

The Natality Program of the Division of Vital Statistics

**National Center for Health Statistics
Centers for Disease Control and Prevention**

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Board of Scientific Counselors
National Center for Health Statistics**

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1. Overview of Natality Component of the National Vital Statistics System

Mission

The mission of the Natality Component of the National Vital Statistics System (NVSS) is the production and dissemination of high quality national natality statistics, including the basic natality data, the linked birth/infant death data, fetal death data, and the matched multiple birth data set.

Functions

The registration of deaths in the U.S. is not a Federal function, but resides with 57 independent vital registration areas (50 States, District of Columbia, New York City, Puerto Rico, U.S. Virgin Islands, Guam, American Samoa and the Commonwealth of the Northern Marianas). The production and dissemination of national natality and fetal death data and statistics are accomplished through the Vital Statistics Cooperative Program (VSCP). The VSCP is a data sharing partnership between the Federal government and the 57 registration areas. The Division of Vital Statistics of the Centers for Disease Control and Prevention's National Center for Health Statistics administers the VSCP and the NVSS. The major functions of the Division of Vital Statistics with regard to the natality and fetal death components of the NVSS are:

1. Production and dissemination of national natality and fetal death datasets
One of the most important functions of the NVSS is the compilation of individual-record national natality and fetal death data sets suitable for the computation and analysis of natality and fetal death statistics across a broad range of variables. The natality component of the NVSS provides birth and fetal death records that are compiled into four major data sets: 1) the national natality data set; 2) the national fetal death data set; (3) the national linked birth/infant death data set; and (4) the national matched multiple birth data set (see section 4 for more detail on the content of the data files).

2. Publication of national natality, fetal death, and linked birth/infant death statistics
National natality, fetal death, and linked birth/infant death statistics published by the Division of Vital Statistics are the official natality, fetal death, and linked birth/infant death statistics for the U.S. These statistics are published on the Internet (<http://www.cdc.gov/nchs>) and in the series *National Vital Statistics Reports* (NVSR). NVSR reports include (see section 4 for itemized listing of the most recent reports):
 - a. Monthly provisional natality statistics – presents provisional monthly, year-to-date, and 12-months ending counts of registered births. Published monthly.
 - b. Preliminary natality statistics – presents preliminary natality statistics based on a large proportion (95-99 percent) of the births occurring during the year. Published annually approximately 6-10 months after the end of the data year.
 - c. Final natality statistics – presents final natality statistics and accompanies the release of the national natality data set. Published annually approximately 12-18 months after the end of the data year.
 - d. Infant mortality statistics (from the linked birth-infant death data) – presents final infant mortality statistics based on information from the death certificate for each

infant who died under 1 year of age that is linked to the infant's birth certificate, and accompanies the release of the linked birth/infant death and perinatal mortality (including births, infant deaths, and fetal deaths) data sets. Published annually approximately 20-24 months after the end of the data year.

- e. Final fetal death statistics – presents final fetal death statistics. Data are published with the perinatal mortality data set and are accompanied by documentation tables and a Technical Appendix.
 - f. Matched multiple birth data set – developed to allow for analysis of characteristics of sets of births and fetal deaths in multiple deliveries. The data set currently includes 6 combined years of data for sets of twins, triplets, and quadruplets.
 - g. Reports on special topics – these include, for example, reports on young teen births, cesarean delivery, nonmarital births, sex ratio, mean age of mother, smoking during pregnancy, characteristics of births by state, Hispanic origin births, multiple births, and analytic reports on perinatal mortality. These reports are published after the release of final natality and linked birth/infant death statistics.
3. Dissemination of national standards
- Another important function is the dissemination of national standards for the collection, coding and processing of natality and fetal death data. This includes facilitating the development of a standard birth certificate and fetal death report (see http://www.cdc.gov/nchs/data/series/sr_04/sr04_028.pdf regarding the 1989 revision and http://www.cdc.gov/nchs/vital_certs_rev.htm regarding the 2003 revision), and the development of standard specifications for the collection and editing of natality and fetal death data. A unique feature of the 2003 revisions is the recommendation that data be collected through the use of standardized worksheets, one for the mother (mainly for the demographic information that she knows best) and the other for the birth facility (for the medical and health information related to the pregnancy and delivery). The worksheets for the birth certificate and fetal death report are available on the Internet at: http://www.cdc.gov/nchs/data/dvs/momswkstf_improv.pdf for the mother in English; <http://www.cdc.gov/nchs/data/dvs/MomsWorksheetSpanishBirth1.pdf> for the mother in Spanish; and for the facility at <http://www.cdc.gov/nchs/data/dvs/facwksBF04.pdf> . In addition, the natality staff designed and oversaw the preparation of a *Guide to Completing the Facility Worksheets for the Certificate of Live Birth and Report of Fetal Death*, available on the Internet at: <http://www.cdc.gov/nchs/data/dvs/GuidetoCompleteFacilityWks.pdf> Natality staff also oversaw the development of detailed specifications for coding and editing the items on the birth certificate and fetal death report, available on the Internet at: <http://www.cdc.gov/nchs/data/dvs/Guidelinesbirthspecs1101acc.pdf> ; <http://www.cdc.gov/nchs/data/dvs/FinalBirthSpecs3-24-2005.pdf>; and <http://www.cdc.gov/nchs/data/dvs/FinalFetalDeathSpecs2-22-05.pdf>

4. Training

In addition to the above instructional materials available on the Internet, the Division of Vital Statistics' training include courses on vital statistics measurement and

analysis, especially focusing on the analytic challenges presented in the transition from the 1989 to 2003 revisions of the U.S. Standard Certificates and Reports, coding of cause of death including cause of death for infants, and vital registration. These courses are offered to both domestic and international students.

5. Research

Birth and infant health team members in the Division of Vital Statistics also conduct fertility- and perinatal research. For example, research has been or is being pursued in the areas of data quality, methodology, racial and ethnic population classification, measurement of gestational age, development and maintenance of national matched multiple birth data set, completeness and quality of data on infant and fetal death reporting, comparison of birth outcomes for single and multiple-race mothers, comparability of information from the 1989 and 2003 revisions of the U.S. Standard Certificate of Live Birth and Report of Fetal Death, racial and ethnic disparities, redesign and revision of cohort fertility measures, factors affecting cesarean delivery patterns, and sudden infant death syndrome (SIDS) reporting and trends. Current research projects and recent journal articles, special reports and presentations are listed below in sections 6 and 7. In addition, staff members routinely serve as peer reviewers for professional journals.

Another important activity for natality staff is the extensive technical and data assistance provided for other components of NCHS, CDC, HHS, other Federal agencies, and the general public. For example, staff members provide guidance on the use of natality public use and special files, participate in research conferences (e.g., NIH conference of stillbirths, NIH State-of-the Science Conference on cesarean delivery), research initiatives such as CDC's State Infant Mortality Collaborative, monitor Healthy People 2010 progress, and many other similar activities.

Major Users of US Natality, Fetal Mortality, and Infant Mortality Data

Federal Agencies:

Centers for Disease Control and Prevention (CDC)
 National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP)
 Division of Reproductive Health
 National Center for HIV, STD and TB Prevention (NCHSTP)
 National Center for Birth Defects and Developmental Disabilities
 National Center for Environmental Health (NCEH)
 Epidemiology Program Office (EPO)
HHS Office of the Surgeon General
HHS Assistant Secretary for Planning and Evaluation (ASPE)
Government Accountability Office (GAO)
US Census Bureau
US Department of Homeland Security
Statistics Canada
Social Security Administration (SSA)
Food and Drug Administration (FDA)
Indian Health Service (IHS)
Maternal and Child Health Bureau, HRSA
National Institutes of Health (NIH)
 National Institute of Child Health and Human Development
 National Institute on Drug Abuse (NIDA)
 National Library of Medicine (NLM)
 Office of Research on Women's Health
 Office of Medical Applications of Research
 National Institute of Nursing Research
Agency for Healthcare Research and Quality (AHRQ)
Substance Abuse and Mental Health Services Administration (SAMHSA)
United Nations

Advocacy Groups, Foundations, Professional Organizations, Think Tanks, Other Organizations:

United Nations
World Health Organization (WHO)
Pan American Health Organization (PAHO)
Brookings Institution
The Urban Institute
March of Dimes
American College of Obstetricians and Gynecologists
American College of Nurse-Midwives
National Campaign to Prevent Teen Pregnancy
Child Trends
Annie E. Casey Foundation (*Kids Count* reports)
Population Reference Bureau
SIDS Alliance
Child Health USA

National Partnership to Help Pregnant Smokers Quit
National Organization of Fetal Alcohol Syndrome
International Cesarean Section Awareness Network
Planned Parenthood
Negative Population Growth
Maternal and Child Health Policy Research Center
Association of Maternal and Child Health Programs
Marvelous Multiples
National Bureau of Economic Research (NBER)
Max Planck Institute for Demographic Research
State and Local Departments of Health
Various Marketing, Investment, Insurance, Pharmaceutical, Healthcare and Law Firms
Independent researchers at various Colleges and Universities

2. Budget and Organizational Structure

Budget

Fiscal Year 2006 Project Funding Approved

Division of Vital Statistics (*note: these numbers represent the total DVS budget; not just the natality, fetal mortality, and infant mortality components*)

Project Category	Funding Approved
On-going contractual support/maintenance of vital statistics operations	\$ 1,977,515.00
State vital statistics funding (incl. VSCP)	\$ 16,029,613.00
Operating Budget (incl. travel, equipment, other services, etc.)	\$ 240,227.00
DVS TOTAL for vital statistics	\$ 18,247,355.00

NOTE: Funding for National Survey of Family Growth (\$800,000), the NAPHSIS Cooperative Agreement (\$171,500), and federal staff salaries are not included in above total.

Organizational Structure

The production of national natality, fetal mortality, and linked birth/infant death data and statistics involves substantive contributions from each of the branches of the Division of Vital Statistics (DVS): the Reproductive Statistics Branch (RSB), the Data Acquisition and Evaluation Branch (DAEB), the Systems Programming and Statistical Resources Branch (SPSRB); and the Mortality Medical Classification Branch (MMCB) and the Mortality Statistics Branch (MSB) (for the linked birth/infant death data set and statistics and cause of fetal death information). In addition, the Registration Methods staff (RMS) (part of the DVS Office of the Director) contributes by coordinating the development of materials and training in the area of registration standards. The functions and staff of each of the branches and the RMS are described in the following pages.

