/index.html>).

CDC supports evidence-based strategies in hospitals to help women who choose to breastfeed start and continue breastfeeding, by promoting the [Ten Steps to Successful Breastfeeding](#) (Ten Steps), a set of practices outlined by the WHO/UNICEF Baby-Friendly Hospital Initiative (BFHI) that have been shown to support breastfeeding mothers and infants. *CDC Health Information for International Travelers* (the Yellow Book) provides recommendations to clinicians advising travelers who are pregnant or breastfeeding. (<https://wwwnc.cdc.gov/travel/yellowbook/2018/advising-travelers-with-specific-needs/pregnant-travelers> and <https://wwwnc.cdc.gov/travel/yellowbook/2018/international-travel-with-infants-children/travel-and-breastfeeding>)

Communications

CDC focuses its communications efforts on public health professionals and the general public, although health care providers are also an important audience. CDC's website provides a broad array of consumer information on issues relevant for pregnant and lactating women, including:

- Gestational diabetes (<https://www.cdc.gov/pregnancy/diabetes-gestational.html>)
- Zika (<https://www.cdc.gov/zika/reporting/pregnancy-outcomes.html>)

- Infections (<https://www.cdc.gov/ncbddd/birthdefects/infographics/prevent2protect/index.html>)
- Folic acid (<https://www.cdc.gov/ncbddd/folicacid/index.html>)
- Preventing birth defects (<https://www.cdc.gov/ncbddd/birthdefects/prevention.html>)
- Safe medication use in pregnancy (<https://www.cdc.gov/treatingfortwo>)
- Pregnancy and opioid pain medication (https://www.cdc.gov/drugoverdose/pdf/pregnancy_opioid_pain_factsheet-a.pdf)
- International travel (<https://wwwnc.cdc.gov/travel/page/pregnant-travelers>) and special information for pregnant women on all international travel destination pages (www.cdc.gov/travel)
- Listeriosis (<https://www.cdc.gov/listeria/risk-groups/pregnant-women.html>)
- Blood pressure (<https://www.cdc.gov/bloodpressure/about.htm>)and
- Breastfeeding (<https://www.cdc.gov/breastfeeding/>)
- Alcohol Use in Pregnancy (<https://www.cdc.gov/ncbddd/fasd/alcohol-use.html>)
- Workplace health information for pregnant and nursing women (<https://www.cdc.gov/niosh/topics/repro/pregnancy.html>)

Other Collaborative Efforts

In addition to efforts noted above, CDC participates in the Federal Interagency Forum on Child and Family Statistics, an interagency group designed to improve both the quality and use of data on children and families (<http://childstats.gov>). CDC co-chairs the Federal Interagency Breastfeeding Work Group, an interagency group designed to increase sharing of information and expertise, prevent duplication, and increase collaboration on projects and initiatives with mutual goals. This work group has also collaborated with the Federal SIDS/SUIDS Work Group in order to mutually promote safe sleep and the safe implementation of maternity practices supportive of breastfeeding.

Agency Activities: Department of Defense (DoD)

Research

DoD supports research related to pregnant and lactating women through over 300 extramural grants funded over the past 30 years and the efforts of scientists in several branches of the military. This research portfolio addresses a range of topics of special interest to the military. A few key examples include:

- To reduce adverse pregnancy outcomes due to obstructive sleep apnea, researchers supported by the DoD are conducting a randomized controlled trial that examines the use of continuous positive airway pressure (CPAP) therapy compared with standard prenatal care only, in high risk pregnant women.
- DoD supports a range of studies designed to explore how both fetal exposures and pregnancy may affect the long-term risks for breast cancer. For example, DoD is supporting a team of scientists who are looking to determine whether epigenetic changes from in utero estrogenic exposures are the cause for Tamoxifen resistance.
- DoD supports studies on the effects of high-altitude hypoxic exposure and placental insufficiency on congenital heart defects and fetal oxygen metabolism.
- DoD conducts studies on environmental exposures on women as seen in The Gulf War Women's Health Cohort study.
- Disruptions in maternal-fetal interactions during the perinatal period due to inflammation or other immune responses can result in fetal neuropsychiatric disorders. The objective of one DoD-funded study is to gain more knowledge about the effect of inflammation during pregnancy on placental tryptophan metabolic pathways and the impact on serotonin-relevant circuits and fetal brain development.
- DoD has supported several studies on perinatal exposures, including illness, environmental exposures and placental abnormalities and their impact on the brain and the risk of autism. For example, the objective of one DoD-funded study is to evaluate the relationship between prostaglandin release due to fever during pregnancy and changes in brain development. Another DoD funded study evaluates the relationship between exposure to environmental contaminants during pregnancy, alterations in the placental serotonin biosynthetic pathway and autism risk.
- In the 2000s, DoD researchers assessed the impact of anthrax vaccination of pregnant women and their offspring. The military health system has established registries to follow families where anthrax or smallpox vaccines were given during pregnancy {<https://health.mil/vaccines>}.
- Serotonin Selective Reuptake Inhibitor (SSRI) antidepressants used by pregnant women have been linked to an increased risk of autism spectrum disorder in offspring. One DoD-funded research study aims to assess the changes to the behavioral and serotonin systems of rat offspring exposed to two SSRI drugs (Celexa and Prozac) versus a non-SSRI drug (Wellbutrin) to demonstrate the disruptive effect that SSRI antidepressants have on brain development.
- DoD supports research that investigates the potential relationship between gut bacteria, GI inflammation, behavioral and neurodevelopmental problems associated with autism by examining the effects of a novel probiotic therapy on maternal immune activation (MIA) in the mouse model.
- DoD has developed a large database linking medical records of women who gave birth in the military health system and their offspring. Among the matched singleton live birth pregnancies,

7 percent of mothers were dispensed an antidepressant at any point during pregnancy, and about 1.3 percent of mothers were given an antiepileptic drug.

- Several military branches have studied questions related to military physical fitness assessments in the pregnancy and postpartum periods.
- DoD has supported several studies describing prenatal and obstetric practice in military settings or by military physicians.
- DoD physicians have described support for breastfeeding in the military (on at least one occasion, in cooperation with VA researchers).

Clinical Care

DoD provides health care services to pregnant and lactating women through TRICARE, the health care system for active duty military, dependents, and retirees (<https://www.tricare.mil>). In FY 2015, about 120,000 babies were born in the military health system (<https://www.tricare.mil/About/Facts>). The military health system provides comprehensive coverage that includes substance abuse and mental health services, breast pumps and lactation support as well as maternity care (<https://tricare.mil/tricareu/PublicCourses.aspx>). Special military health programs related to pregnancy or lactation include:

- The Family Advocacy Program is designed to promote healthy family relationships and prevent family violence (http://www.militaryonesource.mil/phases-military-leadership?content_id=266712).
- The New Parent Support Program (NPSP) offers home visitation, parenting education, and other services to help young families provide a safe and nurturing environment for their children (http://www.militaryonesource.mil/phases-military-leadership?content_id=266712).

Related to its health care services programs, DoD provides policies, regulations, and guidance related to the health impacts of therapies on pregnant and lactating women and their offspring. DoD has also developed case definitions to support surveillance of pregnancy-related conditions in military populations. These policies and guidance help women and their clinicians make informed decisions about medication in pregnancy. VA and DoD have together implemented a clinical practice guideline on management of pregnancy (https://www.healthquality.va.gov/guidelines/WH/up/mpg_v2_1_full.pdf).

