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# Linking WIC Program Data to Medicaid and Vital Records Data

## Phase II Report, Data Development Initiatives for Research on Food Assistance and Nutrition Programs— Final Report

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### Abstract

This report is a followup to a proposal to create a national database that links State data from the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) with Medicaid and vital records data. The linked information would create new opportunities for Federal and State program administrators, as well as independent researchers, to examine a number of factors related to program participation and dynamics. The report provides an implementation plan for creating a national database, including potential costs, benefits, and alternatives. The initiative is one of three that have the potential to improve the usefulness and cost-effectiveness of research on Federal food assistance and nutrition programs. The other initiatives are addressed in the reports, *Linking the Current Population Survey to State Food Stamp Program Administrative Data* (E-FAN-04-005-1) and *Establishing a Web-Based Data Collection System for National School Lunch and National School Breakfast Program Data* (E-FAN-04-005-3).

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The opinions expressed and conclusions drawn in this report are the responsibility of the author, and do not represent the official views of Economic Research Service other government agencies, Health Systems Research, Inc. or The Urban Institute, which acted as the prime contractor for this effort with ERS.

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## I. Overview

The purpose of this initiative is to create a national database containing information regarding WIC participant health outcomes and participation in the Medicaid program by encouraging State WIC agencies to link WIC, Medicaid, and vital records data. The initiative proposes to take advantage of advances made by States in conducting and using linked WIC, Medicaid, and vital record data for program planning and evaluation. This initiative is designed to identify potential experts in record linkage, create models by which record linkages can take place, and provide technical assistance and support to interested States to facilitate the process of linking these data sets. The long-term goal is to have in place a nationally representative database of linked WIC, Medicaid, and vital record data that can be accessed by both researchers and program administrators.

This report is a follow-up to Wittenburg, et al. (2001), which included a summary of ten data collection/enhancement initiatives that have the potential to improve the utility and cost-effectiveness of research on federal food assistance and nutrition programs. Economic Research Service (ERS) selected three initiatives from that report for further development. This report, along with Wittenberg, et. al (2002) and Kenyon, et al. (2002), provide a specific implementation plan, including potential costs, benefits, and alternative options, for the three initiatives selected by ERS.

Data currently collected by WIC, Medicaid and vital records would be linked and aggregated to create a nationally representative database containing information on the demographic characteristics, services provided to, and health outcomes of WIC participants. State-level merged data sets of this sort would be combined into a single federal-level database enabling both state program administrators and program researchers to do a much better job of monitoring outcomes for WIC clients, identifying gaps in program participation and services, and helping to better direct resources to improve health outcomes.

USDA places a high priority on well-designed outcome studies for the WIC program, focusing on the program's health outcomes. In the past, the Food and Nutrition Service (FNS) has funded several important studies using linked WIC and health records at the individual level, and FNS officials continue to regard well-designed outcome studies using this approach as an important evaluation tool. In addition, individual States have increasingly recognized the importance of conducting outcome studies of WIC participants linking WIC data with Medicaid and vital records data, both to identify health outcomes related to WIC participation, and to assess program participation dynamics and targeting of high-risk clients.

In the past, the costs of producing a new record linkage from scratch for each evaluation effort have been substantial. To overcome this shortcoming, this initiative proposes to begin regular and more widespread development of a type of data resource whose value has been well demonstrated. This initiative is consistent with information obtained through key informant interviews with State WIC officials and FNS staff, both

of which indicated that future WIC research will need to focus on developing appropriate outcome measures that describe the effectiveness of WIC program participation.

The initiative proposes to create a nationally representative database composed of WIC client demographic, nutritional risk, birth outcome, and health services data obtained from the States' WIC program files; vital records data obtained through state birth registries; and data on Medicaid participation accessed through the state's Medicaid agency. By linking WIC and vital records data, one can establish a database containing pregnancy and birth outcome information not available on the WIC record alone (such as APGAR, complications of delivery, etc). In addition, by linking the WIC record with vital records, the database can then be used to link the mother's record with the child's. Because the WIC program enrolls children separately from their mom, this link cannot often be established from the WIC record alone. Linking WIC and vital records data has become easier as State vital records programs begin implementing the new national model birth certificate, which has a field for capturing WIC participation. By adding Medicaid participation to the database, the potential exists to examine both WIC participant access to health care and health status information of children through data obtained from Medicaid services files, such as those contained in the Early and Periodic Screening, Diagnosis, and Treatment (EPSDT) program.

These data can be used by program administrators at the federal and state level, as well as independent researchers, to examine a number of factors related to program participation and dynamics. For example, the proposed database could be used to examine trends in birth outcomes of WIC mothers, assessments of the impact of WIC participation on Medicaid births, and to identify target populations that are likely to be eligible for WIC services but not being reached by the WIC program.

## II. Background

Since its inception, the WIC program has been viewed as a nutritional program designed to be an adjunct to the health care delivery system. The WIC program is the only food assistance program administered by State health departments. Over the years, local WIC programs have been encouraged (and in some cases, required) to refer low-income women and children to health care services. Among the types of services to which WIC clients have been historically referred are prenatal care, well baby checks, the Medicaid program, and immunization services.

Data from the WIC program have been linked to data from the Medicaid program in the past. For example, in 1986 the State of Missouri became one of the first States to examine the effect of WIC participation on the Medicaid costs related to the delivery and care of newborns by matching Medicaid claims records with WIC administrative records (Schramm, 1986). In addition, the Missouri WIC Program has continued to use linked WIC, Medicaid, and vital records data to produce annual reports on the status of WIC participants participation in Medicaid, examine prenatal pregnancy outcomes of WIC participants, and examine the extent to which WIC has provided coverage to high-risk infants (Stockbauer, 1996). The linkage of WIC program data with Medicaid and vital records information has proven so valuable to Missouri officials, they continue to link these records to produce annual reports from these linked data. Sample reports provided to HSR by Missouri officials reflecting data analyzed from 1997-2000 are included in Appendix B.

Additional research conducted in 1999 by the North Carolina Department of Health, examined how WIC and Medicaid data could be linked to examine birth outcomes of Medicaid clients on WIC as compared to those not enrolled in WIC (Center for Infomatics and Health Statistics, 1999). In another use of this type of linkage, data have been linked between the WIC program and vital records in Washington State to check for the possibility of dual participation by WIC clients (Bell, et. al. 2001)

A variety of other researchers have used WIC, Medicaid, and vital records data to conduct both state-level research and research in local WIC programs in order to examine outcomes. Researchers have found that by linking WIC records with vital records data, mothers can be linked with their children to examine birth outcomes based on such variables as number of prenatal care visits, demographic data, income data, and pregnancy weight gain. For example, the 1987 national WIC evaluation linked WIC records with birth outcomes in order to determine the impact of WIC participation on birth outcomes (U.S. Department of Agriculture, Food and Nutrition Service, 1987). However, in each case, individual researchers were required to negotiate with individual state programs to access data from these three sources. These researchers were then responsible for linking the files, and creating a usable database. Currently, there is no single representative database that researchers can access to conduct research on WIC outcomes, program participation, and program dynamics using data from these three sources.

Additional research conducted using linked WIC, Medicaid, and vital records data include:

- Utilizing WIC, Medicaid, and vital records data from 1985 to 1997, the Illinois Department of Human Services conducted a study of the effect of multiple program participation on birth outcomes (Durkee, 1999)
- In 2000, the South Carolina Department of Health and Environment conducted a study of immunization coverage using linked WIC, Medicaid, and vital records data (South Carolina Department of Health and Environment, 2000)
- A study published in the March 2002 American Journal of Public Health used linked WIC, Medicaid, and vital records data to examine improved health of children at Medicaid managed care sites with WIC providers on location (Kendal, et.al. 2002)

Because all three files are rich in client-level data, such a database would allow for better descriptions of WIC participants and provide an ongoing capability to evaluate WIC in relation to various prenatal, post-partum, and child health program objectives. By developing and updating a database that is readily available to researchers, USDA can create a data file that can be used to examine client demographic contributions (age of mother, weight gain, use of prenatal care, breastfeeding status, race and ethnicity, etc.) to a number of health outcomes, such as mother's weight gain, birth weight of children, pregnancy complications, APGAR scores, and nutritional risks of the pregnant woman and child. In addition, participation in the Medicaid program will help to examine such issues as access to preventative health services, immunization status, and ongoing utilization of health care services. Further, since nutrition and health services are complementary services that work together to improve health outcomes for infants and children, these linked data will be very useful in better understanding the relationships between maternal and child health and nutrition services, food assistance, and health outcomes.

### III. Initiative Summary

#### A. Structure and Content

This initiative proposes to create a national database of linked WIC, Medicaid, and vital records data. The database will be created by asking States to link a single month WIC participation data with data from the States' Medicaid program, and for infants and children, with the States birth registry. To ease the reporting burden for States, it is proposed that the WIC data used for the linkage be the same data that are reported for the required WIC program characteristics data set.

The database itself will contain information from all three data sources. While the exact structure and number of variables included in the database will need to be developed as a part of this initiative, the number and type of variables available are impressive. Some of the potential variables available from each data set are described below. A detailed listing of variables contained in the WIC and vital records files are contained in Appendix C.

- ***Client Demographic Information.*** Information regarding client demographics are numerous. From all three files, data can include date of birth, race/ethnicity, and sex. The WIC files contain such demographic information as migrant status, family income, and certification category. From the vital records data, additional demographic data are available, including mother and father's education level, number of live births, and parents birthplace. In addition information in the vital records system includes the status of such risk factors as tobacco use during pregnancy and alcohol use during pregnancy.
- ***Client Services Information.*** The database will provide information regarding the client's access to health care service through information regarding the geographic location of service providers and the number of visits to the providers. From the WIC record, information is available regarding the location of the WIC service site. From the vital records data, information is available on the county of residence, the location of the delivery, the type of services provided the mother (including amniocentesis, ultrasound, etc) and the number of pre-natal visits. From the Medicaid records, information is available regarding the location of the Medicaid service provider, and the number and types of EPSDT visits for children.
- ***Client Health Outcome Information.*** The WIC record will provide information regarding the WIC priority level, nutritional risk(s) present at certification, anemia status, weight, height, and breastfeeding status. The vital records data will provide such basic information as the weight and length of the infant and the APGAR score, as well as information such as complications of labor and delivery, method of delivery, medical risk factors for the mother, abnormal conditions of the newborn. Through the Medicaid EPSDT records,

information is available about the immunization status of the child, the number and type of screenings, information regarding lead poisoning, and information regarding hearing loss.

While this is not intended to be a complete list of all the variables available, nor is it a set of specific variable recommendations, it does show the type of database that can be created from the linked records. The variables included in the final database will likely need to be prioritized in order to capture data of most interest to federal and State researchers.

The basic procedure for the initiative will have five steps, which will be detailed in section V. These steps will include:

- Using the experience of those States that have linked WIC, Medicaid, and vital record data, the initiative proposes to Develop Federal guidelines for data sharing, data abstraction, and data linkages. This will include the development of a model data linkage file, a hierarchical database, and protocols for linking the data.
- Developing the format and structure of the national database, including the list of variables, reporting methods, sampling techniques, access protocols, and data file updating and storage.
- Recruit States and provide assistance with creating the linked data set . This would be accomplished by having the State first linking the WIC records with vital records, and then linking the combined file to the State's Medicaid records. This will also involve having the States strip individual client identifying information from the files.
- Extracting a nationally representative sample from the linked state-level data, and entering it into a national database.
- Storing the national database in an accessible file that will be made available to Federal and State officials, as well as program researchers.

## B. Importance for Research and Administrative Purposes

As was noted above, linking WIC, Medicaid and vital records data will provide a significant source of information on WIC program outcomes, program participation and program dynamics. In addition, by linking data from the national database with files containing health outcomes of individuals not participating in the WIC program, researchers will be able to compare the outcomes of WIC clients with those who did not participate in the program. Also, because the State agency will be creating the initial links, each State will have its own database that can be used to evaluate program participation and outcome objectives. A discussion of these advantages is presented below.

1. Advantages of the single federal database.

By having the single federal database containing linked information about WIC clients, federal officials and researchers will be able to examine the health outcomes of WIC clients, examine program participation dynamics related to joint WIC/Medicaid enrollment, and conduct trend analyses of WIC health outcomes over time. Each of these advantages is discussed below.

- A, *Development of a single data source that can be used to track the health outcomes of WIC participants.*** The creation of a single data set containing the linked information can be used to track a number of health outcomes of WIC clients. Researchers will have access to a national database to examine trends in program outcomes and conduct very specific research studies. For example, if a researcher wanted to conduct a study of the birth outcomes of overweight women participating in the WIC program, the linked data set would contain this information.

This is a significant improvement over the current system. Under the current system, the only national data set available on WIC clients is the minimum data set required by FNS for the program characteristics study. These data only provide access to an individual participant's basic program data, and the data can not link the mother to the child to evaluate outcomes.

Under the proposed initiative, the data that will be available for each WIC client will be significantly larger than the current minimum data set. More importantly, the proposed national database. will contain information about both the mother to the child, thus allowing researchers to examine pregnancy factors as they might related to birth outcomes. In addition, the linked data will allow researchers to not only examine national trends, but compare outcomes between States and regions as well.

Having the national database of linked WIC /Medicaid/Vital Records data avoids the pitfall of the current system for conducting research studies, which must rely on multiple data collection efforts that are geared to the specific research or program management objectives. The initiative provides a far more cost-effective approach to conducting research and program administrative activities than currently exists.

- B. *The ability to track the health outcomes of WIC participants.*** As noted above, by linking the WIC participant's record to the birth record and Medicaid file, information about the mother and child is created. One can then use the proposed database to examine contributing factors of the mother's health status on the birth outcome of the child. For example,

once could examine the birth outcomes of women with various nutritional risks to possibly identify those risks for which WIC participation seem to have little impact on positive birth outcomes.

In addition, information is available to assess the impact of Medicaid participation on WIC birth outcomes as compared to those not participating. For example, if one wanted to compare the impact of Medicaid participation on birth outcomes of WIC children, the database would contain information about WIC infants and moms who participated in Medicaid, and those who did not.

- C. ***The ability to conduct trend analysis.*** The national database will allow for researchers to conduct trend analysis of the WIC population over time. By updating the file every two years, any trends in program participation and health outcomes can be examined by comparing data from prior years, and by updating prior files.

In addition, the national database would allow researchers to compare trends between States. This may be useful in examining the impact of outreach campaigns or other targeted efforts that may occur in one state, but not in another. In addition, trend analysis can be conducted based upon the priority status of the WIC participant, which would then allow an examination of the WIC program's impact on various risk groups.

2. ***Advantages of having a database that can be linked to data regarding persons not participating in the WIC program.***

One of the key research questions regarding the WIC program has been the question related to whether or not program participation makes a difference in health outcomes. The national database of linked WIC/Medicaid/vital records data is a major step in creating a research database that will allow some of these questions to be addressed. While data regarding persons who do not participate in the WIC program will not be available in the national database, the initiative makes it much easier to obtain information about non-participants. This is done by making it simpler for researchers and State officials to create a database of non-WIC participants for comparison purposes.

For example, because each state will link their own data, it will be easy for a researcher to have access at the same time to an individual State's vital records data with WIC participants already extracted. A researcher could simply request these data from either the WIC State Agency or the State Vital Records office once the linkage was complete. The researcher could then compare the health outcomes of individuals who did not participate in WIC with those in the national database.

In addition, by creating a single, data-rich file, the newly created database can potentially be linked to data from other national surveys, other data files maintained by

state and local governments (food stamp administrative files, TANF files, etc.), or data files maintained by Federal agencies such as the Centers for Disease Control and Prevention (nutrition surveillance files). Data from these files could be used to track outcomes beyond those reported in the WIC/Medicaid/vital records files. For example, through linkages with the CDC pediatric and maternal nutrition surveillance systems, additional information about the nutritional status of clients can be obtained. However, because only 44 states participate in the nutrition surveillance system, data would be limited in scope.

**3. *Advantages to State WIC Agencies in using the Database to identify gaps in program practices.***

Since the individual States will be linking the three data sets, they will be able to maintain a complete data set of their own linked data for use at the State level. There are major benefits that can accrue to State WIC agencies by having a linked database of their own WIC clients available for research and program evaluation purposes. For example, by linking the data from the three files, issues related to the relative health outcomes of persons of color, persons living in rural areas, or adolescents can be assessed and new program interventions can be devised to better serve these clients. Data on these demographic factors can then be used to target specific outreach efforts. In addition, the data can be used to expose gaps in program coverage by identifying Medicaid births in geographic areas where mothers did not receive WIC services, or the extent to which WIC children may be eligible for Medicaid coverage, but are not enrolled. An example of how the State of Missouri used these linked data to examine whether the WIC program was reaching the highest risk clients is provided in Appendix D.

As can be seen, there are a number of advantages to a national linked WIC/Medicaid/vital records database. In addition to having a significant advantages over the existing system of collecting WIC data for research purposes, a number of potential research questions can be addressed by this initiative. These include:

- Because the database will contain information that allows the infant to be linked to the mother, one can examine the extent to which various maternal health and demographic factors contribute to the health outcome of the infant. For example, one can ask “Is there any association of various nutritional risk factors (such as obesity) of the mother that may influence birth outcomes of WIC participants?”
- By linking Medicaid enrollment data with WIC participation data, one can address the question “How does participation in both WIC and Medicaid impact birth outcomes as compared to participation in only one of the two programs?”
- By linking WIC data with data available in the Medicaid files (such as EPSDT data) one can answer the question “What are some of the health outcomes of WIC participation on children as compared to children participating in the EPSDT program, but not participating in the WIC program?”

- With the combined WIC/Medicaid data in a single database, one can examine the extent to which WIC clients are served by the Medicaid program. This has been an important issue for State health departments that have been conducting strong outreach programs to reach children without health insurance.
- By having data available on the risk status of the mother and infant, and combining these data with vital records data, one can examine the extent to which low-income mothers of high-risk infants participated in the WIC program.

These are just some of the research questions that can be answered at the national level by utilizing the database proposed in this initiative. As was noted earlier, States can use the information that will be available to examine program participation dynamics, conduct demographic analysis of various groupings of WIC clients, and compare outcomes across states.

## IV. Overview of the Implementation Plan

This section introduces the proposed methodology for developing the initiative to create a national research database linking WIC, Medicaid and vital records data. Specifically, it provides information about the key individuals that will need to be involved in the initiative, an overview of the activities that must take place, and potential implementation barriers.

It is very important to note that the success of this initiative is dependent on a significant amount of “up-front” work on the part of federal and State officials. By bringing together experts in the area of data linkages, persons with experience using linked WIC data for research purposes, and experts in maternal and child health, a number of difficult factors can be dealt with in advance of presenting the initiative to the States. Specific challenges that can be mitigated by such up-front cooperation and deliberation are discussed in Section C.

### A. Description of Key Actors

When designing an initiative that involves programs administered through two Federal Departments and three separate state-level agencies, it is critical to identify key players for both the design and oversight of the initiative as well as the implementation phase. This initiative is designed to bring together experts from the key federal and state agencies, as well as national organizations representing State agencies, for the design and oversight portion of the project. Once the implementation phase begins, additional actors will become involved, as State WIC programs work with their Medicaid and Vital Records directors to coordinate data merging and submission. Specific actors and their roles include:

#### 1. USDA Staff

Staff from USDA will be responsible for coordinating this initiative and providing guidance to other key players. Specifically, staff from USDA will be responsible for:

- Identifying key Federal and State officials to participate in the planning and oversight of the initiative;
- Conducting meetings with key constituent and oversight groups in order to develop and implement the initiative;
- Developing, in conjunction with HHS officials, the model data sharing agreement by which the individual programs in each state (WIC, Medicaid, Vital Records) can share their data with one-another.
- Develop the sampling plan for data collection;

- Identifying the key data elements that will be included in the database, and developing the database structure;
- Identifying appropriate methods by which data can be linked and submitted to USDA or other appropriate Federal agency;
- Testing the linkage methodologies, data base development, and data submission protocols;
- Obtaining OMB clearance, if necessary;
- Providing technical assistance to States during the implementation phase of the project;
- Making the database accessible to researchers and State agency officials; and
- Overseeing quality control and storage of the data.

2. Officials from the Department of Health and Human Services.

Because this initiative utilizes data from three different sources, it will be important for officials located within the Department of Health and Human Services to be involved in this project. Specifically, it will be important to have representatives from the National Center for Health Statistics and the Health Care Financing Administration involved in the project. In addition, USDA may wish to involve officials from the Maternal and Child Health Bureau, as they have experience with using Medicaid and vital records data for evaluation purposes. The specific activities in which these federal officials will be involved include:

- Assisting USDA officials with providing overall guidance to State agencies;
- Helping to draft a model data sharing agreement for use by State programs;
- Participating in oversight committee meetings during the development and implementation phase; and
- Providing support and assistance to USDA and State agencies in order to resolve issues that may arise during the testing and implementation phases.

It is important to note that funding issues will likely arise from these meetings. It is anticipated that there will be interest on the part of HHS officials in being able to utilize this database to promote research into achieving such departmental objectives as the Healthy People 2010 goals. In addition, during the 2000 federal fiscal year, the Maternal and Child Health Bureau funded grants to State health departments and research institutions to examine methods by which public health programs could overcome racial/ethnic disparities in access to health care. A number of these grantees proposed

developing links between WIC program data and vital records/Medicaid data (MCH Bureau grant announcements, 2001). It therefore will likely be prudent to include in the discussions between HHS and USDA the notion of joint funding of this initiative.

### 3. Representatives from State Associations of Program Directors.

In order to gain the cooperation of State officials, it will be critical to involve representatives from each of the three programs in the early developmental stages of this initiative. Each of the three programs involved have associations composed of State program directors. Asking each of these three associations to participate in the developmental stages will be key to gaining state support during the testing and implementation phases. Specific responsibilities of the State association representatives will include:

- Providing advice and technical consultation to Federal officials during the developmental stages of the initiative;
- Attending meetings of the developmental and oversight committees in order to represent the interests of State officials;
- Provide feedback to State officials through the normal channels used by the associations for communicating with their membership; and
- Providing support to the federal agencies during the testing and implementation phases of the initiative.

### 4. State Program Directors

Much of the testing and implementation of this initiative will be the responsibility of the State WIC directors and their counterparts in the Medicaid and Vital Records programs. It is assumed that the State WIC programs will take the lead in coordinating state-level activities, including developing data sharing agreements, arranging for obtaining data from the other two programs, conducting the data merge, and submitting data to USDA. Specific responsibilities include:

- Developing data sharing agreements with State Medicaid programs and offices administering the State's vital records ;
- Implementing the database structure to be compatible with the State's WIC data system so data can be merged;
- Conduct the data merge and create the datafiles for submission;
- Obtain State-level clearances required by State human subjects review committees;

- Conduct data quality edits and updates prior to submission of data; and
- Submission of data to USDA

## B. Overview of Activities

On the surface, this initiative seems feasible because it requires no new data collection on the part of State agencies. However, because this initiative requires the cooperation of so many agencies and officials, it will require a significant amount of preliminary activities, planning, and testing prior to implementation. This initiative will likely take from two to two and one-half years to implement. Detailed tasks involved in the planning and implementation of this initiative are contained in Section V.

It is envisioned that the initiative will be developed and implemented in three phases. These phases include:

- A preliminary phase that will bring together all of the major players in the initiative and develop a shared vision of the project, its goals, and its methodology. The preliminary phases will require that officials both agree to cooperate with the initiative and commit to providing their time and expertise in the developmental and implementation phases.
- A developmental phase, in which after all parties agree to the value of pursuing the initiative, the basic logistical and technical issues will be developed. This phase will include the development of model data sharing agreements, identification of data elements and development of the basic database that will be created for the merged data set, development of the data merging protocols and the programs necessary to implement the data merge, and development of quality control, data access, and data storage protocols. Activities will need to occur at both the State and Federal level during this phase, and by its end the mechanisms should be in place to begin testing and implementation of the initiative.
- An implementation schedule, which will begin with testing the developed data merging protocols, database integrity, and the data submission protocols. Refinements will need to be made once the initial testing is complete, and a second round of testing will be likely. Once the testing phase is complete, and implementation schedule will need to be developed and submitted to the States.

Much of the time-consuming work will be involved in the developmental phase, and will involve obtaining agreement and cooperation from the multitude of Federal and State officials involved. In addition it will be important to provide States WIC officials with assurances that this initiative will not be a significant added burden to their workload.

In order to properly implement this initiative, a steering committee will need to be organized to oversee each of the phases of the initiative, and, at times, may involve different individuals depending upon the task being undertaken. For example, while a State WIC director may wish to participate in the preliminary and planning phases, they may wish to have a technical person participate in activities involving the development of the database structure and data merging activities. Therefore, it is envisioned that a steering committee to oversee the phases will be developed, some of the players may change as the initiative progresses.

### C. Potential Barriers to Implementation

Some limitations and potential difficulties in developing this initiative also need to be considered before deciding to proceed.

1. ***The Complexity of the Data Links.*** While it has been noted previously that several States have been successful in linking WIC, Medicaid, and vital records data, this is still a complex process when expanded across all States. This initiative proposes to use the expertise of numerous individuals who have had experience in linking data files to both develop the content and structure of the database as well as develop the protocols for linking the data. Because data can not be linked through a single identifier, an algorithm utilizing demographic information will be used to create the links. The algorithm will need to be tested and refined prior to utilizing it as the method by which files will be linked in each State. Once in place, however, the future data links should be much easier to accomplish.

One other factor must also be considered, which is the technical feasibility of State systems to link the records. It is important to note that States are consistently refining their State WIC program data systems, and, in many cases, have included systems by which linking WIC with Medicaid and vital records data will be easier. For example, North Carolina, South Carolina, California, Massachusetts, and Illinois identify Medicaid participation in their WIC files. Recent RFPs for North Dakota, Iowa and Maryland propose to capture data to improve linkages. We believe that improvements in State data systems, including the movement to Internet-based systems, will make the feasibility of data linkages easier.

2. ***Obtaining the Cooperation of State Agencies.*** State agency's initial reaction to this initiative may be to express concerns regarding the perceived burden they will incur to make the initiative successful. However, it must be noted that given the interest expressed by State officials regarding the importance and need for outcome information regarding WIC program participation and program dynamics, the existing system places a far greater burden on States than would a structure approach proposed in this initiative. The number of States that currently

link data further supports this. Under the existing system, data are collected and used for a single individual study. This means that any time additional information is needed, or additional research projects are funded, States must undergo the burdensome process of cooperating with the new study. By conducting a data linkage every two years, as proposed in this initiative, multiple research projects can be undertaken by federal and state officials, without requiring state cooperation and involvement in each individual research effort.

3. ***Overcoming Administrative Barriers.*** One of the key implementation parameter to consider in terms of project time and effort needed to enact this initiative is the fact that there are both technical and administrative pieces requiring time and effort on the part of those involved. In most cases, the technical components will likely be less difficult to design and implement in comparison to the time-consuming administrative process that will be necessary to obtain cooperation and approval from all of the key players. As was noted earlier, the up-front efforts to develop this initiative are critical to its acceptance and success. It is anticipated that there will need to be a review of the initiative's progress at different stages to decide if full implementation is still possible, or if alternatives will need to be considered
  
4. ***Limitations of Vital Records Data.*** Vital records data reflect only the births within a given State, so some WIC and Medicaid data will not be able to be linked to these data. In the studies cited earlier in the States of Missouri and North Carolina, the main reason cited for non-matching records was the fact that some WIC infants were born out-of-state, and therefore were not included in the vital records database. While both North Carolina and Missouri showed relatively high match rates (over 95%), this may be more problematic in States with more migrant populations.
  