Reproductive Statistics Branch

Stephanie J. Ventura, MA, Chief

The Reproductive Statistics Branch (RSB) (1) assesses data needs in the fields of reproduction, maternal and infant health, family formation, growth, and dissolution; (2) plans and implements a statistical program to obtain, evaluate, analyze, and disseminate data to meet these needs; (3) plans and conducts data collections, including but not limited to vital records, record linkage, and sample survey methodologies; (4) analyzes data and prepares tabular and analytical reports; (5) collaborates with other agencies and organization in the design, implementation, and analysis of vital records and survey data; (6) evaluates data quality and reliability; (7) designs and conducts methodological research to improve statistics on reproduction, maternal and infant health, family formation, growth and dissolution; (8) develops or evaluates specifications for data collection, quality control, coding, editing, imputation, sample design, weighting, record linkage, tabulation, and electronic media documentation; (9) plans and disseminates a program for disseminating data in electronic and printed media; (10) recommends content of U.S. Standard Certificates and Reports; (11) provides consultation and assistance to data users such as vital registration personnel, researchers, Congress, and other government agencies; and (12) develops and implements education and training activities related to the collection, production, use, and interpretation of data. RSB staff members take the lead in the production and analysis of the main natality data set, the fetal death data set, and the linked birth/infant death data set. RSB staff members also are responsible for the creation of the perinatal mortality data set and the matched multiple birth data set.

The perinatal mortality data set includes live births, fetal deaths, and infant deaths; the linked birth/infant death data set links information from the death certificate for each infant who died under 1 year of age to the infant's birth certificate. The matched multiple birth file includes matched sets of twins, triplets, and quadruplets in live births and fetal deaths; live birth records are linked to the corresponding infant death records for babies who died. Because of concerns for confidentiality with respect to small numbers for multiple births, some data fields are suppressed; no geographic identifiers are shown.

The RSB program includes the National Survey of Family Growth (NSFG), the Nation's leading source of reliable national data on topics related to birth and pregnancy rates; contraception and fertility; marriage, divorce, and cohabitation; sexual activity; and HIV risk factors. The materials and information in this review package are focused on the natality file, the fetal death file, the linked birth/infant death data file, and the matched multiple birth data file. The National Survey of Family Growth will be reviewed separately.

Stephanie Ventura manages the Reproductive Statistics Branch as the Branch Chief, and has held that position since 2000. Ms. Ventura has a MA degree in Economic History from the University of Pennsylvania and a BA degree (*cum laude*) from Brandeis University. She received a Population Council fellowship to study at Penn and joined NCHS in the Junior Professional Training Program. Prior to becoming the branch chief, Mrs. Ventura published extensively on a number of fertility-related topics, especially births to unmarried mothers, teenage pregnancy,

delayed childbearing and childbearing by Hispanic women. She has also authored many reports on teenage births, including detailed analyses of national and state-specific patterns. She has been extensively involved in implementation activities for NCHS for the 2003 revisions of the U.S. Standard Certificate of Live Birth and the U.S. Standard Report of Fetal Death.

Following is a listing of staff involved in the natality program's activities, including a brief synopsis of their educational and career backgrounds as well as their substantive research interests and responsibilities within the natality program.

Joyce Martin, MPH. - Lead Statistician, Birth and Infant Health team

Ms. Martin has a BA from American University's School of International Service where she studied International Relations, concentrating in Middle Eastern politics. After two adventurous years in North Yemen with the U.S. Peace Corps, she joined the U.S. Department of Labor as an investigator for compliance with federal labor laws. Upon completing her M.P.H at Boston University's School of Public Health (epidemiology and biostatistics), Ms. Martin joined NCHS/CDC's Division of Vital Statistics, Natality, Marriage and Divorce Branch in 1991.

Ms. Martin's current duties are to lead the birth team in planning, developing, and analyzing the birth, fetal death, and linked birth/infant death files. With the Branch Chief, she delegates and reviews the work of the 7 team members. She is first author of the annual final reports of birth data ("Births: Final Data") and co-author of the annual preliminary reports of birth data ("Births: Preliminary Data"). She is lead developer of the Matched Multiple Birth Files which links sets of births, fetal deaths, and corresponding infant deaths in multiple deliveries. Ms. Martin is also lead developer of revision-related materials such as the "Edit Specifications for the Revised Certificate of Live Birth and Fetal Death" the "Guidebook for Completing the Facility Worksheet for the Certificate of Live Birth and Report of Fetal Death," and the test deck for states to use in assessing data quality. She was the birth representative for the NCHS/NAPHSIS/SSA collaboration to develop the Model Vital Events Registration Systems. On behalf of NCHS, she developed and co-organized a recent workshop on the measurement of gestational age that included national and international experts in the field. She provides consultation, expertise and guidance on all aspects of vital statistics perinatal data, specializing in health topics and issues surrounding the 2003 Revision of The Standard Certificate of Live Birth and Report of Fetal Death. Her primary research interests are in outcome measures such as birthweight, gestational age, and multiple births, and in improving the quality of vital statistics data.

Marian MacDorman, Ph.D. – Social Scientist

Dr. MacDorman has been a statistician and senior social scientist in the Division of Vital Statistics for the past 18 years. She received her Ph.D. in Demography from the Australian National University in 1987, and a MA in Population Geography from the University of Hawaii, Manoa in 1981. She was a recipient of a full fellowship from the East-West Population Institute, Honolulu, Hawaii, and received a Certificate of Population Studies from the East-West Population Institute and the University of Hawaii in 1980. Her areas of expertise include infant and perinatal mortality analysis, and cause-of-death analysis (with an emphasis on SIDS research).

During her tenure at NCHS she has been the manager of the fetal death file, and the linked birth-infant death file, and is currently NCHS project officer for the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B). She has over 60 professional publications and 50 presentations at professional meetings. She has served on numerous professional and governmental committees and working groups, and is currently co-chair of the SIDS and Infant Mortality Committee for the American Public Health Association (MCH section). Most recently, Dr. MacDorman has been the lead analyst in investigating the unexpected rise in infant mortality during 2001-2002, and she is the lead analyst for a new report on perinatal mortality that is in preparation.

Brady E. Hamilton, Ph.D. – Statistician (Demography)

Dr. Hamilton received his Ph.D. in Sociology from Purdue University. He was a Postdoctoral Research Fellow in Rational Choice theory at the University of Chicago, from 1992 to 1993, working with James S. Coleman. Dr. Hamilton was visiting Assistant Professor in the Department of Sociology at the University of Utah, 1997 to 2000, and previously was a Lecturer in the Department of Sociology at Ohio State University, from 1995 to 1997.

He joined the staff of the Reproductive Statistics Branch in 2000. During his tenure at NCHS, Dr. Hamilton has been the lead technical expert for population estimates issues as they impact measures of fertility. He provides consultation, expertise, and guidance in the areas of fertility and multiple-race reporting, as well as in data quality. He is also an expert on small area data issues, including data disclosure guidelines, and has served as technical advisor for the development and updating of “The Interactive Atlas of Reproductive Health,” a CDC web-based interactive geographic information system (GIS) dedicated to reproductive health issues such as infant mortality, fertility, and low birth weight. Dr. Hamilton has also overseen the development of cohort fertility measures for black women, an effort that will result soon in the availability of a forty-year series of data on CD-ROM. His research interests include tracking trends in the sex ratio at birth, rates of reproduction, and monitoring population-based fertility rates by race and Hispanic origin. He is lead author for the annual preliminary birth report.

TJ Mathews, M.S. - Statistician (Demography)

Mr. Mathews’ primary responsibility is to coordinate the twelve annual linked birth/infant death data files (six each for the Period and Cohort linked files). This includes detailed review of annual analysis tables, documentation tables, final report tables, and in the case of the Cohort file additional file review. He is lead author of the annual linked birth/infant death data final report, participated on the team which analyzed the 2001/2002 increase in the infant mortality rate, and will be co-authoring a report on disparities in infant mortality due to birth defects. In his 14 years at NCHS he has authored dozens of papers on topics including smoking during pregnancy, neural tube defects, and sex ratio at birth. He has also analyzed racial and ethnic disparities and co-authored several reports on state-specific variations in characteristics of births, Hispanic subgroups, and teenage birth rates.

He received his master’s degree in demography at The Center for Demography and Population Health at Florida State University. He has traveled on five continents and lived in Botswana for 2.5 years as a Peace Corps volunteer teaching mathematics.

Paul D. Sutton, Ph.D. – Statistician (Demography)

Dr. Sutton earned his Ph.D. in Geography from Texas State University. He also has a Master of Applied Geography and his undergraduate degree was in geography with a focus on population. He joined the staff of the Reproductive Statistics Branch in 2001. During his tenure at NCHS, he has been extensively involved in data quality issues, reviewing and evaluating data, with special focus on the impact of the transition to the 2003 revision of the birth certificate. He has assisted with the development of the revised annual birth file. He provides consultation and expertise in geographic coding of vital events; prepares monthly provisional reports of births, marriages, divorces, and deaths; and is leading the Division of Vital Statistics' effort to select and implement tools for disseminating vital statistics online. He is a co-author of the annual preliminary and final birth reports. Dr. Sutton's research interests include evaluation of geographic data quality, and spatial analysis of characteristics of parents and infant, including contextual studies linking other sources of social, economic, and environmental data to that available from the birth file. He has co-authored two large reports focusing on geographic patterns in characteristics of births and birth rates, and fertility among Hispanic subgroup populations.

Fay Menacker, Dr.P.H. – Statistician (Demography)

Dr. Menacker holds an M.P.H. and Dr. P.H. from the Johns Hopkins Bloomberg School of Public Health. She is a board-certified pediatric nurse practitioner (C.P.N.P.). Prior to joining NCHS in 2000, Dr. Menacker was research coordinator for a medication errors reporting program. Previously, as a senior study director for a private research firm, she coordinated and supervised data collection for large national surveys, including a survey of the prevalence of drug use during pregnancy.

She is a co-author of the annual reports on preliminary and final birth data, and works on data quality issues, especially as they relate to cesarean delivery and related health topics. She is coordinating the DVS perinatal team which is developing analytic reports on perinatal mortality. She is recognized as a national expert on the trends and epidemiology of cesarean delivery, and recently gave the opening statistical data presentation at the National Institutes of Health (NIH) State-of-the-Science Conference on "Cesarean Delivery by Maternal Request." Her principal research interests include trends and outcomes related to method of delivery, use of obstetric procedures, and births to very young teenagers, and she has co-authored NCHS reports and journal articles on these topics. She represents NCHS on the Planning Committee for the annual CDC Maternal Child Health Epidemiology Conference (MCH EPI), is a member of the editorial board of the journal *Birth*, and a member of the Research Advisory Panel of the Midwives Alliance of North America (MANA).