Communications

DoD's military health websites provide resources to pregnant and lactating women and their health care providers. DoD seeks to inform a wide range of audiences about medication use and safety among pregnant and lactating women. DoD is a federal partner in Text4Baby, a text messaging application free to pregnant women and women with infants to inform them of a variety of pregnancy- and lactation-related health issues (<https://partners.text4baby.org/index.php/about/partners>).

Other Collaborative Efforts

Collaborations noted above include DoD's work with VA on practice guidelines and with other federal agencies on Text4Baby. Other collaborations include:

- DoD participates in the Federal Interagency Forum on Child and Family Statistics, an interagency group designed to improve both the quality and use of data on children and families by investigating questions of data quality, data measurement, and data integration and by

coordinating the development and use of statistical data bases among Federal agencies (<http://childstats.gov>).

- In 2016, DoD partnered with NIH, FDA, CDC, and SAMHSA to sponsor a workshop addressing critical gaps in research on opioid misuse and pregnancy. Topics included (1) Screening for opioid use in pregnancy (2) Complications of pregnancy associated with opioid use (3) Most appropriate treatment of pregnant women with opioid use disorders given risks and benefits (4) Treatment and management of infants with neonatal abstinence syndrome; and (5) long-term effects of prenatal opioid exposure on children and the role of preventive interventions to improve childhood outcomes for this high-risk population.

Agency Activities: Department of Veterans Affairs (VA)

Research

VA supports research related to pregnant and lactating women through its intramural research program in the Office of Research and Development, primarily through its Health Services Research and Development Service, which funds research addressing all aspects of VA health care. Women's health research is a priority for the VA, and the VA has established a comprehensive Women's Health Research Agenda (https://www.hsrd.research.va.gov/for_researchers/womens_health/default.cfm). This program of research is aimed at understanding the health and healthcare needs of women Veterans and informing systematic improvements in their care through partnerships with the VA healthcare system.

VA supports research on medication safety for pregnant women and their offspring, and research on the effect of military service, trauma, and co-occurring conditions on reproductive health and pregnancy, health care delivery, and care coordination. VA scientists have also contributed to the basic science literature related to pregnancy-associated conditions. Some specific examples of research include:

- Through the Pregnancy Outcomes of Veterans (PROVE) project, scientists are linking VA and California data to describe the effect of maternal PTSD on birth outcomes, confirming an increased risk of preterm birth and quantifying the distribution and character of preterm births.
- Researchers are assessing the coordination of pregnancy care experienced by women veterans by examining health care utilization data and interviewing women veterans and their health care providers.
- Researchers are investigating the effects of opioid use on pregnant veterans.
- Researchers have assessed counseling of female veterans about the teratogenic risks of prescription medications and are testing new programs to enhance provider-patient communication about these risks.

Clinical Care

VA provides health care services to pregnant and lactating women veterans, usually in the community but also through the Veterans Health Administration (VHA). All VHA medical centers have a maternity care coordinator who assists pregnant women veterans with coordinating VA and community resources for prenatal care and delivery, and ensures that women veterans receive appropriate lactation support and screening for post-partum depression. VA researchers have documented a significant recent increase in the utilization of VA maternity benefits among eligible women veterans. Moreover, a VA-supported research study found that women who use VA benefits tend to be at higher risk, especially for depression, compared with women who do not use these benefits. VA provides counseling or mental health services, substance abuse counseling and/or treatment, and training for providers specifically related to the needs of pregnant or lactating women.

Related to its health care services programs, VA provides policies, regulations, and guidance related to the health impacts of therapies on pregnant and lactating women and their offspring. These policies and guidance help women and their clinicians make informed decisions about medication in pregnancy.

Examples include:

- VA's Pharmacy Benefit Management Program includes decision tools to help women and their physicians make informed decisions when they prescribe medication for pregnant or lactating women. VA formularies and decision aids are based on information from FDA and from NLM's LactMed.

- VA's Teratogenic Drugs Project is an information technology initiative that enhances VHA's electronic medical records system to display pregnancy and lactation information in the vital signs display; implements automatic order checks for medication and imaging studies; includes notification to providers about potential teratogenic medications; and provides reminders to providers addressing pregnancy and lactation status.
- VA and DoD have together implemented a clinical practice guideline on management of pregnancy { https://www.healthquality.va.gov/guidelines/WH/up/mpg_v2_1_full.pdf }. The guideline is designed to: reduce clinical practice variation; provide evidence-based recommendations to patients and providers; and identify outcome measures to improve clinical practice.
- VHA's Handbook established procedures for the coordination of maternity care for veterans.
- VHA is establishing a Maternity Tracker to enhance the coordination of care of pregnant women veterans using shared information between providers to improve screening, care, patient safety and health outcomes. The Maternity Tracker web application, to be available to each VA site in 2018, allows VA maternity care coordinators to track and monitor the antenatal and postnatal maternity care for women veterans. The web based tool is designed to interact with VA's electronic health record and computerized patient record system (VistA, CPRS and the Women's Health Data Package) to track and share educational items, phone calls, notes and other information for pregnant veterans.

Communications

VA's website provides an array of resources to pregnant and lactating women and their health care providers. VA seeks to inform a wide range of audiences about medication use and safety among pregnant and lactating women (<https://www.pregnancyatoz.org>; https://www.tucson.va.gov/docs/WomenHealth/Maternity_Care_Benefits_08052015.pdf). VA's communication activities related to pregnancy and lactation include:

- The Purple Book is a resource for pregnant patients to help explain VA's and DoD's evidence-based practices for pregnancy care {https://www.va.gov/COMMUNITYCARE/docs/providers/VHA_CC-Provider_Toolkit.pdf and <https://www.tucson.va.gov/services/women/Maternity.asp> }
- MomMoodBooster, a free online program for women veterans designed to help women veterans recover from postpartum depression. In addition to online information, women complete six sessions and receive phone calls from a phone coach to assist in their recovery (<https://mummoodbooster.com/public/us>).
- As part of its women's health continuing education webinar series, VA has sponsored webinars on the use of medications during pregnancy.
- As part of VA's training web site, pregnancy-related information is available to VA providers (https://www.va.gov/COMMUNITYCARE/docs/providers/VHA_CC-Provider_Toolkit.pdf and <https://www.tucson.va.gov/services/women/Maternity.asp>).

Other Collaborative Efforts

Collaborations noted above include VA's work with DoD on practice guidelines. VA also collaborates with federal, state, and local governments, community-based care organizations, professional societies and others on issues related to research and clinical care for pregnant and lactating women. For example, VA served as a member of CDC's Preconception Health and Health Care Committee, which

issued recommendations to improve preconception health to prevent adverse pregnancy outcomes (<https://www.cdc.gov/preconception/documents/actionplannationalinitiativepchc2012-2014.pdf>).