5. ***Creating Data Sharing Agreements.*** One of the key issues identified by State WIC agencies in trying to link data records is the need to develop data sharing agreements. This is particularly important since the passage of the Health Insurance Portability and Accountability Act of 1996 (HIPAA), which enhances privacy, rights of individuals receiving health care. The custodians of the WIC, Medicaid, and vital records data all face limitations as to how their data can be used, and by whom. However, States are addressing this issue through the modification of existing data sharing agreements. For example, the Massachusetts WIC and Medicaid programs recently worked with their Attorney General's office to revise their data sharing agreement to address HIPAA concerns. Both Missouri and Iowa are currently working on revising data sharing agreements and

consent forms to allow for the continued linkage of WIC, Medicaid and vital records data.

It would be very helpful to States for USDA to take the lead in working with States who successfully addressed the HIPAA issues to develop model data sharing agreements. This initiative envisions USDA working with selected States, along with several divisions of the Department of Health and Human Services on this initiative. These players would include the National Center for Health Statistics, the Health Care Financing Administration, and the Maternal and Child Health Bureau. While the idea of cooperation between the two departments is reasonable, the resulting need to coordinate may slow the process down.

6. ***Use of Managed Care Plans by State Medicaid Agencies.*** Because some State Medicaid programs use managed care plans for delivering health services, there will be limited encounter data available on individual client medical visits. Traditional Medicaid encounter data includes information on the type of services provided to the client. However, because managed care plans are not required to bill for individual visits, the specific encounter data is usually not available in the State's Medicaid data file. Researchers would still be able to use Medicaid enrollment data to examine program participation and dynamics issues. In addition, most states required managed care plans to report on certain basic health services, such as EPSDT services, pre-natal care information, and the immunization status of children enrolled in the plan. This information would be useful in examining some of the program outcomes of interest to USDA. Finally, as was demonstrated in the Detroit study, linkage of managed care data and WIC data with birth records can also examine birth outcomes in managed care settings as compared to traditional primary care providers.
7. ***Client Confidentiality Issues.*** There may be concerns expressed by individual State WIC Directors with regard to client confidentiality. This is likely to be a result of traditional concerns combined with HIPAA regulations. It is important to note that this initiative proposes to strip off any client identifying information prior to making the data available for research purposes. This issue must be addressed when the data sharing agreements noted above are developed by the individual states. In addition, we propose to develop model data sharing agreements and consent forms that can address HIPAA issues, which will help States to overcome administrative barriers associated with client confidentiality. It is important to note that the data being asked for from the WIC program is data that is already collected and submitted to USDA for the WIC Program Participant Characteristics database. While the linkages with vital records and Medicaid may result in additional concerns, the fact that

several states currently or in the recent past have overcome privacy issues should be considered encouraging and not insurmountable.

## V. Description of Specific Tasks

While the technology that would be used for linking the records from these three programs has been proven to be effective in a number of prior studies, there are a number of tasks that must take place that will require the cooperation of both Federal and State agencies. Below is an overview of each of the tasks, including a listing of proposed subtasks. In addition, at the end of each task is a summary of the cost information for that task. In order to be consistent with Kenyon, et. al (2001) and Wittenburg and Alderson (2001) we assume that each agency has three labor categories; Senior Manager, Senior Analyst, and Research Assistant. The Senior Manager category includes experts who have at least ten years of research and /or program experience. The Senior Analyst category includes researchers and technical staff that have between three to nine years of experience. The Research Assistant category includes individuals with limited experience.

Estimates for labor hours were derived from examining prior efforts to conduct data merges at the State level, prior experience of the principle investigator in implementing the WIC minimum dataset, and experience from other federal agencies conducting research with data merging. In particular, information provided by the Maternal and Child Health Information Resource Center, which is funded by the Bureau of Maternal and Child Health (HHS) and administered by HSR, was very helpful in estimating labor hours.

The following tasks are proposed for creating the database.

### **Task 1. Conduct Initial Meeting Among Federal Agencies**

One of the key issues that will need to be addressed by Federal and State officials is the need to develop data sharing agreements between the WIC Program, the State Office of Vital records, and the State Medicaid program. In order to facilitate this process, it is proposed that an initial meeting be conducted between representatives from USDA and those from offices within the Department of Health and Human Services responsible for the state-level programs included in this initiative. The meeting should include representatives from the National Center for Health Statistics (vital records), the Medicaid program, and possibly representatives from the Maternal and Child Health Bureau.

The purpose of this initial meeting would be to brief the representatives from these agencies on the proposed initiative and request their involvement and cooperation. A number of products could come from this meeting, including a joint letter of agreement supporting the initiative that could be shared with State agencies, a working “steering committee” to help oversee the implementation, and a sample data sharing agreement that could be used by States to meet both federal and state data confidentiality requirements.

Subtasks:

- Identify potential participants to be included in initial meeting.
- Prepare summary of project and distribute to invited participants.
- Conduct meeting.
- Identify committee to prepare model data sharing agreement.
- Prepare and distribute model data sharing agreement

Federal Costs:	\$12,056
State Costs:	0
<b>Total Task Cost:</b>	<b>\$12,056</b>

**Task 2. Conduct a Series of Meetings with State Program Representatives and steering committee members.**

Once there is agreement among the Federal Agencies, the next task would be for USDA to conduct a meeting with representatives from each of the three State programs involved in this initiative. This meeting would be with representatives from the National Association of WIC Directors, The National Association of State Registrars, and the National Association of State Medicaid Directors. The purpose of the meeting would be to provide information about the initiative, gain their support and cooperation with the initiative, and develop a workgroup to help oversee the implementation process and solve problems as they occur. It will be critical to have support and input from these agencies as the initiative progresses.

At this meeting, it will be important to identify a core group of State and Federal staff who can serve as a steering committee for the project. The committee should represent all of the major players in the initiative. This committee will have responsibility to oversee both the developmental and testing phase of the project, as well as the implementation of the national database.

Subtasks:

- Identify and invite participants to initial meeting.
- Prepare and distribute background materials to meeting participants.
- Conduct meeting and develop Steering Committee for ongoing oversight of the initiative.

- Prepare joint letter to State Health Departments and Medicaid Agencies from committee describing the initiative and requesting State agency support.
- Conduct additional Steering Committee meetings as the project progresses.

Federal Costs:	\$39,772
State Costs:	\$17,627
<b>Total Task Cost:</b>	<b>\$57,399</b>

**Task 3.        Develop a Nationally Representative Sample Plan**

Deciding on how to construct the sample frame for the database will require considerable thought on the part of USDA and other federal officials. While developing sample frames for national studies are not new, the fact that the ultimate goal is to link the data with other participant databases may provide for opportunities not commonly considered in developing samples. In the case of this initiative, the sample will be designed to allow for both state-level analysis of data as well as national research. This means that a larger number of WIC participants will be included in the sample than if the purposed was to examine national issues alone.

Another key issue that will need to be decided is at what point during WIC participation the record should be entered into the database. While the database should be representative of women, infants and children enrolled in WIC, there may need to be some consideration given to the age of the child and length of participation prior to inclusion. For example, if a four-year old is added to the file, and then data are linked, there will be more data available for that child than a two-year old. However, if the four-year old is only recently enrolled in WIC, then there will be less WIC data available than for a two-year old that has participated since birth. This may mean that the sample may need to be controlled for the child’s age and length of participation.

Once these decisions are made, the sample can be drawn. The sample frame will need to be constructed using data currently available in the participant characteristics study, but actual data to complete the sample will need to be obtained from the State WIC program participant database.

Subtasks:

- Identify model and structure for national sample that includes the ability to examine state-level data.
- Develop sampling plan for national data collection.

- Develop State-by-State sample requirements to assure validity of State-level data.
- Prepare and submit sampling plan to oversight committee for review.

Federal Costs:	\$7,599
State Costs:	\$2,820
<b>Total Task Cost:</b>	<b>\$10,419</b>

**Task 4. Create the Database Structure for Data to be Linked.**

This next step will require that the specific data elements to be contained in the database be identified, and a database be constructed in a form that allows for analysis. The database structure would be hierarchical, creating a header record that links all data back to a family unit tied to the mother. Then separate detail records are created containing information about the mother and child, including the health status of the mother and pregnancy information, birth outcome data, and information about the child. The database should be large enough to capture the essential demographic components of the WIC participant, as well as health outcome information contained in the records. For example, the WIC record for a pregnant woman will contain both demographic information as well as health outcome information such as weight gain during pregnancy and nutritional risk factors. The birth certificate information will also contain numerous demographic data for the baby’s parents, as well as information about the pregnancy. The Medicaid record will also contain information about health care utilization, such as prenatal care visits.

As a result, the database structure will need to be carefully constructed in order to recognize duplicate information that will be available from each of the three files. For example, in the case of a pregnant woman, it is likely that all three files will contain information regarding her age, racial or ethnic identification, weight gain during pregnancy, and other demographic and service-related factors. The database will need to be structured in such a way that duplications can be recognized and inconsistencies resolved.

Additional consideration will need to be made when linking the child’s file to the mother’s. The database will need to be structured in such a way that individual information about the parent and child can be extracted for research purposes. At the same time the data file must be able to create associations between the mother’s pregnancy, the birth outcome, medical participation and ongoing WIC participation.

In implementing this task, it would be advisable to develop a participatory process that would include representatives from the federal and state agencies involved, as well as independent researchers. Having this type of input may make it easier to construct a workable database as well as avoid pitfalls that other researchers may have experienced.

Subtasks:

- Identify key data elements to be included in the merged database, including the development of consistent data definitions and acceptable ranges of values;
- Identify potential duplications of data that will need to be resolved through edits;
- Identify an appropriate structure for the database, including the structure of the hierarchical database, how to display family data within the hierarchical structure, and how the overall structure of the database can be made user-friendly
- Develop security and access protocols for the database; and
- Develop methods by which client identifiers are stripped from the records prior to submission to USDA.

Federal Costs:	\$19,514
State Costs:	\$0
<b>Total Task Cost:</b>	<b>\$19,514</b>

**Task 5. Create the Protocols for Linking the Three Databases.**

Once the sampling method is developed, the next step is to develop the protocols that will be used to link the WIC record with the Medicaid and vital record information. This can be done using a number of methods. Because the data files contain a significant amount of demographic data about the clients, matches can be created by identifying common demographic characteristics. As has been noted, matching WIC records with birth records has been successfully accomplished in the past, and would likely be the first two databases to be linked. For example, the WIC, Medicaid, vital records links that occurred in the Missouri studies accomplished a 93.6% linkage in 1994 and a 95% linkage rate in 1997. In some cases, records can be linked if the mother's social security number is available. However, in most cases, WIC programs do not collect social security numbers, so matching will need to take place using demographic data such as name, birthday, date of delivery, and other client demographic data.

After a combined WIC/birth record match has been established, the next step is to determine whether or not the individual WIC participant also is enrolled in Medicaid. This can be done by matching the newly linked database to the state's Medicaid enrollment file. The newly created database will then have information as to whether the participant was enrolled in Medicaid or not. This will allow for outcome comparisons of WIC clients who are enrolled in Medicaid as compared to those who are not. In addition,

some States will have information on services provided through the Medicaid program, such as the immunization status of children or the prenatal visits of the mother, can be captured and analyzed.

Subtasks:

- Examine prior efforts to link the three databases and develop a range of specific protocols and algorithms that will be considered for developing model methods for data linkages;
- Develop a technical panel to review the prior efforts and make recommendations as to the best protocols to recommend and implement; and
- Prepare a document that provides guidance to State agencies on the best methods by which data can be linked.

Federal Costs:	\$16,667
State Costs:	\$17,627
<b>Total Task Cost:</b>	<b>\$34,294</b>

**Task 6. Develop Access Protocols and Guidelines for Removing Client Identifying Information**

The next step will be to develop recommended protocols for remove identifying information about the client and develop methods by which researchers will be able to gain access to the database. In addition, decisions will need to be made about how often to update the database. To provide quality information, it is recommended that the database be updated at least every two years with new data. The updating procedure should be able to be linked with the prior database in order to update client records, and allow for tracking of certain clients over time. By using the birth record number as an identifier, information about the delivery of pregnant women included in the prior database can be updated. The resulting file will then be available for research purposes. It is recommended that the database be maintained by and made available through USDA.

Subtasks:

- Identify key client identifiers that must be removed from the database in order to ensure client confidentiality;

- Review methodologies used in prior studies linking data from these sources to develop the best method by which to remove client identification information; and
- Develop a method by which dummy client identifiers can be inserted so comparisons can be run once the data are linked.

Federal Costs:	\$5,558
State Costs:	\$4,230
<b>Total Task Cost:</b>	<b>\$9,789</b>

**Task 7. Test the Protocols for Data Linkage Integrity and Database Functionality.**

One of the key elements of this initiative will be to test the protocols that have been developed by asking a limited number of States to create a linked database using the developed protocols. In order to avoid having to obtain clearance from the Office of Management and Budget during this test phase, it is recommended that fewer than nine states be selected to test the protocols. The States selected for the test should be ones that have had experience linking their WIC files with Medicaid and vital records data. Each State would be asked to develop their data sharing agreements and then follow the linkage protocols developed by USDA. These data would be submitted to USDA electronically and placed into the newly designed database. Once the data were in place, tests should be run on the data to assess the functionality of the database and query software.

Subtasks:

- Identify testing methods and protocols;
- Identify States that have linked records in the past, and would be willing to test the data merge protocols;
- Develop and implement data sharing agreements in the selected States;
- Run test data linkages in each State and submit data to trial database;
- Develop and test query software on the sample database; and
- Review results of the testing and make appropriate adjustments to the data collection and merger protocols and/or query software.

Federal Costs:	\$32,861
State Costs:	\$48,448

<b>Total Task Cost:</b>	<b>\$81,309</b>
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**Task 8. Revise Protocols Based Upon Test Results.**

After completion of the testing, the protocols may need to be revised to incorporate lessons learned. Once the protocols are revised, it is recommended that representatives from the nine test states review the protocols to be sure they are still functional and have not created any new problems.

Federal Costs:	\$8,521
State Costs:	\$4,230
<b>Total Task Cost:</b>	<b>\$12,715</b>

**Task 9. Prepare OMB Clearance Package.**

It is not known whether or not this initiative will require clearance from the Office of Management and Budget (OMB), but because data are being merged from different Federal programs, it is assumed that such clearance will be required. Upon completion of the testing phase, the next step will be to request clearance from OMB to collect data from all the States that will be included in the sample. This package should emphasize that these data are already being collected by State agencies, and the linking of these existing database will lessen State-level burdens when conducting future research on WIC outcomes.

Subtasks:

- Prepare Federal Register notice of data collection;
- Prepare and submit OMB clearance package; and
- Make revisions to clearance package as required by OMB.

Federal Costs:	\$6,742
State Costs:	\$0
<b>Total Task Cost:</b>	<b>\$6,742</b>

**Task 10. Implement the Initiative on a National Level.**

Once OMB clearance is granted, the next step will be to implement the initiative on the national level. It will be important for there to be technical assistance available to States during the first year in order to help them with implementing the protocols. Each

State would complete the data linkage, and then submit the sample data to USDA. Once the file is complete, USDA will need to clean and edit the file, and then can prepare a public access file for use by researchers.

Subtasks:

- Develop time table for full implementation of the initiative;
- Notify States of timetable and submission requirements;
- Ensure that proper data sharing agreements are in place within each State;
- Ensure that appropriate data collection and merge protocols are in place;
- States WIC program obtain Medicaid and Vital Record data and complete data merge;
- Run State-level edits to remove duplicate information and clean data;
- Submit Data to USDA;
- Edit and clean data at Federal level; and
- Implement query software and make data available to researchers

Federal Costs:	\$44338
State Costs:	\$175,552
<b>Total Task Cost:</b>	<b>\$219,860</b>

## VI Summary of Costs and Schedule

Table 1 below summarizes the cost of the initiative to the government. Costs include both Federal and State loaded labor costs and estimates of other direct costs.

**Table 1. Summary of Costs of Base Initiative by Government Agency**

Agency	Total Cost
Federal	\$193,628
States	\$270,204
<b>Total</b>	<b>\$463,832</b>

*Table 2* summarizes the schedule and estimated cost for each of the proposed tasks described in *Section V*. A detailed itemization of the estimated costs for each task in the Base Initiative is presented in Appendix A. A detailed itemization of the estimated costs for each alternative task is presented.

**Table 2. Summary by Proposed Task of Schedule and Estimated Cost**

<b>Task</b>	<b>Description</b>	<b>Duration of Activity</b>	<b>Estimated Cost</b>	<b>Estimated Cost of Alternative</b>
<u><b>Task 1</b></u> Conduct Initial Meeting among Federal agencies	Identify officials and HHS and invite them to initial meeting	Month 1	\$12,506	N/A
<u><b>Task 2</b></u> Conduct Meetings with State program representatives	Identify representatives from State program directors associations and invite them to participate in initiative	Months 2-3	\$57,399	N/A
<u><b>Task 3</b></u> Develop the sampling plan	Develop the plan by which the number of WIC participants will be selected for inclusion in the database	Months 3-6	\$10,419	N/A
<u><b>Task 4</b></u> Create the database structure	Develop the overall structure for the national database	Months 3-7	\$19,514	N/A
<u><b>Task 5</b></u> Create data linkage protocols	Develop methods for States to use in order to ensure quality protocols for linking data.	Months 7-10	\$34,294	N/A
<u><b>Task 6</b></u> Develop access protocols and guidelines for removing client identifying information	Develop methods by which researchers will be able to access data and client identification information will be removed	Months 7-10	\$ 9,789	N/A
<u><b>Task 7</b></u> Test protocols for data linkage integrity and database functionality	Conduct tests of the data linkage protocols and the database functionality in no more than 9 States	Months 8-12	\$81,309	N/A
<u><b>Task 8</b></u> Revise protocols based upon test results	Make revisions to protocols based upon problems or issues identified in the test phase	Months 13-15	\$12,751	N/A
<u><b>Task 9</b></u> Prepare OMB clearance package	Prepare any required clearances	Months 16-18	\$6,742	N/A
<u><b>Task 10</b></u> Implement Initiative on national level	Schedule and implement initiative at the national level	Months 20-24	\$157,965	N/A

## VII. SUMMARY OF INITIATIVE ALTERNATIVES

In order to accomplish development of a national research database that can be used to measure WIC program outcomes and participation dynamics at both the Federal and the State level, there are very little in the way of alternatives. The obvious alternative would be to maintain the present system, where each individual State may chose to link records to measure program outcomes, or the Federal government can conduct a national study using linked records as was done in the national WIC program evaluation.

The only real alternative that might accomplish some or all of the goals of this initiative would be to limit the data linkage to just WIC and Vital Records, and not including Medicaid. The justification for this might be that Vital Record database often contain sources of payment for pre-natal care and delivery, which would include Medicaid. If these data were available, one could compare WIC clients who claimed to be on Medicaid with those that did not report Medicaid as a source of payment.

There are two major problems with this approach. First, not all States require local hospitals to report source of payment, and those that do may not always know at the time of delivery that Medicaid is paying for the services. It is unknown how often this field is left blank by hospital staff, but discussions with two State registrars indicated that both find source of payment data in the vital records system to be unreliable. By cross-linking the WIC and vital records data with the Medicaid data, a more accurate picture of Medicaid participation can be developed.

The second problem with this approach is that there would be a missed opportunity to obtain data that would be valuable in measuring WIC program outcomes and/or participation dynamics. States that still use fee-for-service billing can provide both encounter data and service data in order to determine which services WIC participants are seeking, and often can provide data on the outcome of those services. Even with States that are using managed care plans, and not collecting encounter data, there are still opportunities to capture data on such services as EPSDT, pre-natal care and immunizations. It would seem valuable to have this third source of data on WIC participants to accurately compare outcomes and program dynamics of participants that use Medicaid as compared to those who do not.

As a result, this initiative has not provided a cost estimate for this alternative.

## VIII References

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## **Appendix A: Detailed Cost Assumptions**

## Appendix A: Detailed cost Assumptions for Specific Tasks

This section describes each task and the assumptions used to determine the number of hours for each labor category. In this section, we describe the distribution of labor and activities within each task across the key actors. *Table A-1* shows the labor and non-labor detail associated with Tasks 1-5, and *Table A-2* presents detailed cost information for tasks 6-10. In the paragraphs that follow, we discuss the cost assumptions for each specific task. Tables A-1 and A-2 are included as a separate Excel spreadsheet.

Cost estimates were developed using a list of hourly wage rates established by Economic Research Service (ERS) from existing projects for each of our three labor categories and a review of similar projects that HSR has performed of this type. Again, these estimates are for illustrative purposes as the actual number of data elements to be included in a core data set have not yet been determined. USDA may choose to contract out some or all of these activities and take on more or less responsibility for these tasks. A decision to implement these tasks within USDA may require additional “subtasks,” depending on the level of expertise within USDA. Additional assistance may be needed from Department of Health and Human Services agencies, such as staff from the Bureau of Maternal and Child Health. These kinds of additional tasks are not considered “in scope” for purposes of costing this initiative.

### **Task 1: Conduct Initial Meeting Among Federal Agency Staff**

#### **Federal Responsibilities**

USDA will coordinate an initial meeting between representatives from the National Center for Health Statistics, The Health Care Financing Administration, and possibly the Bureau of Maternal and Child Health. The purpose of this meeting to agree upon the scope of the initiative, solicit support from the Federal agencies involved, and identify staff to serve on a future steering committee.

**Estimated Time Requirements:** It is estimated that a one-day meeting would occur involving officials from the above organizations, with a series of follow-up meetings to occur based upon discussions at the first meeting. A total of 60 hours of Senior Management time is allocated for two individuals from USDA to attend the meetings. An additional 80 hours are allocated for three representatives from HHS (one from each agency) to attend the meetings and for USDA staff to prepare briefing materials. Sixteen hours of Research Assistant time is allocated for assisting with preparation of briefing materials, attending the meeting as a note-taker, and preparing a summary report.

A modest amount of local travel funds are included for officials to attend the meetings.

#### **State Responsibilities**

None in the Task

## **Task 2: Conduct Meetings with State Representatives.**

### **Federal Responsibility**

This task will require that USDA coordinate a series of meetings with Federal Steering committee members and representatives State programs. It was assumed for budget purposes that five meetings would take place over the project year, and additional conference calls as necessary.

**Estimated Time Requirements:** The budget allots time for three USDA representatives, two HHS representatives, and four State officials to serve on the steering committee. A total of 80 hours of Senior Manager time has been allocated for attending the five meetings and doing preparation work. Eighty hours of Senior Analyst time has also been allocated for attending meetings and overseeing the preparation of materials. Research analyst time has also been allocated to prepare materials. As was true in Task 1, a modest amount of local travel funds are included. However, it is also assumed that the Federal government will pay for the cost of State representatives to attend the Steering Committee meetings. As a result, a total of \$24,000 has been allocated for State program director travel. This number is based upon an average cost of \$1200 per trip, for four individuals attending five meetings.

### **State Responsibility**

It is assumed that a total of four State representatives will be involved in the initial meeting and on the Steering committee. These will include two WIC program representatives, one Vital Records representative, and one Medicaid program representative. These officials will help to guide the project, provide input on products developed, and present their State-level perspective to the committee.

**Estimated Time Requirements:** It is estimated that a total of 100 hours Senior Manger and 100 Hours of Senior Analyst time will be devoted to this project. It is unknown if State officials will select program directors, technical staff , or a combination of both to serve on the committee.

## **Task 3: Develop Sampling Plan**

### **Federal Responsibility**

It is assumed that the Federal Government will take the lead in developing the sampling plan.

**Estimated Time Requirement:** Based upon the amount of time needed to develop sampling plans for similar projects, a total of 20 Senior manager hours, 60 Senior Analyst hours, and 40 Research Analyst hours have been allocated.

### **State Responsibility**

It is assumed that State officials will be provided the opportunity to review the sampling plan and provide comments.

**Estimated Time Requirements:** A total of 16 hours Senior Manager and 16 hours Senior Analyst time have been allocated for review and comment.

**Task 4: Create the Database Structure**

**Federal Responsibility**

The Federal Government will take the lead on providing the staff work for developing the database structure for the initiative, with a review role for State officials. This task involves identifying the basic data elements that will be included in the database. In addition, this task will involve technical staff working to identify the appropriated database software to utilize, developing the structure for the database, and creating consistent data definitions.

**Estimated Time Requirements:** A total of 32 hours of Senior Manager time is allocated to oversee the process. A total of 200 hours of Senior Analyst time, mostly that of technical staff, is allocated to develop the database. An additional 80 hours of Research Analyst time is allocated to research how States have built their linked databases in the past and to assist with the technical work involved in building the database .

**State Responsibility:**

A total of 80 hours has been allocated to Senior Management and another 80 hours allocated to Senior Analyst to review and comment on the database structure.

**Task 5: Create Data Linkage Protocols.**

**Federal Responsibility**

As was true in Task 4, the Federal Government will take the lead in developing the data linkage protocols. However, USDA staff should be able to take advantage of technology developed by State Agencies who have linked these data sources, and other Federal agencies that have worked with linking Medicaid and Vital Records data.

**Estimated Time Requirement:** A total of 40 hours of Senior Management time has been allocated to review the protocols, once developed. A total of 120 hours of Senior Analyst and 120 hours of Research Assistant time has been allocated to review prior methodologies and protocols used for linking data, and develop a recommended set of protocols for the steering committee to review.

**State Responsibility**

In order to take advantage of existing State expertise in this area, a total of 100 hours of Senior Manager and 100 hours of Senior Analyst time has been allotted for State officials to collect and provide information to Federal staff on prior methodologies.

**Task 6: Develop Access Protocols and Guidelines for Removing Client Identifying Information.**

**Federal Responsibility**

The Federal Staff will take the lead in this task by developing guidelines for data access that meet the needs of the two Federal Agencies involved. In addition, Federal staff will be responsible for identifying appropriate protocols to allow for a consistent method of eliminating any client identification information from the database.

**Estimated Time Requirement:** A total of 16 hours of Senior Manager time is allocated to review and approve the protocols. Forty hours of Senior Analyst time is allocated to develop the protocols, and 32 hours of Research Analyst time is allocated to research and resolve technical issues related to requirements that may be unique to one of the three Federal programs.

**State Responsibility**

States will need to review the protocols that are developed in order to be sure that there are no problems with State regulations regarding client confidentiality. To this end, State associations may play a valuable role in circulating the proposed protocols and soliciting State program director comments.

**Estimated Time Requirement:** A total of 24 hours Senior Manager time and 24 hours Senior Analyst time is allocated for the State associations to circulate the protocols and collect comments from State agencies.

**Task 7: Test Protocols For Data Linkage Integrity and Database Functionality**

**Federal Responsibility.**

This task will require significant cooperation between Federal officials and States who volunteer to test the data linkage protocols. This task is essentially the pilot test of all the materials developed to this point. The Federal government will take the lead in recruiting up to nine States that will test the protocols, and will provide technical assistance to the States to resolve any problems. In addition, once the pilot test is complete, the Federal government staff will be responsible for re-drafting the protocols based upon the experience of the pilot.

In addition to testing the data linkage protocols, Federal officials will also test the database functionality. This will involve developing the query software, loading the data from the pilot sites into the database, and running sample queries and reports. Adjustments will then be made to the database and the query software once this test is complete.

**Estimated Time Requirements:** It is assumed that a significant amount of time will need to be devoted to testing the database and supporting the State linkage effort. A total of 80 hours of Senior Manager time has been allocated to oversee the testing, identify need resources for technical assistance, and examine the utility of the database. A total of 200 hours of Senior

Analyst and 200 hours of Research Assistant time is allocated to construct the queries, test the database, assess State needs for technical assistance and support, and provide assistance to the nine States.

### **State Responsibility**

The State WIC Program managers, along with their counterparts in Medicaid and vital records, will be taking the lead role in creating the data linkages. It will be their responsibility to put in place data sharing agreements, collect the data from the Medicaid and Vital Records programs, run the linkage protocols, and submit the data to the Federal government.

**Estimated Time Requirements:** A total of 180 hours of Senior Management (most likely State WIC Director) time is allocated to develop the data sharing agreements and oversee the implementation of the data linkage. A total of 300 hours of Senior Analyst time is devoted to actually collecting the data, implementing the protocols, and running the programs. A total of 120 hours of Research Assistant time is devoted to assisting the Senior Analyst with conducting the tests and troubleshooting programming problems.