Martha L. Munson, M.S. – Statistician (Demography)

Ms. Munson received an M.S. in Sociology/Demography from the University of Wisconsin at Madison and a B.A. *cum laude* in Sociology from Cornell. She also completed course work toward a Ph.D. as well as coursework in Applied Statistics at Wisconsin.

Ms. Munson joined the Reproductive Statistics Branch in February 2002. She holds primary responsibility for the preparation of edits and tables for the fetal mortality file, including production of file documentation and the Technical Appendix for publication. She is also a

member of the recently-established perinatal team that will soon inaugurate a new annual report series on perinatal mortality. She is involved in data quality issues for the natality file as well, including review of edit, analysis, and work tables and documentation. Ms. Munson prepares the monthly provisional reports of births, marriages, divorces, and deaths, and is responsible for all aspects, including processing, editing, tabulating, and preparing for Internet publication. Her research interests are the sociodemographic determinants of fertility and fetal loss (both spontaneous and induced) as factors in that process, working on both survey data (National Survey of Family Growth) and vital statistics registration data.

Sharon Kirmeyer, Ph.D. – Statistician (Demography)

Dr. Kirmeyer received her BA in Sociology at the University of California at Davis, studied applied mathematics at California Polytechnic University, and received both her MA and PhD from Brown University, concentrating on Mathematical Demography and Medical Sociology. Prior to joining the Reproductive Statistics Branch in 2004, she worked for the Population Council, the US Census Bureau, the United Nations and two contract research firms. For over 30 years Dr. Kirmeyer analyzed reproductive health data in a variety of settings in Latin America, Africa, Eastern Europe and the US, gaining expertise in registration, surveillance and survey data. Her work in 53 countries assists in addressing the variation of reproductive health behaviors in the U.S., and in doing literature searches in a dozen languages.

She collaborates with other RSB members in the total development of the 2004 Final Birth Report, including data quality review, emphasizing interests in weight gain in pregnancy and medical risks and events occurring to mothers and newborns. She continues to work on issues related to gestational age data. Her interests include the relationship between anthropometric measures and reproductive outcomes, and developing methods to enhance comprehension of changing reproductive outcomes.

Yashodhara Patel, B. Comm – Statistical Assistant

Ms. Patel holds a Bachelor of Commerce degree in Accountancy, and a Diploma in Secretarial Practice. She provides extensive statistical support such as data compilation, computation, verification, and text review for the Reproductive Statistics Branch (RSB). She also assists in producing several critical statistical reports such as the preliminary and final birth reports, the annual linked birth/infant death report, and special reports and tabulations from the matched multiple birth file for the natality program, as well as *Advance Datas* and *Vital and Health Statistics* series reports for the National Survey of Family Growth program in RSB. She assists in designing table shells, formatting and programming tables, and creating Excel tables from data sets for data requests as well as for NCHS reports. Ms. Patel also assists statisticians in locating information to respond data requests. She has organized and maintains the voluminous reference files of the branch in the RSB reference library. Ms. Patel's responsibilities also include administrative work such as managing time and attendance and making travel arrangements.

Data Acquisition and Evaluation Branch

Rajesh Virkar, Chief

The Data Acquisition and Evaluation Branch (1) serves as the NCHS focal point for communication between states and NCHS regarding data acquisition, quality control and procurement for both mortality and birth data; (2) promotes state participation in the Vital Statistics Cooperative Program; (3) contributes to the specifications for coding, editing and management of vital statistics data by states and NCHS; (4) develops and administers the funding formulas and contracts used to obtain data for the VSCP program from states and other organizations; (5) assures that data files are delivered and completed on schedule using state, federal (NCHS – Research Triangle Park, NC), and contract resources to meet the needs of preliminary as well as final data files; (6) develops and operates a comprehensive quality assurance program to monitor the quality of data prepared by states and NCHS, and assures that national data are accurate, complete and consistent with specifications; (7) develops, installs, and maintains computer software and procedures needed to collect and process data once received by NCHS; (8) coordinates, through the state project directors, a comprehensive program of technical assistance to states including data files, training, processing and coding of data; and (9) designs and provides consultation on methodological and evaluation studies.

This section presents a list of those staff members whose tasks directly or indirectly contribute to the mission of the Reproductive Statistics Branch.

Vital Statistics Specialists - For assigned states, the Vital Statistics Specialists are responsible for acquiring timely data files, processing data files, reviewing state procedures and documentation, and serving as Vital Statistics Cooperative Program (VSCP) contract project officers.

Chrissy Jarman – Team Leader

Assigned Jurisdictions: Connecticut, Florida, Maryland, Pennsylvania, South Carolina

Connie Gentry

Assigned Jurisdictions: American Samoa, Arizona, Kentucky, Michigan, Missouri, Nebraska, New Hampshire, New Mexico, Ohio, Oklahoma, Texas, Vermont, Wyoming

Pam Stephenson

Assigned Jurisdictions: Alabama, Alaska, Arkansas, Delaware, District of Columbia, Hawaii, Idaho, Indiana, Maine, Mississippi, New York State, Virgin Islands, Virginia

Millie Johnson

Assigned Jurisdictions: Colorado, Guam, Illinois, Iowa, Kansas, Massachusetts, Minnesota, Montana, North Carolina, North Dakota, Oregon, South Dakota, Utah

Susan McBroom

Assigned Jurisdictions: California, Georgia, Louisiana, Nevada, New Jersey, New York City, Commonwealth of the Northern Marianas, Puerto Rico, Rhode Island, Tennessee, Washington, West Virginia, Wisconsin

Statisticians - For assigned states, the Statisticians are responsible for assuring data are of the highest quality possible for release to subject matter branches in Hyattsville, MD, routinely reviewing trend analysis tables and reports, producing/reviewing ad hoc tables (using Beyond 20/20) as needed to analyze data using multiple dimensions, reviewing quality of monthly counts, communicating problems and anomalies to states.

David Justice

Assigned Jurisdictions: California, Florida, Georgia, Maryland, Montana, New York City, Texas

Jenny Justice – Team Leader

Assigned Jurisdictions: American Samoa, Arizona, Delaware, Guam, Maine, Massachusetts, New Hampshire, Commonwealth of the Northern Marianas, Ohio, Oklahoma, Virgin Islands

Adrienne Rouse

Assigned Jurisdictions: Colorado, District of Columbia, Hawaii, Idaho, Kansas, Missouri, Oregon, South Dakota, Utah, Vermont, Washington, Wisconsin

Brenda Green

Assigned Jurisdictions: Arkansas, Illinois, Iowa, Kentucky, Michigan, Minnesota, Mississippi, Nebraska, North Dakota, Puerto Rico, West Virginia, Wyoming

Chuck Sirc

Assigned Jurisdictions: Alabama, Alaska, Indiana, Louisiana, Nevada, New Mexico, Rhode Island, Virginia

Kryn Krautheim

Assigned Jurisdictions: Connecticut, New York State, New Jersey, North Carolina, Pennsylvania, South Carolina, Tennessee

Statistical Assistants (Jenny Justice – Team Leader)

Faye Cavalchire – mortality unit record quality control (coding and adjudication), coding of non-VSCP births and fetal deaths, prepares weekly graphs on status of data receipts

Receipt and Control (Chrissy Jarman – Team Leader)

Brenda Tuttle – responsible for receipt and control of all microfilm, hard copies, CD ROMs, etc. used by staff for coding and quality control, works as a backup for Secure Data Network (SDN) activities

Kathy Holiday – manages SDN file transfers, acquires monthly counts from all the jurisdictions, works as a backup for receipt and control activities

VSCP Contracts (Chrissy Jarman – Team Leader)

Denise Little – responsible for processing all VSCP vouchers as well as other administrative duties for the branch such as preparing travel, maintaining supplies, etc.

Systems, Programming and Statistical Resources Branch

Nicholas Pace, Chief

Branch Mission and Responsibilities:

(1) Conducts research into the design, development, and administration of vital statistics information technology systems; (2) performs systems analysis and computer programming of vital registration data; (3) develops technologies, data architectures, security infrastructure, and database management related to vital records, record linkage, and sample surveys consistent with Center and Agency information technology requirements; (4) develops, maintains, and employs state-of-the-art information technologies (e.g., relational data bases, Web-enabled applications, applications development and dissemination activities) associated with vital statistics; (5) develops and maintains systems and databases to support the National Death Index program; (6) provides consultation and expert technical assistance to the Division concerning mainframe, client-server, and networking applications; (7) prepares and maintains population databases as well as conducts studies on statistical computation and data quality; (8) designs and implements information technology applications to produce final edited and imputed vital statistics and survey data; (9) produces and distributes a wide variety of vital statistics reports and tabulations in multiple formats; (10) provides consultation, policy guidance and expert technical assistance NCHS-wide as well as to a broad range of agencies, institutions, federal, local, and international governments, researchers, and individuals, in regard to vital statistics systems design, administration, and usage; and (11) manages national vital statistics data files and databases and the DVS vital statistics data request program.

Staff Duties:

Nicholas F. Pace, B.S., Branch Chief

Directs activities in the analysis, programming and implementation of computer processing systems that process, compute, impute, store, retrieve and tabulate national vital statistics data in the National Vital Statistics System (NVSS). The scope of the branch's systems and programming functions includes several continuing complex national statistical functional areas: Mortality, Natality, Fetal Death, Linked Birth-Infant Death; National Death Index, and Marriage and Divorces. Performs special programming projects. Develops and maintains the division's Intranet website. Serves as IT Security Steward of the National Vital Statistics System (NVSS) and mainframe RACF Administrator.

David Johnson, B.S., Statistician

Responsible for analysis, programming, and implementation of computer processing systems involving the editing and creation of the national Mortality Historic Final and Preliminary files. Also responsible for developing and maintaining the Race Coding software engine, VSCP server administration and applications, developing statistical software models and sampling programs, data transmission and encryption software, and Vital Records Exchange applications. Serves as Technical Steward of the National Vital Statistics System (NVSS).

Steven Steimel, B.S., Lead IT Specialist

Responsible for analysis, programming, and implementation of computer processing systems involving the editing and creation of the Natality Final, Preliminary file, Fetal Death file, and Linked-Birth Infant Death file in the National Vital Statistics System (NVSS). Also serves as database administrator of vital statistics databases and develops computer applications.