Agency Activities: Food and Drug Administration (FDA)

Research

FDA designs and performs research to advance knowledge related to drugs, devices, biologics, cosmetics, foods, and tobacco used by pregnant and lactating women. FDA supported science includes basic research into the mechanisms of therapies in pregnancy and lactation; preclinical studies, especially in toxicity; utilization of medication by pregnant and lactating women; safety and effectiveness of therapies and medications during pregnancy and lactation; pharmacokinetics and pharmacodynamics; effects of exposure to medical devices; and the impact of tobacco product use during pregnancy and lactation. Multiple FDA organizational units support intramural and extramural research portfolios applicable to the work of the Task Force.

- The FDA's Medication Exposure in Pregnancy Risk Evaluation Program (MEPREP) is a multi-site collaborative research program developed to enable the conduct of studies of medication use and outcomes in pregnancy. Collaborators include the U.S. Food and Drug Administration and researchers at the HMO Research Network, Kaiser Permanente Northern and Southern California, and Vanderbilt University. Datasets have been created at each site linking healthcare data for women delivering an infant from 2001-2008 and infants born to these women.
- The FDA Office of Women's Health (OWH) funds, promotes, and conducts research related to sex differences and conditions unique to women, including pregnancy.
- The Tobacco Regulatory Science Program (TRSP) works with other FDA organizations and with the NIH to fund research supporting regulatory activities over tobacco products. For example, TRSP funds studies that investigate the impact of health warnings on tobacco use, ultrasound markers of maternal smoking, how design and flavors affect waterpipe use, and response to reduced nicotine content in pregnant smokers compared to non-pregnant smokers. FDA has described the likelihood of electronic nicotine delivery systems among pregnant smokers.
- The CDRH funds studies of prenatal exposures to medical devices. For example, researchers used a computational modeling approach to evaluate electromagnetic exposure to hand-held metal detectors and MRIs.
- The FDA's NCTR worked with NIH's National Institute for Environmental Health Sciences (NIEHS) on a preclinical toxicology study of exposure to oxybenzone, a UV filter that is often incorporated into consumer products. NCTR has worked with a number of other FDA groups and NIEHS on a group of studies to address exposure to BPA, including in pregnant and lactating women. NCTR has also modeled the physiology of pregnancy to test drug metabolism.
- CBER conducts animal and human studies related to the safety and efficacy of vaccines in a variety of populations, including pregnant women. Examples include studies of maternal immunization and Zika infection in pregnant populations.
- The FDA Center for Food Safety and Applied Nutrition conducts research on infant feeding practices, contaminants in dietary supplements, and the potential of birth defects from cosmetic products containing retinol.
- The CBER intramural grant program funds a variety of programs including a study on the assessment of Zika virus glycoprotein immunogen placental transmission and an evaluation of pharmacokinetics of thrombogenic impurity following different routes of immune globulin administration during pregnancy.

FDA has supported research on the utilization of medication among pregnant and/or lactating women for a wide variety of health conditions. These studies primarily describe how many women with a

particular condition use medication, and what types of medications they use. FDA researchers have assessed medication use among pregnant women with asthma; convulsive disorders; and mental health disorders; bacterial and viral infections.

Clinical Practice Information and Recommendations

FDA generally does not provide direct clinical care. However, the information produced and analyzed by the FDA forms the foundation for the regulation of prescription drugs, biologics, and medical devices. FDA's role as a regulatory agency also includes development of guidance, policies, and information to ensure the safety and effectiveness of therapies for pregnant and lactating women.

FDA's Pregnancy and Lactation Labeling Rule requires industry to provide standardized information on prescription drug labels to help health care providers in assessing benefit and risk, and in subsequent discussions with pregnant and lactating women who need medication.

Other examples of relevant regulation and/or guidance include:

- FDA regulates human donor milk under the FDA's regulatory authorities for foods as per the Food Safety and Modernization Act (FSMA).
- Facilities producing foods (i.e., donor human milk) covered by FDA's rule implementing mandatory preventive controls for human food are subject to FSMA's risk-based mandated inspection frequencies. FSMA mandates that these non-high-risk domestic facilities be inspected every 5 years and high-risk domestic facilities every 3 years.
- FDA's CDRH is working to provide more information about MRI exposure in pregnancy.
- On December 3, 2014, the FDA published the Content and Format of Labeling for Human Prescription Drug and Biological Products; Requirements for Pregnancy and Lactation Labeling, referred to as the "Pregnancy and Lactation Labeling Rule" (PLLR or final rule). (<https://www.fda.gov/drugs/developmentapprovalprocess/developmentresources/labeling/ucm093307.htm>; <https://www.fda.gov/biologicsbloodvaccines/guidancecomplianceregulatoryinformation/actsrulesregulations/ucm445102.htm> ; <https://www.fda.gov/drugs/developmentapprovalprocess/developmentresources/labeling/ucm093311.htm>).
- FDA is providing guidance on toxicity potential in infectious disease therapies for women of childbearing age and pregnant women in *Considerations for Developmental Toxicity Studies for Preventive and Therapeutic Vaccines for Infectious Disease Indications* (<https://www.fda.gov/biologicsbloodvaccines/guidancecomplianceregulatoryinformation/guidances/vaccines/ucm074827.htm>)

FDA also participates in provider training activities to help inform clinical practitioners about the safety and effectiveness of drugs in pregnancy. FDA webinars or briefing materials are available on a wide range of medications and related topics, including:

- vaccines in pregnancy (<https://www.fda.gov/aboutfda/transparency/basics/ucm508553.htm>);
- pain medication in pregnancy (<https://www.fda.gov/drugs/drugsafety/ucm429117.htm>) ;
- use of amoxicillin in pregnancy (<https://www.fda.gov/drugs/emergencypreparedness/bioterrorismdrugpreparedness/ucm072124.htm>)

- flu treatment in pregnancy (<https://www.fda.gov/drugs/drugsafety/informationbydrugclass/ucm184917.htm>)
- valporate (<https://www.fda.gov/Drugs/DrugSafety/ucm350684.htm>)
- doxycycline (<https://www.fda.gov/drugs/emergencypreparedness/bioterrorismanddrugpreparedness/ucm131011.htm>)
- cipro (<https://www.fda.gov/Drugs/EmergencyPreparedness/BioterrorismandDrugPreparedness/ucm130712.htm>) and
- magnesium sulfate (<https://www.fda.gov/drugs/drugsafety/ucm353333.htm>).

FDA connects health professionals and consumers to registries and provides links to drug information and educational resources for pregnant women via the [FDA Pregnancy Registry List](#).

In 2016, FDA issued the Revised Recommendations for Reducing the Risk of Zika Virus Transmission by Blood to address blood safety in response to the Zika virus. Although these recommendations were not specific to pregnant women, they were important as a preventive measure to reduce pregnant women's potential exposure to the virus.

