Fetal and Infant Mortality Review: Activities of the Yolo County FIMR Team and Analysis of Local FIMR Data

Yolo County Health Department
FIMR Program

2008

County of Yolo
HEALTH DEPARTMENT

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Dear Colleague:

This report was prepared to provide a chronicle of the Fetal and Infant Mortality Review (FIMR) Program of Yolo County, and an overview of health factors affecting fetal and infant death. FIMR is a dynamic community process with lessons to be learned for improving systems of care and health outcomes for mothers and babies.

Infant and fetal mortality are indicators of our county's overall health and well-being. Clear understanding of issues and recommendations made earlier in Yolo County FIMR's history, along with clear understanding of the developing issues in maternal and child health, will better inform strategies to prevent adverse occurrences and improve birth outcomes in the future.

We hope this report will be useful to all who want to learn:

- More about Yolo County
- More about how our statistics fare when compared to state and national data, and
- More about emerging trends and indicators relating to birth outcomes.

The importance of healthy parents who bear healthy children and a community that designs services to support their growth and development cannot be overstated.

Bette G. Hinton, M.D., M.P.H.
Yolo County Health Officer

"Investing In Our Community's Future"

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Yolo County Health Department would like to recognize the current and past FIMR Coordinators:

Donna Nevraumont, PHN	2006-Present
Carla Hutchison, PHN	2005-2006
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Executive Summary

This report provides information related to fetal and infant mortality specific to Yolo County. Section 1 reviews the history and activities of the Fetal and Infant Mortality Review Team from 1998 to the present. The FIMR Team reviews Yolo County fetal, neonatal and infant deaths to identify social, economic, cultural, safety and health factors that may be associated with these deaths. Based on case review, the FIMR Team develops action plans involving activities that can be accomplished to address these factors. Action plans have included activities in the areas of safe infant sleeping, domestic violence, substance abuse in pregnancy, health policies, access to prenatal care, bereavement support services, culturally appropriate resources and maternal obesity.

Section 2 is an analysis of health factors involved in all Yolo County FIMR cases from 1998 to 2006. This analysis uses information from medical record review, review of family interviews and State birth and death certificate data. Following is a summary of some of the key findings of this analysis, which are expanded in much more detail in the body of the report:

1. Fetal, neonatal and infant mortality rates have trended downward over the past 20 years. Yolo County mortality rates are at or below the State average in all categories except for perinatal mortality.
2. 75% of fetal and 73% of neonatal demises in Yolo County were born premature.
3. At least one congenital anomaly was noted in 18% of fetal and 42% of neonatal demises.
4. Maternal health problems were an issue in a large number of fetal and neonatal deaths. 39% of mothers with a fetal demise were obese and 15% of mothers with a fetal or neonatal demise had diabetes. Chronic maternal health problems were noted in 44% of mothers with a fetal or neonatal demise. Maternal drug, alcohol or tobacco use was noted in 25% of fetal and neonatal deaths. 10% of mothers with a fetal or neonatal demise had a history of domestic violence and 19% had a history of CPS or law enforcement involvement.
5. Sleep position was a factor in over 31% of Yolo County infant deaths. Preventable risk factors were involved in 42% of infant deaths.
6. Barriers to care continue to be a problem. Of mothers with a fetal or neonatal demise, 35% had limited or no prenatal care. 23% of fetal demises were at term gestation with no congenital anomaly noted. Analysis using the Perinatal Periods of Risk (PPOR) model indicates a possible shortfall in the area of maternal care.

Based on these findings, recommendations are made that highlight the importance of preconception care, access to payment programs for early prenatal care, reduction in barriers to care and the importance of resources for healthy weight. These recommendations also include screening and counseling related to substance abuse and domestic violence, continued campaigns to encourage safe sleeping for infants and ongoing support for the FIMR program.

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The mission of the Yolo County Health Department is to protect and enhance the health and safety of the residents of Yolo County. One segment of our community whose health is universally recognized as uniquely worthy of protection and enhancement is the newborn infant. The death of a fetus, neonate or infant is viewed as a harbinger of the overall health of the community. Indeed, fetal and infant death rates are considered to be closely tied to the social and economic status of the community. Community resources, health systems, and social support services all have a role to play in the effort to reduce the occurrence of this unfortunate outcome. Examination of individual cases of fetal or infant death and analysis of aggregate data to determine trends over time are important public health functions which help to identify where in our community systems we may need to focus our efforts. Section 1 of this report will summarize the activities of the Yolo County Fetal and Infant Mortality Review (FIMR) Team, a community team which examines individual cases of fetal or infant death and recommends actions which are designed to address issues raised. Section 2 will present an analysis of local FIMR data based upon the aggregate of all known information regarding deaths occurring during the past eight years. The purpose of this report is to bring this information to those in our community who may have a role to play in promoting healthy birth outcomes and reducing the fetal and infant death rates in Yolo County. We hope to increase awareness in the community, and in turn strengthen resolve to provide community-wide systems which support and protect the health of our young.