Thomas Dunn, PhD., Statistician

Acts as liaison to data users in the DVS data request program. Records and tracks all data requests and takes appropriate actions to meet requestor data needs. Creates SETS and ASCII data CD products. Creates and maintains population tables. Performs statistical validation and quality review activities.

Candace Cosgrove, M.S., Computer Scientist

Responsible for analysis, programming, and implementation of computer processing systems involving the editing and creation of the Linked File, Linked Birth-Cohort file, Matched Multiple Birth file, and programming for the Fertility Cohort Study. Also provides programming for a variety of the division's major statistical reports and serves as a consultant in the use of SAS and other statistical software.

Jordan Sacks, B.S., IT Specialist

Provides programming and systems analysis for a variety of the division's major statistical files and reports. Also, assists in the development and maintenance of the division's Intranet web pages.

Manju Sharma, B.S., IT Specialist

Provides programming and systems analysis for a variety of the division's major statistical files and reports.

John Birken, M.S., IT Specialist

Provides programming and systems analysis for a variety of the division's major statistical files and reports.

Bonita Gross, IT Specialist

Performs system administration for the processing of vital record shipments from states in the National Vital Statistics System (NVSS). Provides programming and system analysis for vital statistics database applications.

Vanetta Harrington, Statistical Assistant

Performs data compilations and verifies statistical tabulations. Also, maintains public use documentation and serves as branch documentation librarian.

Jaleh Mousavi, B.S., IT Specialist

Provides database administration and programming for the National Death Index (NDI). Performs system administration for the processing of vital record shipments from states in the National Vital Statistics System (NVSS). Provides programming and system analysis for vital statistics database applications.

Joyce Arbertha, IT Specialist

Serves as Systems Administrator for the National Death Index (NDI).

Annie Liu, M.P.A., (contractor - NG/NOVA) Senior Computer Programmer

Provides programming and systems analysis for a variety of the division's major statistical reports, including Vital Statistics of the United States, Natality. Also serves as a consultant in the use of SAS software.

Sergey Yagodin, PhD (contractor – NG/NOVA) Senior Computer Programmer

Provides programming and systems analysis for a variety of the division's major statistical reports and serves as a consultant in the use of SAS and Beyond 20/20 software.

Charles Royer, B.S., (Professional Services Contract) Senior Computer Programmer

Serves as consultant on vital statistics geographic coding. Also, provides programming and systems analysis to convert legacy software applications to the SAS programming language.

Mortality Medical Classification Branch

Donna Glenn, Chief

Lawanda Champion, Deputy Chief

The Mortality Medical Classification Branch (1) develops the Mortality Medical Data System (MMDS) medical classification software and procedures for collecting and processing of mortality medical data in states and at NCHS; (2) provides leadership to the international community in the use and adoption of the MMDS; (3) directs a comprehensive program of technical assistance and consultation related to medical mortality data classification to states, local areas, other countries, and private organizations; (4) tests, refines, and updates the MMDS; (5) provides nosological assistance and training, both nationally and internationally, in regard to International Classification of Diseases (ICD) information for mortality and new revisions of the ICD; (6) classifies, codes, keys, and verifies medical information from the death certificate, including rejects from the MMDS; (7) develops and implements training programs for cause-of-death coding and provides technical assistance to international, federal, state, and local government and non-government agencies.

Training Team: This team is responsible for providing general nosological assistance and training; for the MMDS instruction manuals including 2a, 2b, 2c; the training for state and international staff in underlying and multiple cause of death coding and the maintenance of all training material; the updating of the MICAR, ACME, TRANSAX decision tables (see section 3 for explanation of the MMDS and its components). They provide technical assistance to the specialists related to coding questions. This team is also responsible for providing programming specification for the MICAR system and international collaboration with WHO for updating the ICD and the MMDS software.

Julia Raynor	Nosologist
Tyringa Ambrose	Nosologist
Dawn King	Team Manager
Shaluanda Johns	Medical Records Control Technician

Contractors: 3 Nosologists

Mortality Medical Data Specialists - For assigned jurisdictions, the Mortality Medical Data Specialists are responsible for reviewing state certificates, preparing special coding/processing rules for each jurisdiction, maintenance of the annual SuperMICAR (see section 3 for a description of SuperMICAR) data file for each jurisdiction, the over-all quality of each jurisdiction's data which includes reviewing and correcting records based upon the edits, entering and processing all missing records, adjudicating the quality control (QC) listings for each month, verifying the inclusion of rare cause of death on the data file, etc. The specialists are also responsible for providing technical assistance to their jurisdictions related to underlying and multiple cause-of-death coding and training in the use of the SuperMICAR software. This team is also responsible for the updating of the 2s instruction manual.

Leslie Stewart - team leader

Assigned Jurisdictions: Arkansas, California, Georgia, Hawaii, New York City, Tennessee

Barbara Porterfield

Assigned Jurisdictions: Illinois, Iowa, Kansas, Louisiana, New Jersey, New York State, North Dakota, Oregon, Puerto Rico, Vermont

Cynthia Harris

Assigned Jurisdictions: Alabama, Colorado, Delaware, Florida, Maryland Missouri

Eldora Shuler-Smith

Assigned Jurisdictions: Massachusetts, Minnesota, North Carolina, South Carolina, Utah, Virgin Islands, West Virginia, Wisconsin, Wyoming

Lorena Bobbitt

Assigned Jurisdictions: Alaska, Arizona, District of Columbia, Maine, Nevada, Pennsylvania

Rosalyn Anderson

Assigned Jurisdictions: American Samoa, Guam, Idaho, Mississippi, Commonwealth of the Northern Marianas, Nebraska, New Mexico, South Dakota, Texas, Virginia

Shirley Clayton-Carter

Assigned Jurisdictions: Connecticut, Indiana, Kentucky, Michigan, Montana, New Hampshire, Ohio, Oklahoma, Rhode Island, Washington

Mortality Medical Records Technicians - The technicians are responsible for coding the MMDS system rejects for selected jurisdictions and providing the QC sample file for each jurisdiction (54) on a monthly basis. Technicians are divided into two teams but help each other out when coding is in danger of being delayed due to unexpected receipt of large amounts of data.

Mary Susan Lippincott - team leader

Team A:

Bernice Judd

Betsy Thompson

Mia Jones

Assigned Jurisdictions

Coding Rejects: California, Florida, Idaho, Missouri, North Dakota, New Jersey, New Mexico, New York City, Oregon, Puerto Rico, South Dakota, Utah, Virginia, Vermont, Wyoming, Guam, Illinois, West Virginia

Quality Control File: Alabama, Alaska, Arkansas, Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Hawaii, Indiana, Kentucky, Maine, Maryland, Michigan, Montana, Nevada, New Hampshire, New York City, Ohio, Oklahoma, Pennsylvania, Rhode Island, Tennessee, Washington

Team B:

Lillian Clark
Terry Harned
James Herndon
Ida Delaney

Assigned Jurisdictions

Coding Rejects: Alabama, Alaska, Arkansas, California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Hawaii, Kentucky, Maine, Nevada, New Hampshire, Ohio, Oklahoma, Rhode Island, American Samoa, Commonwealth of the Northern Marianas, Virgin Islands

Quality Control File: Arizona, California, Idaho, Illinois, Iowa, Kansas, Louisiana, Massachusetts, Minnesota, Mississippi, Missouri, Nebraska, New Jersey, New Mexico, New York State, North Carolina, North Dakota, Oregon, Puerto Rico, South Carolina, South Dakota, Texas, Utah, Vermont, Virginia, West Virginia, Wisconsin, Wyoming

Contract: 1 full-time and 2 part-time Medical Records Technicians

File Development Staff This team is responsible for receipt and processing of the mainframe data files, generating all software used on the mainframe; monitoring the rare cause listings; providing out-of-state medical records as requested by each jurisdiction; coordinating the data files stored on the network with the data files on the mainframe; reviewing files for possible errors identified by statisticians and other users.

Dora Wilkerson
Faye Webster

Steve Rushing: While a member of the file development team, Steve's responsibilities include: Technical support for in-house and state office users; creation and distribution of MMDS releases; database administrator; creating and maintaining databases for file tracking, batch control, quality assurance and customer response; off site training in MMDS use and implementation for state offices; documenting processes; handling exceptional batches.

Contractor: Processes the in-coming SuperMICAR files and moves them to the appropriate space for the medical records technicians to select for coding. Also processes mainframe files.

SuperMICAR Data Entry Team: This team consist of 4 contract staff who are responsible for entering the cause of death data into SuperMICAR for all non-VSCP jurisdictions (those that provide microfilm records) and for certain jurisdictions which require additional assistance with entering records which have additional information.

Software Development Team: This team consist of 6 programmers/database administrators and 1 manager who are responsible for the MMDS software (SuperMICAR, MICAR100/200, ACME, and TRANSAX); the decision tables; the training software; tracking programs, system documentation and help files; determining the quality of the data processed through the system.

Mortality Statistics Branch

Robert N. Anderson, PhD, Chief

The Mortality Statistics Branch (1) establishes the research agenda for mortality statistics in response to public health priorities; (2) converts identified data needs into statistical and research programs to obtain, evaluate, analyze, and disseminate mortality statistics data; (3) conducts research to improve data collection of vital records related to mortality statistics; (4) performs theoretical and experimental research that improves the content of the mortality statistics data collection effort and the timeliness, availability, and quality of mortality statistics data; (6) recommends content of U.S. Standard Certificates; (7) assesses disclosure risk and develops optimal data release strategies that improve policy analysis and decision-making; (9) conducts research related to the International Classification of Diseases (ICD) and cause of death classification; (10) conducts national and state-specific comparability studies of cause of death classification to facilitate the study of mortality trends across ICD revisions; (11) designs and conducts methodological research to improve the collection, production, use, and interpretation of mortality-related data; and (13) develops and promotes training activities related to the collection, production, use and interpretation of mortality statistics.

Donna L. Hoyert, PhD. – Health Scientist

Duties are to provide consultation, expertise, and guidance in medical certification of death, the international statistical classification of diseases and other causes of death, manage the fetal cause-of-death project, and collaborate in the development of fetal and perinatal mortality statistical products. With regard to international classification activities, coordinates the actions of WHO's Mortality Reference Group and represents the North American Collaborating Centre for the Family of International Classifications on WHO's Update and Revision Committee. Other duties include: provides review and guidance on revised State death certificates and fetal death reports, updates instruction manuals (e.g., Instruction manual part 20, cause-of-death querying).