### **Task 8: Revised Protocols Based Upon Test Results**

#### **Federal Responsibility**

Federal officials will revise the data linkage protocols, the database structure, and the query programs based upon the input from the test States.

**Estimated Time Requirements:** A total of 40 hours has been allocated to all three labor categories to make the necessary revisions to the protocols, database, and query software.

#### **State Responsibility**

State officials will provide input to potential solutions proposed by USDA.

**Estimated Time Requirements:** A total of 24 hours of Senior Manager and 24 hours of Senior Analyst time has been allocated to review and comment on the revised protocols.

### **Task 9 Obtain OMB Clearance**

#### **Federal Responsibility.**

USDA will be responsible for developing and publishing the Federal Register Notice and preparing the OMB clearance package for submission.

**Estimated Time Requirements:** Based upon agency experience in develop these packages, a total of 24 hours Senior Management review time has been allocated. A total of 40 hours Senior

Analyst and 40 hours Research Assistant time has been allocated to prepare the notice and OMB package.

### **State Responsibility**

None.

## **Task 10      Implement Initiative on National Level**

### **Federal Responsibility**

After OMB clearance is obtained, USDA officials, along with their Federal HHS partners, will implement the sampling plan in the rest of the states. Federal officials will be responsible for providing technical assistance to State officials regarding the implementation of the protocols and use of the database.

**Estimated Time Requirements:** A total of 40 hours of Senior Management hours have been allocated to oversee the implementation. An additional 500 hours of Senior Analyst time is allocated to provide technical assistance to States needing help in implementing the project. An additional 200 hours of Research Analyst time is allocated to support the technical assistance effort and coordinate State requests for assistance.

### **State Responsibility**

States will assume responsibility for implementing the data sharing agreements and conducting the data linkages. It is assumed that much of the work will have already been accomplished through the testing phase, and the only resource needs State officials will require is initial support in implementing the linkage protocols.

Estimated Time Requirements. An average total of 40 hours of Senior Analyst and 40 hours of Research Assistant time have been allocated to each of the 42 States that will be implementing the data linkages. These hours will be used to support State level efforts to implement the protocols and adjust for unique needs that may occur. It is assumed that some states that have worked with these types of linkages before will not need as many hours, while others may need far more. However, it is the assumption of this initiative that the work conducted in Tasks 4-7 will reduce the amount of work required by the State agencies, as the protocols will have been tested and implemented in up to nine States. This is a significant cost to the States, and would likely need to be supported

**Table A-1**  
**Estimates of Task Cost**  
**Data Development Initiative**  
**Creating a National Research Database using WIC, Medicaid, and Vital Records Data**  
**Tasks 1-5**

Federal Costs											
		Task One		Task Two		Task Three		Task Four		Task Five	
Labor Categories	Assumed Rates	Total Hours	Total Dollars								
Senior Management	\$111.19	60	\$6,671	80	\$8,895	20	\$2,224	32	\$3,558	40	\$4,448
Senior Analyst	\$65.08	80	\$5,206	80	\$5,206	60	\$3,905	200	\$13,016	120	\$7,810
Research Assistant	\$36.75	16	\$588	40	\$1,470	40	\$1,470	80	\$2,940	120	\$4,410
<b>Total Labor</b>		<b>156</b>	<b>\$12,466</b>		<b>\$15,572</b>		<b>\$7,599</b>		<b>\$19,514</b>		<b>\$16,667</b>
<b>Other Direct Costs</b>											
Travel			\$40		\$24,200		\$0		\$0		\$0
Software			\$0		\$0		\$0		\$0		\$0
Data Storage			\$0		\$0		\$0		\$0		\$0
<b>Total Other Direct Costs</b>			<b>\$40</b>		<b>\$24,200</b>		<b>\$0</b>		<b>\$0</b>		<b>\$0</b>
<b>Total Cost</b>			<b>\$12,506</b>		<b>\$39,772</b>		<b>\$7,599</b>		<b>\$19,514</b>		<b>\$16,667</b>
State Costs											
		Task One		Task Two		Task Three		Task Four		Task Five	
Labor Categories	Assumed Rates	Total Hours	Total Dollars								
Senior Management	\$111.19	0	\$0	100	\$11,119	16	\$1,779	0	\$0	100	\$11,119
Senior Analyst	\$65.08	0	\$0	100	\$6,508	16	\$1,041	0	\$0	100	\$6,508
Research Assistant	\$36.75	0	\$0		\$0	0	\$0	0	\$0	0	\$0
<b>Total Labor</b>		<b>0</b>	<b>\$0</b>	<b>200</b>	<b>\$17,627</b>		<b>\$2,820</b>		<b>\$0</b>		<b>\$17,627</b>
<b>Other Direct Costs</b>											
Travel							\$0				\$0
Software							\$0				\$0
Data Storage							\$0				\$0
<b>Total Other Direct Cost</b>			<b>\$0</b>								
<b>Total Cost</b>			<b>\$0</b>		<b>\$17,627</b>		<b>\$2,820</b>		<b>\$0</b>		<b>\$17,627</b>
<b>Total Cost- Federal and State</b>			<b>\$12,506</b>		<b>\$57,399</b>		<b>\$10,419</b>		<b>\$19,514</b>		<b>\$34,294</b>

**Table A-2**  
**Estimates of Task Cost**  
**Data Development Initiative**  
**Creating a National Research Database using WIC, Medicaid, and Vital Records Data**  
**Tasks 6-10**

Federal Costs		Task Six		Task Seven		Task Eight		Task Nine		Task Ten	
		Total Hours	Total Dollars	Total Hours	Total Dollars	Total Hours	Total Dollars	Total Hours	Total Dollars	Total Hours	Total Dollars
<b>Labor Categories</b>	<b>Assumed Rates</b>										
Senior Management	\$111.19	16	\$1,779	80	\$8,895	40	\$4,448	24	\$2,669	40	\$4,448
Senior Analyst	\$65.08	40	\$2,603	200	\$13,016	40	\$2,603	40	\$2,603	500	\$32,540
Research Assistant	\$36.75	32	\$1,176	200	\$7,350	40	\$1,470	40	\$1,470	200	\$7,350
<b>Total Labor</b>		<b>88</b>	<b>\$5,558</b>		<b>\$29,261</b>		<b>\$8,521</b>		<b>\$6,742</b>		<b>\$44,338</b>
<b>Other Direct Costs</b>											
Travel			\$0		\$0		\$0		\$0		\$0
Software			\$0		\$2,400		\$0		\$0		\$0
Data Storage			\$0		\$1,200		\$0		\$0		\$0
<b>Total Other Direct Costs</b>			<b>\$0</b>		<b>\$3,600</b>		<b>\$0</b>		<b>\$0</b>		<b>\$0</b>
<b>Total Cost</b>			<b>\$5,558</b>		<b>\$32,861</b>		<b>\$8,521</b>		<b>\$6,742</b>		<b>\$44,338</b>
<b>State Costs</b>		<b>Task Six</b>		<b>Task Seven</b>		<b>Task Eight</b>		<b>Task Nine</b>		<b>Task Ten</b>	
<b>Labor Categories</b>											
Senior Management	\$111.19	24	\$2,669	180	\$20,014	24	\$2,669	0	\$0	40	\$4,448
Senior Analyst	\$65.08	24	\$1,562	300	\$19,524	24	\$1,562	0	\$0	1680	\$109,334
Research Assistant	\$36.75	0	\$0	120	\$4,410	0	\$0	0	\$0	1680	\$61,740
<b>Total Labor</b>		<b>48</b>	<b>\$4,230</b>	<b>600</b>	<b>\$43,948</b>		<b>\$4,230</b>		<b>\$0</b>		<b>\$175,522</b>
<b>Other Direct Costs</b>											
Travel			0		\$0		\$0		\$0		\$0
Software			0		\$4,500		\$0		\$0		\$0
Data Storage			0		\$0		\$0		\$0		\$0
<b>Total Other Direct Cost</b>			<b>\$0</b>		<b>\$4,500</b>		<b>\$0</b>		<b>\$0</b>		<b>\$0</b>
<b>Total Cost</b>			<b>\$4,230</b>		<b>\$48,448</b>		<b>\$4,230</b>		<b>\$0</b>		<b>\$175,522</b>
<b>Total Cost- Federal and State</b>			<b>\$9,789</b>	<b>\$81,309</b>	<b>\$12,751</b>	<b>\$6,742</b>	<b>\$219,860</b>				



## **Appendix B: Sample Missouri Reports Using Linked Data**

**(Source—Missouri WIC Program)**

Live births, WIC and Medicaid prenatal participation and  
Overlap by resident county  
Final 1997 Missouri resident data

County of residency	Live Births	Prenatal Medicaid	Prenatal WIC	Prenatal WIC and Medicaid	Prenatal Medicaid and not WIC	Prenatal WIC and not Medicaid	Medicaid status unknown	WIC status unknown	Percent Prenatal Medicaid	Percent Prenatal WIC	Percent WIC and Medicaid	Percent Medicaid Not WIC	Percent WIC Not Medicaid	Percent Medicaid on WIC
***	1	0	0	0	0	0	1	1	0.00	0.00	0.00	.	.	.
ADAIR	256	105	100	82	23	18	1	1	41.02	39.06	32.03	21.90	18.00	78.10
ANDREW	183	65	66	54	11	12	2	2	35.52	36.07	29.51	16.92	18.18	83.08
ATCHISON	54	16	27	15	1	12	14	14	29.63	50.00	27.78	6.25	44.44	93.75
AUDRAIN	308	123	122	100	23	22	4	4	39.94	39.61	32.47	18.70	18.03	81.30
BARRY	454	229	240	205	24	35	58	58	50.44	52.86	45.15	10.48	14.58	89.52
BARTON	182	95	101	83	12	18	6	6	52.20	55.49	45.60	12.63	17.82	87.37
BATES	218	109	115	95	14	20	24	24	50.00	52.75	43.58	12.84	17.39	87.16
BENTON	149	101	96	88	13	8	1	1	67.79	64.43	59.06	12.87	8.33	87.13
BOLLINGER	117	61	68	54	7	14	1	1	52.14	58.12	46.15	11.48	20.59	88.52
BOONE	1761	537	441	348	188	93	30	31	30.49	25.04	19.76	35.01	21.09	64.80
BUCHANAN	1091	579	531	482	97	49	18	18	53.07	48.67	44.18	16.75	9.23	83.25
BUTLER	514	332	327	298	34	29	3	3	64.59	63.62	57.98	10.24	8.87	89.76
CALDWELL	100	48	50	42	6	8	2	2	48.00	50.00	42.00	12.50	16.00	87.50
CALLAWAY	484	181	178	147	34	31	3	3	37.40	36.78	30.37	18.78	17.42	81.22
CAMDEN	299	168	148	130	38	18	2	2	56.19	49.50	43.48	22.62	12.16	77.38
CAPE GIRARDEAU	774	287	305	238	49	67	3	3	37.08	39.41	30.75	17.07	21.97	82.93
CARROLL	122	73	76	66	7	10	1	1	59.84	62.30	54.10	9.59	13.16	90.41
CARTER	87	52	55	48	4	7	0	0	59.77	63.22	55.17	7.69	12.73	92.31
CASS	1085	316	302	226	90	76	174	174	29.12	27.83	20.83	28.48	25.17	71.52
CEDAR	154	96	88	80	16	8	2	2	62.34	57.14	51.95	16.67	9.09	83.33
CHARITON	79	40	37	32	8	5	1	1	50.63	46.84	40.51	20.00	13.51	80.00
CHRISTIAN	682	234	237	183	51	54	4	4	34.31	34.75	26.83	21.79	22.78	78.21
CLARK	80	14	12	12	2	0	63	63	17.50	15.00	15.00	14.29	0.00	85.71
CLAY	2546	591	593	439	151	154	114	115	23.21	23.29	17.24	25.55	25.97	74.28
CLINTON	228	86	115	79	7	36	4	4	37.72	50.44	34.65	8.14	31.30	91.86
COLE	876	237	237	190	47	47	1	1	27.05	27.05	21.69	19.83	19.83	80.17
COOPER	196	81	78	63	18	15	4	4	41.33	39.80	32.14	22.22	19.23	77.78
CRAWFORD	333	172	195	152	20	43	0	0	51.65	58.56	45.65	11.63	22.05	88.37
DADE	75	37	35	28	9	7	0	0	49.33	46.67	37.33	24.32	20.00	75.68
DALLAS	208	97	103	80	17	23	0	0	46.63	49.52	38.46	17.53	22.33	82.47
DAVISS	120	64	71	60	4	11	0	0	53.33	59.17	50.00	6.25	15.49	93.75
DE KALB	105	47	54	40	7	14	0	0	44.76	51.43	38.10	14.89	25.93	85.11
DENT	183	117	113	100	17	13	0	0	63.93	61.75	54.64	14.53	11.50	85.47
DOUGLAS	149	99	97	88	11	9	1	1	66.44	65.10	59.06	11.11	9.28	88.89
DUNKLIN	493	345	354	321	23	33	68	69	69.98	71.81	65.11	6.67	9.32	93.04

Surrounding states do not have an item on their birth certificate on whether the mother was on Medicaid or WIC so Missouri counties adjacent to other states where a part of their population goes out of Missouri to deliver will have under reporting of WIC and Medicaid participation. This is most prevalent in the following counties: Clark, McDonald, Lewis, Ozark, Putnam, Pemiscot, Barry, Vernon, Dunklin, and Atchison run date 06/12/97 wicmedbth.sas

Live births, WIC and Medicaid prenatal participation and  
Overlap by resident county  
Final 1997 Missouri resident data

County of residency	Live Births	Prenatal Medicaid	Prenatal WIC	Prenatal WIC and Medicaid	Prenatal Medicaid and not WIC	Prenatal WIC and not Medicaid	Medicaid status unknown	WIC status unknown	Percent Prenatal Medicaid	Percent Prenatal WIC	Percent WIC and Medicaid	Percent Medicaid Not WIC	Percent WIC Not Medicaid	Percent Medicaid on WIC
FRANKLIN	1292	409	431	327	82	104	5	5	31.66	33.36	25.31	20.05	24.13	79.95
GASCONADE	180	68	79	59	9	20	0	0	37.78	43.89	32.78	13.24	25.32	86.76
GENTRY	79	41	45	36	5	9	0	0	51.90	56.96	45.57	12.20	20.00	87.80
GREENE	3011	1277	1233	1029	248	204	7	7	42.41	40.95	34.17	19.42	16.55	80.58
GRUNDY	129	73	76	67	6	9	1	1	56.59	58.91	51.94	8.22	11.84	91.78
HARRISON	80	45	47	40	5	7	11	11	56.25	58.75	50.00	11.11	14.89	88.89
HENRY	253	137	142	114	23	28	3	3	54.15	56.13	45.06	16.79	19.72	83.21
HICKORY	73	48	43	38	9	5	0	1	65.75	58.90	52.05	18.75	11.63	79.17
HOLT	48	28	30	24	4	6	0	0	58.33	62.50	50.00	14.29	20.00	85.71
HOWARD	115	44	43	36	8	7	2	2	38.26	37.39	31.30	18.18	16.28	81.82
HOWELL	477	276	327	261	15	66	11	11	57.86	68.55	54.72	5.43	20.18	94.57
IRON	130	83	90	76	7	14	0	0	63.85	69.23	58.46	8.43	15.56	91.57
JACKSON	9584	3713	3860	2940	766	918	870	875	38.74	40.28	30.68	20.63	23.78	79.18
JASPER	1552	822	817	676	146	141	7	7	52.96	52.64	43.56	17.76	17.26	82.24
JEFFERSON	2705	809	845	642	167	203	22	22	29.91	31.24	23.73	20.64	24.02	79.36
JOHNSON	610	209	294	178	31	116	17	17	34.26	48.20	29.18	14.83	39.46	85.17
KNOX	52	26	26	24	2	2	5	5	50.00	50.00	46.15	7.69	7.69	92.31
LACLEDE	404	206	206	169	36	37	0	1	50.99	50.99	41.83	17.48	17.96	82.04
LAFAYETTE	381	141	149	126	15	23	6	6	37.01	39.11	33.07	10.64	15.44	89.36
LAWRENCE	496	268	271	229	39	42	1	1	54.03	54.64	46.17	14.55	15.50	85.45
LEWIS	151	12	18	12	0	6	109	109	7.95	11.92	7.95	0.00	33.33	100.00
LINCOLN	507	204	197	153	51	44	1	1	40.24	38.86	30.18	25.00	22.34	75.00
LINN	183	101	104	91	10	13	2	2	55.19	56.83	49.73	9.90	12.50	90.10
LIVINGSTON	176	92	97	79	13	18	0	0	52.27	55.11	44.89	14.13	18.56	85.87
MACON	200	96	109	88	8	21	5	5	48.00	54.50	44.00	8.33	19.27	91.67
MADISON	149	84	110	84	0	26	1	1	56.38	73.83	56.38	0.00	23.64	100.00
MARIES	89	33	37	31	2	6	0	0	37.08	41.57	34.83	6.06	16.22	93.94
MARION	408	167	174	147	20	27	94	94	40.93	42.65	36.03	11.98	15.52	88.02
MCDONALD	327	96	104	89	7	15	166	166	29.36	31.80	27.22	7.29	14.42	92.71
MERCER	35	7	9	6	1	3	18	18	20.00	25.71	17.14	14.29	33.33	85.71
HILLER	323	170	166	139	31	27	1	1	52.63	51.39	43.03	18.24	16.27	81.76
MISSISSIPPI	197	141	141	127	14	14	9	9	71.57	71.57	64.47	9.93	9.93	90.07
HONITEAU	199	60	67	49	11	18	3	3	30.15	33.67	24.62	18.33	26.87	81.67
HONROE	110	38	49	34	4	15	9	9	34.55	44.55	30.91	10.53	30.61	89.47
MONTGOMERY	135	63	63	51	12	12	0	0	46.67	46.67	37.78	19.05	19.05	80.95
MORGAN	224	106	107	89	17	18	0	0	47.32	47.77	39.73	16.04	16.82	83.96

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NEW MADRID	287	190	195	167	23	28	14	14	66.20	67.94	58.19	12.11	14.36	87.89
NEWTON	682	356	370	314	42	56	7	7	52.20	54.25	46.04	11.80	15.14	88.20
HOOWAY	193	67	83	65	2	18	8	8	34.72	43.01	33.68	2.99	21.69	97.01
OREGON	114	74	87	70	4	17	8	8	64.91	76.32	61.40	5.41	19.54	94.59
OSAGE	178	33	43	30	3	13	1	1	18.54	24.16	16.85	9.09	30.23	90.91
OZARK	109	54	60	51	3	9	31	31	49.54	55.05	46.79	5.56	15.00	94.44
PEMISCOT	406	311	299	287	24	12	67	67	76.60	73.65	70.69	7.72	4.01	92.28
PERRY	244	101	113	92	9	21	4	4	41.39	46.31	37.70	8.91	18.58	91.09
PETTIS	550	276	282	240	36	41	4	3	50.18	51.27	43.64	13.04	14.54	86.96
PHELPS	430	221	229	193	28	36	0	0	51.40	53.26	44.88	12.67	15.72	87.33
PIKE	196	91	99	82	9	17	9	9	46.43	50.51	41.84	9.89	17.17	90.11
PLATTE	1006	182	179	128	53	51	99	100	18.09	17.79	12.72	29.12	28.49	70.33
POLK	329	135	135	108	27	27	1	1	41.03	41.03	32.83	20.00	20.00	80.00
PULASKI	609	206	359	176	30	183	6	6	33.83	58.95	28.90	14.56	50.97	85.44
PUTNAM	62	35	36	30	5	6	9	9	56.45	58.06	48.39	14.29	16.67	85.71
RALLS	89	35	31	28	7	3	13	13	39.33	34.83	31.46	20.00	9.68	80.00
RANDOLPH	331	187	211	174	13	37	2	2	56.50	63.75	52.57	6.95	17.54	93.05
RAY	290	122	120	106	16	14	7	7	42.07	41.38	36.55	13.11	11.67	86.89
REYNOLDS	70	47	54	42	4	12	0	1	67.14	77.14	60.00	8.51	22.22	89.36
RIPLEY	147	107	106	94	13	12	1	1	72.79	72.11	63.95	12.15	11.32	87.85
SALINE	251	125	132	108	17	24	1	1	49.80	52.59	43.03	13.60	18.18	86.40
SCHUYLER	64	43	46	39	4	7	2	2	67.19	71.88	60.94	9.30	15.22	90.70
SCOTLAND	75	30	33	26	4	7	5	5	40.00	44.00	34.67	13.33	21.21	86.67
SCOTT	584	307	338	269	38	68	5	4	52.57	57.88	46.06	12.38	20.12	87.62
SHANNON	99	71	71	63	8	8	0	0	71.72	71.72	63.64	11.27	11.27	88.73
SHELBY	74	31	41	29	2	12	7	7	41.89	55.41	39.19	6.45	29.27	93.55
ST CHARLES	3906	598	596	414	184	182	19	19	15.31	15.26	10.60	30.77	30.54	69.23
ST CLAIR	94	53	54	46	7	8	1	1	56.38	57.45	48.94	13.21	14.81	86.79
ST FRANCOIS	670	355	399	322	33	77	3	3	52.99	59.55	48.06	9.30	19.30	90.70
ST LOUIS CITY	5723	3588	3684	3152	435	532	37	38	62.69	64.37	55.08	12.12	14.44	87.85
ST LOUIS COUNTY	12939	2992	2989	2246	745	743	116	117	23.12	23.10	17.36	24.90	24.86	75.07
STE GENEVIEVE	172	61	92	57	4	35	1	1	35.47	53.49	33.14	6.56	38.04	93.44
STODDARD	303	184	197	168	16	29	4	4	60.73	65.02	55.45	8.70	14.72	91.30
STONE	331	201	199	174	27	25	6	6	60.73	60.12	52.57	13.43	12.56	86.57
SULLIVAN	80	39	41	33	6	8	3	3	48.75	51.25	41.25	15.38	19.51	84.62
TANEY	491	282	279	235	47	44	3	3	57.43	56.82	47.86	16.67	15.77	83.33

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TEXAS	256	154	149	132	22	17	2	2	60.16	58.20	51.56	14.29	11.41	85.71
VERNON	282	163	153	134	29	19	16	16	57.80	54.26	47.52	17.79	12.42	82.21
JARREN	276	76	90	57	19	33	2	2	27.54	32.61	20.65	25.00	36.67	75.00
WASHINGTON	292	195	207	177	18	30	0	0	66.78	70.89	60.62	9.23	14.49	90.77
WAYNE	140	91	104	89	2	15	0	0	65.00	74.29	63.57	2.20	14.42	97.80
WEBSTER	449	178	197	160	18	37	0	0	39.64	43.88	35.63	10.11	18.78	89.89
WORTH	23	15	14	14	1	0	1	1	65.22	60.87	60.87	6.67	0.00	93.33
WRIGHT	234	148	140	127	21	13	2	2	63.25	59.83	54.27	14.19	9.29	85.81
=====	73940	28837	29709	23856	4965	5849	2523	2535	39.0	40.2	32.3	17.2	19.7	82.7

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&&&	3	0	0	0	0	0	3	3	0.00	0.00	0.00	.	.	.
ADAIR	319	145	142	115	30	27	1	1	45.45	44.51	36.05	20.69	19.01	79.31
ANDREW	172	70	67	58	12	9	3	3	40.70	38.95	33.72	17.14	13.43	82.86
ATCHISON	68	24	30	19	5	11	16	16	35.29	44.12	27.94	20.83	36.67	79.17
AUDRAIN	358	147	144	124	23	20	3	3	41.06	40.22	34.64	15.65	13.89	84.35
BARRY	448	225	243	196	29	47	48	48	50.22	54.24	43.75	12.89	19.34	87.11
BARTON	179	81	91	73	8	18	4	4	45.25	50.84	40.78	9.88	19.78	90.12
BATES	199	98	116	89	9	27	17	17	49.25	58.29	44.72	9.18	23.28	90.82
BENTON	153	98	90	87	11	3	3	3	64.05	58.82	56.86	11.22	3.33	88.78
BOLLINGER	120	72	88	67	5	21	0	0	60.00	73.33	55.83	6.94	23.86	93.06
BOONE	1709	575	474	398	177	76	30	30	33.65	27.74	23.29	30.78	16.03	69.22
BUCHANAN	1171	621	577	530	91	47	26	26	53.03	49.27	45.26	14.65	8.15	85.35
BUTLER	547	341	348	308	33	40	6	6	62.34	63.62	56.31	9.68	11.49	90.32
CALDWELL	102	50	52	45	5	7	0	0	49.02	50.98	44.12	10.00	13.46	90.00
CALLAWAY	456	167	166	135	32	31	1	1	36.62	36.40	29.61	19.16	18.67	80.84
CAMDEN	337	178	158	140	37	18	1	2	52.82	46.88	41.54	20.79	11.39	78.65
CAPE GIRARDEAU	776	305	321	257	48	64	7	7	39.30	41.37	33.12	15.74	19.94	84.26
CARROLL	130	66	79	59	7	20	2	2	50.77	60.77	45.38	10.61	25.32	89.39
CARTER	89	68	73	64	4	9	0	0	76.40	82.02	71.91	5.88	12.33	94.12
CASS	1174	261	303	209	52	94	231	231	22.23	25.81	17.80	19.92	31.02	80.08
CEDAR	152	95	99	82	13	17	0	0	62.50	65.13	53.95	13.68	17.17	86.32
CHARITON	76	28	27	22	6	5	0	0	36.84	35.53	28.95	21.43	18.52	78.57
CHRISTIAN	701	250	260	200	50	60	0	0	35.66	37.09	28.53	20.00	23.08	80.00
CLARK	76	7	9	7	0	2	55	55	9.21	11.84	9.21	0.00	22.22	100.00
CLAY	2566	582	595	427	155	168	109	109	22.68	23.19	16.64	26.63	28.24	73.37
CLINTON	244	83	92	72	11	20	4	4	34.02	37.70	29.51	13.25	21.74	86.75
COLE	899	260	271	211	49	60	2	2	28.92	30.14	23.47	18.85	22.14	81.15
COOPER	205	63	68	48	15	20	1	1	30.73	33.17	23.41	23.81	29.41	76.19
CRAWFORD	281	164	160	138	26	22	0	0	58.36	56.94	49.11	15.85	13.75	84.15
DADE	89	54	56	47	7	9	0	0	60.67	62.92	52.81	12.96	16.07	87.04
DALLAS	192	101	99	88	13	11	3	3	52.60	51.56	45.83	12.87	11.11	87.13
DAVIESS	116	57	58	50	7	8	1	1	49.14	50.00	43.10	12.28	13.79	87.72
DE KALB	108	46	50	39	7	11	0	0	42.59	46.30	36.11	15.22	22.00	84.78
DENT	168	101	100	86	15	14	2	2	60.12	59.52	51.19	14.85	14.00	85.15
DOUGLAS	130	87	87	73	14	14	1	1	66.92	66.92	56.15	16.09	16.09	83.91
DUNKLIN	476	334	336	304	29	32	57	58	70.17	70.59	63.87	8.68	9.52	91.02