Communications

FDA uses a wide range of forms of print, digital, and web-based communications related to pregnancy and lactation. FDA's websites provide detailed information to pregnant and lactating women and their health care providers about medications in pregnancy and lactation generally, and about specific therapies as well. FDA seeks to inform a wide range of audiences about use and safety for medications, biologics, and medical devices among pregnant and lactating women. Some examples include:

- FDA's Pregnancy web page includes consumer-oriented information on medication in pregnancy, breast pumps, food safety, and X ray and ultrasound (<https://www.fda.gov/ForConsumers/ByAudience/ForWomen/WomensHealthTopics/ucm117976.htm>).
- FDA's CDRH provides information on the availability, safety, and use of breast pumps (<https://www.fda.gov/forconsumers/consumerupdates/ucm335261.htm>)
- FDA's Drug Safety Communications provide up to date information about drug safety issues, including those of special interest to pregnant and lactating women (<https://www.fda.gov/aboutfda/centersoffices/officeofmedicalproductsandtobacco/cder/ucm413118.htm>; <https://www.fda.gov/Drugs/DrugSafety/ucm199082.htm>). For example, a recent communication recommended against the use of prescription codeine pain and cough medicines and tramadol pain medicines in breastfeeding women (<https://www.fda.gov/Drugs/DrugSafety/ucm549679.htm>).
- FDA's OWH created a web portal to help connect pregnant women and health professionals with medical product and disease-based registries that collect information on drug exposures during pregnancy (<https://www.fda.gov/ScienceResearch/SpecialTopics/WomensHealthResearch/ucm134848.htm>).

Other Collaborative Efforts

In addition to those noted above, FDA is involved in a wide range of collaborative efforts with other federal agencies to promote scientific and communications efforts to benefit pregnant and lactating women. For example, FDA is a collaborating agency in the Treating for Two initiative, to review medication safety data in pregnancy to develop treatment guidelines (<https://www.cdc.gov/pregnancy/meds/treatingfortwo/index.html>).

FDA often collaborates with professional groups and other federal agencies on scientific workshops:

- In 2016, FDA also collaborated with NIH, other HHS divisions, EPA, and USAID to hold a scientific workshop to identify optimal approaches for treating and caring for the generation of children exposed to ZIKV in the womb.
- FDA and CDC collaborated on a conference on Zika Virus in the Americas in March 2016; FDA presented material on regulatory considerations in the development of drugs for use in pregnant women (<https://www.cdc.gov/zap/index.html>).
- In November 2014, FDA and CDC held a workshop, in collaboration with the American College of Obstetricians and Gynecologists, to discuss new and emerging tobacco product use in pregnant and reproductive age women (<https://www.fda.gov/downloads/tobaccoproducts/newsevents/ucm542886>)
- In 2016, FDA representatives participated in the Academy of Breastfeeding Medicine's 8th annual summit on breastfeeding (<http://www.bfmed.org/>)
- FDA collaborated with NIH on an expert panel to advance inclusion of pregnant and postpartum women in tuberculosis drug trials (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4772846/pdf/civ991.pdf>).
- FDA and NIH collaborated on a scientific review conference on phenylketonuria (PKU), including PKU and pregnancy (<http://www.sciencedirect.com/science/article/pii/S1096719214000857>).

FDA's CDRH and CDER participate as liaisons to the ACOG OB Practice Committee.

FDA collaborates with CDC on the National Health and Nutrition Examination Survey (NHANES), which includes medical, diet, dental, and physiologic measurements that may contribute to understanding of medical and nutritional issues in pregnant and lactating women (<https://www.cdc.gov/nchs/nhanes/index.htm>). FDA also collaborates with CDC on the Pregnancy Risk Assessment Monitoring System (PRAMS) (<https://www.cdc.gov/prams/index.htm>).

FDA and NIH collaborate in the Consortium Linking Academic and Regulatory Insights on the Toxicity of BPA (CLARITY – BPA) study. This collaboration joins federal regulators and academic researcher to help inform regulatory decision-making regarding BPA (https://www.niehs.nih.gov/research/programs/endocrine/bpa_initiatives/index.cfm). FDA also collaborates with NIH in the Biomarkers, EndpointS, and other Tools (BEST) Resource effort. This resource provides clarity about terminology related to biomarkers, including pregnancy biomarkers, and surrogate endpoints which is vital for collaborations across agencies.

Agency Activities: Health Resources and Services Administration (HRSA)

Research

HRSA is not primarily a research agency; HRSA's mission involves improving health care to people who are geographically isolated, economically or medically vulnerable. HRSA also supports the training of health professionals, the distribution of providers to areas where they are needed most, and improvements in health care delivery (<https://www.hrsa.gov/about/index.html>). However, HRSA does support some research on topics related to the health of pregnant and lactating women. Most of HRSA's research efforts are supported out of the Maternal and Child Health Bureau. These grants typically do not address safety and effectiveness of medication for pregnant women directly. Instead, these projects are primarily focused on health care utilization, impact of HRSA's programs, and dissemination of evidence-based practices in the community. Between 30 and 50 such HRSA-supported research projects related to pregnancy and/or lactation have been active in each of the previous 5 years. Examples of HRSA-funded research projects include:

- Researchers supported by HRSA are examining the impact of the mandate to provide lactation support services under the Affordable Care Act, and assessing this mandate's effects on breastfeeding behaviors.
- Another HRSA-supported study was designed to examine the efficacy of an exercise intervention to prevent perinatal depression among women attending federally qualified health centers serving high risk women. Possible effects on gestational weight gain and retention will also be explored.
- HRSA-supported scientists are conducting a pilot randomized controlled trial to generate data on the impact of tele-lactation services via video calls on personal electronic devices. Data on breastfeeding duration and exclusivity, as well as perceptions and satisfaction with breastfeeding, will be captured via surveys and in-depth interviews and compared across groups.
- A recently-completed HRSA project was designed to adapt and test an evidence-based intervention for pregnant women with PTSD (and sub-threshold PTSD symptoms) served by the HRSA-funded Healthy Start program.

HRSA supports the MCH Research Network on Pregnancy Related Care (also known as the CARN network), a group of practicing obstetrician-gynecologists affiliated with the American College of Obstetricians and Gynecologists (ACOG). The CARN network conducts multi-site research on critical issues affecting pregnancy-related care and maternal health across the lifespan, and administers survey studies to inform clinical practice. Recent findings from the CARN network include:

- Researchers found variation in practice patterns of obstetricians related to screening for group B streptococcal colonization and providing preventive antibiotics before or during labor.
- CARN researchers studied patient and provider reports about recommendations for, and receipt of, flu vaccine among pregnant women. They found substantial discrepancies between self-reports of medical providers and patients and medical records; for example, nearly 80% of patients self-reported accepting the influenza vaccine, but medical record data indicated only 36% of patients accepting the vaccine. Similarly, all medical providers reported giving recommendations for the vaccine, but only 85% of patients reported receiving a recommendation.
- Researchers investigated physician practice patterns for pregnant patients around the influenza vaccine during the 2009-2010 H1N1 flu seasons. The data showed that a higher proportion of

women eligible for Medicaid in a practice was associated with a lower estimate of vaccination rate. Ob-gyns with more than 20 years of practice were more likely to be concerned about the risks of antivirals and less likely to routinely prescribe them. An earlier CARN survey had also demonstrated that some barriers existed to vaccination within ob-gyn practices.

- A survey conducted by CARN indicated that many ob-gyns are not utilizing the recommended validated resources such as the DSM-IV or PHQ-2 for diagnosis of depression or prior to prescribing antidepressants.

HRSA has also recently funded a Home Visiting Research network to facilitate research and research-based practice in home visiting programs (<http://www.hvrn.org/index.html>).