Kenneth D. Kochanek, MA – Statistician (Demography)

Duties involve management of activities related to the Multiple Cause of Death data set, including yearly review of documentation, data set specifications, file specifications, control total tables and overall coordination of public use CD-ROM's and the development, evaluation data related to multiple cause of death. Other duties include responsibility for managing ICD-10 cause of death tabulation lists, including updates; responding to data and information requests pertaining to all aspects of mortality data; technical appendix review and updates Also serves on the planning committee of the International Collaborative Effort (ICE) on Automating Mortality Statistics.

Arialdi M. Miniño, MPH – Statistician (Demography)

Duties include conducting periodic comparability studies in response to changes or revision of the International Classification of Diseases, and responsibility for updates to Instruction Manual Part 11 which details mortality-related computer edits. Also provides staff support for the planning committee of the International Collaborative Effort (ICE) on Automating Mortality Statistics.

Sherry L. Murphy, BS – Statistician (Demography)

Duties involve management of the main mortality file. This includes performing a detailed review of demographic and medical data; ascertaining the quality and completeness of the data; identifying and documenting data problems; reviewing edits and file specifications; recommending edit changes; reviewing and researching deaths from rare causes; assessing and developing improved methods of data evaluation; serving as primary point of contact for issues pertaining to the processing requirements of final mortality data; and organizing and directing team efforts related to specific tasks for managing the main mortality file, including table development, table review and development of technical documentation. Other duties include preparing and submitting to the Census Bureau the annual request for special populations; reviewing data file documentation and submitting recommendations for change; and responding to questions requiring technical expertise in the analysis and interpretation of mortality data.

Jiaquan Xu, MD, MS – Epidemiologist

Duties include assisting in the management of the main mortality file, including review of demographic and medical data; ascertaining the quality and completeness of the data; identifying and documenting data problems; reviewing edits and file specifications; reviewing and researching deaths from rare causes; assessing and developing improved methods of data evaluation.

Registration Methods staff

Delton Atkinson, Team Leader

The Registration Methods Staff is a four-person staff located within the Office of the Director, Division of Vital Statistics (DVS) with three broad functions. These are: 1) provide program, statistical, and IT consultation and technical assistance to state and local registration personnel and to subject matter experts within DVS with respect to the development, production, analysis and/or dissemination of vital statistics; 2) manage the IT capital planning process for the National Vital Statistics System (NVSS); and 3) manage the development and the subsequent implementation of vital statistics standards and regulations in response to the recently approved Terrorism and Prevention Act of 2004.

Major responsibilities by staff are as follows:

- a. **IT Project Management** (Delton Atkinson): Responsible for the production of the OMB-required Exhibit 300 capital planning document for the NVSS and the monthly Earned Value Management Report. Track the performance (both cost and schedule) of all design, enhancement and modernization projects for the NVSS and assist the staff in improving their ability to monitor performance.
- b. **Standards and Regulations for Vital Statistics** (Delton Atkinson and Julie Kowaleski): In response to the Terrorism and Prevention Act of 2004, DVS has been tasked with the lead to develop the regulations associated with the Act. Through the lead of Delton and Julie, the Registration Methods Staff is working with a partnership of federal agencies in the development of the regulations for birth certificates and in their subsequent implementation.
- c. **Training** (Julie Kowaleski and Judy Barnes): This staff is responsible for planning, organizing conducting, and evaluating training programs for state and local vital registration personnel. Stand-alone courses are planned and delivered each year on topics ranging from records administration to statistics. In addition, these persons assist the planning and implementation of other NCHS-wide and DVS-affiliated training courses or conferences such as the VSCP Workshop, the Data Users Conference, and the Joint NAPHSIS/NCHS Conference.
- d. **Technical Assistance to States and Local Registration Personnel** (Julie Kowaleski, George Tolson, and Judy Barnes). These persons provide assistance and general information to meet the needs and demands of state and local registrations staff. This assistance can include the organization and delivery of onsite audits/evaluations to assist the states in improving their vital records and vital statistics operations. Through this technical assistance effort, the Staff is working with states to encourage them to use the U.S. Standard Certificates and the Model Law. Finally, this staff maintains electronic mailing lists of state personnel for use throughout the Division.
- e. **Publications** (Julie Kowaleski and George Tolson): This staff is responsible for the publication of newsletters and technical manuals to assist the states in the daily management of their programs. Examples are the quarterly NCHS Vital News and the 2003 Revision of the U.S. Standard Certificates of Birth and Death and the Report of Fetal Death.

3. Collection and Processing of Natality and Fetal Death Data

Data collection and processing

As noted in section 1, natality and fetal death statistics for the U.S. are collected and published through a decentralized, cooperative system. The degree of uniformity necessary for the NVSS has been achieved by periodic issuance of recommended standards from the responsible national agency and the cooperative adoption of these standards by the individual registration areas. These standards take the form of recommended laws and regulations (Model State Vital Statistics Act and Regulations - <http://www.cdc.gov/nchs/data/misc/mvsact92b.pdf>), definitions and reporting requirements, and reporting forms (U.S. Standard Certificates and Reports) – in the case of natality and fetal death, the U.S. Standard Certificate of Live Birth (see http://www.cdc.gov/nchs/data/series/sr_04/sr04_028.pdf for the 1989 revision (page 17) and <http://www.cdc.gov/nchs/data/dvs/birth11-03final-ACC.pdf> for the 2003 revision) and the U.S. Standard Report of Fetal Death (see http://www.cdc.gov/nchs/data/series/sr_04/sr04_028.pdf for the 1989 revision (page 24) and <http://www.cdc.gov/nchs/data/dvs/FDEATH11-03finalACC.pdf> for the 2003 revision). To ensure that the standard certificates and reports meet current data needs, it is essential that they be reviewed and revised periodically; the most recent revision was scheduled for implementation in 2003.

All 57 registration areas, with one exception, provide coded vital events data to the Data Acquisition and Evaluation Branch (DAEB) in the Division of Vital Statistics (DVS) in electronic form over the CDC secure data network (SDN) in a standard format (see <http://www.cdc.gov/nchs/data/dvs/3amanual.pdf> and <http://www.cdc.gov/nchs/data/dvs/3bmanual.pdf> for the specifications related to the 1989 revision of the standard certificate of live birth and standard report of fetal death, and <http://www.cdc.gov/nchs/data/dvs/Guidelinesbirthspecs1101acc.pdf> and <http://www.cdc.gov/nchs/data/dvs/FinalDeathSpecs2-22-05.pdf> and <http://www.cdc.gov/nchs/data/dvs/FinalFetalDeathSpecs2-22-05.pdf> for the 2003 specifications). These files include all of the births registered and fetal deaths reported and within their jurisdiction for each calendar year. Transmittals take place at regular intervals and contain any and all records received and initially processed in the state office since the last transmittal. For purposes of improved quality for full utilization and release of the data, states are expected to transmit the majority of records within the schedule provided in the Vital Statistics Cooperative Program (VSCP) contract. The demographic portion of the death certificates is processed by DAEB, while the medical portion of the death certificates is handed over to the Mortality Medical Classification Branch (MMCB) for further processing.

As the files are received by DAEB, they are automatically checked for completeness, individual item code validity, and unacceptable inconsistencies between data items. The registration area is notified of any problems. In addition, the DAEB staff review the files on an ongoing basis to detect problems in overall quality such as inadequate reporting of certain items, failure to follow NCHS coding rules, and systems and software errors. Traditionally, quality assurance procedures have been limited to review and analysis of differences between the NCHS and registration area code assignments for a small sample of records. This procedure has now been augmented by analyses of year to year and area to area variations in the data. All differences that

are judged to have consequences for quality and completeness are investigated by NCHS. Follow-up with the registration areas is then conducted in order to resolve these differences.

The files are closed (one registration area at a time) once DAEB has received all records from the registration areas, and no significant issues remain to be resolved. At this point files are made available to the Systems Programming, and Statistical Resources Branch (SPSRB) for further processing and file creation, and subsequently to the Reproductive Statistics Branch (RSB) for end-of-the-year analyses.

4. Unique Challenges in Creating National Natality Data Sets

Beginning in the late 1990s, natality staff members along with DVS colleagues in DAEB and SPSRB, have been intensively engaged in the revision of the U.S. Standard Certificates and Reports. While responsibility for developing the content of these standards rests with state registration executives, DVS staff play a critical and indispensable role as subject matter resources, as experts in the issues entailed in creating national data sets, and as technical experts on all aspects of the collection, coding, editing, and processing of the data files. With the 2003 revisions came striking transformations in the data collection procedures used historically. State registrars participating in the evaluation process agreed with a fundamental concept, namely that the task at hand was to move the vital statistics system from “a system primarily based on the flow of paper to the faster electronic registration of vital events. The Panel [to Evaluate the U.S. Standard Certificates] looked beyond designing new paper documents and concentrated on cultivating an appropriate vital statistics data base grounded in the electronic transfer of information.” (NCHS. *Report of Panel to Evaluate the U.S. Standard Certificates and Reports*. Available on the Internet at: http://www.cdc.gov/nchs/data/dvs/panelreport_acc.pdf . 2001.)

Following the release of the Panel’s recommended data collection forms, natality staff began work in earnest to implement the recommendations. These included the development of recommended worksheets to collect the data from the mother (for the demographic information) and from the birth facility (for the medical and health information), the development of standardized procedures for collecting and editing the data electronically (documents of 230+ pages each for natality, mortality, and fetal deaths), and the design and development of a *Guidebook* to assist medical records personnel in completing the facility worksheets for births and fetal deaths. All of this represented fundamental changes in the ways birth certificate data had been collected in the past.

Natality staff members were intensively involved in the DVS effort, in collaboration with the National Association for Public Health Statistics and Information Systems (NAPHSIS) and the Social Security Administration, to develop national models of electronic vital event registration systems. Before states began to implement the revised standards, DVS staff developed additional materials to assist in the process. These included a test deck so that states could test whether their electronic systems were working appropriately and cross walks so that states could assess the comparability of the items on the previous (1989) revision and the 2003 revision. In addition, DVS staff developed a multiple race coding engine and a test deck. With the coding engine, NCHS could convert the multiple race entries to single race. This was necessary, because implementation of multiple race collection on the standard certificates is also being phased in. In order for NCHS to produce consistent national population-based birth (and death) rates, it was necessary to convert the multiple race entries to single race.