Section 1: Fetal and Infant Mortality Review Team

Background and History

In 1991, California was the first state in the nation to establish a state-directed FIMR Program. It was modeled after the National FIMR Program of the American College of Obstetricians and Gynecologists (ACOG). (3) FIMR Programs are currently being implemented in 17 local health jurisdictions across the state, including Yolo County. The Yolo County FIMR Program receives funds via an allocation from the California Department of Public Health, Maternal, Child and Adolescent Health Program. Additional support for the program is provided by local County funds. Each agency receiving FIMR funds is required to maintain a FIMR Coordinator and local case review authority from the Local Health Officer. In Yolo County a Senior Public Health Nurse holds the position of FIMR Coordinator. The position is allocated twelve hours per week to collect, maintain and abstract all records pertaining to FIMR cases, conduct FIMR meetings nine months of the year, and follow-up on FIMR community action items. Some of the larger jurisdictions in California conduct both FIMR and Black Infant Health (BIH) FIMR Programs in order to address the persistent disparity in African American fetal and infant deaths. In Yolo County, separate analysis of black fetal and infant deaths is not feasible due to the small number of these events.

Infant and fetal mortality are indicators of a community's overall health, as well as social and economic well-being. The FIMR Program is a method for understanding the health care system and social problems that contribute to preventable fetal and infant deaths, and for identifying and implementing local interventions to rectify the identified problems. FIMR includes the following four public health program elements:

- Assessment of fetal and infant deaths in local communities via data collection and analysis.
- Program planning by community members and organizations to develop recommendations and a plan of action to address identified factors and problems.
- Implementation of primary, secondary and tertiary prevention interventions through system changes and the institutionalization of long-term policies.
- Evaluation and monitoring of program outcomes.

The team of individuals who comprise the FIMR Team is community-based, and interdisciplinary. It includes law enforcement officers, coroner staff, medical care providers, public health professionals, social services staff, and advocacy groups. A list of current and past Yolo County FIMR Team members is included in Appendix A. The team has both case review functions and community action functions. Diversity and cultural competence among team members promotes the development of findings and recommendations that more accurately reflect the strengths of Yolo County as well as the need for services.

Under provisions of the California Health and Safety Code Section 100325 to 100335, the Yolo County FIMR Team reviews individual fetal and infant deaths from 20 weeks gestation to one year of age. Records are accessed to confidentially investigate sources of mortality, and identify factors (social, economic, cultural, health systems, safety, etc.) associated with these deaths. The Health Insurance Portability and Accountability Act (HIPAA) and the California Civil Code include provisions that allow public health monitoring, investigation and intervention. These laws allow health care providers and other covered entities to disclose medical information for public health purposes. Five times per year, the FIMR Team conducts case review meetings. At these meetings, an abstraction of each case, with all identifiers removed, is presented by the FIMR Coordinator. Based on case review, the FIMR Team may then make recommendations for interventions that address contributing factors or policy changes to improve service systems. Between case review meetings, on alternating months, FIMR Community Action meetings follow-up on case review recommendations. As an instrument of community action, the FIMR Team mobilizes the community to participate in the implementation of community-based interventions with the intent of improving health and social services for families.

All deaths of children up to 18 years of age are reviewed by a separate team in this county; the Coroner's Child Death Review Team (CDRT). The FIMR Team differs from the CDRT in that the cases reviewed by FIMR are for a narrower age range and reviewed anonymously. Unlike CDRT, in FIMR there is no objective to investigate potential criminal fault or responsibility by any individual or institution. The current report does not address the work of the Yolo County CDRT.

Translating FIMR Team Case Review into Community Action

Yolo County has had a FIMR Team continuously since 1998. In the process of examining significant social, economic, cultural, safety and health system factors associated with fetal,

neonatal and infant deaths from case review, the team members continue to prioritize activities and interventions that they feel can be reasonably accomplished. This community action plan agenda is evaluated and monitored for ongoing progress. Several themes, some persistent, have developed over the course of FIMR's existence. All have been generated from FIMR case review, and some are also related to ongoing public health campaigns. The following sections describe Community Action activities of the Yolo County FIMR Team. (38)

Early Challenges

As the FIMR process was instituted and formalized in Yolo County, early action items involved such topics as the obtaining of complete medical and coroner records for review, home visits for all families after a fetal or infant demise, gifts for families who complete a home visit, and the use of National FIMR documents to record information. Questions arose concerning autopsy. The County Coroner presented information as to when an autopsy is performed and their communication protocols. Suggestions were brought forward to enhance communication, especially with Child Protective Services and FIMR.

Some medical providers were initially reluctant to share what they saw as sensitive information under HIPAA regulations. It has taken time and networking to ensure that the use of the authority of the Health Officer for FIMR is properly executed and appropriate according to legal regulation. Over time, efforts have been made to ensure a broad and inclusive FIMR Team membership with representation of all systems of care and inclusion of key agencies. This work over the years has resulted in improved data collection, more complete case review, and better communication of FIMR recommendations to the community.

Safe Sleeping/SIDS Education

One of the earliest identified, consistently addressed, and most successful community action activities of FIMR has been in the area of safe sleeping recommendations. This grew out of the "Back to Sleep" Campaign from SIDS (Sudden Infant Death Syndrome) research. From 1998 through 2000 there was a T-Shirt campaign, with t-shirts distributed at hospital discharge to all newborns. This campaign was supported financially by the Yolo County Tobacco Education Program. The message in English and Spanish was "This Side Up" on the front, and on the back "Blow Me a Kiss Not Smoke". Public service announcements on SIDS ran on two Spanish radio stations. Presentation boards were prepared for community health displays at health fairs and for Public Health Week in 1999-2000. Trainings for first responders, public health nurses and the community were given, with autopsy and death scene investigation procedures included. In 2004, 2006, and 2007, with cases of infants found dead in unsafe sleeping environments an ongoing issue, a tri-fold Safe Sleeping Brochure (Appendix B) was developed, distributed, and then updated with funding from First 5 Yolo. To date, approximately 3000 of these brochures have been distributed to families with young infants through partnership with birthing hospitals, medical providers and community clinics. They are currently included in the First 5 Yolo kit for new parents.