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FRANKLIN	1272	388	439	305	83	134	5	5	30.50	34.51	23.98	21.39	30.52	78.61
GASCONADE	166	50	53	39	11	14	0	0	30.12	31.93	23.49	22.00	26.42	78.00
GENTRY	70	35	42	32	3	10	1	1	50.00	60.00	45.71	8.57	23.81	91.43
GREENE	3180	1402	1365	1095	307	270	9	9	44.09	42.92	34.43	21.90	19.78	78.10
GRUNDY	130	74	76	64	10	12	4	4	56.92	58.46	49.23	13.51	15.79	86.49
HARRISON	114	50	60	47	3	13	23	23	43.86	52.63	41.23	6.00	21.67	94.00
HENRY	251	144	139	124	20	15	6	6	57.37	55.38	49.40	13.89	10.79	86.11
HICKORY	70	42	44	37	5	7	1	1	60.00	62.86	52.86	11.90	15.91	88.10
HOLT	52	24	31	21	3	10	1	1	46.15	59.62	40.38	12.50	32.26	87.50
HOWARD	102	43	48	36	7	12	2	2	42.16	47.06	35.29	16.28	25.00	83.72
HOWELL	493	298	321	269	29	52	11	11	60.45	65.11	54.56	9.73	16.20	90.27
IRON	127	82	91	77	5	14	0	0	64.57	71.65	60.63	6.10	15.38	93.90
JACKSON	9964	3822	3939	2993	824	945	1005	1009	38.36	39.53	30.04	21.56	23.99	78.31
JASPER	1574	815	792	664	151	128	8	8	51.78	50.32	42.19	18.53	16.16	81.47
JEFFERSON	2757	818	874	646	171	227	11	11	29.67	31.70	23.43	20.90	25.97	78.97
JOHNSON	670	214	320	193	20	126	19	19	31.94	47.76	28.81	9.35	39.38	90.19
KNOX	63	22	24	19	3	5	8	8	34.92	38.10	30.16	13.64	20.83	86.36
LACLEDE	431	238	249	193	44	56	0	1	55.22	57.77	44.78	18.49	22.49	81.09
LAFAYETTE	387	125	133	104	21	29	6	6	32.30	34.37	26.87	16.80	21.80	83.20
LAWRENCE	465	218	236	183	35	53	0	0	46.88	50.75	39.35	16.06	22.46	83.94
LEWIS	138	10	10	7	3	3	99	99	7.25	7.25	5.07	30.00	30.00	70.00
LINCOLN	493	173	181	136	37	45	0	0	35.09	36.71	27.59	21.39	24.86	78.61
LINN	168	95	85	79	15	6	0	1	56.55	50.60	47.02	15.79	7.06	83.16
LIVINGSTON	184	96	97	87	9	10	1	1	52.17	52.72	47.28	9.38	10.31	90.63
MACON	211	104	117	90	14	27	0	0	49.29	55.45	42.65	13.46	23.08	86.54
MADISON	146	93	103	82	11	21	0	0	63.70	70.55	56.16	11.83	20.39	88.17
MARIES	103	33	41	29	4	12	1	1	32.04	39.81	28.16	12.12	29.27	87.88
MARION	400	177	180	158	19	22	77	77	44.25	45.00	39.50	10.73	12.22	89.27
MCDONALD	372	123	127	106	17	21	162	162	33.06	34.14	28.49	13.82	16.54	86.18
MERCER	48	8	12	6	2	6	21	21	16.67	25.00	12.50	25.00	50.00	75.00
MILLER	344	198	193	165	33	28	2	2	57.56	56.10	47.97	16.67	14.51	83.33
MISSISSIPPI	218	172	173	161	10	12	2	3	78.90	79.36	73.85	5.81	6.94	93.60
MONITEAU	201	57	77	54	3	23	0	0	28.36	38.31	26.87	5.26	29.87	94.74
MONROE	105	42	46	36	6	10	5	5	40.00	43.81	34.29	14.29	21.74	85.71
MONTGOMERY	135	62	59	50	12	9	0	0	45.93	43.70	37.04	19.35	15.25	80.65
MORGAN	204	101	96	84	17	12	1	1	49.51	47.06	41.18	16.83	12.50	83.17

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NEW MADRID	262	184	203	175	9	28	4	4	70.23	77.48	66.79	4.89	13.79	95.11
NEWTON	746	388	387	313	74	74	7	8	52.01	51.88	41.96	19.07	19.12	80.67
NODAWAY	210	75	85	68	7	17	4	4	35.71	40.48	32.38	9.33	20.00	90.67
OREGON	123	80	90	78	2	12	6	6	65.04	73.17	63.41	2.50	13.33	97.50
OSAGE	169	29	41	25	4	16	1	1	17.16	24.26	14.79	13.79	39.02	86.21
OZARK	104	67	67	61	6	6	22	22	64.42	64.42	58.65	8.96	8.96	91.04
PEMISCOT	342	254	249	238	16	11	67	67	74.27	72.81	69.59	6.30	4.42	93.70
PERRY	213	69	90	62	7	28	1	1	32.39	42.25	29.11	10.14	31.11	89.86
PETTIS	549	316	305	267	49	38	3	3	57.56	55.56	48.63	15.51	12.46	84.49
PHELPS	467	248	251	211	37	40	0	0	53.10	53.75	45.18	14.92	15.94	85.08
PIKE	221	101	104	89	12	15	15	15	45.70	47.06	40.27	11.88	14.42	88.12
PLATTE	985	176	160	125	51	35	79	79	17.87	16.24	12.69	28.98	21.88	71.02
POLK	358	156	174	133	23	41	0	0	43.58	48.60	37.15	14.74	23.56	85.26
PULASKI	632	208	390	182	26	208	4	4	32.91	61.71	28.80	12.50	53.33	87.50
PUTNAM	61	28	28	22	6	6	10	10	45.90	45.90	36.07	21.43	21.43	78.57
RALLS	86	31	27	24	7	3	13	13	36.05	31.40	27.91	22.58	11.11	77.42
RANDOLPH	325	201	204	185	16	19	2	2	61.85	62.77	56.92	7.96	9.31	92.04
RAY	307	115	124	96	19	28	5	5	37.46	40.39	31.27	16.52	22.58	83.48
REYNOLDS	81	51	52	46	5	6	1	1	62.96	64.20	56.79	9.80	11.54	90.20
RIPLEY	175	121	127	109	12	18	4	4	69.14	72.57	62.29	9.92	14.17	90.08
SALINE	307	153	182	135	18	46	3	2	49.84	59.28	43.97	11.76	25.27	88.24
SCHUYLER	48	22	22	19	3	3	3	3	45.83	45.83	39.58	13.64	13.64	86.36
SCOTLAND	78	29	31	26	3	5	2	2	37.18	39.74	33.33	10.34	16.13	89.66
SCOTT	599	364	371	313	49	58	9	11	60.77	61.94	52.25	13.46	15.63	85.99
SHANNON	105	74	76	65	9	11	0	0	70.48	72.38	61.90	12.16	14.47	87.84
SHELBY	62	27	42	24	3	18	5	5	43.55	67.74	38.71	11.11	42.86	88.89
ST CHARLES	4096	635	620	422	213	198	18	18	15.50	15.14	10.30	33.54	31.94	66.46
ST CLAIR	91	56	57	51	5	6	1	1	61.54	62.64	56.04	8.93	10.53	91.07
ST FRANCOIS	678	361	401	318	43	83	2	2	53.24	59.14	46.90	11.91	20.70	88.09
ST LOUIS CITY	5584	3295	3285	2698	589	587	55	63	59.01	58.83	48.32	17.88	17.87	81.88
ST LOUIS COUNTY	12840	2891	2851	2071	815	779	122	125	22.52	22.20	16.13	28.19	27.32	71.64
STE GENEVIEVE	190	70	90	66	4	24	0	0	36.84	47.37	34.74	5.71	26.67	94.29
STODDARD	347	198	216	177	21	39	6	6	57.06	62.25	51.01	10.61	18.06	89.39
STONE	311	181	170	144	37	26	6	6	58.20	54.66	46.30	20.44	15.29	79.56
SULLIVAN	103	56	58	45	11	13	6	6	54.37	56.31	43.69	19.64	22.41	80.36
TANEY	518	304	297	256	47	41	2	3	58.69	57.34	49.42	15.46	13.80	84.21

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TEXAS	281	175	168	135	40	33	1	1	62.28	59.79	48.04	22.86	19.64	77.14
VERNON	270	127	127	111	14	16	16	18	47.04	47.04	41.11	11.02	12.60	87.40
WARREN	323	116	126	96	20	30	3	3	35.91	39.01	29.72	17.24	23.81	82.76
WASHINGTON	330	210	235	192	18	42	1	0	63.64	71.21	58.18	8.57	17.87	91.43
WAYNE	133	83	98	79	4	19	1	1	62.41	73.68	59.40	4.82	19.39	95.18
WEBSTER	453	180	201	152	28	49	2	2	39.74	44.37	33.55	15.56	24.38	84.44
WORTH	23	14	14	13	1	1	1	1	60.87	60.87	56.52	7.14	7.14	92.86
WRIGHT	259	159	155	126	33	29	1	1	61.39	59.85	48.65	20.75	18.71	79.25
	75242	29030	29853	23581	5418	6266	2642	2666	38.6	39.7	31.3	18.7	21.0	81.2

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County of residency	Live Births	Prenatal Medicaid	Prenatal WIC	Prenatal WIC and Medicaid	Prenatal Medicaid and not WIC	Prenatal WIC and not Medicaid	Medicaid status unknown	WIC status unknown	Percent Prenatal Medicaid	Percent Prenatal WIC	Percent WIC and Medicaid	Percent Medicaid Not WIC	Percent WIC Not Medicaid	Percent Medicaid on WIC
ADAIR	273	127	115	96	31	19	2	2	46.52	42.12	35.16	24.41	16.52	75.59
ANDREW	172	73	78	64	9	14	1	1	42.44	45.35	37.21	12.33	17.95	87.67
ATCHISON	48	17	15	13	4	2	15	15	35.42	31.25	27.08	23.53	13.33	76.47
AUDRAIN	334	130	134	106	24	28	3	3	38.92	40.12	31.74	18.46	20.90	81.54
BARRY	467	236	242	202	34	40	57	57	50.54	51.82	43.25	14.41	16.53	85.59
BARTON	180	94	92	79	15	13	3	3	52.22	51.11	43.89	15.96	14.13	84.04
BATES	191	102	98	83	19	15	18	18	53.40	51.31	43.46	18.63	15.31	81.37
BENTON	138	86	76	67	19	9	1	1	62.32	55.07	48.55	22.09	11.84	77.91
BOLLINGER	161	74	102	68	6	34	1	1	45.96	63.35	42.24	8.11	33.33	91.89
BOONE	1782	596	491	412	184	79	8	8	33.45	27.55	23.12	30.87	16.09	69.13
BUCHANAN	1129	560	509	461	99	48	11	11	49.60	45.08	40.83	17.68	9.43	82.32
BUTLER	548	348	347	301	47	46	1	1	63.50	63.32	54.93	13.51	13.26	86.49
CALDWELL	99	45	48	38	7	10	3	3	45.45	48.48	38.38	15.56	20.83	84.44
CALLAWAY	489	172	165	130	42	35	2	2	35.17	33.74	26.58	24.42	21.21	75.58
CAMDEN	392	194	182	149	45	33	1	1	49.49	46.43	38.01	23.20	18.13	76.80
CAPE GIRARDEAU	873	311	322	263	48	59	8	8	35.62	36.88	30.13	15.43	18.32	84.57
CARROLL	109	54	63	47	7	16	1	1	49.54	57.80	43.12	12.96	25.40	87.04
CARTER	82	62	62	56	6	6	0	0	75.61	75.61	68.29	9.68	9.68	90.32
CASS	1077	250	283	202	48	81	235	235	23.21	26.28	18.76	19.20	28.62	80.80
CEDAR	153	94	92	77	17	15	1	1	61.44	60.13	50.33	18.09	16.30	81.91
CHARITON	75	31	33	27	4	6	0	0	41.33	44.00	36.00	12.90	18.18	87.10
CHRISTIAN	807	283	275	200	83	75	3	3	35.07	34.08	24.78	29.33	27.27	70.67
CLARK	92	7	10	7	0	3	73	73	7.61	10.87	7.61	0.00	30.00	100.00
CLAY	2654	586	592	416	169	176	136	137	22.08	22.31	15.67	28.84	29.73	70.99
CLINTON	237	88	98	74	14	24	9	9	37.13	41.35	31.22	15.91	24.49	84.09
COLE	966	264	292	223	41	69	3	3	27.33	30.23	23.08	15.53	23.63	84.47
COOPER	174	66	75	53	13	22	1	1	37.93	43.10	30.46	19.70	29.33	80.30
CRAWFORD	336	192	189	161	31	28	4	4	57.14	56.25	47.92	16.15	14.81	83.85
DADE	86	44	44	33	11	11	0	0	51.16	51.16	38.37	25.00	25.00	75.00
DALLAS	214	94	96	73	21	23	3	3	43.93	44.86	34.11	22.34	23.96	77.66
DAVISS	115	58	56	45	13	11	1	1	50.43	48.70	39.13	22.41	19.64	77.59
DE KALB	118	45	47	39	6	8	0	0	38.14	39.83	33.05	13.33	17.02	86.67
DENT	183	111	109	90	21	19	1	1	60.66	59.56	49.18	18.92	17.43	81.08
DOUGLAS	143	86	86	72	14	14	0	0	60.14	60.14	50.35	16.28	16.28	83.72
DUNKLIN	507	378	351	341	37	10	50	50	74.56	69.23	67.26	9.79	2.85	90.21
FRANKLIN	1284	380	423	293	87	130	3	3	29.60	32.94	22.82	22.89	30.73	77.11

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Live births, WIC and Medicaid prenatal participation and  
Overlap by resident county  
1999 Missouri resident data

County of residency	Live Births	Prenatal Medicaid	Prenatal WIC	Prenatal WIC and Medicaid	Prenatal Medicaid and not WIC	Prenatal WIC and not Medicaid	Medicaid status unknown	WIC status unknown	Percent Prenatal Medicaid	Percent Prenatal WIC	Percent WIC and Medicaid	Percent Medicaid Not WIC	Percent WIC Not Medicaid	Percent Medicaid on WIC
GASCONADE	174	66	75	55	11	20	1	1	37.93	43.10	31.61	16.67	26.67	83.33
GENTRY	87	43	52	40	3	12	0	0	49.43	59.77	45.98	6.98	23.08	93.02
GREENE	3172	1333	1284	995	338	289	9	8	42.02	40.48	31.37	25.36	22.51	74.64
GRUNDY	137	71	83	65	6	18	0	0	51.82	60.58	47.45	8.45	21.69	91.55
HARRISON	114	48	57	43	5	14	19	19	42.11	50.00	37.72	10.42	24.56	89.58
HENRY	259	144	146	124	20	22	3	3	55.60	56.37	47.88	13.89	15.07	86.11
HICKORY	67	39	34	26	13	8	0	0	58.21	50.75	38.81	33.33	23.53	66.67
HOLT	42	15	23	14	1	9	2	2	35.71	54.76	33.33	6.67	39.13	93.33
HOWARD	123	55	46	41	14	5	3	3	44.72	37.40	33.33	25.45	10.87	74.55
HOWELL	531	319	344	295	24	49	17	17	60.08	64.78	55.56	7.52	14.24	92.48
IRON	139	91	97	84	7	13	1	1	65.47	69.78	60.43	7.69	13.40	92.31
JACKSON	9970	3859	3863	3024	818	838	1138	1154	38.71	38.75	30.33	21.20	21.69	78.36
JASPER	1639	875	820	683	192	137	10	10	53.39	50.03	41.67	21.94	16.71	78.06
JEFFERSON	2784	803	837	614	185	217	24	21	28.84	30.06	22.05	23.04	25.93	76.46
JOHNSON	690	209	289	183	26	106	31	31	30.29	41.88	26.52	12.44	36.68	87.56
KNOX	59	23	28	21	2	7	7	7	38.98	47.46	35.59	8.70	25.00	91.30
LACLEDE	443	239	225	198	41	27	0	0	53.95	50.79	44.70	17.15	12.00	82.85
LAFAYETTE	403	145	128	106	38	22	3	4	35.98	31.76	26.30	26.21	17.19	73.10
LAWRENCE	503	244	248	206	38	42	0	0	48.51	49.30	40.95	15.57	16.94	84.43
LEWIS	123	14	16	12	2	4	90	90	11.38	13.01	9.76	14.29	25.00	85.71
LINCOLN	526	165	161	127	38	34	4	4	31.37	30.61	24.14	23.03	21.12	76.97
LINN	171	90	85	74	16	11	0	0	52.63	49.71	43.27	17.78	12.94	82.22
LIVINGSTON	168	97	101	91	6	10	2	2	57.74	60.12	54.17	6.19	9.90	93.81
MACON	155	75	83	67	8	16	0	0	48.39	53.55	43.23	10.67	19.28	89.33
MADISON	134	88	92	78	10	14	0	0	65.67	68.66	58.21	11.36	15.22	88.64
MARIES	106	34	37	29	5	8	0	0	32.08	34.91	27.36	14.71	21.62	85.29
MARION	404	187	167	153	34	14	87	87	46.29	41.34	37.87	18.18	8.38	81.82
MCDONALD	332	113	117	99	14	18	146	146	34.04	35.24	29.82	12.39	15.38	87.61
MERCER	39	13	16	12	1	4	18	18	33.33	41.03	30.77	7.69	25.00	92.31
MILLER	328	173	160	141	32	19	2	2	52.74	48.78	42.99	18.50	11.88	81.50
MISSISSIPPI	210	160	158	141	17	17	3	5	76.19	75.24	67.14	10.63	10.76	88.13
MONITEAU	179	52	69	46	6	23	2	2	29.05	38.55	25.70	11.54	33.33	88.46
MONROE	126	47	56	44	3	12	3	3	37.30	44.44	34.92	6.38	21.43	93.62
MONTGOMERY	142	63	68	51	12	17	2	2	44.37	47.89	35.92	19.05	25.00	80.95
MORGAN	227	112	107	91	21	16	5	5	49.34	47.14	40.09	18.75	14.95	81.25
NEW MADRID	235	166	179	156	10	23	7	7	70.64	76.17	66.38	6.02	12.85	93.98

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Live births, WIC and Medicaid prenatal participation and  
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County of residency	Live Births	Prenatal Medicaid	Prenatal WIC	Prenatal WIC and Medicaid	Prenatal Medicaid and not WIC	Prenatal WIC and not Medicaid	Medicaid status unknown	WIC status unknown	Percent Prenatal Medicaid	Percent Prenatal WIC	Percent WIC and Medicaid	Percent Medicaid Not WIC	Percent WIC Not Medicaid	Percent Medicaid on WIC
NEWTON	683	369	367	307	61	60	11	12	54.03	53.73	44.95	16.53	16.35	83.20
NODAWAY	196	72	77	67	5	10	3	3	36.73	39.29	34.18	6.94	12.99	93.06
OREGON	107	71	84	68	3	16	8	8	66.36	78.50	63.55	4.23	19.05	95.77
OSAGE	166	36	44	34	2	10	0	0	21.69	26.51	20.48	5.56	22.73	94.44
OZARK	97	65	63	59	6	4	15	15	67.01	64.95	60.82	9.23	6.35	90.77
PEMISCOT	336	246	245	235	11	10	71	71	73.21	72.92	69.94	4.47	4.08	95.53
PERRY	254	100	137	93	7	44	1	1	39.37	53.94	36.61	7.00	32.12	93.00
PETTIS	588	295	271	233	62	38	4	4	50.17	46.09	39.63	21.02	14.02	78.98
PHELPS	491	247	258	216	31	42	3	3	50.31	52.55	43.99	12.55	16.28	87.45
PIKE	192	69	73	59	10	14	26	26	35.94	38.02	30.73	14.49	19.18	85.51
PLATTE	1004	187	203	144	43	59	89	89	18.63	20.22	14.34	22.99	29.06	77.01
POLK	363	162	164	124	38	40	0	0	44.63	45.18	34.16	23.46	24.39	76.54
PULASKI	602	201	331	168	33	163	5	5	33.39	54.98	27.91	16.42	49.24	83.58
PUTNAM	70	29	27	23	6	4	16	16	41.43	38.57	32.86	20.69	14.81	79.31
RALLS	89	40	36	34	6	2	11	11	44.94	40.45	38.20	15.00	5.56	85.00
RANDOLPH	318	183	194	165	18	29	4	4	57.55	61.01	51.89	9.84	14.95	90.16
RAY	299	95	100	75	20	25	1	1	31.77	33.44	25.08	21.05	25.00	78.95
REYNOLDS	81	52	50	44	8	6	0	0	64.20	61.73	54.32	15.38	12.00	84.62
RIPLEY	167	130	122	114	16	8	2	2	77.84	73.05	68.26	12.31	6.56	87.69
SALINE	295	141	153	117	24	36	0	0	47.80	51.86	39.66	17.02	23.53	82.98
SCHUYLER	38	23	29	21	2	8	1	1	60.53	76.32	55.26	8.70	27.59	91.30
SCOTLAND	53	19	20	14	5	6	0	0	35.85	37.74	26.42	26.32	30.00	73.68
SCOTT	580	362	396	333	29	63	3	3	62.41	68.28	57.41	8.01	15.91	91.99
SHANNON	82	53	51	46	7	5	0	0	64.63	62.20	56.10	13.21	9.80	86.79
SHELBY	81	40	46	37	3	9	7	7	49.38	56.79	45.68	7.50	19.57	92.50
ST CHARLES	4072	588	553	374	214	179	21	21	14.44	13.58	9.18	36.39	32.37	63.61
ST CLAIR	92	57	58	48	9	10	0	0	61.96	63.04	52.17	15.79	17.24	84.21
ST FRANCOIS	706	381	406	330	51	76	2	2	53.97	57.51	46.74	13.39	18.72	86.61
ST LOUIS CITY	5500	3341	3253	2700	636	549	46	47	60.75	59.15	49.09	19.04	16.88	80.81
ST LOUIS COUNTY	12593	2982	2875	2088	886	787	100	108	23.68	22.83	16.58	29.71	27.37	70.02
STE GENEVIEVE	182	58	92	55	3	37	0	0	31.87	50.55	30.22	5.17	40.22	94.83
STODDARD	314	190	192	168	22	24	0	0	60.51	61.15	53.50	11.58	12.50	88.42
STONE	313	174	180	152	22	28	10	10	55.59	57.51	48.56	12.64	15.56	87.36
SULLIVAN	103	57	56	44	13	12	3	3	55.34	54.37	42.72	22.81	21.43	77.19
TANEY	524	309	308	267	42	41	6	6	58.97	58.78	50.95	13.59	13.31	86.41
TEXAS	264	184	183	162	22	21	0	0	69.70	69.32	61.36	11.96	11.48	88.04

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VERNON	272	141	127	105	36	22	13	13	51.84	46.69	38.60	25.53	17.32	74.47
WARREN	318	116	118	94	22	24	0	0	36.48	37.11	29.56	18.97	20.34	81.03
WASHINGTON	328	205	234	190	14	44	1	2	62.50	71.34	57.93	6.83	18.80	92.68
WAYNE	150	111	123	102	9	21	0	0	74.00	82.00	68.00	8.11	17.07	91.89
WEBSTER	468	175	181	138	37	43	2	2	37.39	38.68	29.49	21.14	23.76	78.86
WORTH	33	20	18	17	3	1	1	1	60.61	54.55	51.52	15.00	5.56	85.00
WRIGHT	273	177	171	145	32	26	0	0	64.84	62.64	53.11	18.08	15.20	81.92
	=====	=====	=====	=====	=====	=====	=====	=====						
	75366	29161	29312	23299	5822	6002	2784	2811						

79.9%

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Live births, WIC and Medicaid prenatal participation and  
 Overlap by resident county  
 FINAL 2000 Missouri Resident Data

County of residency	Live Births	Prenatal Medicaid	Prenatal WIC	Prenatal WIC and Medicaid	Prenatal Medicaid and not WIC	Prenatal WIC and not Medicaid	Medicaid status unknown	WIC status unknown	Percent Prenatal Medicaid	Percent Prenatal WIC	Percent WIC and Medicaid	Percent Medicaid Not WIC	Percent WIC Not Medicaid	Percent WIC on Medicaid	Percent Medicaid on WIC
Missouri	76329	30029	29205	23436	6566	5762	2799	2819	39.3	38.3	30.7	21.9	19.7	78.0	80.2
ADAIR	261	119	101	88	31	13	2	2	45.6	38.7	33.7	26.1	12.9	73.9	87.1
ANDREW	201	77	75	67	10	8	3	3	38.3	37.3	33.3	13.0	10.7	87.0	89.3
ATCHISON	56	21	19	16	5	3	11	11	37.5	33.9	28.6	23.8	15.8	76.2	84.2
AUDRAIN	389	163	161	129	34	32	1	1	41.9	41.4	33.2	20.9	19.9	79.1	80.1
BARRY	459	262	246	218	44	28	42	42	57.1	53.6	47.5	16.8	11.4	83.2	88.6
BARTON	187	88	87	72	16	15	8	8	47.1	46.5	38.5	18.2	17.2	81.8	82.8
BATES	226	121	121	101	20	20	21	21	53.5	53.5	44.7	16.5	16.5	83.5	83.5
BENTON	151	91	87	78	13	9	1	1	60.3	57.6	51.7	14.3	10.3	85.7	89.7
BOLLINGER	154	75	88	66	9	22	3	3	48.7	57.1	42.9	12.0	25.0	88.0	75.0
BOONE	1784	593	490	416	177	74	8	8	33.2	27.5	23.3	29.8	15.1	70.2	84.9
BUCHANAN	1147	565	497	445	120	52	14	14	49.3	43.3	38.8	21.2	10.5	78.8	89.5
BUTLER	576	377	363	330	47	33	3	3	65.5	63.0	57.3	12.5	9.1	87.5	90.9
CALDWELL	129	63	60	48	15	12	3	3	48.8	46.5	37.2	23.8	20.0	76.2	80.0
CALLAWAY	489	187	187	147	40	40	4	4	38.2	38.2	30.1	21.4	21.4	78.6	78.6
CAMDEN	368	218	192	172	46	20	0	0	59.2	52.2	46.7	21.1	10.4	78.9	89.6
CAPE GIRARDEAU	849	326	321	252	74	69	6	6	38.4	37.8	29.7	22.7	21.5	77.3	78.5
CARROLL	125	65	71	56	9	15	0	0	52.0	56.8	44.8	13.8	21.1	86.2	78.9
CARTER	68	54	57	52	2	5	1	1	79.4	83.8	76.5	3.7	8.8	96.3	91.2
CASS	1156	265	295	206	59	89	266	266	22.9	25.5	17.8	22.3	30.2	77.7	69.8
CEDAR	170	102	92	79	23	13	0	0	60.0	54.1	46.5	22.5	14.1	77.5	85.9
CHARITON	81	34	36	27	7	9	1	1	42.0	44.4	33.3	20.6	25.0	79.4	75.0
CHRISTIAN	858	319	276	225	94	51	0	0	37.2	32.2	26.2	29.5	18.5	70.5	81.5
CLARK	76	14	15	12	2	3	54	54	18.4	19.7	15.8	14.3	20.0	85.7	80.0
CLAY	2673	594	588	430	164	158	120	120	22.2	22.0	16.1	27.6	26.9	72.4	73.1
CLINTON	252	93	93	72	21	21	3	3	36.9	36.9	28.6	22.6	22.6	77.4	77.4
COLE	861	229	265	201	28	64	2	2	26.6	30.8	23.3	12.2	24.2	87.8	75.8
COOPER	180	64	77	52	12	25	0	0	35.6	42.8	28.9	18.8	32.5	81.3	67.5
CRAWFORD	300	170	159	132	38	27	1	1	56.7	53.0	44.0	22.4	17.0	77.6	83.0
DADE	101	60	57	48	12	9	0	0	59.4	56.4	47.5	20.0	15.8	80.0	84.2
DALLAS	212	106	84	74	32	10	1	1	50.0	39.6	34.9	30.2	11.9	69.8	88.1
DAVISS	128	57	61	51	6	10	3	3	44.5	47.7	39.8	10.5	16.4	89.5	83.6
DE KALB	118	38	39	29	9	10	2	2	32.2	33.1	24.6	23.7	25.6	76.3	74.4
DENT	190	132	123	111	21	12	1	1	69.5	64.7	58.4	15.9	9.8	84.1	90.2
DOUGLAS	122	73	70	59	14	11	2	2	59.8	57.4	48.4	19.2	15.7	80.8	84.3
DUNKLIN	477	361	331	314	47	17	37	37	75.7	69.4	65.8	13.0	5.1	87.0	94.9