Since 2003, implementation of the revised birth certificate and fetal death report has been phased in by the states. Two registration areas adopted the 2003 revision of the standard birth certificate, 7 additional areas in 2004, 5 in 2005, and 9 in 2006; as of the end of 2006, 23 registration areas will have adopted the new certificate. Full implementation by all areas is unknown at this time, because no information on implementation plans has been provided by 9 registration areas: Guam, Hawaii, Iowa, Illinois, Maryland, North Marianas, Mississippi, Rhode Island, and the Virgin Islands. Implementation of the revised Standard Report of Fetal Death is similarly being phased in. Two states revised in 2003, 5 in 2004, 4 in 2005, and 7 in 2006, a total of 18 states.

No information has been provided for 9 states for their implementation schedule. Further complicating the phased-in implementation of the new standards is the fact that some states have implemented in mid-year, thus jeopardizing the ability to include their statistical information in NCHS national reports.

Natality staff and DVS colleagues have responded to these challenges on many fronts. First, a new file layout and documentation were created that incorporates data from both unrevised and revised states. In practical terms, this has resulted in a near quadrupling of the field length from 350 to 1350. Special fields have been added that combine data items that are comparable between revisions. The new file also includes multiple race data, an important reason for the added file size. Over 100 edit and analysis tables have been designed and programmed to assist staff in the review and analysis of the data. As mentioned above, cross walks have been developed to help guide states as to which items are comparable or not comparable between revisions. Determination of comparability in many cases awaited the natality experts' review of the initial data. This could not always be done on an *ad hoc* basis before the data were processed. We have already determined that at least three high-profile data items are not comparable between revisions: prenatal care, tobacco use during pregnancy, and educational attainment (of mother and father and of decedent). Thus, we will not be able to produce national data on these important topics now or for the foreseeable future.

Another important issue in the revision process is that a number of new data items were added with the 2003 revision. These include, for example, questions on whether the infant was alive at the time of discharge, breastfeeding, receipt of WIC food, expected source of payment for the delivery, and others. In addition, some of the checkboxes for items on the previous revision have been modified and changed. Because of a lack of funding support from NCHS, States at the last NAPHSIS annual meeting passed a resolution which does not allow NCHS to publish these data nor provide the data to others in public use data sets. We are continuing to use the new data items for quality control and display purposes for internal use and to provide feedback to the States. More information about our research efforts with the new data items is presented in this report in section 6, "Research," on page 38.

The summary above makes it clear that natality staff and DVS staff time over the last several years have been quite focused on developing approaches to dealing with these historic challenges. As a consequence, less time has been available for research. Basic research is a critical aspect of DVS' work, because it contributes to knowledge and understanding of the strengths and limitations of the data, how data collection procedures might be modified to improve data quality, and familiarity with new issues that may affect the ability of vital statistics to monitor maternal and infant health.

5. Natality Program Products

Information from the National Vital Statistics System is disseminated through a variety of mechanisms, including the NCHS website, other electronic media, hard-copy reports, and courses and presentations. Examples of natality program products include:

Data files

Natality Public Use Data File

The Natality Public Use Data Set is an individual record data file that contains detailed information for each infant born in the 50 states and the District of Columbia. Births occurring to U.S. citizens outside the United States are not included. Data are obtained from certificates filed for births occurring in each State. The detailed file format is for a single calendar year and includes data for cities, counties, and metropolitan areas with a population of 100,000 or more. Date of infant's birth and dates of birth of the mother and father and birth certificate numbers are excluded from this file. Beginning in 1994, the same detail is available on a separate file for Puerto Rico, the Virgin Islands, and Guam and more recently includes American Samoa and the Commonwealth of the Northern Marianas.

Data items for the 2003 public use natality data file include:

Year of birth

Revision (1989 or 2003)

Residence of mother:

State

County (100,000 persons or more)

City (100,000 persons or more)

MSA/CMSA

Place of birth:

State

County (100,000 persons or more)

Abnormal conditions of the newborn

Age of mother and father

Alcohol use

Apgar score

Attendant at birth

Birthweight (in grams)

Complications of labor/delivery

Congenital anomalies

Date of last live birth

Date of last normal menses

Day of week of birth/death

Education of mother

Gestation period

Hispanic origin of mother and father

Live-birth order

Marital status

Medical risk factors
 Method of delivery
 Month of pregnancy prenatal care began
 Month of year of birth /death
 Mother's place of birth
 Nativity of mother
 Number of prenatal visits
 Obstetric procedures
 Place of delivery
 Plurality
 Prior births living/dead
 Prior other terminations
 Race of mother and father
 Sex of infant
 Tobacco use
 Total birth order
 Weight gain

Linked Birth-Infant Death File

The Linked Birth/Infant Death Data Set is an individual-record data file containing linkage of nearly all infant deaths occurring in the 50 states, the District of Columbia, Puerto Rico, and Guam, with their corresponding birth records. As part of the Vital Statistics Cooperative Program, each state provides to CDC's NCHS matching birth and death certificate numbers for each infant under 1 year of age who dies in the state during a given calendar year. When the birth and death occurred in different states, the state of death is responsible for contacting the state of birth identified on the death certificate to obtain the original birth certificate number. NCHS' Division of Vital Statistics then uses the matching birth and death certificate numbers to extract final edited data from the NCHS natality and mortality statistical files. These data are linked to form a single statistical record, thereby establishing a national linked record file. The linked data set contains both numerator and denominator files for the U.S. In 2003, 99.0% of all infant death records were matched to their corresponding birth records. These files can be used to calculate infant mortality rates by selected infant and maternal characteristics. The numerator file contains statistical data from linked birth and infant death records. The denominator file is the NCHS natality file in a compressed format.

Since 1995, the linked birth/infant death data set has been produced in two formats: a period format and a cohort format. Thus, for example, the 2002 period linked file contains a numerator file that consists of all infant deaths occurring in 2002 that have been linked to their corresponding birth certificates, whether the birth occurred in 2001 or 2002. In contrast, the 2002 birth cohort linked file will contain a numerator file that consists of all infant deaths to babies born in 2002 whether the death occurred in 2002 or 2003.

Data items for the linked file include:

Numerator file

Year of birth

Revision (1989 or 2003)

Residence of mother:

State

County (250,000 persons or more)
City (250,000 persons or more)
MSA/CMSA
Place of birth:
State
County (250,000 persons or more)
Abnormal conditions of the newborn
Age of mother and father
Alcohol use
Apgar score
Attendant at birth
Autopsy
Birthweight (in grams)
Complications of labor/delivery
Congenital anomalies
Date of last live birth
Date of last normal menses
Day of week of birth/death
Education of mother
Gestation period
Hispanic origin of mother and father
Live-birth order
Manner of death
Marital status
Medical risk factors
Method of delivery
Method of disposition
Month of pregnancy prenatal care began
Month of year of birth/death
Mother's place of birth
Nativity of mother
Number of prenatal visits
Obstetric procedures
Place of delivery
Plurality
Prior births living/dead
Prior other terminations
Race of mother and father
Record weight
Sex of infant
Tobacco use
Total birth order
Weight gain
Year of death
Residence of decedent:
State
County (250,000 persons or more)
City (250,000 persons or more)

Place of death:
State
County (250,000 persons or more)
Age at death
Hospital and status of decedent
Whether autopsy performed
Place of accident
Cause of death
Underlying cause
Multiple conditions

Denominator file

Year of birth
Revision (1989 or 2003)
Residence of mother:
State
County (250,000 persons or more)
City (250,000 persons or more)
MSA/CMSA
Place of birth:
State
County (250,000 persons or more)
Abnormal conditions of the newborn
Age of mother and father
Alcohol use
Apgar score
Attendant at birth
Birthweight (in grams)
Complications of labor/delivery
Congenital anomalies
Date of last live birth
Date of last normal menses
Day of week of birth/death
Education of mother
Gestation period
Hispanic origin of mother and father
Live-birth order
Marital status
Medical risk factors
Method of delivery
Month of pregnancy prenatal care began
Month of year of birth /death
Mother's place of birth

Nativity of mother
Number of prenatal visits
Obstetric procedures
Place of delivery
Plurality
Prior births living/dead

Prior other terminations
Race of mother and father
Sex of infant
Tobacco use
Total birth order
Weight gain

Matched Multiple Birth File

The matched multiple birth file was developed by staff of the Reproductive Statistics Branch working closely with a programming specialist from the Systems, Programming, and Statistical Resources Branch. The file was developed to allow for analysis of characteristics of *sets* of births and fetal deaths in multiple deliveries. The matched multiple birth file currently includes 6 combined years of data of matched sets of twins, triplets, and quadruplets in live births and fetal deaths; live birth records are linked to the corresponding infant death records for babies who died. Because of concerns for confidentiality with respect to small numbers for multiple births, some data fields are suppressed; no geographic identifiers are shown.

Data items for the matched multiple birth data set include:

Year of birth
Abnormal conditions of the newborn
Age of mother and father
Alcohol use
Apgar score
Attendant at birth
Birthweight (in grams)
Birth ID
Complications of labor/delivery
Congenital anomalies
Date of last live birth
Date of last normal menses
Day of week of birth/death
Education of mother
Gestation period
Hispanic origin of mother and father
Live-birth order
Marital status
Medical risk factors
Method of delivery
Month of pregnancy prenatal care began
Month of year of birth /death
Mother's place of birth
Nativity of mother
Number of prenatal visits
Number of records in the set
Obstetric procedures
Place of delivery
Plurality

Prior births living/dead
Prior other terminations
Race of mother and father
Sequence number
Set identification number
Set completeness flag
Set birth order
Sex of infant
Tobacco use
Total birth order
Weight gain

Additional variables from the infant death file:

Age at death in days
Cause of death
 Underlying cause
 Multiple conditions
Hospital and status of decedent
Place of accident
Place of injury

Courses

Natality staff members co-teach the course on “Vital Statistics: Measurement and Production.” The other courses listed here are offered by DVS colleagues.

Vital Statistics Records and their Administration

This course focuses on the proper management and administration of a vital statistics records system. Topics include techniques for collecting, editing, querying, and completing vital records; processing and managing a vital records information system; certification and verification procedures; maintenance of a records system and guidelines for storage and retrieval; protecting confidentiality of vital records; controlling fraudulent use of vital records; interaction with the public; legislative and regulatory policies (duration 4 1/2 days).

Vital Statistics: Measurement and Production

The course is on standard vital statistics measurements and topics related to current issues in the analysis of vital statistics data. Participants in the course need to have knowledge of basic statistics (college level course). The course content includes general types of vital statistics measures, measures in reproductive statistics, standardization of birth and death rates, problems of small numbers, application of standard errors and confidence intervals, issues related to the revised certificates, racial and ethnic classification, approaches to data quality issues, availability of vital statistics data, and issues of privacy and confidentiality, among other topics.