Clinical Care

HRSA's **Health Center Program** is a national network of health centers that provide comprehensive primary health care services to more than 24 million people nationwide, regardless of a patients' ability to pay, charging for services on a sliding fee scale. About 1 in 13 people relies on a HRSA-funded center for primary care (<https://www.hrsa.gov/about/organization/bureaus/bphc/index.html>). In addition, more than half of pregnant women and more than a third of infants and children benefit from HRSA's **Title V Maternal and Child Health Block Grant** program. The MCH Block Grant contains three major funding categories: (1) MCH Formula Grants to States are awarded to State health agencies based on the number of children in poverty in a state, and represent the largest funding component of Title V (roughly 85 percent); (2) Special Projects of Regional and National Significance (SPRANS) grants; and (3) Community Integrated Service Systems (CISS) grants. Both SPRANS and CISS grants are awarded on a competitive basis and support such activities as research, training, and systems building to improve access and equity in health care (<https://www.hrsa.gov/about/pdf/mchb.pdf>).

HRSA's **Healthy Start** program provides grants in geographic areas with high infant mortality. In these areas, pregnant women who enroll in Healthy Start receive health care services, but also may receive (as needed) case management, outreach, home visiting, adolescent pregnancy prevention, childbirth education, parenting skill-building, self-esteem building, transportation, translation, child care, breastfeeding and nutrition education, father support, housing assistance, job training, and prison/jail-based services (<https://mchb.hrsa.gov/maternal-child-health-initiatives/healthy-start>). The **Maternal, Infant, and Early Childhood Home Visiting Program** gives pregnant women and families, particularly those considered at-risk, necessary resources and skills to raise children who are physically, socially, and emotionally healthy and ready to learn (<https://mchb.hrsa.gov/maternal-child-health-initiatives/home-visiting-overview>). The **Ryan White HIV/AIDS program** provides primary medical care and essential support services for people living with HIV who are uninsured or underinsured. Part D of the Ryan White program is designated specially for women, infants, children and youth living with HIV (<https://hab.hrsa.gov/about-ryan-white-hiv-aids-program/about-ryan-white-hiv-aids-program>).

The **Healthy Tomorrows Partnership for Children** program, through several projects across the country, supports services for pregnant and lactating women and their children (https://www.grants.gov/view-opportunity.html?oppld=284005&utm_campaign=enews06022016&utm_medium=email&utm_source=govdelivery). Examples of program activities include:

- The Medical Care Management for Complex Prenatal Patients project provides coordinated medical care management to complex and high risk prenatal patients to improve care coordination and address poor perinatal health outcomes in south Los Angeles.

- The Healthy Tomorrows Hawaii program works to make prenatal and pediatric care more culturally appropriate and accessible.
- The Maternal and Child Health Coordination Project in Chicago provides services to new mothers and babies in low-income, medically underserved neighborhoods. The program encourages breastfeeding, postpartum follow-up, and preventive screenings.
- The ReadNPlay for a Bright Future program in Tennessee provides lactation education and support for mothers of infants.

Through its **training programs**, HRSA provides some guidance and/or information related to the care of pregnant and/or lactating women. For example:

- the Leadership Education in Adolescent Health (LEAH) training program may provide training related to the care of pregnant or lactating teens.
- The Maternal and Child Health Nutrition Training program (<https://mchb.hrsa.gov/training/projects.asp?program=12>) may also include information related to nutrition in pregnancy.
- MCH training programs also prepare health care professionals including visiting nurses and home workers.
- Centers of Excellence in Maternal and Child Health Education, Science, and Practice prepares students for careers in maternal and child health fields. Several centers within this program offer education related directly to pregnancy and/or lactation. For example:
 - The University of Minnesota’s program offers continuing education materials on breastfeeding;
 - The University of North Carolina’s program established accredited training for lactation consultants;
 - The University of Washington’s program serves as a regional resource on a variety of maternal and child health issues, including breastfeeding.

Communications

In addition to the activities noted above, HRSA is a federal partner in Text4Baby, a text messaging application free to pregnant women and women with infants to inform them of a variety of pregnancy- and lactation-related health issues.

HRSA also supports MotherToBaby which is a national call system that provides information about the safety of medications, herbal products, substances of abuse, chemicals, and other exposures during pregnancy and nursing.

HRSA’s websites provide resources to pregnant and lactating women and their health care providers. HRSA seeks to inform a wide range of audiences about medication use and safety among pregnant and lactating women (<https://mchb.hrsa.gov/maternal-child-health-topics/maternal-and-womens-health>).

Other Collaborative Efforts

In addition to efforts noted above, HRSA participates in the Federal Interagency Forum on Child and Family Statistics, an interagency group designed to improve both the quality and use of data on children and families by investigating questions of data quality, data measurement, and data integration and by coordinating the development and use of statistical data bases among Federal agencies (<http://childstats.gov>).

In 2016, HRSA also collaborated with NIH, other HHS divisions, EPA, and USAID to hold a scientific workshop to identify optimal approaches for treating and caring for the generation of children exposed to ZIKV in the womb.

Agency Activities: National Institutes of Health (NIH)

Research

NIH is the largest biomedical research agency in the world. Through its institutes and centers (ICs), as well as the NIH Office of the Director, the NIH supports extramural, intramural, and interagency research related to pregnant and lactating women. These studies range from investigations into the fundamental processes that drive biological changes during pregnancy to the development and testing of new interventions in pregnant and lactating women. NIH's studies specifically related to pregnant and lactating women cover a range of conditions, both those associated with pregnancy itself and chronic conditions that many pregnant women experience before and during pregnancy and lactation.

NIH reports on its research to the public by scientific category, using a standardized process that combines scientific expertise with sophisticated automated systems. In 2017, NIH developed and implemented two new scientific categories – (1) Pregnancy and (2) Breastfeeding, Lactation, and Breast Milk – to enable the agency to analyze and track research in these areas. As of August 2017, although FY 2017 is not yet complete, preliminary analysis were generated to inform the initial Task Force discussions.

Pregnancy

For pregnancy, the preliminary review of NIH grants indicates that:

- A total of 21 of NIH's 27 ICs support at least one grant or project related to pregnancy. (A list of NIH ICs is included in Appendix I.)
- The *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) supports the largest share of NIH grants on pregnancy. Other ICs with significant research investments include the National Heart, Lung, and Blood Institute (NHLBI), National Institute of Allergy and Infectious Diseases (NIAID), the National Institute on Drug Abuse (NIDA), the National Institute of Environmental Health Sciences (NIEHS), and the National Institute on Diabetes and Digestive and Kidney Diseases (NIDDK).
- The largest share of these grants are funded using the R01 type of research grant mechanism.
- The majority of NIH's pregnancy research grants – 87 percent – are directly applicable to the Task Force mission. The remaining grants are related to pregnancy but are not applicable to therapies for pregnant and lactating women. For example, NIH supports some research on the impact of short pregnancy intervals on maternal and child health.

Examples of NIH research grants related to pregnancy include:

- The [Obstetric-Fetal Pharmacology Research Unit Network](#) is designed specifically to improve the safety and effective use of therapeutic drugs in women during pregnancy and lactation. The network provides the expert infrastructure needed to test therapeutic drugs during pregnancy, and conducts multidisciplinary research to enhance the understanding of obstetric pharmacokinetics and pharmacodynamics. This program allows researchers to conduct safe, technically sophisticated, and complex studies that will help clinicians protect women's health, improve birth outcomes, and reduce infant mortality. Some research by the network focuses on pharmacology, efficacy, placental transfer, and placental biotransformation of therapies and drugs to treat a variety of medical conditions. Studies conducted by the network have focused on a variety of conditions, including gestational diabetes, type 2 diabetes, pregnancy side effects

like nausea, uterine complications that lead to preterm labor, and other critical conditions in pregnant women.