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Live births, WIC and Medicaid prenatal participation and  
Overlap by resident county  
FINAL 2000 Missouri Resident Data

County of residency	Live Births	Prenatal Medicaid	Prenatal WIC	Prenatal WIC and Medicaid	Prenatal Medicaid and not WIC	Prenatal WIC and not Medicaid	Medicaid status unknown	WIC status unknown	Percent Prenatal Medicaid	Percent Prenatal WIC	Percent WIC and Medicaid	Percent Medicaid Not WIC	Percent WIC Not Medicaid	Percent WIC on Medicaid	Percent Medicaid on WIC
FRANKLIN	1249	416	390	304	112	85	6	5	33.3	31.2	24.3	26.9	21.8	73.1	77.9
GASCONADE	178	63	68	52	11	16	0	0	35.4	38.2	29.2	17.5	23.5	82.5	76.5
GENTRY	74	40	43	36	4	7	1	1	54.1	58.1	48.6	10.0	16.3	90.0	83.7
GREENE	3099	1404	1235	1005	399	230	8	8	45.3	39.9	32.4	28.4	18.6	71.6	81.4
GRUNDY	121	67	69	55	12	14	0	0	55.4	57.0	45.5	17.9	20.3	82.1	79.7
HARRISON	112	56	58	48	8	10	19	19	50.0	51.8	42.9	14.3	17.2	85.7	82.8
HENRY	309	161	176	146	15	30	8	8	52.1	57.0	47.2	9.3	17.0	90.7	83.0
HICKORY	73	52	45	43	9	2	2	2	71.2	61.6	58.9	17.3	4.4	82.7	95.6
HOLT	43	24	26	20	4	6	1	1	55.8	60.5	46.5	16.7	23.1	83.3	76.9
HOWARD	127	56	55	43	13	12	0	0	44.1	43.3	33.9	23.2	21.8	76.8	78.2
HOWELL	451	289	298	259	30	39	11	11	64.1	66.1	57.4	10.4	13.1	89.6	86.9
IRON	118	74	86	70	4	16	0	0	62.7	72.9	59.3	5.4	18.6	94.6	81.4
JACKSON	10095	3991	3871	3066	912	804	1197	1209	39.5	38.3	30.4	22.9	20.8	76.8	79.2
JASPER	1728	911	838	699	211	139	17	18	52.7	48.5	40.5	23.2	16.6	76.7	83.4
JEFFERSON	2753	861	773	608	253	165	13	13	31.3	28.1	22.1	29.4	21.3	70.6	78.7
JOHNSON	734	247	338	203	44	135	31	31	33.7	46.0	27.7	17.8	39.9	82.2	60.1
KNOX	47	15	15	13	2	2	6	6	31.9	31.9	27.7	13.3	13.3	86.7	86.7
LACLEDE	443	265	231	207	58	24	1	1	59.8	52.1	46.7	21.9	10.4	78.1	89.6
LAFAYETTE	382	123	133	101	22	32	5	5	32.2	34.8	26.4	17.9	24.1	82.1	75.9
LAWRENCE	484	243	243	196	47	47	3	3	50.2	50.2	40.5	19.3	19.3	80.7	80.7
LEWIS	119	10	14	10	0	4	84	84	8.4	11.8	8.4	0.0	28.6	100.0	71.4
LINCOLN	540	182	170	132	50	38	4	4	33.7	31.5	24.4	27.5	22.4	72.5	77.6
LINN	171	93	88	83	10	5	0	0	54.4	51.5	48.5	10.8	5.7	89.2	94.3
LIVINGSTON	146	90	85	78	12	7	2	2	61.6	58.2	53.4	13.3	8.2	86.7	91.8
MCDONALD	343	118	114	97	21	17	144	144	34.4	33.2	28.3	17.8	14.9	82.2	85.1
MACON	193	90	85	74	16	11	0	0	46.6	44.0	38.3	17.8	12.9	82.2	87.1
MADISON	134	73	92	64	9	28	0	0	54.5	68.7	47.8	12.3	30.4	87.7	69.6
MARIES	100	44	43	40	4	3	0	0	44.0	43.0	40.0	9.1	7.0	90.9	93.0
MARION	424	187	169	151	36	18	85	85	44.1	39.9	35.6	19.3	10.7	80.7	89.3
MERCER	39	10	12	10	0	2	20	20	25.6	30.8	25.6	0.0	16.7	100.0	83.3
MILLER	311	174	168	140	34	28	2	2	55.9	54.0	45.0	19.5	16.7	80.5	83.3
MISSISSIPPI	221	173	175	164	9	11	0	0	78.3	79.2	74.2	5.2	6.3	94.8	93.7
MONITEAU	218	71	81	59	12	22	1	1	32.6	37.2	27.1	16.9	27.2	83.1	72.8
MONROE	95	38	46	34	4	12	6	6	40.0	48.4	35.8	10.5	26.1	89.5	73.9
MONTGOMERY	157	68	74	58	10	16	0	0	43.3	47.1	36.9	14.7	21.6	85.3	78.4
MORGAN	236	112	110	91	21	19	3	3	47.5	46.6	38.6	18.8	17.3	81.3	82.7

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NEW MADRID	248	169	183	155	14	28	3	3	68.1	73.8	62.5	8.3	15.3	91.7	84.7
NEWTON	693	359	357	295	64	62	9	9	51.8	51.5	42.6	17.8	17.4	82.2	82.6
NODAWAY	214	71	74	59	12	15	4	4	33.2	34.6	27.6	16.9	20.3	83.1	79.7
OREGON	122	86	92	82	4	10	5	5	70.5	75.4	67.2	4.7	10.9	95.3	89.1
OSAGE	157	38	40	31	7	9	2	2	24.2	25.5	19.7	18.4	22.5	81.6	77.5
OZARK	93	58	57	52	6	5	17	17	62.4	61.3	55.9	10.3	8.8	89.7	91.2
PEMISCOT	355	265	255	243	22	12	60	60	74.6	71.8	68.5	8.3	4.7	91.7	95.3
PERRY	262	106	131	93	13	38	0	0	40.5	50.0	35.5	12.3	29.0	87.7	71.0
PETTIS	605	308	292	244	64	48	4	4	50.9	48.3	40.3	20.8	16.4	79.2	83.6
PHELPS	442	233	233	198	35	35	2	2	52.7	52.7	44.8	15.0	15.0	85.0	85.0
PIKE	201	95	102	77	18	25	5	5	47.3	50.7	38.3	18.9	24.5	81.1	75.5
PLATTE	1012	189	191	139	49	52	98	99	18.7	18.9	13.7	25.9	27.2	73.5	72.8
POLK	390	212	183	156	56	27	0	0	54.4	46.9	40.0	26.4	14.8	73.6	85.2
PULASKI	622	195	315	152	43	163	4	4	31.4	50.6	24.4	22.1	51.7	77.9	48.3
PUTNAM	58	28	27	25	3	2	19	19	48.3	46.6	43.1	10.7	7.4	89.3	92.6
RALLS	92	39	39	33	6	6	12	12	42.4	42.4	35.9	15.4	15.4	84.6	84.6
RANDOLPH	357	207	221	189	18	32	0	0	58.0	61.9	52.9	8.7	14.5	91.3	85.5
RAY	303	96	99	77	19	22	6	6	31.7	32.7	25.4	19.8	22.2	80.2	77.8
REYNOLDS	64	42	44	39	3	5	0	0	65.6	68.8	60.9	7.1	11.4	92.9	88.6
RIPLEY	160	118	112	102	16	10	0	0	73.8	70.0	63.8	13.6	8.9	86.4	91.1
ST CHARLES	4244	648	576	414	233	162	21	22	15.3	13.6	9.8	36.0	28.1	63.9	71.9
ST CLAIR	97	57	55	51	6	4	1	1	58.8	56.7	52.6	10.5	7.3	89.5	92.7
ST FRANCOIS	713	393	411	347	46	64	1	1	55.1	57.6	48.7	11.7	15.6	88.3	84.4
ST LOUIS COUNTY	12894	3075	2977	2121	949	853	120	122	23.8	23.1	16.4	30.9	28.7	69.0	71.2
STE GENEVIEVE	197	73	85	59	14	26	0	0	37.1	43.1	29.9	19.2	30.6	80.8	69.4
SALINE	281	143	147	118	25	29	2	2	50.9	52.3	42.0	17.5	19.7	82.5	80.3
SCHUYLER	54	31	27	26	5	1	7	7	57.4	50.0	48.1	16.1	3.7	83.9	96.3
SCOTLAND	64	19	21	16	3	5	4	4	29.7	32.8	25.0	15.8	23.8	84.2	76.2
SCOTT	522	329	341	302	27	39	1	1	63.0	65.3	57.9	8.2	11.4	91.8	88.6
SHANNON	98	74	78	71	3	7	0	0	75.5	79.6	72.4	4.1	9.0	95.9	91.0
SHELBY	84	42	43	38	4	5	9	9	50.0	51.2	45.2	9.5	11.6	90.5	88.4
STODDARD	387	234	241	207	27	34	2	2	60.5	62.3	53.5	11.5	14.1	88.5	85.9
STONE	340	201	184	158	43	26	8	8	59.1	54.1	46.5	21.4	14.1	78.6	85.9
SULLIVAN	116	76	57	51	25	6	1	1	65.5	49.1	44.0	32.9	10.5	67.1	89.5
TANEY	571	367	354	319	48	35	7	7	64.3	62.0	55.9	13.1	9.9	86.9	90.1
TEXAS	264	184	177	156	28	21	2	2	69.7	67.0	59.1	15.2	11.9	84.8	88.1

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VERNON	320	179	159	134	45	25	13	13	55.9	49.7	41.9	25.1	15.7	74.9	84.3
WARREN	345	107	108	83	24	25	1	1	31.0	31.3	24.1	22.4	23.1	77.6	76.9
WASHINGTON	304	184	202	163	21	39	2	2	60.5	66.4	53.6	11.4	19.3	88.6	80.7
WAYNE	154	119	125	110	9	15	0	0	77.3	81.2	71.4	7.6	12.0	92.4	88.0
WEBSTER	511	220	211	172	48	39	0	0	43.1	41.3	33.7	21.8	18.5	78.2	81.5
WORTH	21	13	12	11	2	1	1	1	61.9	57.1	52.4	15.4	8.3	84.6	91.7
WRIGHT	236	149	148	120	29	28	2	2	63.1	62.7	50.8	19.5	18.9	80.5	81.1
ST LOUIS CITY	5421	3131	3018	2414	711	602	40	44	57.8	55.7	44.5	22.7	19.9	77.1	80.0

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## **Appendix C: Data Elements Contained in WIC and Vital Records Files**

**(Source—USDA PC 98 Instructions and National Center for Health Statistics)**

## **Birth Certificate Data Elements**

TYPE/PRINT  
IN  
PERMANENT  
BLACK INK  
FOR  
INSTRUCTIONS  
SEE  
HANDBOOK

U.S. STANDARD  
CERTIFICATE OF LIVE BIRTH

LOCAL FILE NUMBER

BIRTH NUMBER

**CHILD**

1. CHILD'S NAME (First, Middle, Last)		2. DATE OF BIRTH (Month, Day, Year)	3. TIME OF BIRTH
4. SEX	5. CITY, TOWN, OR LOCATION OF BIRTH		6. COUNTY OF BIRTH
7. PLACE OF BIRTH: <input type="checkbox"/> Hospital <input type="checkbox"/> Free-standing Birthing Center <input type="checkbox"/> Clerk/Doctor's Office <input type="checkbox"/> Residence <input type="checkbox"/> Other (Specify)		8. FACILITY NAME (if not institution, give street and number)	

**CERTIFIER/  
ATTENDANT**

DEATH UNDER  
ONE YEAR OF  
AGE  
Enter State File  
Number of Death  
Certificate for  
this child

9. I certify that this child was born alive at the place and time and on the date stated.  Signature	10. DATE SIGNED (Month, Day, Year)	11. ATTENDANT'S NAME AND TITLE (if other than certified) (Type/print) Name _____ <input type="checkbox"/> M.D. <input type="checkbox"/> D.O. <input type="checkbox"/> C.N.M. <input type="checkbox"/> Other Midwife <input type="checkbox"/> Other (Specify)
12. CERTIFIER'S NAME AND TITLE (Type/print) Name _____ <input type="checkbox"/> M.D. <input type="checkbox"/> D.O. <input type="checkbox"/> Hospital Admin. <input type="checkbox"/> C.N.M. <input type="checkbox"/> Other Midwife <input type="checkbox"/> Other (Specify)		13. ATTENDANT'S MAILING ADDRESS (Street and Number or Rural Route Number, City or Town, State, Zip Code)
14. REGISTRAR'S SIGNATURE		15. DATE FILED BY REGISTRAR (Month, Day, Year)

**MOTHER**

16a. MOTHER'S NAME (First, Middle, Last)		16b. MAIDEN SURNAME	17. DATE OF BIRTH (Month, Day, Year)
18. BIRTHPLACE (State or Foreign Country)	19a. RESIDENCE—STATE	19b. COUNTY	19c. CITY, TOWN, OR LOCATION
19d. STREET AND NUMBER	19e. INSIDE CITY LIMITS? (Yes or No)	20. MOTHER'S MAILING ADDRESS (if same as residence, enter Zip Code as	

**FATHER**

21. FATHER'S NAME (First, Middle, Last)	22. DATE OF BIRTH (Month, Day, Year)	23. BIRTHPLACE (State or Foreign Country)
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**INFORMANT**

24. I certify that the personal information provided on this certificate is correct to the best of my knowledge and belief.  
Signature of Parent or Other Informant

INFORMATION FOR MEDICAL AND HEALTH USE ONLY

**MOTHER**

**FATHER**

MULTIPLE BIRTHS  
Enter State File  
Number for Highest  
LIVE BIRTH(S)

FETAL DEATH(S)

25. OF HISPANIC ORIGIN? (Specify No or Yes—if yes, specify Cuban, Mexican, Puerto Rican, etc.)		26. RACE—American Indian, Black, White, etc. (Specify below)	27. EDUCATION (Specify only highest grade completed) Elementary/Secondary (0-12)   College (1-4 or 5+)	
25a. <input type="checkbox"/> No <input type="checkbox"/> Yes Specify:		26a.	27a.	
25b. <input type="checkbox"/> No <input type="checkbox"/> Yes Specify:		26b.	27b.	
28. PREGNANCY HISTORY (Complete each section)		29. MOTHER MARRIED? (At birth, conception, or any time between) (Yes or No)	30. DATE LAST NORMAL MENSES BEGAN (Month, Day, Year)	
LIVE BIRTHS (Do not include this child)		31. MONTH OF PREGNANCY/PRENATAL CARE BEGAN—First, Second, Third, etc. (Specify)		
OTHER TERMINATIONS (Spontaneous and induced at any time after conception)		32. PRENATAL VISITS—Total Number (if none, so state)		
28a. Now Living Number _____ <input type="checkbox"/> None	28b. Now Dead Number _____ <input type="checkbox"/> None	33. BIRTH WEIGHT (Specify unit)		
28c. DATE OF LAST LIVE BIRTH (Month, Year)		34. CLINICAL ESTIMATE OF GESTATION (weeks)		
28d. DATE OF LAST OTHER TERMINATION (Month, Year)		35a. PLURALITY—Single, Twin, Triplet, etc. (Specify)		
36. APGAR SCORE		37a. MOTHER TRANSFERRED PRIOR TO DELIVERY? <input type="checkbox"/> No <input type="checkbox"/> Yes If Yes, enter name of facility transferred here:		
36a. 1 Minute	36b. 5 Minutes	37b. INFANT TRANSFERRED? <input type="checkbox"/> No <input type="checkbox"/> Yes If Yes, enter name of facility transferred to:		

**38a. MEDICAL RISK FACTORS FOR THIS PREGNANCY**

(Check all that apply)

- Anemia (Hct. < 30/Hgb. < 10) ..... 01
- Cardiac disease ..... 02
- Acute or chronic lung disease ..... 03
- Diabetes ..... 04
- Genital herpes ..... 06
- Hydramnios/Oligohydramnios ..... 06
- Hemoglobinopathy ..... 07
- Hypertension, chronic ..... 08
- Hypertension, pregnancy-associated ..... 09
- Eclampsia ..... 10
- Incompetent cervix ..... 11
- Previous infant 4000+ grams ..... 12
- Previous preterm or small for-gestational-age infant ..... 13
- Renal disease ..... 14
- Rh sensitization ..... 15
- Uterine bleeding ..... 18
- None ..... 00
- Other \_\_\_\_\_ 17

(Specify)

**38b. OTHER RISK FACTORS FOR THIS PREGNANCY**

(Complete all items)

- Tobacco use during pregnancy ..... Yes  No
- Average number cigarettes per day \_\_\_\_\_
- Alcohol use during pregnancy ..... Yes  No
- Average number drinks per week \_\_\_\_\_
- Weight gained during pregnancy \_\_\_\_\_ lb.

**39. OBSTETRIC PROCEDURES**

(Check all that apply)

- Amniocentesis ..... 01
- Electronic fetal monitoring ..... 02
- Induction of labor ..... 03
- Stimulation of labor ..... 04
- Tocolysis ..... 05
- Ultrasound ..... 06
- None ..... 00
- Other \_\_\_\_\_ 07

(Specify)

**40. COMPLICATIONS OF LABOR AND/OR DELIVERY**

(Check all that apply)

- Fever (> 100°F. or 38°C.) ..... 01
- Meconium, moderate/heavy ..... 02
- Premature rupture of membrane (> 12 hours) ..... 03
- Abruption placenta ..... 04
- Placenta previa ..... 05
- Other excessive bleeding ..... 06
- Seizure during labor ..... 07
- Precipitous labor (< 3 hours) ..... 08
- Prolonged labor (> 20 hours) ..... 09
- Dysfunctional labor ..... 10
- Breech/Malpresentation ..... 11
- Cephalopelvic disproportion ..... 12
- Cord prolapse ..... 13
- Anesthetic complications ..... 14
- Fetal distress ..... 15
- None ..... 00
- Other \_\_\_\_\_ 16

(Specify)

**41. METHOD OF DELIVERY (Check all that apply)**

- Vaginal ..... 01
- Vaginal birth after previous C-section ..... 02
- Primary C-section ..... 03
- Repeat C-section ..... 04
- Forceps ..... 05
- Vacuum ..... 06

**42. ABNORMAL CONDITIONS OF THE NEWBORN**

(Check all that apply)

- Anemia (Hct. < 38/Hgb. < 13) ..... 01
- Birth injury ..... 02
- Fetal alcohol syndrome ..... 03
- Hyaline membrane disease/RDS ..... 04
- Meconium aspiration syndrome ..... 05
- Assisted ventilation < 30 min ..... 06
- Assisted ventilation ≥ 30 min ..... 07
- Seizures ..... 08
- None ..... 00
- Other \_\_\_\_\_ 09

(Specify)

**43. CONGENITAL ANOMALIES OF CHILD**

(Check all that apply)

- Anencephalus ..... 01
- Spina bifida/Meningocele ..... 02
- Hydrocephalus ..... 03
- Microcephalus ..... 04
- Other central nervous system anomalies (Specify) \_\_\_\_\_ 05
- Heart malformations ..... 06
- Other circulatory/respiratory anomalies (Specify) \_\_\_\_\_ 07
- Rectal atresia/stenosis ..... 08
- Tracheo-esophageal fistula/ Esophageal atresia ..... 09
- Omphalocele/ Gastroschisis ..... 10
- Other gastrointestinal anomalies (Specify) \_\_\_\_\_ 11
- Malformed genitalia ..... 12
- Renal agenesis ..... 13
- Other urogenital anomalies (Specify) \_\_\_\_\_ 14
- Cleft lip/palate ..... 15
- Polydactyly/Syndactyly/Adactyly ..... 16
- Club foot ..... 17
- Diaphragmatic hernia ..... 18
- Other musculoskeletal/integumental anomalies (Specify) \_\_\_\_\_ 19
- Down's syndrome ..... 20
- Other chromosomal anomalies (Specify) \_\_\_\_\_ 21
- None ..... 00
- Other \_\_\_\_\_ 22

(Specify)

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**ABOUT THE CHILD**

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1	Child's Name	This item identifies the individual for whom the certificate is being prepared.
2	Date of Birth	This item records the date of birth of the individual named on the certificate. It is used to establish age for such purposes as school entrance, obtaining a driver's license and social security benefits. This information is used in conjunction with date last normal menses began to date length of gestation, which is used to study survivorship of low-birth-weight and premature infants. It is also used in conjunction with dates of last live birth and other termination to compute intervals between births and pregnancies.
3	Time of Birth	This item documents the exact time of birth for various legal uses, such as the order of birth in plural deliveries. When the birth occurs around midnight, the exact hour and minute may affect the date of birth. For births occurring at the end of the year, the hour and minute affect not only the day but the year of birth, a factor in establishing dependency for income tax purposes.
4	Sex	This item aids in identification of the child. It is also used for ensuring sex differentials in health related characteristics and for making population estimates and projections.
5	City, Town or Location of Birth	These items identify the place of birth, which is used to determine U.S. citizenship. Information on the place of occurrence, together with the information on the place of residence, is used to evaluate the supply and distribution of obstetrical services.
6	County of Birth	
7	Place of Birth	This item identifies home births, births in freestanding birthing centers, and births in non-hospital clinics or physicians' offices. Such information permits analysis of the number and characteristics of births by type of facility and is helpful in determining the level of utilization and characteristics of births occurring in such facilities.
8	Facility Name	The facility name is used for follow-up and query programs in the State vital statistics office and is of historical value to the parents and child. It is also used by many States to produce statistical data by specific facility.

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**CERTIFIER/ATTENDANT INFORMATION**

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9	Signature Notification that Child was Born Alive	Obtain the signature of the physician or other person in attendance at the birth or other person as authorized by State law. Rubber stamps or other facsimile signatures are not permitted.
10	Date Signed	The certification validates the accuracy of the date, time, and place of birth of the child recorded on the certificate.
11	Attendants Name	The attendant's name is important in case of queries. The title provides information on the type of attendant, which is used to assess the service rendered. This information will permit separate identification of deliveries attended by certified nurse midwives, lay midwives, and other persons.
12	Certifiers Name and Title	This item provides information about the certifier and indicates the type of person who attended the birth when the certifier is the attendant.
13	Attendants Mailing Address	The mailing address is used for inquiries to correct or complete items on the record and for follow-back studies to obtain additional information about the birth.
14	Registrar's Signature	The signature documents the fact that the certificate has been accepted by and filed with the registrar.
15	Date Filed by Registrar	This item documents whether the certificate was filed with the time period specified by law.

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**ABOUT THE MOTHER**

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16a	Mother's Name (F,M,L)	Items 16a and 16b are used for identification and as documentary evidence of parentage. The mother's maiden surname is important because it remains constant throughout her life, in contrast to other names, which may change because of marriage or divorce.
16b	Maiden Surname	
17	Date of Birth	This item is used to calculate the age of the mother, which is one of the most important factors in the study of childbearing. Studies have shown a relationship between the health of the child and the age of the mother. This item is also useful for genealogical research.
18	Birthplace	Items 16a and 16b are used for identification and as documentary evidence of parentage. The mother's maiden surname is important because it remains constant throughout her life, in contrast to other names, which may change because of marriage or divorce.
19a	Residence-State	Statistics on births are tabulated by place of residence of the mother. This makes it possible to compute birth rates based on the population residing in the area. Data on births by place of residence of the mother are used to prepare population estimates and projections. These data are used in planning for and evaluating community services and facilities, including maternal and child health programs, schools, etc. "Inside City Limits" is used to properly assign residence to either the city or the remainder of the county.
19b	County	
19c	City, Town or Location	
19d	Street and Number	
19e	Inside City Limits (Y or N?)	
20	Mother's Mailing Address	This information is used to mail a birth notification record or a copy of the certificate to the mother and to ask for clarification of birth certificate entries or obtain missing information. It is also used for follow-back studies to obtain additional details about the birth.

ABOUT THE FATHER		
21	Father's Name	This item is used for identification and as documentary evidence of parentage.
22	Date of Birth	This item is used to calculate the age of the father, which is used in the study of childbearing and health and genealogical research.
23	Birthplace	This item provides information on recent immigrant groups such as Asian and Pacific Islanders, and is used for tracing family histories.
INFORMANT		
24	Signature Certification that info is correct	The certification validates the accuracy of the personal information recorded on the certificate.
HISPANIC ORIGIN		
25a	Mother of Hispanic Origin (Y or N?)	Hispanics comprise the second largest ethnic minority in this country. This item provides data to measure differences in fertility and pregnancy outcome as well as variations in health care for people of Hispanic and non-Hispanic origin. Without collection of data on persons of Hispanic origin, it is impossible to obtain valid demographic and health information on this important group of Americans.
25b	Father of Hispanic Origin (Y or N?)	
RACE		
26a	Race of Mother	These items are used to determine the race of the child. Information on race is essential in producing data for minority groups. It is used to study racial variations in childbearing, access to health care, and pregnancy outcomes. Race is an important variable in planning for and evaluation the effectiveness of health programs and in preparing population estimates.
26b	Race of Father	
EDUCATION		
27a	Mother's Highest Grade Completed	Education is correlated with fertility and birth outcome, and is used as an indicator of socioeconomic status. It is used to measure the effect of education and socioeconomic status on health, childbearing and infant mortality.
27b	Father's Highest Grade Completed	
PREGNANCY HISTORY		
28a	Number of Live Births now living	These items are used to determine live-birth order and total-birth order, which are important in studying trends in childbearing and child spacing. They are also useful in studying health problems associated with birth order and determining the relationship of birth order to infant and perinatal mortality.
28b	Number of Live Births now dead	
28c	Date of Last Live Birth	
28d	Number of Other Terminations	
28e	Date of Last Other Termination	
29	Mother Married?	This information is used to monitor the substantial differences in health and fertility between married and unmarried women. It enables the study of health problems encountered during and after pregnancies of unmarried women. This information allows researchers to measure medical risk factors of out-of-wedlock children and their mothers. These children tend to have lower birth weight and higher infant mortality, and they many be born to mothers with less prenatal care. Because of these differences, unmarried women and their babies are more likely to require additional health services.
30	Date Last Normal Menses Began	This item is used in conjunction with the date of birth to determine the length of gestation, which is closely related to infant morbidity and mortality. Length of gestation is linked with birth weight to determine the maturity of the child at birth.
PRENATAL CARE		
31	Month of Pregnancy Prenatal Care Began	This information is used to determine the relationship of prenatal care to the health of the child at birth. Women receiving delayed care or no care are of considerable interest to public health officials because inadequate care may be harmful to both the mother and fetus.
32	Total Number of Prenatal Visits	Information on the month of pregnancy prenatal care began and number of prenatal visits can be used with length of gestation to compute the Kessner Index, a quantitative measure of the adequacy of prenatal care.
33	Birth Weight	This is the single most important characteristic associated with infant mortality. It is also related to prenatal care, socioeconomic status, marital status, and other factors surrounding the birth. Consequently, it is used with other information to plan for and evaluate the effectiveness of health care.
34	Clinical Estimate of Gestation	This item provides information on gestational age when the item on date last normal menses began contains and invalid or missing information. For a record with a plausible date last normal menses began, it provides a cross-check with the length of gestation based on ultrasound or other techniques.