Advanced Topics in Mortality Statistics

This course is designed to provide the conceptual basis for topics including stochastic variation and small numbers, age standardization, life table construction, multiple cause-of-death analysis, and comparability of cause of death (duration 3 days).

Cause-of-Death Classification and Coding: ICD-10 Course for Statisticians

This course is geared toward statisticians who wish to become acquainted with cause-of-death classification and with coding medical data using the Tenth Revision of the International Classification of Diseases (ICD-10) (duration 2 days). The instructors discuss the history and uses of the international classification, as well as its content, arrangement and conventions. Special attention focused on the principles used to assign the correct codes for diseases and external causes of injury, and the role that modern automated systems play in processing cause-of-death information. The instructors also discuss issues that affect the analysis of cause-of-death data, in particular multiple-cause data and comparability across revisions of the ICD.

Seminar for PC Managers

This course is designed to instruct pc managers for each State on how to manage mortality medical data entry and coding. The pc manager should be able to solve most problems with ACME, MICAR, and SuperMICAR in-house after completing the course (duration 3 days). This course is also made available to international students with emphasis on how the software could be modified for other languages.

SuperMICAR Data Entry

This course provides intensive practical training using personal computers and the SuperMICAR software package. Trainees learn to recognize medical entities found on death certificates and key/enter these following MICAR rules. This input, when processed by MICAR software routines, produces input for ACME (duration 2.5 days).

Basic Underlying Cause of Death

This course provides intensive practical training to develop skill in coding the underlying cause-of-death according to the ICD system of classification (duration 10 days).

Basic Multiple Causes of Death

This course provides intensive practical training in multiple cause-of-death coding in accordance with rules for use with the Automated Classification of Medical Entities (ACME) System (duration 10 days).

Advanced Underlying Cause of Death Classification

This is a refresher course for coders with at least one year of experience in using ICD-10 to code underlying cause of death (duration of 5 days).

Advanced Multiple Causes of Death Classification

This is a refresher course for experienced coders who have attended the Basic Multiple Causes of Death coding course (duration of 5 days).

International Underlying Cause of Death

This course is a "train the trainer" course. It provides intensive practical training to develop skill in coding the underlying cause-of-death according to the ICD system of classification (duration 15 days). All training materials are provided to the students so they can provide training in their respective countries.

International Multiple Causes of Death

This course is a "train the trainer" course. It provides intensive practical training in multiple cause-of-death coding in accordance with rules for use with the Automated Classification of Medical Entities (ACME) System (duration 15 days). All training materials are provided to the students so they can provide training in their respective countries.

NCHS Statistical Reports by Natality Team Members, 2005-06

Copies of the following NCHS reports (published 2005-06) are included:

Birth and Fertility Rates for States by Hispanic Origin Subgroups: United States, 1990 and 2000

Available on the Internet (May 9, 2006) at: <http://www.cdc.gov/nchs>

Infant Mortality Statistics from the 2003 Period Linked Birth/Infant Death Data Set
Available on the Internet at: http://www.cdc.gov/nchs/data/nvsr/nvsr54/nvsr54_16.pdf

Births, Marriages, Divorces, and Deaths: Provisional Data for September 2005
Available on the Internet at: http://www.cdc.gov/nchs/data/nvsr/nvsr54/nvsr54_15.pdf

Births: Preliminary Data for 2004
Available on the Internet at: http://www.cdc.gov/nchs/data/nvsr/nvsr54/nvsr54_08.pdf

Preliminary Births for 2004 (*Health E-Stat*). Available on the Internet at:
http://www.cdc.gov/nchs/products/pubs/pubd/hestats/prelim_births/prelim_births04.htm

Preliminary Births for 2004: Infant and Maternal Health (*Health E-Stat*).
Available on the Internet at:
<http://www.cdc.gov/nchs/products/pubs/pubd/hestats/prelimbirths04/prelimbirths04health.htm>

Explaining the 2001-02 Infant Mortality Increase: Data from the Linked Birth/Infant Death Data Set
Available on the Internet at: http://www.cdc.gov/nchs/data/nvsr/nvsr53/nvsr53_12.pdf

Trends in Spina Bifida and Anencephalus in the United States, 1991-2003 (*Health E-Stat*).
Available on the Internet at:
http://www.cdc.gov/nchs/products/pubs/pubd/hestats/spine_anen.htm

Births: Final Data for 2003
Available on the Internet at: http://www.cdc.gov/nchs/data/nvsr/nvsr54/nvsr54_02.pdf

Trends in Cesarean Rates for First Births and Repeat Cesarean Rates for Low-Risk Women: 1990-2003
Available on the Internet at: http://www.cdc.gov/nchs/data/nvsr/nvsr54/nvsr54_04.pdf

Trend Analysis of the Sex Ratio at Birth in the United States (presents trends for 1940-2002)
Available on the Internet at: http://www.cdc.gov/nchs/data/nvsr/nvsr53/nvsr53_20.pdf

6. Research

Selected current research projects

Below is a list of selected major research projects related to the natality component of the NVSS and the investigators involved from the Division of Vital Statistics.

Development of the 2003 Birth File

Unlike any previous revision of the U.S. Standard Certificates, implementation of the 2003 revisions has been significantly delayed, with states phasing in implementation over a period of several years. Systems for data collection, editing, and processing, are thus not standardized. Details of this are presented in section 4 above, “**Unique Challenges in Creating National Natality Data Sets.**” RSB and SPSRB staff work on this has been intense, focusing in particular on the following: quadrupling of the file to include both revised and unrevised data as well as multiple race entries for parents who report more than one race; review of revised data that were intended to be produced in conjunction with standardized software based on the NCHS specifications, but were not actually collected and produced in accordance with the standardized systems; and analysis of data compatibility from unrevised and revised certificates (see special project below). RSB staff assisted by SPSRB and DAEB colleagues developed several strategies to minimize data problems, beyond the conventional edit and analysis table review. RSB staff developed a comprehensive test deck for the states to use to test the revised data that has been distributed by RSB and NAPHSIS; a test deck to test the new edits in the national file; and a test deck of the multiple race coding system developed by SPSRB. RSB staff members continue to be extensively involved in review of the bridged race data (see special project below). These initiatives are continuing throughout the implementation period for the revised certificates.

Investigator(s): Joyce Martin, Paul Sutton, Brady Hamilton, Steven Steimel, David Johnson, David Justice, Fay Menacker, TJ Mathews, Martha Munson, Marian MacDorman, Sharon Kirmeyer

Comparability of data from the 1989 and 2003 revisions of the birth certificate

This study involves an ongoing evaluation and assessment of the comparability of data for items and topic areas for which the basic questions on the birth certificate differ substantively between the two revisions. Examples of high-profile items with significant discontinuities in data sources and question wording are month of pregnancy prenatal care began (2003 revision: Date of first prenatal visit); years of schooling completed by the mother/father (2003 revision: Highest degree attained); and tobacco use (at any time) during pregnancy (2003 revision: tobacco use collected by trimester of pregnancy and for three months prior to pregnancy); and components of the method of delivery item. Other items have been affected by the revision, but the comparability between revisions is believed to be adequate at this time.

Investigator(s): Joyce Martin, Brady Hamilton, Paul Sutton, TJ Mathews, Fay Menacker, Sharon Kirmeyer, TJ Mathews, Marian MacDorman

Data Quality Analysis of New Data Items on the 2003 Revision of the Birth Certificate

The 2003 revision of the birth certificate includes several new data items for which no comparable vital statistics-based information is available. As of the end of 2006, we expect that 23 registration areas will have implemented the 2003 U.S. Standard Certificate. However, NCHS

can not publish or disseminate information to the public or researchers from the new data items. Because of a lack of funding support from NCHS, States at the last NAPHSIS annual meeting passed a resolution which does not allow NCHS to publish these data nor provide the data to others in public use data sets. The new information is very important from a public health and maternal and infant health perspective. For example, new information is collected on maternal morbidity, appropriate maternal weight gain during pregnancy (based on the Body Mass Index), and expected source of payment for the delivery, among other topics. Although NCHS is not able to publish the data, we can review the new data items for quality control purposes and provide feedback to the States. In this spirit, natality analysts have begun a series of quality control reports (*NVSS New Item Data Quality*) on the new data items and have produced two reports thus far. In accord with the NAPHSIS resolution, these reports have been distributed only to colleagues in the Vital Statistics Cooperative Program:

- Breastfeeding and WIC
- Infant living at time of report

A third report on maternal weight gain derived from prepregnancy weight and weight at delivery is in preparation, and other reports are planned.

Investigator(s): Marian MacDorman, Joyce Martin, Paul Sutton, Sharon Kirmeyer

Bridging multiple race responses for births and populations to single race

In accordance with revised race and ethnicity standards issues by the Office of Management and Budget in 1997, the 2000 decennial census permitted respondents to report one or more races. The National Vital Statistics System, which is based on data collected by the states, is not as yet fully compliant with these revised standards. Consequently, beginning with the 2000 data year, the numerators (births) for race-specific birth and fertility rates were incompatible with the denominators (populations). To permit the calculation of race-specific rates, the National Center for Health Statistics developed a “bridging” procedure to impute the responses of those who reported more than one race to a single-race, for both the populations and births in those states which have started to report multiple-race birth certificate data (i.e., more than one race for mother and father). Research on the impact of “bridging” on demographic and health measures is being conducted. Once all states revise their birth registration systems to be compliant with the revised standards, the use of the “bridging” procedure will be discontinued.

Investigator(s): Brady Hamilton, David Johnson, James Weed, Deborah Ingram

Measurement of Gestational Age This research focuses on data quality and reporting issues for the two items on which gestational age is currently derived, namely, the first day of the mother’s last menstrual period, and the clinical estimate of gestation. (The 2003 revision asks for the “obstetric estimate of gestation” rather than the clinical estimate.) This research initiative was inaugurated with a highly successful workshop developed and co-sponsored by NCHS and the Division of Reproductive Health, NCCDPHP, which brought together 41 invited experts and featured 10 invited presentations. The workshop agenda was to investigate changes in reporting of gestational age data on birth certificates; the impact of these changes on the measurement of gestational age; to identify strategies that minimize gestational age misclassification; and to make recommendations for improved and standardized editing of vital statistics data. Workshop proceedings and additional research generated by the workshop will be published in an upcoming special edition of *Paediatric and Perinatal Epidemiology*. Two papers by natality staff

have been submitted for publication in this special edition. Research on the gestational age measurement issues is ongoing and includes collaboration with the Division of Reproductive Health along with State vital statistics subject matter experts. Future research includes an evaluation of gestational age data currently reported, and will be carried out by the natality team and DVS colleagues in conjunction with NAPHSIS and with support from the Office of the Assistant Secretary for Planning and Evaluation for HHS.