Domestic Violence

Concern regarding a lack of screening and referral for domestic violence was noted by the FIMR Team as a system issue in 2001. An important addition to the FIMR Team, the Sexual Assault and Domestic Violence Center of Yolo (SADVC) has collaborated with FIMR to address this

issue. Training for key agencies was sponsored by FIMR in 2002 and again in 2007. Screening and referral guidelines especially for perinatal medical providers were the focus of the 2007 training.

Substance Abuse in Pregnancy

The health impact of substance use during pregnancy has been a factor in a large number of FIMR case reviews. Action plans around this issue were first developed in 2000, focusing on the areas of screening, resources, and toxicology testing for mother and baby. In 2001, based on a FIMR case involving a substance abusing teen, work was started on a Child Protective Services protocol for referral. In 2002, the issue of smoking during pregnancy was addressed with packets of information related to screening and referral sent to providers. Currently a medical in-service on perinatal substance abuse is planned for 2008. John H. Jones Clinic offers day-treatment services for perinatal substance abuse regardless of where the woman receives her prenatal care. Staff from John H. Jones Clinic regularly attend FIMR meetings.

Health System Policy

Occasionally case review has led the FIMR Team to take a position regarding health system policy. These position statements have been communicated to health systems via correspondence on a variety of topics related to maternal and infant care. In all cases, policy recommendations are made to all local hospitals in order to maintain confidentiality within the FIMR process. Past subjects have included use and documentation of obstetric laboratory and diagnostic tests, airway support and resuscitation procedures.

Access to Prenatal Care

In 1998 and again in 2000, a FIMR Team subcommittee reviewed Emergency Department protocols regarding pregnant women who present in the emergency room with irregular or no prenatal care. A referral form for Public Health Nursing services was developed. A Memorandum of Understanding was signed with one local healthcare system in March 2000. Transportation to prenatal appointments is another ongoing issue noted in Yolo County settings where much of the population lives outside of the cities and has limited public transportation available. In 2001, Partnership Health Plan began offering transportation to prenatal clients with MediCal. While in recent years this service has been scaled back, it still covers high-risk patients. In 2005, a resource list for perinatal services was developed in collaboration with the Yolo County Comprehensive Perinatal Services Program (CPSP). The list was distributed to all FIMR partner agencies. Cases reviewed in 2006 and 2007 resulted in an effort to promote community awareness of programs which pay for prenatal care, including Access for Infants and Mothers (AIM), MediCal and MediCal Presumptive Eligibility. These programs cover obstetric visits and procedures and promote early entrance into prenatal care. An effort was launched to promote knowledge and use of the Presumptive Eligibility Program with a new flyer in English and Spanish developed and distributed to providers, non-profit groups and organizations serving families.

Grief/Bereavement Support

In 2000 a FIMR Bereavement Subcommittee was formed to review and improve grief and bereavement support services for families. Leadership for this subcommittee was provided by the

social worker members of FIMR. In 2003 the lack of bereavement support in hospitals on weekends was noted in a case. One hospital worked on an in-service for obstetric nurses. From 2006 through the present, a binder of bereavement resources and information has been developed and updated. This binder is available to FIMR members and organizations who may be working with families that have experienced a death. Plans for distribution of the Bereavement Binder are currently being developed by the FIMR Community Action Team. Compassionate Friends, an international volunteer organization of parents who have lost a child, meets regularly in Davis. They sponsor a Candlelight Service in December each year open to all interested individuals. The FIMR Team is currently interested in supporting and working with this group on this project.

Development of Relevant and Culturally Sensitive Materials and Resources

One of the first FIMR actions was a letter to County Communications recommending multilingual 911 emergency information. At the time information was given solely in English. In 1999, it was also noted in a case review that education materials were not at an appropriate literacy level. There was follow-up with a hospital and with a CPSP provider. Several other general education issues have been raised as action items. The need for folic acid education was generated from a case in 2001. The issue was addressed by renewed efforts of the Perinatal Outreach Education project of the Health Department in outreach discussions at sites such as the Family Resource Center, the Yolo County Jail, Cache Creek Substance Abuse Program, and at WIC. Providing mothers with information on the warning signs of premature labor was identified as an educational need in 2001. In 1999, and again in 2005, efforts were made to support prenatal teaching of fetal kick counts, again based on a need identified in case review findings. In 1999, there was follow-up with CPSP providers. Since 2005, there has been ongoing work to design and find funding for a Fetal Kick Count magnet.

Maternal Obesity

From cases as early as 2001, maternal obesity has been noted as a factor in poor birth outcomes from case review. Roughly 40% of the cases reviewed mentioned maternal obesity in the records from 2004-2006. In August 2005, the Nutrition Supervisor for CommuniCare Health Center gave a presentation to the FIMR Team on the research associated with the dramatic increase in the rate of maternal obesity and associated complications. In 2004, 2007 and 2008, Yolo County FIMR Team members and affiliated programs sponsored and participated in forums on childhood obesity. Most recently, in March 2008, a medical provider education event on the topic of preconception care, maternal weight and healthy birth outcomes was provided by the Yolo County MCAH Program in collaboration with FIMR Team participant agencies.