<b>BIRTH ORDER/PLURALITY</b>		
35a	Plurality	These items are related to other items on the certificate that have important health implications.
35b	Order of Birth (if not single birth)	This information is also used to study twin deliveries and high-risk infants who may require additional medical attention.
<b>APGAR SCORE</b>		
36a	Apgar Score 1 minute after Birth	The Apgar score is regarded as a reliable summary measure for evaluation the physical condition of the infant at birth.
36b	Apgar Score 5 minutes after Birth	
37a	Mother Transferred Prior to Delivery (Y or N?)	This information is used to study transfer patterns and determine whether timely identification and movement of high-risk patients is occurring.
37b	Infant Transferred (Y or N?)	This information is used to examine transfer patterns and perinatal outcomes by type of hospital or level of care. It may also be used to follow up and determine the survival status of an infant transferred to a different facility.
<b>MEDICAL RISK FACTORS FOR THIS PREGNANCY</b>		
38a1	Anemia	This information allows for the identification of specific maternal conditions that are often predictive of poor maternal and infant outcomes. It can be used for planning intervention and prevention strategies.
38a2	Cardiac Disease	
38a3	Acute or chronic lung disease	
38a4	Diabetes	
38a5	Genital Herpes	
38a6	Hydraminos/Oligohydraminos	
38a7	Hemoglobinopathy	
38a8	Hypertension, chronic	
38a9	Hypertension, pregnancy-associated	
38a10	Eclampsia	
38a11	Incompetent cervix	
38a12	Previous infant 4000+ grams	
38a13	Pervious preterm or SMGA infant	
38a14	Renal Disease	
38a15	Rh Sensitization	
38a16	Uterine bleeding	
38a00	None	
38a17	Other	
<b>OTHER RISK FACTORS</b>		
38b1	Tobacco use during pregnancy	Smoking and drinking during pregnancy may have an adverse impact on pregnancy outcome. This information is used to evaluate the relationship between certain lifestyle factors and pregnancy outcome and to determine at what levels these factors clearly begin to affect pregnancy outcome.
38b2	Avg. # Cigarettes per day	
38b3	Alcohol use during pregnancy	
38b4	Avg. # drinks per day	
38b5	Weight gained during pregnancy	
<b>OBSTETRIC PROCEDURES</b>		
39_1	Amniocentesis	Information on obstetric procedures is used to measure the use of advanced medical technology during pregnancy and labor and to investigate the relationship of these procedures to the type of delivery and pregnancy outcome.
39_2	Electronic fetal monitoring	
39_3	Induction of labor	
39_4	Stimulation of labor	
39_5	Tocolysis	
39_6	Ultrasound	
39_0	None	
39_7	Other	

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**COMPLICATIONS OF LABOR AND/OR DELIVERY**

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40_1	Febrile (>100oF or 38oC)	
40_2	Meconium, moderate/heavy	
40_3	Premature rupture of membrane	
40_4	Abruptio placenta	
40_5	Placenta previa	
40_6	Other excessive bleeding	
40_7	Seizures during labor	
40_8	Precipitous labor	This information is used to identify pregnancy complications during labor and delivery and their relationship to method of delivery and birth outcome.
40_9	Prolonged labor	
40_10	Dysfunctional labor	
40_11	Breech/Malpresentation	
40_12	Cephalopelvic disproportion	
40_13	Cord prolapsed	
40_14	Anesthetic complications	
40_15	Fetal distress	
40_00	None	
40_16	Other	

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**METHOD OF DELIVERY**

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41-1	Vaginal	This information is used to relate method of delivery with birth outcome, to monitor changing trends in obstetric practice, and to determine which groups of women are most likely to have cesarean delivery.
41-2	Vaginal birth after previous C-section	
41-3	Primary C-section	The method of delivery is relevant to the health of mothers, especially if it is by cesarean section. Information from this item can be used to monitor delivery trends across the United States.
41-4	Repeat C-section	
41-5	Forceps	
41-6	Vacuum	

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**ABNORMAL CONDITIONS OF THE NEWBORN**

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42_1	Anemial	
42_2	Birth Injury	
42_3	Fetal Alcohol Syndrome	
42_4	Hyaline membrane disease/RDS	Information on abnormal conditions of the newborn helps measure the extent infants experience medical problems and can be used to plan for their health care needs. This item also provides a source of information on abnormal outcome in addition to congenital anomaly or infant death.
42_5	meconium aspiration syndrome	
42_6	Assisted Ventilation < 30min	These data allow researchers to estimate the number of high-risk infants who may benefit from special medical services.
42_7	Assisted Ventilation ≥ 30min	
42_8	Seizures	
42_0	None	
42_9	Other	

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**CONGENITAL ANOMALIES OF CHILD**

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43_1	Anencephalus	
43_2	Spina bifida/Meningocele	
43_3	Hydrocephalus	
43_4	Microcephalus	
43_5	Other Central nervous system anomalies	
43_6	Heart malformations	
43_7	Other circulatory/respiratory anomalies	
43_8	rectal atresia/stenosis	
43_9	Tracheo-esophageal fistula/Esophageal atresia	
43_10	Omphalocele/Gastroschisis	
43_11	Other gastrointestinal anomalies	Information on congenital anomalies is used to identify health problems that require medical care and monitor the incidence of the stated conditions. It is also used to study unusual clusters of selected anomalies, to track trends among different segments of the population, and to relate the prevalence of anomalies to other characteristics of the mother, infant, and the environment.
43_12	Malformed genitalia	
43_13	Renal agenesis	
43_14	Other urogenital anomalies	
43_15	Cleft lip/palate	
43_16	Polydactyly/Syndactyly/Adactyly	
43_17	Club foot	
43_18	Diaphragmatic hernia Other	
43_19	musculoskeletal/integumental anomalies	
43_20	Down's Syndrome	
43_21	Other chromosomal anomalies	
43_00	None	
43_22	Other	

## **WIC PC Data Elements**

**Exhibit 1.4**  
**Minimum Data Set Variables and Definitions**

For biennial reports on WIC participant and program characteristics, the term "participant" means a person on WIC master lists or a person listed in WIC operating files who is certified to receive WIC benefits in April 1998.

The data items should reflect the participant's status on each item at the time of the most recent WIC Program certification as of April 1998. However, as a convenience to State agencies that do not maintain historical files and that update the information in their automated systems during certification periods, current information that is on the file for each participant in April 1998 will be accepted.

1.	<b>State Agency ID</b>	A unique number that permits linkage to the WIC State agency where the participant was certified.
2.	<b>Local Agency ID</b>	A unique number that permits linkage to the local agency where the participant was certified as eligible for WIC benefits.
	<i>or</i>	
	<b>Service Site ID</b>	A unique number that permits linkage to the service site where certified. Either local agency ID or service site ID may be reported according to the level the State Agency feels appropriate. At a minimum, State agencies must provide agency names and addresses for each ID provided on their files.
3.	<b>Case ID</b>	A unique record number for each participant which maintains individual privacy at the national level.
	<b>General Instructions</b>	Participant or Case IDs for each participant should continue to maintain individual privacy at the national level. States are requested to generate these IDs in the same manner that was applied for PC92 to allow longitudinal tracking of participant characteristics. This task can be accomplished by applying the PC92 algorithm to construction of PC98 participant IDs.
4.	<b>Date of Birth</b>	Month, day, and year of participant's birth reported in MMDDYYYY format.
5.	<b>Race/Ethnicity</b>	The classification of the participant into one of the five (5) racial/ethnic categories: white; black; Hispanic; American Indian or Alaskan Native; or Asian or Pacific Islander. The ethnic categories, white and black, include only those persons who are not of Hispanic origin.
6a.	<b>Certification Category</b>	The category—one of five (5) possible categories—under which a person is certified as eligible for WIC benefits: pregnant woman; breastfeeding woman; postpartum woman (not breastfeeding); infant (under 12 months); or child (12-59 months).
6b-c.	<b>Expected Date of Delivery or Weeks Gestation</b>	For pregnant women, the projected date of delivery (MMDDYYYY format) or the number of weeks since the last menstrual period as determined at WIC Program certification.

Exhibit 1.4 (continued)

7.	<b>Date of Certification</b>	The <b>date</b> the person was declared eligible for the most current WIC Program certification as of April 1998. Month, day, and year should be reported in MMDDYYYY format.
8.	<b>Sex</b>	For infants and children, male or female.
9.	<b>Priority Level</b>	Participant priority level for WIC Program certification at the time of the most recent WIC Program certification as of April 1998.
10a-c.	<b>Participation in TANF/AFDC, Food Stamps, Medicaid</b>	The participant's reported participation in each of these programs at the time of the most recent WIC Program certification as of April 1998.
11.	<b>Migrant Status</b>	Participant migrant status according to the federal WIC Program definition of a migrant farmworker (currently counted in the FNS 498 report).
12.	<b>Number in Family or Economic Unit</b>	The number of persons in the family or economic unit upon which WIC income eligibility was based. A self-declared number in the family or economic unit may be reported for participants whose income was not required to be determined as part of the WIC certification process.
13a-c.	<b>Family or Economic Unit Income</b>	<p>1. For persons for whom income is determined during the certification process, the income amount that was determined to qualify them for the WIC Program during the most recent certification as of April 1998.</p> <p>FNS will convert income expressed in different measures (weekly, monthly, yearly, etc.) to annual amounts.</p> <p>2. For descriptive purposes only, for participants whose income was <b>not</b> required to be determined as part of the WIC Program certification process, the self-reported income at time of certification. These participants include adjunctively income-eligible participants (due to TANF, Food Stamp Program, or Medicaid participation) and those participants deemed income eligible under optional procedures available to the State Agency in Federal WIC Regulations, Section 246.7(d)(2)(vi-viii) (means tested programs identified by the State for automatic WIC Program income eligibility, income eligibility of Indian and instream migrant farmworker applicants).</p> <p>Zero should not be used to indicate income values that are missing or not available. <b>Zero should indicate only an actual value of zero.</b></p>

Exhibit 1.4 (continued)

14a-c.	<b>Nutritional Risks Present at Certification</b>	The three highest priority nutritional risks present at the WIC Program certification current in April 1998.
15a-b.	<b>Hemoglobin or Hematocrit</b>	That value for the measure of iron status that applies to the WIC Program certification current in April 1998. It is assumed that the measure was collected within sixty (60) days of the certification date.
16a-b.	<b>Weight</b>	The participant's weight measured according to the CDC nutrition surveillance program standards [nearest one-quarter (¼) pound]. If weight is not collected in pounds and quarter pounds, weight may be reported in grams.
17a-b.	<b>Height</b>	The participant's height (or length) measured according to the CDC nutrition surveillance program standards [nearest one-eighth (⅛) inch]. If height is not collected in inches and eighth inches, height may be reported in centimeters.
18.	<b>Date of Height and Weight Measure</b>	The date of the height and weight measures that were used during the most recent WIC Program certification period as of April 1998 in MMDDYYYY format.
19a.	<b>Currently Breastfed</b>	For infant participants between the ages of seven and eleven months in April 1998, whether or not the participant is <b>currently</b> receiving breastmilk.
19b.	<b>Ever Breastfed</b>	For infants between the ages of seven and eleven months in April 1998, whether or not the infant was <b>ever</b> breastfed.
19c.	<b>Length of Time Breastfed</b>	For infants between the ages of seven and eleven months in April 1998, the number of weeks the infant received breastmilk.
19d.	<b>Date Breastfeeding Data Collected</b>	For infants between the ages of seven and eleven months in April 1998, the date on which breastfeeding status was reported in MMDDYYYY format.
20a-j.	<b>Food Packages</b>	The food package code(s) for the WIC food package or for all food instruments prescribed for the participant during the month of April 1998.

**Exhibit 1.6  
Supplemental Data Set Variables and Definitions**

For biennial reports on WIC participant and program characteristics, the term participant means a person on WIC master lists or a person listed in WIC operating files who is certified to receive WIC benefits in April 1998.

The data items should reflect the participant's status on each item at the time of the most recent WIC Program certification as of April 1998. However, as a convenience to State agencies that do not maintain historical files and that update the information in their automated systems during certification periods, current information that is on the file for each participant in April 1998 will be accepted.

- |     |  |   |
|-----|--|---|
| 21. | <b>Date of First WIC Certification</b> | Date the participant was first certified for the WIC Program in MMDDYYYY format. For pregnant, breastfeeding and postpartum women this applies to the current/most recent pregnancy and not to prior pregnancies. |
| 22. | <b>Education Level</b>                 | For pregnant, breastfeeding and postpartum women, the highest grade or year of school completed. For infants and children, the highest grade or year of school completed by mother or primary caretaker.          |
| 23. | <b>Number in Household in WIC</b>      | The number of people in the participant's household receiving WIC benefits.   |
| 24. | <b>Source of Prenatal Care</b>         | For pregnant, breastfeeding and postpartum women, source of care for current/most recent pregnancy.   |
| 25. | <b>Date When Prenatal Care Began</b>   | For pregnant, breastfeeding and postpartum women, the date when prenatal care began for the most recent pregnancy in MMDDYYYY format.   |
| 26. | <b>Date Previous Pregnancy Ended</b>   | For pregnant women, the date that the previous pregnancy ended in MMDDYYYY format.  |
| 27. | <b>Total Number of Pregnancies</b>     | For pregnant women, the total number of times the woman has been pregnant, including this pregnancy, all live births and any pregnancies resulting in miscarriage, abortion or stillbirth.                        |
| 28. | <b>Total Number of Live Births</b>     | For pregnant women, the total number of babies born alive to this woman, including babies who may have died shortly after birth.  |

**Appendix D: 1997 Missouri Report  
“WIC Coverage and Targeting High-Risk Infants”**

**(Source—Missouri WIC Program)**

## 1997 Missouri WIC Coverage and Targeting of High Risk Infants

The WIC Program was initiated to serve low-income families that are determined to be at nutritional risk. In order to assess the program's coverage of the targeted risk population, one must know how prevalent those risk conditions are in the population and how many are served by the program.

What follows is an update of the 'Coverage and Targeting of High Risk Infants by the Missouri WIC Program' (1) report which utilized 1994 live births. This update uses infants born in 1997.

As with the 1994 study, the birth certificate was used to acquire information on the statewide prevalence of potential risk factors for WIC participation on infants. The birth certificate data set was linked with the WIC-Infant data set to obtain a means of assessing participation status. This linkage was completed for 1997 live births and resulted in a 95.0 percent link rate; as 38,705 of 40,741 WIC infants born in 1997 were linked to their birth certificates. Table 1 shows the corresponding linkage rate for 1994 was 93.6 percent. The unlinked WIC infant records may or may not have had a corresponding Missouri birth certificate. Some reasons for not having a corresponding birth certificate include duplicate records and migration. However, most of the unlinked WIC infant records most likely have corresponding birth certificates so the actual coverage and targeting rates could be higher than those reported in this document.

### Selection of At-Risk Population for Coverage and Targeting Study

As with the 1994 study, those risk factors available from the birth certificate which closely mirror what WIC used in 1997 as their risk factors for infant eligibility were used to identify the at-risk population. These risk factors are listed in Appendix A. As noted before, the at-risk population selected excludes infants with risk factors that are not available off the birth

certificate and includes infants that are above 185 percent of the Federal Poverty Level (i.e., the financial cutoff for WIC).

For 1997, 50,770 infants were born with one or more of the above risk factors noted on their birth certificate representing 68.3 percent of all Missouri resident live births. Of these 50,770 infants, 28,748 were on WIC for a 56.6 percent coverage rate using this criteria. The corresponding targeting rate; that is the percent of WIC infants having one or more of the risk factors, was 74.3 percent. Table 1 shows that these numbers and rates did not vary much between 1994 and 1997.

#### Prevalence, Coverage and Targeting Rates and Relative Targeting Ratio Definitions

The following formulas were used to compute the prevalence, coverage, and targeting rates and the relative targeting ratio by county of residence:

Prevalence of at-risk infants = Number of at-risk infants x 100/ Total number of infants

Coverage rate = Number of at-risk infants in WIC x 100/Total at-risk infants

Targeting rate = Number of at-risk infants in WIC x 100/Total infants in WIC

Because the targeting rate is dependent on the prevalence of at-risk infants in a given county an adjustment was made to account for the variation in prevalence and therefore permit more accurate comparisons of targeting rates between counties. This measure is noted as the Relative Targeting Ratio and is defined as:

Relative Targeting Ratio = (Number at-risk infants in WIC/Number infants  
in WIC) / (Number at-risk infants not in  
WIC/Number infants not WIC)

## Results

Map 1 and Appendix B shows prevalence of the at-risk infant population by county. The statewide infant at-risk prevalence rate for 1997 was 68.3 percent. The at-risk prevalence rate ranged from 52.2 percent for Worth County to 79.7 percent for Schuyler County. There are striking differences between the distribution of at-risk prevalence quartiles presented for 1997 and 1994. For 1994, most counties in the highest risk quartile were located in the southern half of Missouri with the majority of those in the southeast section. For 1997, counties in the highest risk quartile are scattered throughout Missouri. The reason for this change is the changing distribution of the at-risk population. There has been decreases in some of the at-risk groups (e.g. teenage births and short spacing between births, pre-pregnancy weight 10 percent or more under desired weight for height) and increases in other at-risk groups (e.g. births to mothers over the age of 34, multifetal pregnancies, overweight for height, low weight gain during pregnancy).

Map 2 and Appendix C presents WIC coverage of at-risk infants by county. The overall statewide infant at-risk WIC coverage rate was 56.6 percent. In other words 56.6 percent of at-risk infants were in the WIC Program. The county-specific WIC coverage of at-risk infants varied from 24.8 percent for St. Charles County to 91.6 percent for Pemiscot County. These extreme counties are the same as noted for 1994. Low coverage was noted for all Missouri counties surrounding St. Louis City (not included) and west along the Missouri River to and including Boone and Moniteau counties. The majority of the counties with low coverage are in the central and northern sections of Missouri with Greene, Christian, Webster and Cape Girardeau counties being the exceptions. The vast majority of the counties with the highest coverage are located in southeast Missouri. This distribution of WIC coverage by county for 1997 is very similar to the one observed for 1994.

The relative targeting ratio (RTR) is defined as the ratio of the prevalence of at-risk infants in WIC to the prevalence of at-risk infants not in WIC for a given geographic area. Map 3 and Appendix D present RTR quartiles for Missouri counties. The RTR ranged from 0.85 for St. Claire County to 1.83 for Shelby County with the overall state RTR of 1.20. Those counties with an RTR below 1.0 have a lower proportion of at-risk infants in WIC than not in WIC and these counties include: Iron, Henry, Daviess, Holt, Bollinger, Clark, Hickory, Dade, Lewis and St. Clair. One hundred four of Missouri's 114 counties and the City of St. Louis have a RTR of 1.0 or more. As for 1994, the counties in the worst quartile are very rural and are spread throughout Missouri.

Map 4 presents the four possible extremes in coverage and targeting. These extremes are:

- a) High coverage and targeting (HCHT) (Programs doing excellent job of covering the targeted population and most of their participants are at-risk according to the study definition.)
- b) High coverage and Low targeting (HCLT) (Counties where most at-risk infants are covered and many non-at risk infants as defined by this study are also covered.)
- c) Low coverage and High targeting (LCHT) (Counties with inadequate resources directed towards the at-risk population.)
- d) Low coverage and targeting (LCLT) (Counties not directing resources to cover the at-risk population and many nonrisk infants are covered.)

The four counties of Audrain, Mercer, Scotland and Webster are noted as having LCLT. Two of these four counties are also in the highest quartile for prevalence of at-risk infants (i.e. Audrain and Scotland). The five counties of Franklin, Moniteau, Nodaway, Osage and Ray are noted as having LCHT and none of these had a high prevalence of at-risk infants.

The counties of Oregon, Ozark, Reynolds, Ripley, Schuyler, Shannon and Stoddard have HCLT. Two of these (i.e. Reynolds and Schuyler) are also in the highest quartile for at-risk infant prevalence. Six of the seven HCLT counties are located in southeast Missouri (all but Schuyler).

The counties of Benton, Carter, Dent, Dunklin, Gentry, Howell, McDonald, New Madrid, Pemiscot, Shelby and Wright stood out as having both high coverage and high targeting. Nine of the eleven counties with HCHT are located in southern Missouri with three located in the Bootheel.

## Discussion

Through using this method of evaluating coverage and targeting we were able to highlight those areas doing an excellent job from those needing more resources and/or needing to direct their resources more towards the at-risk population.

A potential concern in using this methodology to evaluate program coverage and targeting is the link rate between the WIC Certification form and the birth certificate. The lower the link rate is, the more the linked data set will under estimate the coverage and targeting rates. So it is very important to know the linkage rate at the geographic level where the comparisons are to occur. For the present evaluation 60 of Missouri's 114 counties and the City of St. Louis had a link rate between 95.0 percent, the state rate, and 100 percent. Another 46 counties had a link rate between 90.1 and 94.9 percent, with eight counties between 85.1 and 90.0 percent and one county (McDonald) at 79.2 percent. With 106 of the counties having linkage rates above 90.0 percent there is not much county by county variation. Therefore the influence of the county-specific linkage rates should be minimal.

The foregoing method of program evaluation can be viewed as a direct method for assessing coverage and targeting. The at-risk population is known, as is the subset that is in WIC. For most public health programs only an indirect approach can be employed to assess coverage and targeting because of not having population and program data available to link.

Having a linked program/population data set permits a program to answer questions that cannot usually be addressed adequately otherwise. For example:

Are there areas that have a high prevalence of at-risk but a low need for additional resources beyond their current level, relative to other areas, because of the majority of the at-risk being in said program? (Too often it is assumed that high prevalence means more resources without checking out what need is currently being met or the information to determine this is unavailable.)

Are there areas that have low targeting and need to redirect their efforts towards the at-risk population?

Are there areas with low coverage and high targeting that need more resources directed at the at-risk population?

Was the reduction/increase in the outcome measure/s a given program is focused on observed just for program participants? Observed for both program and nonprogram participants?

Observed for only the non-participants?

## Summary

Using the 1997 linked WIC Infant/Birth data set to evaluate WIC coverage and targeting of at-risk infants it was found that the counties of Audrain, Mercer, Scotland and Webster had low coverage and targeting relative to other Missouri counties. The counties of Franklin, Moniteau, Nodaway, Osage and Ray had low coverage but high targeting indicating a need for more

resources directed at the at-risk population. The counties of Oregon, Ozark, Reynolds, Ripley, Schuyler, Shannon and Stoddard had high coverage and low targeting indicating the at-risk population, as defined by the study, represents a low percentage of their participants relative to non-participants in the counties. Further, it was found that the counties of Benton, Carter, Dent, Dunklin, Gentry, Howell, McDonald, New Madrid, Pemiscot, Shelby and Wright had both high coverage and high targeting relative to the other counties in Missouri. This information can be used to help the WIC program better focus its service towards the at-risk population

#### References:

1. Stockbauer, J.W.: Coverage and Targeting of High Risk Infants by the Missouri WIC Program. Missouri Department of Health Document July 12, 1996.

## Appendix A

WIC risk factors with approximations used from birth certificate file:

### WIC risk factor

Age 18 or younger at time of conception

Age 35 or older at time of conception

Less than 16 months between termination date of last pregnancy of 28 weeks or more and conception date of this pregnancy

Four or more previous pregnancies (includes miscarriages and abortions)

Present pregnancy exhibits multiple fetuses

Three or more spontaneous abortions, or stillbirth

Previous neonatal death

Premature or small for gestational age delivery within the past 5 years

Diseases and conditions complicating present pregnancy which affect or are affected by the adequacy of dietary intake as diagnosed by a physician such as: pregnancy induced hypertension (systolic >140, diastolic >90 after the 28th week), diabetes, renal disease, sickle cell disease, tuberculosis and heart disease

Hemoglobin  $\leq 11.0$  gm/100ml

Hematocrit  $\leq 34\%$

Gain less than 20 pounds by the 37th week of present pregnancy

Pre-pregnancy weight was 10% or more under the desired weight for height

Pre-pregnancy weight was 50% or more over the desired weight for height

### Approximation

Age less than 18 at date of infants birth

Age greater than 34 at date of infants birth

Less than 25 months between the birth dates of this and previous live birth

Four or more previous pregnancies (includes miscarriages and abortions)

Present pregnancy-multifetal

Three or more previous pregnancies not resulting in a live birth

Previous infant born alive now dead

Previous preterm or small-for-gestational-age infant

Chronic or pregnancy induced hypertension, insulin dependent or other diabetes, hemoglobinopathy, heart, lung or renal disease

Anemia Hgb. <10

Hct. <30%

Weight gain less than 20 pounds for pregnancies lasting 37 or more weeks

Pre-pregnancy weight 10% or more under the desired weight for height

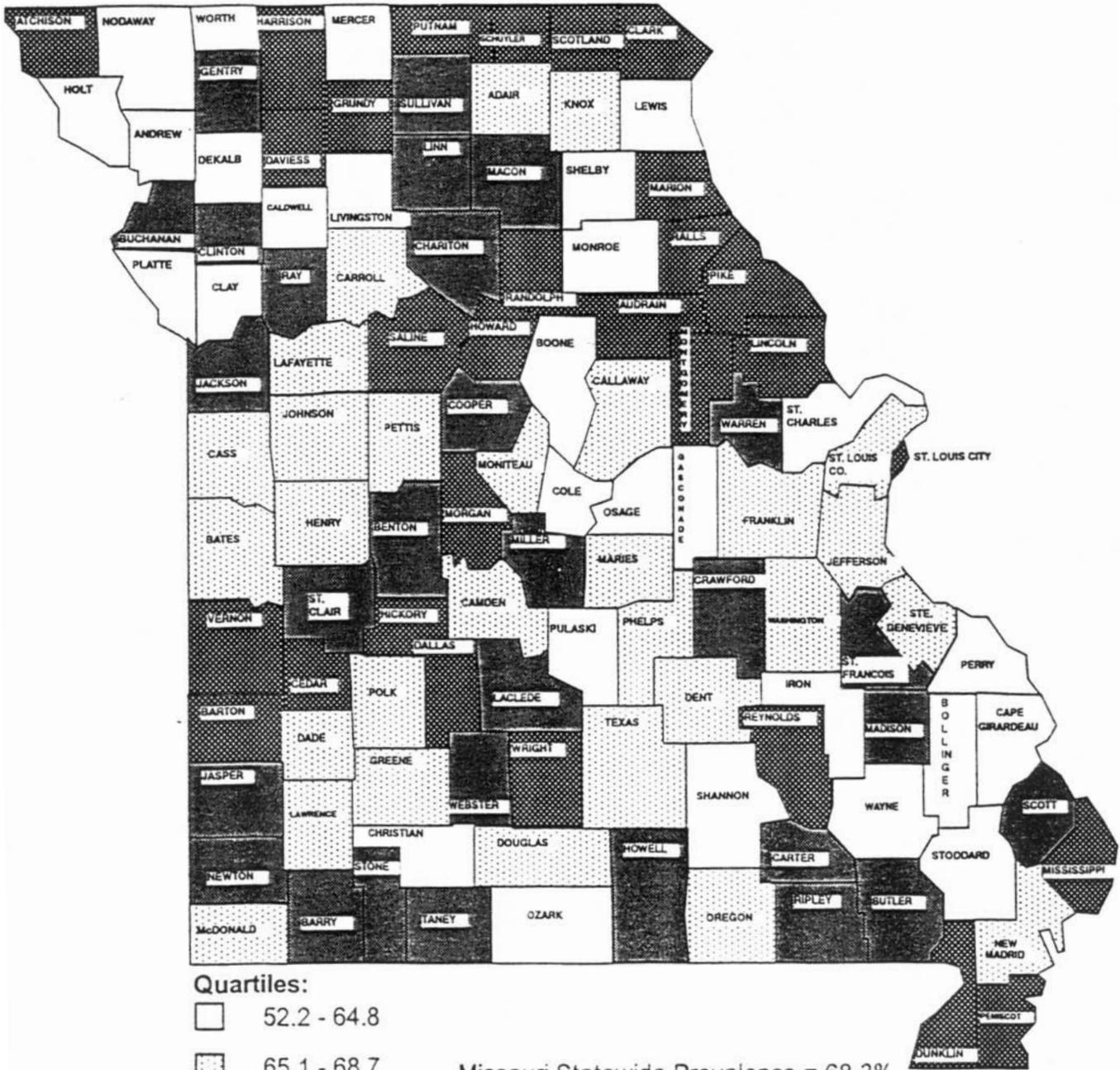
Pre-pregnancy weight was 50% or more over the desired weight for height

Table 1  
WIC Infant Coverage and Targeting Statistics  
1994 vs 1997  
Missouri Resident Data

	1994		1997	
	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
Live Births	73,373	100.0	74,346	100.0
At-Risk Population*	49,620	67.6	50,770	68.3
All WIC Infants	40,675	55.4	40,741	54.8
Linked WIC Infants/Birth Certificates	38,088	51.9	38,705	52.1
Link Rate		93.6		95.0
WIC Coverage	28,347	57.1	28,748	56.6
WIC Targeting	28,347	74.4	28,748	74.3
WIC Relative Targeting Ratio	1.23		1.20	

\*All WIC criteria identifiable from birth certificate items includes: Mothers aged less than 19, greater than 34, spacing less than 25 months, 4+ previous pregnancies, multifetal pregnancy, 3+ previous spontaneous/induced/stillbirths, previous death live born infant, previous SGA or preterm, pregnancy induced hypertension, insulin and non-insulin dependent diabetes, hemoglobinopathy, cardiac disease, acute or chronic lung disease, chronic hypertension, renal disease, anemia (hct <30/hgb <10), weight gain during pregnancy less than 20 pounds, weight was 10% or more under desired weight for height, weight was 50% or more above desired weight for height, low birth weight infant, SGA infant, and preterm infant.