- The [Maternal Fetal Medicine Unit Network](#) conducts rigorous clinical trials in maternal-fetal medicine and obstetrics, particularly with respect to the continuing problem of preterm birth. The network's research studies are designed to address maternal, fetal, and infant morbidity related to preterm birth, fetal growth abnormalities, and maternal complications, and to provide the rationale for evidence-based, cost-effective obstetric practice. For example, current studies are examining: (1) the use of antenatal steroids at 34-36 weeks gestation to reduce the need for neonatal respiratory support, (2) treatment for pregnant women with mild gestational diabetes to decrease the risk of childhood obesity for their offspring, and (3) administration of congenital cytomegalovirus infection (CMV) hyperimmune globulin before 23 weeks gestation in women with primary CMV infection.
- A cohort of 10,000 nulliparous women were enrolled in the nuMoM2b study to ascertain pregnancy outcomes, particularly adverse outcomes such as preterm birth, preeclampsia, gestational diabetes, stillbirth and small for gestational age. Half of the cohort is currently being followed 2-7 years post-partum in the nuMoM2b Heart Health Study to elucidate the relationship between adverse pregnancy outcomes and future cardiovascular disease and to use knowledge gained for modification of risk factors for cardiovascular disease.
- The Chronic Hypertension and Pregnancy (CHAP) project is a large pragmatic multi-center randomized clinical trial designed to evaluate the comparative effectiveness and safety of pharmacologic treatment of mild chronic hypertension in pregnancy.
- Researchers are assessing how pregnancy-related hormones and/or growth factors affect specific enzymes and placental drug transporters during pregnancy.
- An early career scientist is evaluating how in utero malaria exposure affects immune tolerance in the offspring.
- Researchers are exploring how maternal arsenic exposure and micronutrient deficiencies alter maternal and newborn influenza antibody function, respiratory morbidity, and systemic immune function following maternal influenza vaccination.
- An early career scientist is currently assessing the impact of pharmacogenomics on the pharmacokinetics and pharmacodynamics of risperidone in pregnant women. Risperidone is a second generation antipsychotic drug used to treat bipolar disorder and schizophrenia.
- The International Maternal, Pediatric, Adolescent AIDS Clinical Trials (IMPAACT) Network is a collaboration of investigators and institutions that study and evaluate HIV/AIDS therapies in pregnant women, infants, children, and adolescents, in the United States and around the world. Topic areas for the network's current clinical trials include: antenatal and postnatal strategies to prevent mother-to-child transmission of HIV, antiretroviral drug use in pregnant and post-partum HIV-infected women, and the pharmacokinetics of antiretroviral therapies for HIV-infected pregnant women and children.
- The National Toxicology Program (NTP) is an interagency program, involving NIH, EPA, and others. The NTP provides scientific information about hazardous substances in the environment and serves as a scientific source for programs, activities, and policies that advocate for health and disease prevention. One NTP effort is a study that examines the developmental effects and pregnancy outcomes associated with cancer chemotherapy use in pregnant women.
- The Microbicide Trials Network aims to prevent HIV infection in high-risk populations through the use of oral and topical microbicides. Researchers in the Microbicide Safety Trials are studying the safety and effects of HIV prevention microbicides in pregnant and lactating women and infants.

- An international expert panel provides recommendations for inclusion of pregnant and postpartum women in clinical trials to unify national and international guidelines regarding TB drug safety, efficacy, and pharmacokinetics in these populations.
- Researchers are enabling the molecular epigenetic validation of postpartum depression biomarkers on pregnant women. This study will generate an important postpartum depression resource as well as confirm and expand the utility of early screening and identify new targets and time points for therapeutic intervention.
- A team of NIH-funded researchers are studying the effects of BMI-based prenatal vitamins as opposed to standard prenatal vitamin supplementation on markers of oxidative stress and inflammation in obese pregnant women.
- Researchers are evaluating a Longitudinal Remote Consultation implementation strategy to improve patient outcomes from team based collaborative care for depressed pregnant women receiving primary care in federally qualified health centers.
- Investigators are assessing the clinical impact of hypothesized mechanisms of behavior change and cost effectiveness of partner focused elimination of mother-to-child transmission of HIV during the pregnancy period.

Breastfeeding, Lactation, and Breast Milk

For breastfeeding, the preliminary review of NIH grants indicates that:

- A total of 19 of NIH's 27 ICs support at least one grant related to breastfeeding.
- The NICHD, NIAID, and NIDDK support the greatest shares of NIH grants on breastfeeding and lactation.
- The largest share of these grants are funded using the R01 type of research grant mechanism.
- The majority of NIH's breastfeeding research grants – 56 percent – are directly applicable to the Task Force mission. The remaining grants are related to breastfeeding but are not applicable to therapies for pregnant and lactating women. For example, NIH supports some research on the most effective ways to promote breastfeeding in general, particularly in disadvantaged communities.

Examples of NIH research grants related to breastfeeding include:

- Because infants less than six months of age rely on maternal antibodies for protection against influenza, it is important to know the types of maternal influenza vaccines that best protect infants. Scientists aim to compare maternal response to the intranasal live-attenuated influenza vaccine and the systemic inactivated influenza vaccine, and to evaluate levels of influenza specific antibodies and cellular immunity in breast milk and blood.
- To avert a decrease in long-term bone mineral density in breastfeeding women who suffer from perinatal depression, researchers are studying the effect of serotonin reuptake inhibitors (SSRIs) on maternal bone health.
- Since little information is known about the specific molecular mechanisms responsible for the development of necrotizing enterocolitis (NEC), a neonatologist is examining the relationship between breast milk and NEC pathogenesis, including characterizing the effects of breast milk on intestinal epithelial cell proliferation and mucosal healing.
- To help prevent new pediatric HIV-1 infections, researchers are testing a passive-active immunization strategy to protect newborns through maternal immunization. The scientists hope that passive antibody transfer in breast milk and in utero will help protect infants once maternal antibodies decline.

- Some scientific evidence indicates that maternal iron deficiency increases an offspring's risk of neurodevelopmental damage due to prenatal alcohol exposure. NIH-funded scientists are studying the relationships between alcohol and iron, prenatal alcohol exposure (PAE), and the administration of iron supplements to normalize fetal brain iron content and brain activities in an animal model.
- Researchers are investigating if a non-pharmacologic treatment (chronotherapy) for depression is effective and accepted in pregnant and lactating women.

Clinical Practice Information and Recommendations

NIH does not directly support clinical care, but the agency works with professional societies, federal agencies, and other stakeholders to help ensure that the scientific evidence produced by NIH research is effectively translated into clinical practice. For example, many of the clinical practice guidelines of the American Congress of Obstetricians and Gynecologists are rooted in NIH-funded studies (<https://www.acog.org/About-ACOG/ACOG-Departments/Deliveries-Before-39-Weeks/ACOG-Clinical-Guidelines>).