In summary, the Yolo County FIMR Team continues to be an active, vital part of the public health infrastructure in our community. Every month there are new cases to review. With each new FIMR case, an opportunity arises to examine our systems, plan for action, and evaluate progress. The previous list of themes demonstrates that while progress is made, FIMR work is never completed. In the subsequent sections of this report, we will examine aggregate data related to fetal and infant death, and the health issues which play a part in our county death rates.

Section 2: Analysis of Yolo County FIMR Data: 1998-2006

Background and Methodology

This section is a review of the health factors involved in all fetal, neonatal and infant deaths of Yolo County residents for which FIMR has records since the inception of the FIMR team. In addition, state and national death certificate data are presented for comparison where it is available. This review provides descriptive information about all deaths from 1998 through 2006 reviewed by FIMR. The risk factors discussed here are known and acknowledged in the literature and references are cited where needed.

Fetal death is the in utero demise or stillbirth of any fetus of 20 weeks or more gestation. Neonatal death refers to the death of an infant born alive whose death occurs in the first month (28 days) of life. This includes neonates who may have lived for only a few minutes. Infant (or post-neonatal) death refers to the death of a child from one month (29 days) to 12 months of age. Cases are reviewed by FIMR if the fetus' or infant's family resided in Yolo County at the time of demise.

As noted previously, fetal and infant death rates are monitored as an indicator of the overall health status of a community. As such, goals for reducing mortality rates are set by the federal government as part of the Healthy People 2010 initiative. This includes a goal to reduce fetal deaths to a rate of 4.1 per 1000 live births by 2010. It also includes a goal to reduce neonatal deaths to 2.9 per 1000 live births and postneonatal deaths to 1.2 per 1000 live births. (34)

Data Sources and Analysis

This report relies upon four sources of information: medical record review, family interview, birth certificate data and death certificate data (California Department of Public Health, Center for Health Statistics, Birth, Fetal Death and Death Statistical Master Files). Summary data are presented here in such a way that individual anonymity and confidentiality are maintained.

The analysis of public health outcomes is frequently based, by necessity, on small numbers of events, in this case fetal and infant deaths. Though often appropriate and beneficial, interpretation of findings based on small numbers requires recognition of inherent limitations associated with small numbers. The primary statistical concern involves the reliability of results based on a small underlying population which may experience significant random variability from year to year. Another chief concern involves protecting patient confidentiality. Aggregation of events over multiple years is a common statistical approach used to address both of these concerns and aggregation has been used in this report. Since Yolo County is a relatively small county, the number of cases, even taken over eight years, is relatively small. As such one must be cautious about over-interpreting any apparent trends.

Medical Record Review

In order to develop this report, the Yolo County FIMR staff conducted a comprehensive review of all medical records available on known Yolo County fetal, neonatal and infant deaths, regardless of where the demise occurred. These "FIMR cases" comprise the set of local data upon which this analysis is based. The term FIMR cases will be used throughout this report to

refer to this dataset. Certain points of information may be missing or incomplete for several reasons. The FIMR team began in 1998 and thus only partial information is available for that year. It also appears that records of several deaths may be missing entirely from 2004 data, possibly due to staffing difficulty at the time. Sometimes deaths of Yolo County residents occur outside of our county, particularly at large tertiary care pediatric hospitals in neighboring counties. Yolo County FIMR staff is not always notified of such deaths occurring out of county. When medical records are requested, sometimes incomplete records are received or necessary information is not noted in the record. Missing and unknown data are excluded from analysis in this report.

The Yolo County FIMR staff gathered information on a total of 88 fetal, 55 neonatal and 19 infant deaths that occurred from 1998 through 2006. A careful review of all FIMR cases was done to look not simply at the cause of death listed on the death certificate but at all the health risk factors that may have contributed to the fetal, neonatal or infant death. Information from death certificate data maintained by the State is an important source of information but may be misleading because it represents only the primary cause of death as listed on the death certificate and not the many other risk factors that may well have contributed to the death.

Rates, Trends & Demographics

On average, Yolo County residents experience 12 fetal deaths per year, 6 neonatal infant deaths per year and 4 postneonatal infant deaths per year. Neonatal deaths account for nearly two-thirds (64.2%) of all infant deaths. This section further characterizes Yolo County fetal, neonatal infant and postneonatal infant death trends and summarizes maternal race/ethnicity and place of residence associated with these deaths. This analysis is based on death certificate data for the most recent years for which data are available (2001-2005). Characteristics of FIMR cases, including birth weight, gestational age and age of mother, are discussed in depth later in this report.

Rates

Rates allow for comparison of health outcomes across jurisdictions. Figure 1 displays rates and rate definitions used in public health to assess fetal and infant mortality in comparison to state and national data and in comparison to national goals. In general, Yolo County rates shown are comparable to statewide rates except for perinatal mortality, where the Yolo county rate is above the State rate. However, Yolo County fetal, perinatal and postneonatal mortality rates are slightly higher than the national goals based on these five-year aggregate rates.

FIGURE 1: Fetal-Infant Mortality Rate Indicators: Yolo County (five-year aggregate), California, United States & Healthy People 2010 National Goal.
Data Source: California Department of Public Health, Center for Health Statistics, 2001-05 Birth Statistical Master Files, 2001-05 Death Statistical Master Files, 2001-05 Fetal Death Statistical Master Files.