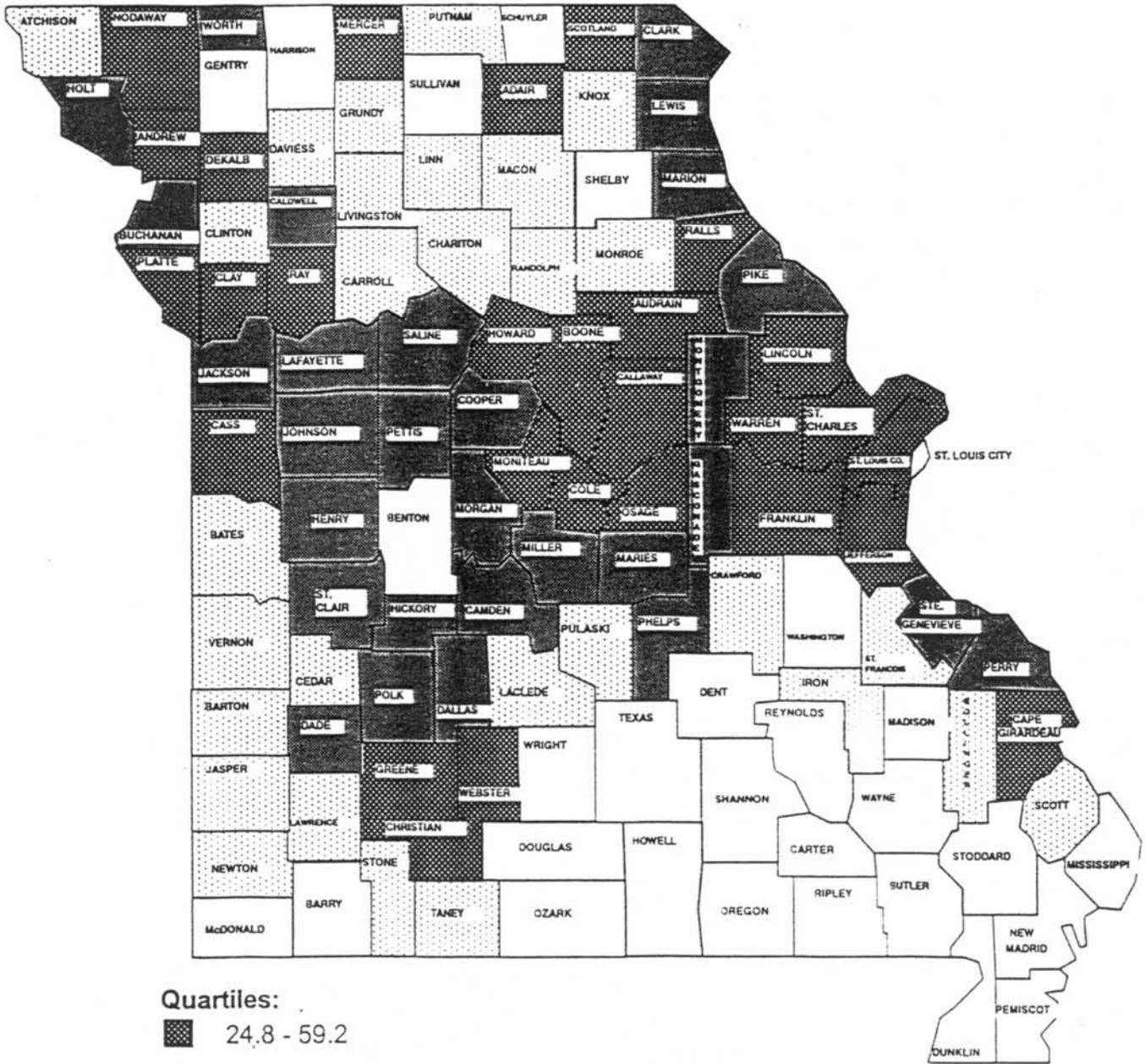
# Prevalence of At-Risk\* Population 1997 WIC Infant Coverage and Targeting by County



\* At-Risk Population defined as infants with any of the WIC Risk Factors available off the birth certificate.

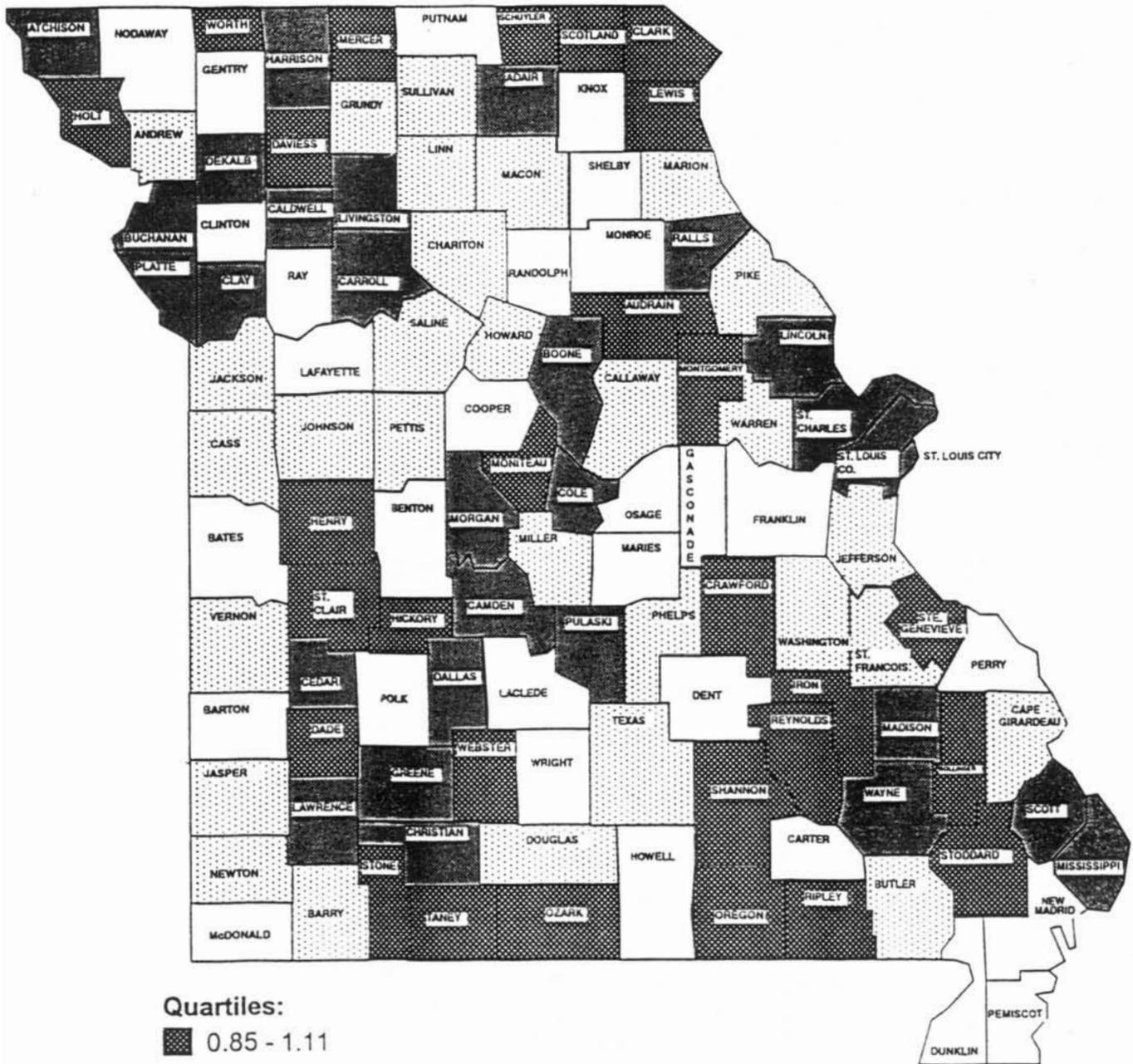
# WIC Coverage of At-Risk\* Population

## 1997 WIC Infant Coverage and Targeting by County



\* At-Risk Population defined as infants with any of the WIC Risk Factors available off the birth certificate.

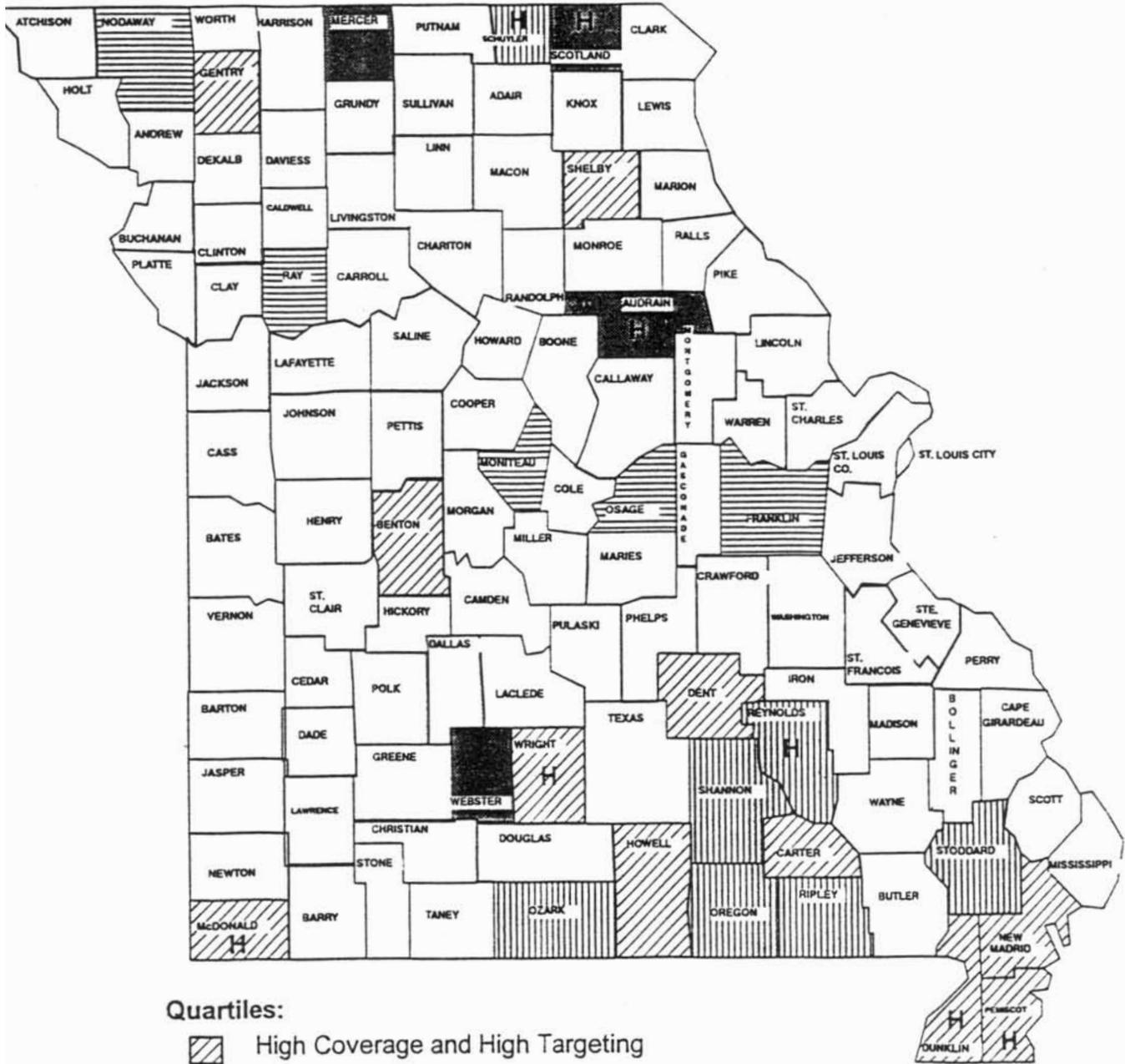
# WIC Relative Targeting Ratios of At-Risk\* Population 1997 WIC Infant Coverage and Targeting by County



\* At-Risk Population defined as infants with any of the WIC Risk Factors available off the birth certificate.

# WIC Coverage and Targeting Extremes

## 1997 WIC Infant Coverage and Targeting by County



**Quartiles:**

- High Coverage and High Targeting
- High Coverage and Low Targeting
- Low Coverage and High Targeting
- Low Coverage and Low Targeting

H Highest Quartile for at-risk prevalence.

WIC Coverage of At-Risk Population  
 Ranked by Prevalence of At-Risk Population  
 \* 1997 St. Louis City Missouri Resident Live Births BLACK ONLY

Resident County	Live Births	At Risk Population	Linked Infants Born 1997	WIC Infants Born With Risk	Non-WIC Infants Born 1997	NONWIC Infants Born With Risk	Overall At Risk Prevalence	Prevalence Quotient	Sig Level	WIC Infant Coverage Rate	WIC Infant Targeting Rate	Targeting Rank	Sig Level	Relative Targeting Ratio	RTR Quotient
SCHUYLER	64	51	51	10	13	10	79.7	4	high	80.4	80.4	4	high	1.0	1
PEMISCOT	406	321	359	27	47	27	79.1	4	high	91.6	81.9	4	high	1.4	4
ST LOUIS CITY	5758	4421	4377	929	1381	929	76.8	4	high	79.0	79.8	4	high	1.2	2
CLARK	81	62	55	21	26	21	76.5	4	high	66.1	74.5	3	high	0.9	1
REYNOLDS	71	54	61	7	10	7	76.1	4	high	87.0	77.0	4	high	1.1	1
NOT MO AT BTH	182	138	182	0	0	0	75.8	4	high	100.0	75.8	4	high	1.1	2
DALLAS	209	158	125	59	84	59	75.6	4	high	62.7	79.2	4	high	1.1	1
MONTGOMERY	135	102	79	62	56	40	75.6	4	high	60.8	78.5	4	high	1.1	1
HICKORY	73	55	51	37	22	18	75.3	4	high	67.3	72.5	2	high	0.9	1
MARION	409	306	248	200	161	106	74.8	4	high	65.4	80.6	4	high	1.2	3
ATCHISON	55	41	39	30	16	11	74.5	4	high	73.2	76.9	3	high	1.1	2
MORGAN	226	168	132	103	94	65	74.3	4	high	61.3	78.0	4	high	1.1	2
HARRISON	80	59	59	45	21	14	73.8	4	high	68.3	76.3	3	high	1.1	2
MISSISSIPPI	197	145	170	128	27	17	73.6	4	high	88.3	75.3	3	high	1.2	2
CEDAR	154	113	109	84	45	29	73.4	4	high	74.3	77.1	4	high	1.2	2
DAVIES	120	88	83	60	37	28	73.3	4	high	68.2	72.3	2	high	1.0	1
WRIGHT	234	171	177	137	57	34	73.1	4	high	80.1	77.4	4	high	1.3	4
HOWARD	115	84	58	47	57	37	73.0	4	high	56.0	81.0	4	high	1.2	3
RALLS	89	65	44	34	45	31	73.0	4	high	52.3	77.3	4	high	1.1	2
GRUNDY	129	94	90	70	39	24	72.9	4	high	74.5	77.8	4	high	1.3	3
LINCOLN	507	369	258	202	249	167	72.8	4	high	54.7	78.3	4	high	1.2	2
VERNON	285	207	183	142	102	65	72.6	4	high	68.6	77.6	4	high	1.2	3
PUTNAM	62	45	43	34	19	11	72.6	4	high	75.6	79.1	4	high	1.4	4
DURKLIN	495	359	419	315	76	44	72.5	4	high	87.7	75.2	3	high	1.3	4
SALINE	251	182	150	117	101	65	72.5	4	high	64.3	78.0	4	high	1.2	3
SCOTLAND	76	55	37	27	39	27	72.4	4	high	50.9	75.7	3	high	1.1	1
BARTON	184	133	119	98	65	35	72.3	4	high	73.7	82.4	4	high	1.5	4
PIKE	204	146	119	94	85	52	71.6	4	high	64.4	79.0	4	high	1.3	4
RANDOLPH	334	239	236	182	98	57	71.6	4	high	76.2	77.1	4	high	1.3	4
AUDRAIN	328	234	152	114	176	120	71.3	4	high	48.7	75.0	3	high	1.1	1
BARRY	460	328	334	251	126	77	71.3	3	high	76.5	75.1	3	high	1.2	3
NEWTON	683	487	448	342	235	145	71.3	3	high	70.2	76.3	3	high	1.2	3
HILLER	324	231	205	156	119	75	71.3	3	high	67.5	76.1	3	high	1.2	3
MACON	202	144	132	100	70	44	71.3	3	high	69.4	75.8	3	high	1.2	3
SULLIVAN	80	57	58	44	22	13	71.3	3	high	77.2	75.9	3	high	1.3	3
BENTON	149	106	108	84	41	22	71.1	3	high	79.2	77.8	4	high	1.4	4
LINN	183	130	115	89	68	41	71.0	3	high	68.5	77.4	4	high	1.3	3
RAT	291	206	152	122	139	84	70.8	3	high	59.2	80.3	4	high	1.3	4
ST FRANCOIS	670	474	464	349	206	125	70.7	3	high	73.6	75.2	3	high	1.2	3
COOPER	196	138	102	85	94	53	70.4	3	high	61.6	83.3	4	high	1.5	4

Data sets used are 1997 births with odds and linked WIC-1/Birth High Risk Population is defined as infants with any of the WIC risk factors Available off the Birth Certificate. Linkage rate was 95.0 percent wicovt97.sas

WIC Coverage of At-Risk Population  
 Ranked by Prevalence of At-Risk Population  
 \* 1997 St. Louis City Missouri Resident Live Births BLACK ONLY

resident county	Live Births	At Risk Population	Linked Births	WIC Born Mom With Risk	Non-WIC Born Mom With Risk	NONWIC Born Mom With Risk	Overall At Risk	Prevalence	WIC Infant Coverage	Cover- age	WIC Infant Targeting Rate	WIC Infant Targeting Rate	WIC Relative Targeting Ratio	RTR
ARREN	277	195	123	97	154	98	70.4	3	49.7	1	78.9	78.9	1.2	3
ARROLL	123	84	89	63	34	21	68.3	2	75.0	3	70.8	70.8	1.1	2
ASHWAY	488	333	227	172	261	161	68.2	2	51.7	1	75.8	75.8	1.2	3
AWRENCE	497	339	346	246	151	93	68.2	2	72.6	3	71.1	71.1	1.2	2
AXAS	257	175	188	135	69	40	68.1	2	77.1	4	71.8	71.8	1.2	3
BEENE	3014	2041	1656	1206	1358	835	67.7	2	59.1	1	72.8	72.8	1.2	2
BW MADRID	287	194	232	166	55	28	67.6	2	85.6	4	71.6	71.6	1.4	4
BSHINGTON	292	197	237	167	55	30	67.5	2	84.8	4	70.5	70.5	1.3	3
OF LOUIS COUNTY	12966	8743	4296	3182	8670	5561	67.4	2	36.4	1	74.1	74.1	1.2	2
URLES	89	60	52	40	37	20	67.4	2	66.7	2	76.9	76.9	1.4	4
TTIS	550	370	346	250	204	120	67.3	2	67.6	2	72.3	72.3	1.2	3
NT	183	123	134	99	49	24	67.2	2	80.5	4	73.9	73.9	1.5	4
ANKLIN	1292	861	557	439	735	422	66.6	2	51.0	1	78.8	78.8	1.4	4
ILK	329	219	176	132	153	87	66.6	2	60.3	3	75.0	75.0	1.3	4
PAIR	257	171	126	89	131	82	66.5	2	61.7	2	70.6	70.6	1.1	2
E GENEVIEVE	173	115	103	71	70	44	66.5	2	61.7	2	68.9	68.9	1.1	1
RY	253	168	168	111	85	57	66.4	2	66.1	2	66.1	66.1	1.0	1
FFERSON	2708	1797	1140	849	1568	948	66.4	2	47.2	1	74.5	74.5	1.2	3

Data sets used are 1997 births with odds and linked WIC-1/Birth High Risk Population is defined as infants with any of the WIC risk factors Available off the Birth Certificate. Linkage rate was 95.0 percent wicovt97.sas

WIC Coverage of At-Risk Population  
 Ranked by Prevalence of At-Risk Population  
 \* 1997 St. Louis City Missouri Resident Live Births BLACK ONLY

resident county	Live Births	At Risk Population	Linked Births 1997	WIC Born With Risk	Non-WIC Born 1997	MONWIC Born With Risk	Overall At Risk	Prevalence Quotient	WIC Infant Coverage Rate	Covered age title	Sig Level	WIC Infant Targeting Rate	Targeting Rank	Sig Level	Relative Targeting Ratio	RTR Quartile
AFAYETTE	383	254	202	152	181	102	66.3	2	59.8	2		75.2	3		1.3	4
BOONE	53	35	33	24	20	11	66.0	2	68.6	3		72.7	2		1.3	4
BOYD	76	50	48	30	28	20	65.8	2	60.0	2		62.5	1		0.9	1
BUONICCONTI	1085	713	464	338	621	375	65.7	2	47.4	1	low	72.8	3		1.2	3
BUONICCONTI	301	197	195	133	106	64	65.4	2	67.5	2	high	68.2	1		1.1	2
BUONICCONTI	199	130	91	62	108	68	65.3	2	47.7	1		68.1	1		1.1	1
BUONICCONTI	610	398	354	252	256	146	65.2	2	63.3	2	high	71.2	2		1.2	3
BUONICCONTI	435	283	260	184	175	99	65.1	2	65.0	2	high	70.8	2		1.3	3
BUONICCONTI	1765	1144	650	470	1115	674	64.8	1	41.1	1	low	72.3	2		1.2	2
BUONICCONTI	48	31	33	21	15	10	64.6	1	67.7	2		63.6	1		1.0	1
BUONICCONTI	1007	649	294	205	713	444	64.4	1	31.6	1	low	69.7	1		1.1	2
BUONICCONTI	303	195	238	156	65	39	64.4	1	80.0	4	high	65.5	1	low	1.1	1
BUONICCONTI	143	92	119	78	24	14	64.3	1	84.8	4	high	65.5	1		1.1	2
BUONICCONTI	112	72	68	49	44	23	64.3	1	70.8	3	high	72.1	2		1.4	4
BUONICCONTI	176	113	118	80	58	33	64.2	1	40.0	1	low	67.8	1		1.2	2
BUONICCONTI	878	563	314	225	564	338	64.1	1	24.8	1	low	71.7	2		1.2	2
BUONICCONTI	3906	2502	873	621	3033	1881	64.1	1	56.5	1	*	65.0	1	*	1.0	1
BUONICCONTI	36	23	20	13	16	10	63.9	1	75.9	3	high	63.6	1		1.0	1
BUONICCONTI	130	83	99	63	31	20	63.8	1	84.1	4	high	63.9	1		1.0	1
BUONICCONTI	99	63	83	53	16	10	63.6	1	51.5	1	low	68.8	1		1.0	1
BUONICCONTI	683	433	324	223	359	210	63.4	1	37.3	1	low	70.7	2		1.2	2
BUONICCONTI	2554	1616	852	602	1702	1014	63.3	1	54.1	1	low	72.5	2		1.2	2
BUONICCONTI	193	122	91	66	102	56	63.2	1	72.7	3	high	65.5	1	low	1.3	4
BUONICCONTI	610	384	426	279	184	105	63.0	1	60.1	2		70.2	2		1.3	4
BUONICCONTI	244	153	131	92	113	61	62.7	1	53.1	1	low	61.2	1	low	0.9	1
BUONICCONTI	778	484	366	257	412	227	62.2	1	70.3	3		65.5	1		1.1	2
BUONICCONTI	119	74	85	52	34	22	62.2	1	58.5	1		65.0	1		1.1	2
BUONICCONTI	105	65	58	38	47	27	61.9	1	61.9	2		61.2	1		1.0	1
BUONICCONTI	102	63	60	39	42	24	60.6	1	48.6	1	high	69.2	1	low	1.3	3
BUONICCONTI	109	66	85	52	24	14	60.3	1	60.9	2		57.1	1	low	1.3	3
BUONICCONTI	184	111	78	54	106	57	60.1	1	84.1	4	high	70.8	2		1.5	4
BUONICCONTI	153	92	98	56	55	36	60.1	1	49.0	1		67.3	1		1.8	4
BUONICCONTI	180	108	96	68	84	40	59.5	1	66.7	2	*	69.6	1	*	1.5	4
BUONICCONTI	74	44	55	37	19	7	55.1	1				53.3	1		1.1	1
BUONICCONTI	178	98	69	48	109	50	52.2	1								
BUONICCONTI	23	12	15	8	8	4										
=====																
74346 50770 38705 28748 35641 22022																

Data sets used are 1997 births with odds and linked WIC-1/Birth High Risk Population is defined as Infants with any of the WIC risk factors Available off the Birth Certificate. Linkage rate was 95.0 percent micovt97.sas

WIC Coverage of At-Risk Population  
 Ranked by Coverage of At-Risk Population  
 \* 1997 St. Louis City Missouri Resident Live Births BLACK ONLY