NIH works with the Agency for Healthcare Research and Quality to inform the U.S. Preventive Services Task Force (USPSTF), an independent, volunteer panel of national experts in prevention and evidence-based medicine (<https://www.uspreventiveservicestaskforce.org/Page/Name/home>). The Task Force works to improve the health of all Americans by making evidence-based recommendations about clinical preventive services such as screenings, counseling services, and preventive medications. A total of 18 USPSTF recommendations are directly related to pregnancy and/or lactation, and 26 recommendations include a component related to pregnancy and/or lactation.

Communications

NIH supports several public health campaigns related to pregnant and lactating women. The Mom's Mental Health Matters campaign, spearheaded by the National Child and Maternal Health Education Program (NCMHEP), focuses on depression and anxiety around pregnancy. Other NCMHEP efforts have focused on preventing preterm birth, especially elective deliveries before 39 weeks of gestation. The long-standing Safe to Sleep campaign was designed to educate parents and caregivers about ways to reduce the risk of Sudden Infant Death Syndrome and other sleep-related causes of infant death, such as suffocation. The Safe to Sleep campaign recognizes the importance of breastfeeding and has worked with breastfeeding advocacy groups.

Many NIH ICs provide resources to the public on pregnancy and treatment of pre-existing conditions. For example, NIDDK include information on its web site about pregnancy for women who have diabetes, thyroid disease, or kidney disease. The National Cancer Institute provides detailed information for women undergoing breast cancer treatment during pregnancy. The National Heart, Lung, and Blood Institute provides information on high blood pressure in pregnancy. The NIH's National Library of Medicine (NLM), through its Medline Plus resource, provides both general information on pregnancy and more detailed information on specific conditions in pregnancy.

NLM also supports the LactMed® database, an important resource for lactating women and their health care providers. The LactMed® database contains information on drugs and other chemicals to which breastfeeding mothers may be exposed. It includes information on the levels of such substances in

breast milk and infant blood, and the possible adverse effects in the nursing infant. Suggested therapeutic alternatives to those drugs are provided, where appropriate. All data are derived from the scientific literature and fully referenced (<https://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm>).

Other Collaborative Efforts

In addition to efforts noted above, NIH participates in the Federal Interagency Forum on Child and Family Statistics, an interagency group designed to improve both the quality and use of data on children and families by investigating questions of data quality, data measurement, and data integration and by coordinating the development and use of statistical databases among federal agencies (<http://childstats.gov>). NIH participates in the Center for Disease Control and Prevention (CDC)'s Treating For Two initiative, which is working to expand and accelerate research to fill knowledge gaps; evaluate available evidence; and deliver up to date information to support decision making among prescribers, pharmacists and consumers (<https://www.cdc.gov/pregnancy/meds/treatingfortwo/index.html>). NIH also partners on Text4baby, a text messaging application free to pregnant women and women with infants to inform them of a variety of pregnancy- and lactation-related health issues (www.text4baby.org).

NIH has supported a variety of inter-agency scientific collaborations, and has received support from other agencies interested in using NIH-funded infrastructure for pregnancy-related research. Several NIH ICs recently worked with the US Food and Drug Administration (FDA) and other agencies to bring experts together and develop a research agenda on Opioid Use in Pregnancy, Neonatal Abstinence Syndrome, and Childhood Outcomes. Other examples include the Antiretroviral Pregnancy Registry, a collaborative effort of NIH, CDC, FDA, and Health Resources and Services Administration (HRSA), and the Zika Experimental Science Team (ZEST) data portal, an electronic collaboration tool for Zika researchers supported by NIH, FDA, and HRSA.

Appendix: NIH Institutes and Centers Supporting Pregnancy- and Lactation-Related Research Grants and Projects

Acronym	Organization	Pregnancy	Lactation
FIC	Fogarty International Center	X	X
NCATS	National Center for Advancing Translational Sciences	X	
NCCIH	National Center for Complementary and Integrative Health	X	X
NCI	National Cancer Institute	X	X
NEI	National Eye Institute	X	X
NHLBI	National Heart, Lung, and Blood Institute	X	X
NHGRI	National Human Genome Research Institute	X	X
NIA	National Institute on Aging		X
NIAAA	National Institute on Alcohol Abuse and Alcoholism	X	X
NIAID	National Institute of Allergy and Infectious Diseases	X	X
NIAMS	National Institute of Arthritis and Musculoskeletal and Skin Diseases	X	X
NIBIB	National Institute of Biomedical Imaging and Bioengineering	X	
NICHD	<i>Eunice Kennedy Shriver</i> National Institute of Child Health and Human Development	X	X
NIDA	National Institute on Drug Abuse	X	X
NIDCD	National Institute on Deafness and Other Communication Disorders		
NIDCR	National Institute of Dental and Craniofacial Research	X	X
NIDDK	National Institute of Diabetes and Digestive and Kidney Diseases	X	X
NIEHS	National Institute of Environmental Health Sciences	X	X
NIGMS	National Institute of General Medical Sciences	X	X
NIMH	National Institute of Mental Health	X	X
NIMHD	National Institute on Minority Health and Health Disparities	X	X
NINDS	National Institute of Neurological Disorders and Stroke	X	
NINR	National Institute of Nursing Research	X	X
NLM	National Library of Medicine		
OD	Office of the Director, National Institutes of Health	X	X

Agency Activities: National Vaccine Program Office, Office of the Assistant Secretary for Health, HHS

Research

The National Vaccine Program Office (NVPO) provides strategic leadership to further the five goals of the [National Vaccine Plan \(NVP\)](#) and ensure collaborative, coordinated immunization activities are carried out in an efficient, consistent and timely manner. To meet the statutory goals outlined for the National Vaccine Program, administered by the Assistant Secretary for Health, NVPO works with both federal and non-federal stakeholders to develop and implement strategies to prevent human infectious diseases through immunization, prevent adverse events following vaccination, and overcome barriers in the planning of immunization activities. NVPO also supports the National Vaccine Advisory Committee and the Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria. (<https://www.hhs.gov/nvpo/about/index.html>).

The first two objectives of the National Vaccine Plan – (1) to develop new and improved vaccines; and (2) to enhance the vaccine safety system – depend crucially on research. NVPO supports research projects specifically related to immunization of women during pregnancy. Key examples include:

- Clinical study of Tetanus Toxoid, Reduced Diphtheria Toxoid, and Acellular pertussis vaccine (Tdap) Safety in Pregnant Women: This is an observational study of both pregnant and non-pregnant women. Detailed data will be collected from study participants on prior Tdap/Td/TT receipt. With Day 0 serving as the day of vaccination, participants will be followed through Day 7 for reaction symptoms, and data will be analyzed to see if there is a difference in reaction symptoms between pregnant and non-pregnant women. Pregnant women will be followed through delivery for collection of pregnancy outcome data. In addition, follow-up will be conducted for infants born to mothers who received Tdap during pregnancy to assess health outcomes and growth through 6 months of life.
- Clinical Study of the Safety of Simultaneous Administration of Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis Vaccine (Tdap) and Inactivated Influenza Vaccine in Pregnant Women: This is a pilot, prospective, randomized, open-label clinical trial. During the study, pregnant women will be randomized (1:1) to receive co-administration of a single dose of influenza vaccine and a single dose of Tdap, or sequential administration of the vaccines – first influenza, followed by Tdap ~ 21 days later. Researchers will analyze whether reaction symptoms, antibody levels, and adverse maternal and infant outcomes vary across the study groups.
- NVPO is also currently supporting a research study in collaboration with BARDA and FDA to analyze possible associations between infections, vaccinations, and medications during pregnancy with possible birth defects outcomes. Tdap, HPV, and influenza vaccines are the vaccines being researched. NVPO is also trying to identify possible causal associations with crucial birth outcomes such as microcephaly (other than Zika virus).