MORTALITY RATE	YOLO COUNTY (2001-05)	CALIFORNIA (2005)	HEALTHY PEOPLE 2010 NATIONAL GOAL	DEFINITION
Fetal Mortality Rate	5.0 per 1,000	5.5 per 1,000	4.1 per 1,000	Number of fetal deaths at 20wks+ gestation per 1,000 live births plus 20wks+ fetal deaths
Perinatal Mortality Rate	5.6 per 1,000	4.6 per 1,000	4.5 per 1,000	Number of fetal deaths at 28wks+ gestation plus postnatal (first week after birth) deaths per 1,000 live births plus fetal deaths at 28wks+
Neonatal Mortality Rate	2.8 per 1,000	2.6 per 1,000	2.9 per 1,000	Number of neonatal deaths per 1,000 live births
Postneonatal Mortality Rate	1.6 per 1,000	1.7 per 1,000	1.2 per 1,000	Number of postneonatal deaths per 1,000 live births
Infant Mortality Rate	4.4 per 1,000	4.2 per 1,000	4.5 per 1,000	Number of neonatal and postneonatal deaths per 1,000 live births

Trends

Trends in the fetal mortality rate and infant mortality rate are shown in Figures 2 and 3 below using three-year aggregate rates. Note that rates shown in Figures 2 and 3 below are based on three-year rolling averages and are slightly different from five-year aggregate rates shown in Figure 1 above. In general, countywide rates have been trending downward. The Yolo County fetal mortality rate has not yet achieved Healthy People 2010 National Goal of 4.1 fetal deaths per 1,000 live births plus fetal deaths.

FIGURE 2: Fetal Mortality Rate, Yolo County, California, & Healthy People 2010 Goal, 1992-2005.
Data Source: California Department of Public Health, Center for Health Statistics, 1992-2005 Birth Statistical Master Files, 1992-2005 Fetal Death Statistical Master Files.

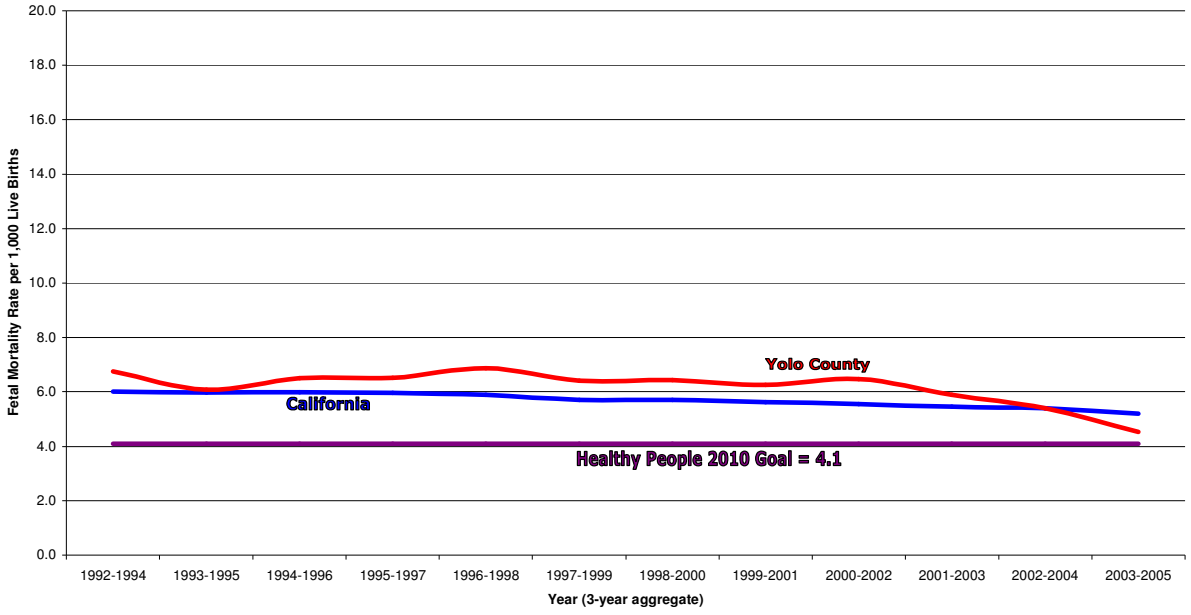
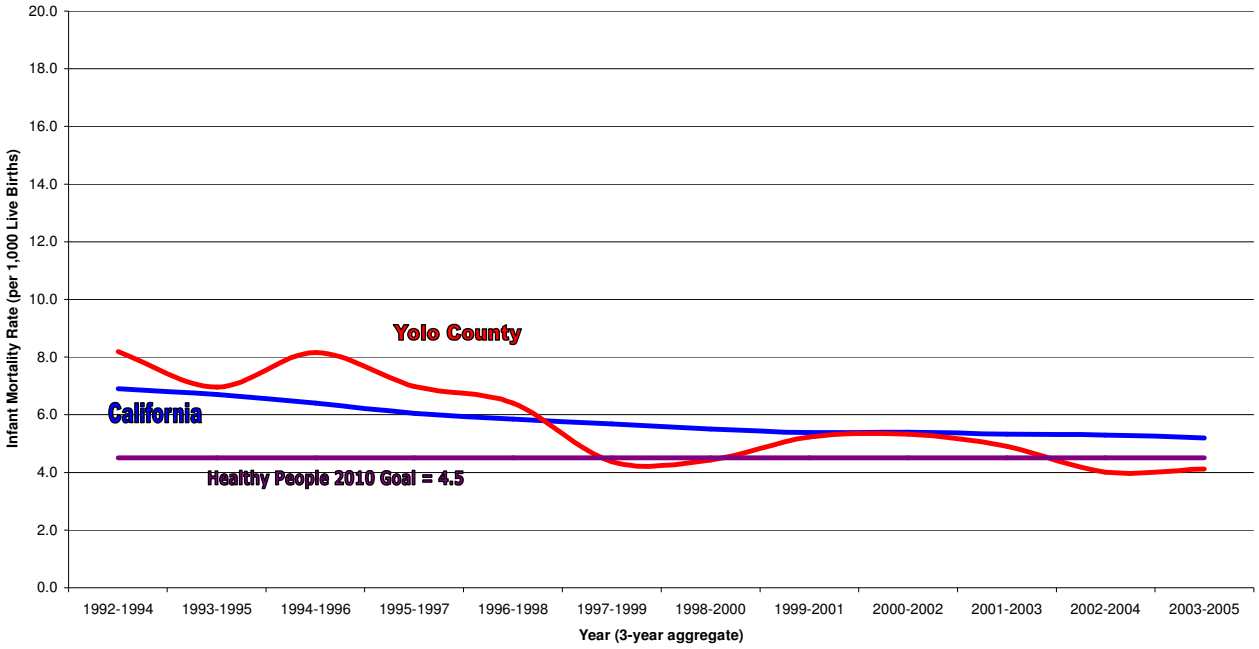