Resident County	Live Births	At Risk Population	Linked Infants Born 1997	WIC Infants Born With Risk	Non-WIC Infants Born 1997	NONWIC Infants Born With Risk	Overall At Risk Prevalence	Prevalence Quotient	WIC Infant Coverage Rate	WIC Infant Targeting Rate	Targeting Rank	Sig Level	Relative Targeting Ratio	RTR Quartile
MOT MO AT BTH	182	138	182	138	0	0	75.8	100.0	100.0	75.8	4	high	1.4	1
PEMISICOT	406	321	359	294	47	27	79.1	91.6	91.6	81.9	4	high	1.1	1
OREGON	114	78	103	71	11	7	68.4	91.0	91.0	68.9	4	high	1.1	1
MISSISSIPPI	197	145	170	128	27	17	73.6	80.3	80.3	75.3	3	high	1.2	2
DUNKLIN	495	359	419	315	76	44	72.5	87.7	87.7	75.2	3	high	1.3	4
REYNOLDS	71	54	61	47	10	7	76.1	87.0	87.0	77.0	4	high	1.1	1
NEW MADRID	287	194	232	166	55	28	67.6	85.6	85.6	71.6	2	high	1.4	4
DOUGLAS	149	102	122	87	24	15	68.5	85.3	85.3	71.3	2	high	1.3	3
WAYNE	143	92	119	78	24	14	64.3	84.8	84.8	65.5	1	high	1.1	2
WASHINGTON	292	197	237	167	55	30	67.5	84.8	84.8	70.5	2	high	1.3	3
RIPLEY	148	103	124	87	24	16	69.6	84.5	84.5	70.2	1	high	1.1	1
SHANNON	99	63	83	53	16	10	63.6	84.1	84.1	63.9	1	high	1.0	1
SHELBY	74	44	55	37	19	7	59.5	84.1	84.1	67.3	1	high	1.8	4
MCDONALD	328	225	257	189	71	36	68.6	84.0	84.0	73.5	3	high	1.5	4
HOWELL	477	329	373	274	104	55	69.0	83.3	83.3	73.5	3	high	1.4	4
CARTER	92	64	72	53	20	11	69.6	82.8	82.8	73.6	3	high	1.3	4
DENT	183	123	134	99	49	24	67.2	80.5	80.5	73.9	3	high	1.5	4
SCHUYLER	64	51	51	41	13	10	79.7	80.4	80.4	80.4	4	high	1.0	1
WRIGHT	234	171	177	137	57	34	73.1	80.1	80.1	77.4	4	high	1.3	4
STODDARD	303	195	238	156	65	39	64.4	80.0	80.0	65.5	1	high	1.1	1
MADISON	149	104	116	83	33	21	69.8	79.8	79.8	71.6	2	low	1.1	2
BENTON	149	106	108	84	41	22	71.1	79.2	79.2	77.8	4	high	1.4	4
ST LOUIS CITY	5758	4421	4377	3492	1381	929	76.8	79.0	79.0	79.8	4	high	1.2	2
OZARK	109	66	85	52	24	14	60.6	78.8	78.8	61.2	1	high	1.0	1
SULLIVAN	80	57	58	44	22	13	71.3	77.2	77.2	75.9	3	high	1.3	3
TEXAS	257	175	188	135	69	40	68.1	77.1	77.1	71.8	2	high	1.2	3
BUTLER	516	355	379	273	137	82	68.8	76.9	76.9	72.0	2	high	1.2	3
BARRY	460	328	334	251	126	77	71.3	76.5	76.5	77.8	3	high	1.2	3
GENTRY	79	55	54	42	25	13	69.6	76.4	76.4	77.8	4	high	1.5	4
HARRISON	80	59	59	45	21	14	73.8	76.3	76.3	76.3	3	high	1.1	2
RANDOLPH	334	239	236	182	98	57	71.6	76.2	76.2	77.1	4	high	1.3	4
IRON	130	83	99	63	31	20	63.8	75.9	75.9	63.6	1	high	1.0	1
PUTNAM	62	45	43	34	19	11	72.6	75.6	75.6	79.1	4	high	1.4	4
CARROLL	123	84	89	63	34	21	68.3	75.0	75.0	70.8	2	high	1.1	2
BATES	217	149	146	111	71	38	68.7	74.5	74.5	76.0	3	high	1.4	4
GRUNDY	129	94	90	70	39	24	72.9	74.5	74.5	77.8	4	high	1.3	3
CEDAR	154	113	109	84	45	29	73.4	74.3	74.3	77.1	4	high	1.2	2
STONE	334	235	246	174	88	61	70.4	74.0	74.0	70.7	2	high	1.0	1
BARTON	184	133	119	98	65	35	72.3	73.7	73.7	82.4	4	high	1.5	4
ST FRANCOIS	670	474	464	349	206	125	70.7	73.6	73.6	75.2	3	high	1.2	3

Data sets used are 1997 births with odds and linked WIC-1/Birth High Risk Population is defined as infants with any of the WIC risk factors Available off the Birth Certificate. Linkage rate was 95.0 percent Wicovt97.sas

WIC Coverage of At-Risk Population  
 Ranked by Coverage of At-Risk Population  
 \* 1997 St. Louis City Missouri Resident Live Births BLACK ONLY

Resident County	Live Births	At Risk Population	Linked Births 1997	WIC Infants Born With Risk	Non-WIC Infants Born 1997	NONWIC Infants Born With Risk	Overall At Risk Prev	Prevalence Quar-tile	WIC Infant Coverage Rate	Sig Level	WIC Infant Targeting Rate	Targeting Rank	Sig Level	Relative Targeting Ratio	RTR Quar-tile
ATCHISON	55	41	39	30	16	11	74.5	4	73.2	3	76.9	3	low	1.1	2
PULASKI	610	384	426	279	184	105	63.0	1	72.7	3	65.5	1	low	1.1	2
SCOTT	584	405	408	294	176	111	69.3	3	72.6	3	72.1	2	high	1.1	2
LAWRENCE	497	339	346	246	151	93	68.2	2	72.6	3	71.1	2	high	1.2	2
TANEY	495	345	348	250	147	95	69.7	3	72.5	3	71.8	2	high	1.1	1
LIVINGSTON	176	113	118	80	58	33	64.2	1	70.8	3	67.8	1	high	1.2	2
LACLEDE	405	280	262	198	143	82	69.1	3	70.7	3	75.6	3	high	1.3	4
BOLLINGER	119	74	85	52	34	22	62.2	1	70.3	3	61.2	1	low	0.9	1
NEWTON	683	487	448	342	235	145	71.3	3	70.2	3	76.3	3	high	1.2	3
HACON	202	144	132	100	70	44	71.3	3	69.4	3	75.8	3	high	1.2	3
CHARITON	79	55	50	38	29	17	69.6	3	69.1	3	76.0	3	high	1.3	3
CLINTON	228	158	134	109	94	49	69.3	3	69.0	3	81.3	4	high	1.6	4
JASPER	1553	1070	997	738	556	332	68.9	3	69.0	3	74.0	3	high	1.2	3
CRAWFORD	333	234	224	161	109	73	70.3	3	68.8	3	71.9	2	high	1.1	1
VERNON	285	207	183	142	102	65	72.6	4	68.6	3	77.6	4	high	1.2	3
KNOX	53	35	33	24	20	11	66.0	2	68.6	3	72.7	2	high	1.3	4
LINN	183	130	115	89	68	41	71.0	3	68.5	3	77.4	4	high	1.3	3
DAVIESS	120	88	83	60	37	28	68.2	3	68.2	3	72.3	2	high	1.0	1
MONROE	112	72	68	49	44	23	64.3	1	68.1	3	72.1	2	high	1.4	4
HOLT	48	31	33	21	15	10	64.6	1	67.7	2	63.6	1	high	1.0	1
PETTIS	550	370	346	250	204	120	67.3	2	67.6	2	72.3	2	high	1.2	3
MILLER	324	231	205	156	119	75	71.3	3	67.5	2	76.1	3	high	1.2	3
CAMDEN	301	197	195	133	106	64	65.4	2	67.5	2	68.2	1	high	1.1	2
HICKORY	73	55	51	37	22	18	75.3	4	67.3	2	72.5	2	high	0.9	1
MARIES	89	60	52	40	37	20	67.4	2	66.7	2	76.9	3	high	1.4	4
WORTH	23	12	15	8	8	4	52.2	1	66.7	2	53.3	1	high	1.1	1
CLARK	81	62	55	41	26	21	76.5	4	66.1	2	74.5	3	high	0.9	1
HENRY	253	168	168	111	85	57	66.4	2	66.1	2	66.1	1	high	1.0	1
MARION	409	306	248	200	161	106	74.8	4	65.4	2	80.6	4	high	1.2	3
PHELPS	435	283	260	184	175	99	65.1	2	65.0	2	70.8	2	high	1.3	3
PIKE	204	146	119	94	85	52	71.6	4	64.4	2	79.0	4	high	1.3	3
SALINE	251	182	150	117	101	65	72.5	4	64.3	2	78.0	4	high	1.2	3
JOHNSON	610	398	354	252	256	146	65.2	2	63.3	2	71.2	2	high	1.2	3
GASCONADE	180	108	96	68	84	40	60.0	1	63.0	2	70.8	2	high	1.5	4
DALLAS	209	158	125	99	84	59	75.6	4	62.7	2	79.2	4	high	1.1	2
ST CLAIR	94	66	62	41	32	25	70.2	3	62.1	2	66.1	1	high	0.8	1
CALDWELL	102	63	60	39	42	24	61.8	1	61.9	2	65.0	1	high	1.1	2
STE GENEVIEVE	173	115	103	71	70	44	66.5	2	61.7	2	68.9	1	high	1.1	1
COOPER	196	138	102	85	94	53	70.4	3	61.6	2	83.3	4	high	1.5	4
MORGAN	226	168	132	103	94	65	74.3	4	61.3	2	78.0	4	high	1.1	2

Data sets used are 1997 births with odds and linked WIC-1/Birth High Risk Population is defined as infants with any of the WIC risk factors Available off the Birth Certificate. Linkage rate was 95.0 percent Wicovt97.sas

MIC Coverage of At-Risk Population  
 Ranked by Coverage of At-Risk Population  
 \* 1997 St. Louis City Missouri Resident Live Births BLACK ONLY

Resident County	Live Births	At Risk Population	Linked Infants Born 1997	MIC Infants Born Mom With Risk	Non-MIC Infants Born Mom With Risk	NONMIC Infants Born Mom With Risk	Overall At Risk Prev title	Prevalence Quar- title	MIC Infant Coverage Rate	Cover- age Quar- title	Sig Level	MIC Infant Targeting Rate	Targeting Rank	Sig Level	Relative Targeting Ratio	RTR Quar- tile
JCHANAN	1093	760	623	463	470	297	69.5	3	60.9	2		74.3	3		1.2	2
EMIS	153	92	98	56	55	36	60.1	1	60.9	2		57.1	1	low	0.9	1
ANTIGOMERY	135	102	79	62	56	40	75.6	4	60.8	2		78.5	4		1.1	1
ACKSON	9605	6615	5325	3998	4280	2617	68.9	3	60.4	2	high	60.4	3		1.1	3
DLK	329	219	176	132	153	87	66.6	2	60.3	2		75.0	3		1.3	4
ERRY	244	153	131	92	113	61	62.7	1	60.1	2		70.2	2		1.3	4
ADE	76	50	48	30	28	20	65.8	2	60.0	2		62.5	1		0.9	1
AFAYETTE	383	254	202	152	181	102	66.3	2	59.8	2		75.2	3		1.3	4
AY	291	206	152	122	139	84	70.8	3	59.2	1		80.3	4		1.3	4
REENE	3014	2041	1656	1206	1358	835	67.7	2	59.1	1		72.8	2		1.2	2
E KALB	105	65	58	38	47	27	61.9	1	58.5	1		65.5	1		1.1	2
EBSTER	454	317	256	183	198	134	69.8	3	57.7	1		71.5	2		1.1	1
ERCER	36	23	20	13	16	10	63.9	1	56.5	1	*	65.0	1	*	1.0	1
WARD	115	84	58	47	57	37	73.0	4	56.0	1		81.0	4		1.2	3
INCOLH	507	369	258	202	249	167	72.8	4	54.7	1		78.3	4		1.2	2
ADAWAY	193	122	91	66	102	56	63.2	1	54.1	1		72.5	2		1.3	4
APE GIRARDEAU	778	484	366	257	412	227	62.2	1	53.1	1	low	70.2	1		1.3	3
ALLS	89	65	44	34	45	31	73.0	4	52.3	1		77.3	4		1.1	2
DAIR	257	171	126	89	131	82	66.5	2	52.0	1		70.6	2		1.1	2
ALLAWAY	488	333	227	172	261	161	68.2	2	51.7	1		75.8	3		1.2	3
HRISTIAN	683	433	324	223	359	210	63.4	1	51.5	1	low	68.8	1		1.2	2
RANKLIN	1292	861	557	439	735	422	66.6	2	51.0	1	low	78.8	4		1.4	4
COTLAND	76	55	37	28	39	27	72.4	4	50.9	1		75.7	3		1.1	1
ARREN	277	195	123	97	154	98	70.4	3	49.7	1		78.9	4		1.2	3
SAGE	178	98	69	48	109	50	55.1	1	49.0	1	low	69.6	1		1.5	4
UDRAIN	328	234	152	114	176	120	71.3	4	48.7	1		75.0	3		1.1	1
NDREW	184	111	78	54	106	57	60.3	1	48.6	1		69.2	1		1.3	3
ONITEAU	199	130	91	62	108	68	65.3	2	47.7	1		68.1	1		1.1	1
ASS	1085	713	464	338	621	375	65.7	2	47.4	1	low	72.8	3		1.2	3
EFFERSON	2708	1797	1140	849	1568	948	66.4	2	47.2	1	low	74.5	3		1.2	3
DOONE	1765	1144	650	470	1115	674	64.8	1	41.1	1	low	72.3	2		1.2	2
OLE	878	563	314	225	564	338	64.1	1	40.0	1	low	71.7	2		1.2	2
LAY	2554	1616	852	602	1702	1014	63.3	1	37.3	1	low	70.7	2		1.2	2
T LOUIS COUNTY	12966	8743	4296	3182	8670	5561	67.4	2	36.4	1	low	74.1	3		1.2	2
LAITE	1007	649	294	205	713	444	64.4	1	31.6	1	low	69.7	1		1.1	2
T CHARLES	3906	2502	873	621	3033	1881	64.1	1	24.8	1	low	71.1	2		1.1	2
*****	74346	50770	38705	28748	35641	22022										

Data sets used are 1997 births with odds and linked MIC-1/Birth High Risk Population is defined as infants with any of the MIC risk factors Available off the Birth Certificate. Linkage rate was 95.0 percent wfcovt97.sas

MIC Coverage of At-Risk Population  
 Ranked by Relative Targeting Ratios  
 \* 1997 St. Louis City Missouri Resident Live Births BLACK ONLY

Resident County	Live Births	At Risk Population	Linked Infants Born 1997	MIC Infants Born With Risk	Non-MIC Infants Born With Risk	Overall At Risk	Prevalence	MIC Infant Coverage	Covered Age	MIC Infant Targeting Rate	Targeting Rank	Relative Targeting Ratio	RTR Quartile
SHELBY	74	44	55	37	19	59.5	1	84.1	4	67.3	1	1.83	4
CLINTON	228	158	134	109	94	69.3	3	69.0	3	81.3	4	1.56	4
BARTON	184	133	119	98	65	72.3	3	73.7	3	82.4	4	1.53	4
OSAGE	178	98	69	48	109	55.1	1	49.0	1	69.6	1	1.52	4
DENT	183	123	134	99	49	67.2	2	80.5	4	73.9	3	1.51	4
GENTRY	79	55	54	42	25	69.6	3	76.4	4	77.8	4	1.50	4
GASCONADE	180	108	96	85	84	60.0	1	63.0	2	70.8	2	1.49	4
COOPER	196	138	102	85	94	70.4	3	61.6	2	83.3	4	1.48	4
MCDONALD	328	225	257	189	36	68.6	2	84.0	4	73.5	3	1.45	4
BENTON	149	106	108	84	41	71.1	3	79.2	4	77.8	4	1.45	4
PEMISCOT	406	321	359	294	47	79.1	4	91.6	4	81.9	4	1.43	4
MARIES	89	60	52	40	37	67.4	2	66.7	2	76.9	3	1.42	4
BATES	217	149	146	111	71	68.7	2	74.5	3	76.0	3	1.42	4
NEW MADRID	287	194	232	166	55	67.6	2	85.6	4	71.6	2	1.41	4
HOWELL	477	329	373	274	104	69.0	3	83.3	4	73.5	3	1.39	4
HONROE	112	72	68	49	44	64.3	1	68.1	3	72.1	2	1.38	4
FRANKLIN	1292	861	557	439	735	66.6	2	51.0	1	78.8	4	1.37	4
PUTNAH	62	45	43	34	19	72.6	4	75.6	3	79.1	4	1.37	4
CARTER	92	64	72	53	20	69.6	3	82.8	4	73.6	3	1.34	4
LAFAYETTE	383	254	202	152	181	66.3	2	59.8	2	75.2	3	1.34	4
RAY	291	206	152	122	139	70.8	3	59.2	1	80.3	4	1.33	4
RANDOLPH	334	239	236	182	98	71.6	4	76.2	3	77.1	4	1.33	4
KNOX	53	35	33	24	20	66.0	2	68.6	3	72.7	2	1.32	4
NODAWAY	193	122	91	66	102	63.2	1	54.1	1	72.5	2	1.32	4
POLK	329	219	176	132	87	66.6	2	60.3	2	75.0	3	1.32	4
LACLEDE	405	280	262	198	143	69.1	3	70.7	3	75.6	3	1.32	4
PERRY	244	153	131	92	113	62.7	1	60.1	2	70.2	2	1.30	4
DUNKLIN	495	359	419	315	76	72.5	4	87.7	4	75.2	3	1.30	4
WRIGHT	234	171	177	137	57	73.1	4	80.1	4	77.4	4	1.30	4
CHARITON	79	55	50	38	29	69.6	3	69.1	3	76.0	3	1.30	3
WASHINGTON	292	197	237	167	55	67.5	2	84.8	4	70.5	2	1.29	3
PIKE	204	146	119	94	85	71.6	4	64.4	2	79.0	4	1.29	3
ANDREW	184	111	78	54	106	60.3	1	48.6	1	69.2	1	1.29	3
SULLIVAN	80	57	58	44	22	71.3	3	77.2	4	75.9	3	1.28	3
DOUGLAS	149	102	122	87	27	68.5	2	85.3	4	71.3	2	1.28	3
LINH	183	130	115	89	68	71.0	3	68.5	3	77.4	4	1.28	3
CAPE GIRARDEAU	778	484	366	257	412	62.2	1	53.1	1	70.2	1	1.27	3
GRUNDY	129	94	90	70	39	72.9	4	74.5	3	77.8	4	1.26	3
HELPS	435	283	260	184	175	65.1	2	65.0	2	70.8	2	1.25	3
HOWARD	115	84	58	47	57	73.0	4	56.0	1	81.0	4	1.25	3

Data sets used are 1997 births with odds and linked MIC-1/Birth High Risk Population is defined as infants with any of the MIC risk factors Available off the Birth Certificate. Linkage rate was 95.0 percent micovt97.sas

WIC Coverage of At-Risk Population  
 Ranked by Relative Targeting Ratios  
 \* 1997 St. Louis City Missouri Resident Live Births BLACK ONLY

Resident County	Live Births	At Risk Population	Linked Infants Born 1997	WIC Infants Born With Risk	Non-WIC Infants Born 1997	NONWIC Infants Born With Risk	Overall At Risk	Prevalence	WIC Infant Coverage Rate	Cover- age Quar- tile	Sig Level	WIC Infant Targeting Rate	Targeting Rank	Sig Level	Relative Targeting Ratio	WIC Relative Targeting Ratio	RTR Quar- tile
JOHNSON	610	398	354	252	256	146	65.2	2	63.3	2	high	71.2	2	high	1.25	1.25	3
JASPER	1553	1070	997	738	556	332	68.9	3	69.0	3	high	74.0	3	high	1.24	1.24	3
ST FRANCIS	670	474	464	349	206	125	70.7	3	73.6	3	high	75.0	3	high	1.24	1.24	3
JARREN	277	195	123	97	154	98	70.4	3	49.7	1	high	78.9	4	high	1.24	1.24	3
TEXAS	257	175	188	135	69	40	68.1	2	77.1	4	high	71.8	2	high	1.24	1.24	3
JEFFERSON	683	448	448	342	235	145	71.3	3	70.2	3	high	76.3	3	high	1.24	1.24	3
JEFFERSON	2708	1797	1140	849	1568	948	66.4	2	47.2	1	low	74.5	3	low	1.23	1.23	3
JARRY	460	328	334	251	126	77	71.3	3	76.5	4	high	75.1	3	high	1.23	1.23	3
ALLAHAY	488	333	227	172	261	161	68.2	2	51.7	1	high	75.8	3	high	1.23	1.23	3
JETTIS	550	370	346	250	204	120	67.3	2	67.6	2	high	72.3	2	high	1.23	1.23	3
JACKSON	9605	6615	5325	3998	4280	2617	68.9	3	60.4	2	high	75.1	3	high	1.23	1.23	3
JARION	409	306	248	200	161	106	74.8	4	65.4	2	high	80.6	4	high	1.22	1.22	3
ERNON	285	207	183	142	102	65	72.6	4	68.6	3	high	77.6	4	high	1.22	1.22	3
ALINE	251	182	150	117	101	65	72.5	4	64.3	2	high	78.0	4	high	1.21	1.21	3
HILLER	324	231	205	156	119	75	71.3	3	47.4	1	low	72.8	3	low	1.21	1.21	3
JASS	1085	713	464	338	621	375	65.7	2	69.4	3	high	75.8	3	high	1.21	1.21	3
JACON	202	144	132	100	70	44	71.3	3	76.9	4	high	72.0	2	high	1.20	1.20	3
JUTLER	516	355	379	273	137	82	68.8	3	41.1	1	low	72.3	2	low	1.20	1.20	2
COONE	1765	1144	650	470	1115	674	64.8	1	88.3	4	high	75.3	3	high	1.20	1.20	2
MISSISSIPPI	197	145	170	128	27	17	73.6	4	74.3	3	high	77.1	4	high	1.20	1.20	2
EDAR	154	113	109	84	45	29	73.4	4	40.0	1	low	71.7	2	low	1.20	1.20	2
OLE	878	563	314	225	564	338	64.1	1	70.8	3	high	67.8	1	high	1.19	1.19	2
IVINGSTON	176	113	118	80	58	33	64.2	1	37.3	1	low	70.7	2	low	1.19	1.19	2
LAY	2554	1616	852	602	1702	1014	63.3	1	59.1	1	low	79.8	4	high	1.19	1.19	2
ST LOUIS CITY	5758	4421	4377	3492	1381	929	76.8	4	79.0	4	high	72.8	2	high	1.18	1.18	2
REENE	3014	2041	1656	1206	1358	835	67.7	2	51.5	1	low	74.3	3	low	1.18	1.18	2
CHRISTIAN	683	433	324	223	359	210	63.4	1	60.9	2	low	78.3	4	low	1.17	1.17	2
UCHARAN	1093	760	623	463	470	297	69.5	3	54.7	1	low	74.1	2	low	1.15	1.15	2
INCOLN	507	369	258	202	249	167	72.8	4	36.4	1	low	71.1	2	low	1.15	1.15	2
ST LOUIS COUNTY	12966	8743	4296	3182	6670	5561	67.4	2	72.6	3	high	65.5	1	low	1.15	1.15	2
AWRENCE	497	339	346	246	151	93	68.2	2	24.8	1	low	70.8	2	low	1.15	1.15	2
ULASKI	610	384	426	279	184	105	63.0	1	75.0	3	high	71.1	2	high	1.15	1.15	2
CHARLES	3906	2502	873	621	3033	1881	64.1	1	76.3	4	high	76.3	3	high	1.14	1.14	2
ARROLL	123	84	89	63	34	21	68.3	2	72.6	3	high	72.1	2	high	1.14	1.14	2
ARRISON	80	59	59	45	21	14	73.8	4	58.5	1	low	65.5	1	low	1.14	1.14	2
COTT	584	405	408	294	176	111	69.3	3	76.3	4	high	70.8	2	high	1.14	1.14	2
E KALB	105	65	58	38	47	27	61.9	1	72.6	3	high	72.1	2	high	1.14	1.14	2
ALDWELL	102	63	60	39	42	24	61.8	1	61.9	2	high	65.5	1	high	1.14	1.14	2
AMDEN	301	197	195	133	106	64	65.4	2	67.5	2	high	68.2	1	high	1.13	1.13	2
ORGAN	226	168	132	103	94	65	74.3	4	61.3	2	high	78.0	4	high	1.13	1.13	2

Data sets used are 1997 births with odds and linked WIC-1/Birth High Risk Population is defined as infants with any of the WIC risk factors Available off the Birth Certificate. Linkage rate was 95.0 percent wlcovt97.sas

MIC Coverage of At-Risk Population  
 Ranked by Relative Targeting Ratios  
 \* 1997 St. Louis City Missouri Resident Live Births BLACK ONLY

Resident County	Live Births	At Risk Population	Linked Born 1997	MIC Born With Risk	Non-MIC Born 1997	NONMIC Born With Risk	Overall At Risk	Prevalence	MIC Infant Coverage	Covered age	Sig Level	MIC Infant Targeting Rate	Targeting Rank	Sig Level	Relative Targeting Ratio	MIC RTR
ADAIR	257	171	126	89	131	82	66.5	2	52.0	1		70.6	2		1.13	2
DALLAS	209	158	125	99	84	59	75.6	4	62.7	2		79.2	4		1.13	2
HADISON	149	104	116	83	33	21	69.8	3	79.8	4	high	71.6	2		1.12	2
WAYNE	143	92	119	78	24	14	64.3	4	84.8	4	high	65.5	1		1.12	2
RALLS	89	65	44	34	45	31	73.0	4	52.3	1		77.3	4		1.12	2
PLATTE	1007	649	294	205	713	444	64.4	1	31.6	1	low	69.7	1		1.12	2
ATCHISON	55	41	39	30	16	11	74.5	4	73.2	3		76.9	3		1.12	2
TANEY	495	345	348	250	147	95	69.7	3	72.5	3	high	71.8	2		1.11	1
REYNOLDS	71	54	61	47	10	7	76.1	4	87.0	4	high	77.0	4		1.10	1
AUDRAIN	328	234	152	114	176	120	71.3	4	48.7	1		75.0	3		1.10	1
MONTGOMERY	135	102	79	62	56	40	75.6	4	60.8	2		78.5	4		1.10	1
STE GENEVIEVE	173	115	103	71	70	44	66.5	2	61.7	2		68.9	1		1.10	1
SCOTLAND	76	55	37	28	39	27	72.4	4	50.9	1		75.7	3		1.09	1
STODDARD	303	195	238	156	65	39	64.4	1	80.0	4	high	65.5	1	low	1.09	1
OREGON	114	78	103	71	11	7	68.4	2	91.0	4	high	68.9	1		1.08	1
MONITEAU	199	130	91	62	108	68	65.3	2	47.7	1		68.1	1		1.08	1
CRAWFORD	333	234	224	161	109	73	70.3	3	68.8	3	high	71.9	2		1.07	1
WORTH	23	12	15	8	8	4	52.2	1	66.7	2	*	53.3	1	*	1.07	1
WEBSTER	454	317	256	183	198	134	69.8	3	57.7	1		71.5	2		1.06	1
RIPLEY	148	103	124	87	24	16	69.6	3	84.5	4	high	70.2	1		1.05	1
OZARK	109	66	85	52	24	14	60.6	1	78.8	4	high	61.2	1	low	1.05	1
SCHUYLER	64	51	51	41	13	10	79.7	4	80.4	4	high	80.4	4		1.05	1
MERCER	36	23	20	13	16	10	63.9	1	56.5	1	*	65.0	1	*	1.04	1
SHANNON	99	63	83	53	16	10	63.6	1	84.1	4	high	63.9	1		1.02	1
STONE	334	235	246	174	88	61	70.4	3	74.0	3	high	70.7	2		1.02	1
IRON	130	83	99	63	31	20	63.8	1	75.9	3	high	63.6	1		0.99	1
HENRY	253	168	168	111	85	57	66.4	2	66.1	2	high	66.1	1		0.99	1
DAVIES	120	88	83	60	37	28	73.3	4	68.2	3		72.3	2		0.96	1
HOLT	48	31	33	21	15	10	64.6	1	67.7	2		63.6	1		0.95	1
BOLLINGER	119	74	85	52	34	22	62.2	1	70.3	3		61.2	1	low	0.95	1
CLARK	81	62	55	41	26	21	76.5	4	66.1	2		74.5	3		0.92	1
HICKORY	73	55	51	37	22	18	75.3	4	67.3	2		72.5	2		0.89	1
DADE	76	50	48	30	28	20	65.8	2	60.0	2		62.5	1		0.88	1
LEWIS	153	92	98	56	55	36	60.1	1	60.9	2		57.1	1	low	0.87	1
ST CLAIR	94	66	62	41	32	25	70.2	3	62.1	2		66.1	1		0.85	1
NOT MO AT BTH	182	138	182	138	0	0	75.8	.	100.0	.	high	75.8	.		.	.
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74346 50770 38705 28748 35641 22022																

Data sets used are 1997 births with odds and linked MIC-1/Birth High Risk Population is defined as infants with any of the MIC risk factors Available off the Birth Certificate. Linkage rate was 95.0 percent micovt97.sas