Investigator(s): Joyce A. Martin, Sharon Kirmeyer, Marian MacDorman

Matched Multiple Birth Data Set, 1995-2000

NCHS has released a third Matched Multiple Birth Data Set that contains six years of detailed data for matched sets of twins, triplets, and quadruplets on CD-ROM. The new matched multiple birth data set includes six combined years of data and sets of quadruplets. "The Matched Multiple Birth File" was developed to allow for analysis of characteristics of sets of births and fetal deaths in multiple deliveries and includes information for infants who die before one year of age. Such analysis is not possible using the traditional NCHS Live Birth and Fetal Death Files because these files contain individual records of births and deaths in multiple deliveries, but do not identify set members. Thus characteristics specific to the multiple set (e.g., gender combination of the set, outcome of the set, birthweight differences among set mates) are not available. Over 98 percent of records were matched. Included on the file are 325,516 sets of twins; 12,157 sets of triplets; and 760 sets of quadruplets. The dataset allows researchers to investigate such topics as the viability of multiples by gender of the set and birthweight discordance among set mates. The data set will be expanded to include 2001 and 2002 events, when the 2001 and 2002 cohort linked birth/infant death data sets are available.

Investigator(s): Joyce Martin, Brady Hamilton, Candace Cosgrove, Martha Munson

Perinatal Mortality Research

In 2005, the Reproductive Statistics Branch formed a perinatal team to give further emphasis to the impact of fetal mortality in examining adverse pregnancy outcomes. Recent events such as the 2002 increase in infant mortality and its relationship to increases in very low birthweight births, and the establishment of the Stillbirth Collaborative Research Network by NICHD in 2003 have pointed out the importance of including fetal mortality analyses in examining adverse pregnancy outcomes. The team is currently working on a report entitled "Fetal and Perinatal Mortality, United States, 2003" which will be available later this year, and will serve as the model for an annual report on this topic.

Investigator(s): Marian MacDorman, Fay Menacker, Joyce Martin, Donna Hoyert, Sharon Kirmeyer, Martha Munson, Brady Hamilton

Cesarean delivery

Research on the factors affecting cesarean delivery patterns as well as vaginal birth after previous cesarean delivery (VBAC) has been intensified in recent years, in response to the steep rise in cesarean delivery (including primary cesareans) and the plummeting of the VBAC rate. A recent NIH State-of-the-Science Conference, "Cesarean Delivery on Maternal Request," included a major presentation by RSB analysts and an academic colleague that provided the statistical data foundation for this conference. The ongoing research within RSB has focused on

identifying the medical and obstetric risk factors that might be associated with these trends and assessing the extent to which the trends vary for women with and without these risk factors. Two journal articles have recently been published on the results to date in the *British Medical Journal* and the *American Journal of Public Health*.

Investigator(s): Fay Menacker and Marian MacDorman

SIDS and related conditions

Research on SIDS and related conditions is currently focused on explaining recent trends in SIDS and in examining certification practices related to SIDS. Two journal articles have been completed on this topic and published recently in *Pediatrics* and in the *American Journal of Epidemiology*. With regard to certification practices, we are pursuing the development of a special database for SIDS and related conditions that would exploit the literal text from SuperMICAR data entry.

Investigator(s): Marian MacDorman, Robert Anderson, Donna Hoyert

Analysis of 2001-2002 infant mortality increase

In 2005, an in-depth research effort was initiated by RSB to examine the reasons for the increase in the US infant mortality rate from 6.8 per 1,000 live births in 2001 to 7.0 in 2002. The linked birth/infant death data set was used to conduct more detailed analyses of infant mortality patterns than is possible using the main mortality file. We found that the increase in infant mortality was primarily due to an increased number of infants born weighing less than 750 grams in 2002. The majority of infants born at this birthweight die in infancy, thus these births contribute disproportionately to the overall infant mortality rate. Factors which may have contributed to the increase included: possible changes in the reporting of births or fetal deaths, possible changes in the risk profile of births, and possible changes in medical management of pregnancy. These findings were released in a recent NCHS report (http://www.cdc.gov/nchs/data/nvsr/nvsr53/nvsr53_12.pdf) and also published in the *International Journal of Health Services* (see references below). RSB staff continue to monitor these trends in more recent data, and are especially focusing on changes in the reporting of births and fetal losses at the limits of viability.

Investigators: Marian MacDorman, Joyce Martin, T.J. Mathews, Donna Hoyert, and Stephanie Ventura

Birth outcomes for single- and multiple-race mothers

In accordance with revised race and ethnicity standards issues by the Office of Management and Budget in 1997, a number of states have started to report multiple-race birth certificate data (i.e., more than one race for mother and father) beginning in 2003. The impact of this change in the reporting of race is not well understood. Consequently, basic research comparing demographic and health characteristics of births for mothers who report more than one race with mothers who report only one race is being conducted to determine any differences in characteristics. A forthcoming report will present the findings of this research.

Investigator(s): Brady Hamilton

Cohort Fertility Tables for Black Women

Cohort fertility tables present fertility rates for a group of women, born in a given year or group of years as they progress through their childbearing years. The National Center for Health Statistics has published cohort fertility tables by race only for white and “all other” women. Development of cohort fertility tables for black women was undertaken because the cohort fertility tables for “all other” women, which has been used as a proxy measure for black women, did not represent the fertility experience of this group over time, as the percent of “all other” women who were black has declined, primarily due to increases in immigration of Asian women whose fertility is different than that of black women. These tables will provide a more accurate measure of cohort fertility rates for black women in the United States. The new data series will be issued on CD-ROM.

Investigator(s): Brady Hamilton, Candace Cosgrove, Stephanie Ventura

Enhancing Internet Access to Vital Statistics Data

RSB staff members have spearheaded the Division of Vital Statistics’ effort to select and implement tools for disseminating vital statistics online. This activity was inaugurated by an NCHS-wide committee comprised of data access experts, subject matter experts, and public information experts, and concluded with the recommendation that Beyond 20/20 be used as the basis for this effort to expand our electronic data dissemination capabilities. The DVS site will have two new functionalities: a mapping capability and the ability to share extracts of the data for further user manipulation. The launch of this effort will be based on birth certificate data. Subsequent expansion will include mortality data as well.

Investigator(s): Paul Sutton, T.J. Mathews

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Appendices

Appendix A. Standards and procedures for cause of infant death coding and tabulation

Mortality statistics including infant mortality statistics published as part of the NVSS are coded in accordance with World Health Organization (WHO) regulations, which specify that member nations classify and code causes of death in accordance with the current revision of the *International Classification of Diseases* (ICD). The ICD provides the basic guidance used in virtually all countries to classify and code causes of death. Effective with deaths occurring in 1999, the United States began using the Tenth Revision of this classification (ICD-10).

The ICD not only details disease classification but also provides definitions, tabulation lists, the format of the cause of death section of the death certificate, and the rules for coding cause of death. The WHO has provided a mechanism for updating the classification from time to time through the Update and Revision Committee (URC) and the Mortality Reference Group (MRG). DVS staff members participate on both of these groups. As a result of the periodic updates (minor changes are made annually and major changes every three years), NCHS publishes updated versions of the ICD-10 tabular list (Instruction Manual Part 2e, volume 1 - <http://www.cdc.gov/nchs/data/dvs/Volume-1-2005.pdf>) and index (Part 2e, volume 3 - <http://www.cdc.gov/nchs/data/dvs/Volume-3-2005.pdf>) on an annual basis.

Cause-of-death data for infants presented in NVSS publications are coded by procedures generally outlined in Volume 2 of the ICD-10 and described in more detail in Instruction Manuals 2a (<http://www.cdc.gov/nchs/data/dvs/2a2005a.pdf>) and 2b (<http://www.cdc.gov/nchs/data/dvs/2b2005a.pdf>). These include rules for selecting the underlying cause of death for tabulation purposes, definitions, tabulation lists, and regulations on the use of the ICD.

These procedures and coding rules are incorporated into the Mortality Medical Data System (MMDS) software that automatically codes cause of death and selects the underlying cause of death for most deaths occurring in the U.S. The MMDS is described below.

Tabulation lists used in NVSS publications are shown in Instruction Manual Part 9 (http://www.cdc.gov/nchs/data/dvs/im9_2002.pdf.pdf). Part 9 includes tabulation lists consistent with the WHO requirements as well as lists intended solely for use with U.S. data. The list of 113 selected causes of death, the most commonly-used tabulation list for U.S. mortality data, is one such list.

Appendix B. Description of the automated coding systems (MMDS)

Since 1968, NCHS has used computer software to carry out some of the coding of causes-of-infant death in its mortality statistics program. Currently, in the U.S. a suite of software developed by NCHS and named the Mortality Medical Data System (MMDS) is used to code cause of death for most of the death records registered in the U.S.

There are three main software applications that comprise the MMDS suite. A description of each of them follows:

SuperMICAR

SuperMICAR automates data-entry and medical cause-of-death data processing. This includes reporting procedures, full-screen data entry and editing, and additional information processing (see Instruction manual Part 2s (<http://www.cdc.gov/nchs/data/dvs/2s2005.pdf>)). SuperMICAR is designed to automatically encode medical cause-of-death data into numeric entity reference numbers (ERNs). SuperMICAR output is used by later programs to classify causes of death to their International Classification of Death (ICD-10) codes.

MICAR200

Automates the multiple cause coding rules (see Instruction manual Part 2b (<http://www.cdc.gov/nchs/data/dvs/2b2005a.pdf>)) and assigns ICD codes to each entity.

ACME/TRANSAX

Applies World Health Organization (WHO) rules to the ICD codes determined by MICAR200 and selects an underlying cause of death (see Instruction Manuals Part 2a (<http://www.cdc.gov/nchs/data/dvs/2a2005a.pdf>) and 2c (<http://www.cdc.gov/nchs/data/dvs/2c2005.pdf>)). It also facilitates the tabulation and use of multiple cause-of-death data. Through the application of the ICD linkage and modification rules, the TRANSAX part of the software translates the axis of classification from an entity to a record base – a format more suitable for statistical analysis.

DVS staff in the Mortality Medical Classification Branch (MMCB) currently maintain the MMDS and provide updates and technical support to domestic and international users of the software.