FIGURE 3: Infant Mortality Rate, Yolo County, California, & Healthy People 2010 Goal, 1992-2005.
Data Source: California Department of Public Health, Center for Health Statistics,
1992-2005 Birth Statistical Master Files, 1992-2005 Fetal Death Statistical Master Files.

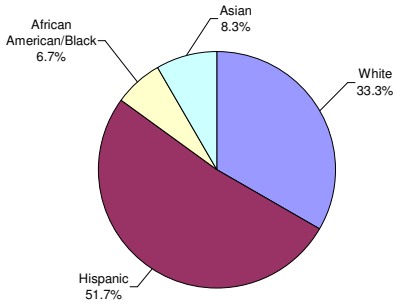


Maternal Race/Ethnicity

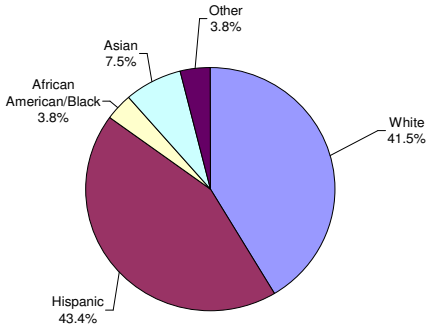
Among Yolo County fetal deaths for 2001 to 2005, 51.7% occurred among Hispanic mothers, 33.3% among non-Hispanic White mothers, 6.7% among non-Hispanic African American mothers and 8.3% among non-Hispanic Asian mothers. Among Yolo County neonatal and postneonatal deaths for 2001 to 2005, 43.4% occurred among Hispanic mothers, 41.5% among non-Hispanic White mothers, 7.5% among non-Hispanic Asian mothers, and the remaining 7.6% among non-Hispanic African American and other maternal race/ethnic groups. This information is shown in Figure 4 below.

FIGURE 4: Fetal Deaths, Neonatal/Postneonatal Deaths and Births by Race/Ethnicity.
NOTE: All groupings are non-Hispanic unless otherwise specified.
Data Source: California Department of Public Health, Center for Health Statistics,
2001-05 Death Statistical Master Files, 2001-05 Fetal Death Statistical Master Files,. AVSS Birth Records 2007.