NVPO also supports efforts to improve research methods and infrastructure to benefit the field of maternal immunization research. For example:

- NVPO funded the creation of a maternal-neonatal vaccine safety database and analysis of outcomes using the database. The first analysis compares the likelihood of fever in babies born to vaccinated versus unvaccinated mothers after receiving their first pertussis vaccination. The second analysis compares alternative benefits to influenza vaccination during pregnancy.

(<https://www.hhs.gov/nvpo/national-vaccine-plan/funding-opportunity-vaccine-safety-research/index.html>)

- NVPO has supported the development of a study to improve the algorithms used to identify miscarriages and stillbirths in post-licensure immunization safety surveillance databases (www.cdc.gov/vaccinesafety).
- NVPO is currently supporting research to validate vaccine safety definitions in studies that include pregnant women and newborns (www.hhs.gov/nvpo/featured-priorities-vaccine-safety/index.htm; <https://www.hhs.gov/nvpo/national-vaccine-plan/funding-opportunity-vaccine-safety-research/index.html>).

Clinical Practice Information and Recommendations

NVPO is responsible for staffing the National Vaccine Advisory Committee. The Committee serves an advisory role, providing peer review, consultation, advice, and recommendations to the Assistant Secretary for Health in his capacity as the Director of the National Vaccine Program, on matters related to the Program's responsibilities. Specifically, the Committee studies and recommends ways to encourage the availability of an adequate supply of safe and effective vaccination products in the United States; recommends research priorities and other measures to enhance the safety and efficacy of vaccines; advises the Assistant Secretary for Health in the implementation of Sections 2102 and 2103 of the PHS Act; and identifies annually the most important areas of government and non-government cooperation that should be considered in implementing Sections 2102 and 2103 of the PHS Act.

In 2014 and 2016, the Committee issued two reports with recommendations regarding maternal immunizations. These reports addressed the charge issued by the Assistant Secretary for Health to i) review the current state of maternal immunization and existing best practices, and identify programmatic barriers to the implementation of current recommendations related to maternal immunization and make recommendations to overcome these barriers; and ii) identify barriers to and opportunities for developing vaccines for pregnant women and make recommendations to overcome these barriers

(https://www.hhs.gov/sites/default/files/nvpo/nvac/reports/nvac_reducing_patient_barriers_maternal_immunizations.pdf ; <http://journals.sagepub.com/doi/full/10.1177/0033354917698118>).

Communications

NVPO administers the www.vaccines.gov website, which provides extensive information about vaccines generally. The website includes specific materials about vaccinations administered during pregnancy (www.vaccines.gov/who_and_when/pregnant/index.htm). NVPO also held a webinar in 2016 about vaccine safety in pregnancy; and supports social media efforts to connect NVPO with stakeholders and the public.

Other Collaborative Efforts

NVPO works in close collaboration with CDC and FDA on vaccine safety related issues in general. NVPO also supports the Immunization Safety Task Force, an interagency effort involving CDC, NIH, DoD, IHS, VA, FDA, and DoD (<https://www.hhs.gov/nvpo/featured-priorities/vaccine-safety/index.html>). The NVPO has contracted with the National Committee for Quality Assurance to incorporate maternal immunization composite measures (including Tdap and influenza) into the Healthcare Effectiveness Data and Information Set (HEDIS).

NVPO is also partnering with Kaiser Permanente to create a new health outcomes database. NVPO wants to improve ways to survey vaccinations during pregnancy through insurance claims and medical health records.

Agency Activities: Office of the Assistant Secretary for Health (OASH)

Research

OASH sponsors research related to therapies for pregnant and lactating women mostly through the National Vaccine Office Program (see separate document).

Clinical Practice Information and Recommendations

OASH's Office of Disease Prevention and Health Promotion supports guidelines on diet and physical activity for all Americans. This includes specific information related to physical activity for women during pregnancy (<https://health.gov/paguidelines/guidelines/chapter7.aspx>). The dietary guidelines also will incorporate comprehensive guidance for women during pregnancy, starting with the next edition ([https:// www.DietaryGuidelines.gov](https://www.DietaryGuidelines.gov)). Information about children from birth to 24 months will also be included in future editions of the Dietary Guidelines for Americans.

OASH's Regional Offices have incorporated USPSTF recommendations into provider training and resources, in collaboration with AHRQ. For example, the Healthier Pregnancy provider training initiative informs providers about successful efforts to implement USPSTF recommendations.

OASH's Region 5 held an education and training event in August 2016 to engage health and social services professionals who serve pregnant women and young mothers, to help promote breastfeeding. In the same region, the Trauma-Informed Care: Understanding and Responding to the Health Effects of Adverse Experiences Through the Lifespan program trains providers about the impact of traumatic exposure on pregnancy health and breastfeeding. OASH's Region 7 supports a regional breastfeeding outreach effort. The Successes in Adolescent Health program provides tools and techniques to support pregnant and parenting young people with breastfeeding.

Research Policies and Regulation

The Office for Human Research Protections oversees regulations for the protection of human research subjects, including rules that specifically address research involving pregnant women (<https://www.hhs.gov/ohrp/>).

Communications

The Office of Women's Health (OWH) includes a wide array of pregnancy-related information on its website, <https://www.womenshealth.gov/pregnancy>. Examples of specific items include:

- Information on medications in pregnancy: <https://www.womenshealth.gov/a-z-topics/pregnancy-and-medicines>;
- Resources on Zika and pregnancy, updated for the summer of 2017: <https://www.hhs.gov/blog/2017/05/15/zika-and-pregnancy-protecting-babies-protecting-yourself.html>
- Information on tobacco and pregnancy: <https://betobaccofree.hhs.gov/gallery/pregnant.html>
- Supporting nursing moms at work: <https://www.womenshealth.gov/breastfeeding/employer-solutions/?from=breastfeeding>
- Other information about breastfeeding and lactation: <https://www.womenshealth.gov/printables-and->

[shareables/resource/guides?from=breastfeeding](#) ;
<https://www.womenshealth.gov/itsonlynatural/?from=breastfeeding>

OWH also supports a National Breastfeeding Helpline at 1-800-994-9662, which provides telephone access to trained breastfeeding peer counselors, in English and Spanish.

The Office of Minority Health supports the "A Healthy Baby Begins with You" campaign to inform women about preconception and pregnancy care.

(<https://www.minorityhealth.hhs.gov/omh/content.aspx?ID=6953&lvl=3&lvlID=8>)

Other Collaborative Efforts

OWH supported a conference and subsequent publication on opioid use which incorporates information on use by pregnant women: <https://www.womenshealth.gov/files/documents/final-report-opioid-508.pdf>. OWH also supports the United States Breastfeeding Committee, an independent nonprofit collaboration of over 50 organizations that support breastfeeding initiatives across the United States.