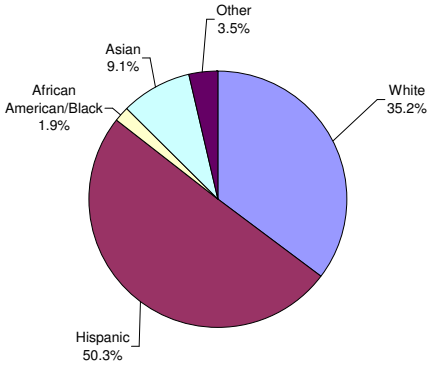
FETAL DEATHS, 2001-05
YOLO COUNTY



NEONATAL & POSTNEONATAL DEATHS, 2001-05
YOLO COUNTY

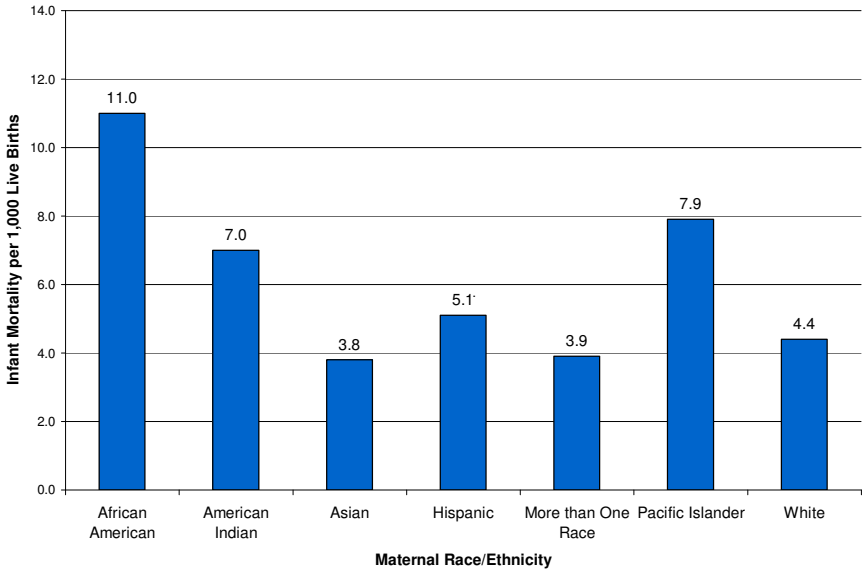


BIRTHS by RACE/ETHNICITY, 2007
YOLO COUNTY



Neonatal and postneonatal infant mortality rates by race/ethnic group are shown for California in Figure 5 below. Disparity in infant mortality is observed with higher mortality rates experienced by non-Hispanic African Americans, non-Hispanic American Indians and non-Hispanic Pacific Islanders when compared to other groups.

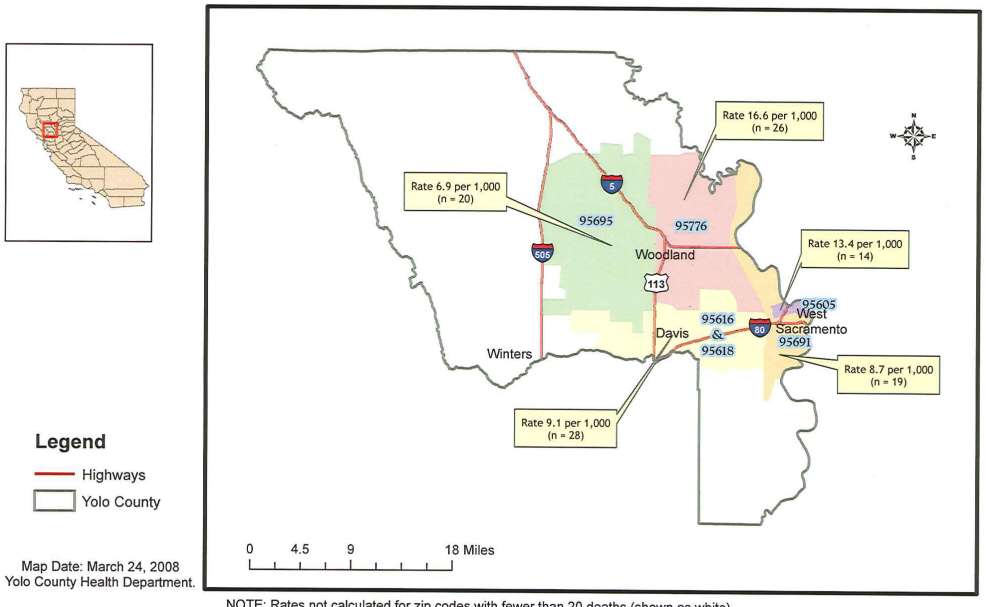
FIGURE 5: Infant Mortality Rates by Maternal Race/Ethnicity, CALIFORNIA, 2003.
NOTE: All groupings are non-Hispanic unless otherwise specified.
Source: California Department of Public Health, Center for Health Statistics,
Office of Health Information & Research, Vital Statistics of California, 2004.



Maternal Place of Residence

Fetal-infant mortality rates and proportional distribution of deaths by zip code are shown in Figure 6 below. Rates greater than the countywide rate of 9.9 deaths per 1,000 are shown in zip codes 95776 (16.6 per 1,000) and 95605 (13.4 per 1,000).

FIGURE 6: Fetal-Infant Mortality Rate by Zip Code
YOLO COUNTY, 2001-05.



NOTE: Rates not calculated for zip codes with fewer than 20 deaths (shown as white).
Fetal-Infant Mortality Rate = Total Number of Fetal and Infant Deaths per 1,000 Live Births and Fetal Deaths.

Data Sources: CDPH, Fetal Death Statistical Master Files and Death Statistical Master Files, 2001 - 2005.

Causes of Death

Figures 7 and 8 show the primary cause of death, as recorded on the death certificate, for neonatal and postneonatal infant deaths in Yolo County for the period 2000 through 2005. Conditions originating in the perinatal period accounted for 73.9% of neonatal deaths and are categorized as shown. Congenital malformations (anomalies) accounted for 21.7% of neonatal deaths.

FIGURE 7. Neonatal Infant Cause of Death, YOLO COUNTY, 2000-05.
Data Source: California Department of Public Health, Center for Health Statistics, 2000-05 Death Statistical Master Files.

NEONATAL INFANTS: Cause of Death		Percent
Conditions Originating in the Perinatal Period		73.9%
	Disorders of short gestation and low birth weight	19.6%
	Respiratory distress and other respiratory conditions	15.2%
	Maternal factor and complications of pregnancy, labor and delivery	13.0%
	Other/Unspecified	26.1%
Congenital malformations and chromosomal abnormalities (Birth Defects)		21.7%
Other		4.3%

FIGURE 8. Postneonatal Infant Cause of Death, YOLO COUNTY, 2000-05.
Data Source: California Department of Public Health, Center for Health Statistics, 2000-05 Death Statistical Master Files.

POSTNEONATAL INFANTS: Cause of Death	Percent
Congenital malformations and chromosomal abnormalities (Birth Defects)	28.6%
Conditions originating in the Perinatal Period	14.3%
Trauma (Accident or Homicide)	14.3%
Other	42.8%

Congenital anomalies were also a major primary cause of death in postneonatal infants, accounting for 28.6% of deaths. Conditions that began in the perinatal period accounted for 14.3% of deaths in this age group. Trauma accounted for another 14.3% of infant deaths. The "other" causes group is large, accounting for 42.8% of infant deaths. This category includes infant deaths due to infection, asthma, positional asphyxia or undetermined causes of death among others. The following sections will examine a number of additional contributing factors to fetal, infant and neonatal deaths as identified by records review.

Health Risk Factors in Fetal, Neonatal and Infant Deaths

Contributing health risk factors for fetal and neonatal deaths include both fetal and neonatal risk factors and maternal health and social risk factors. Prematurity, excessively low or high birth weight, congenital anomalies and multiple gestation are all well known health risk factors for

both fetal and neonatal mortality. In addition, respiratory disease, serious infection and brain hemorrhage are important causes or contributing factors to neonatal mortality.

Maternal health risk factors for fetal or neonatal demise include tobacco, drug and alcohol use during pregnancy, diabetes, advanced or very young (teenage) maternal age, lack of prenatal care and complications of pregnancy. Maternal obesity, other chronic maternal health problems and medications, domestic violence and injury during pregnancy may also contribute to the fetal or neonatal demise.

The most critical periods of fetal development occur in the earliest weeks of pregnancy. (35) The health and behavior of the mother can impact the pregnancy outcome weeks before prenatal obstetrical care begins. Interventions to prevent birth defects initiated during the first prenatal visit may come too late to do any good. (5) Thus, optimal preconception health of the mother is of vital importance to assuring a healthy birth outcome. Preconceptual health promotion means minimizing risk factors, managing chronic health problems and optimizing healthy lifestyle practices prior to pregnancy. Substance use, unhealthy weight, and use of folic acid supplementation are all examples of maternal conditions which are best addressed prior to pregnancy. Early prenatal care is important in order to screen for problems and initiate treatment. Infection, anemia, and gestational diabetes are examples of maternal conditions which can be addressed via early and adequate prenatal care with a result of improving mother's health and avoiding potential consequences to the well-being of the fetus, and later the newborn baby.

Contributing health risk factors for infant deaths include both health conditions of the infant, as well as some parental health and social risk factors. Possible risk factors in terms of the infant's health include underlying respiratory disease, complications of prematurity, infection, serious congenital anomalies and malignancy. Parental risk factors include parental smoking (thus exposing the infant to secondhand smoke), parental choice of sleep location and position for the infant (risk for asphyxia or SIDS), and a parental history of drug or alcohol abuse, previous child abuse or neglect or domestic violence.

Fetal Risk Factors

As discussed above, prematurity, excessively low or high birth weight, congenital anomalies ("birth defects") and multiple (twin or more) gestation are all known to be fetal risk factors for mortality.

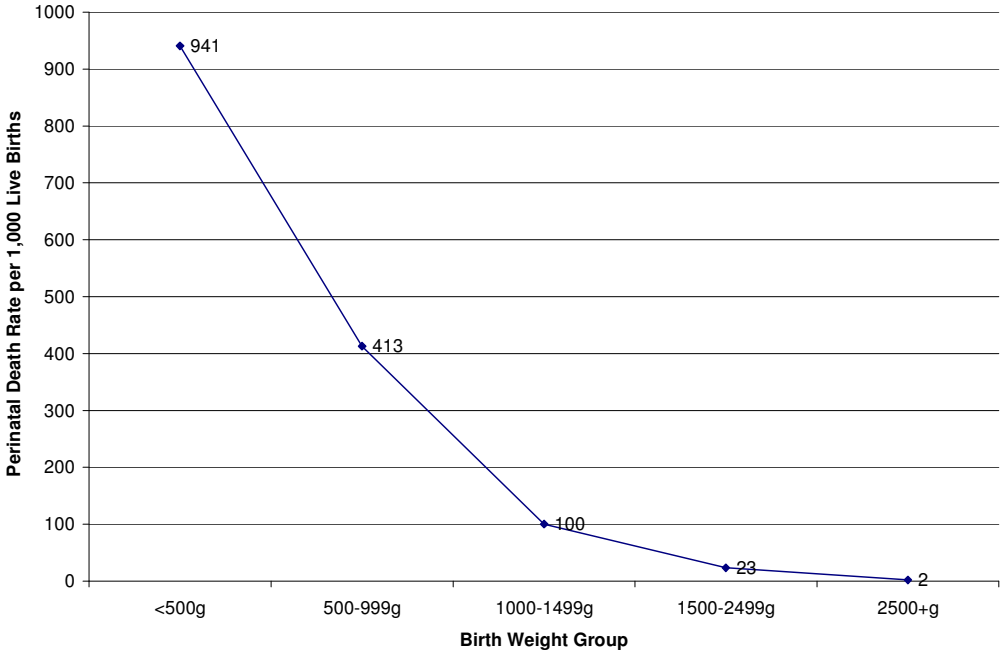
Birth Weight

Infants weighing below 2500g at birth are generally considered low birth weight, those weighing below 1500g are considered very low birth weight and those weighing below 500g have a very low chance of survival.

For the State of California, for the year 2004, fetuses and neonates weighing under 500g at birth had a combined fetal and neonatal death rate of 941 per 1000 births. Those weighing 500-999g had a combined fetal and neonatal death rate of 413 per 1000 births. For the 1000g to 1499g group this rate drops to 100 per 1000 births. As birth weight increases to 1500g to 2499g, this

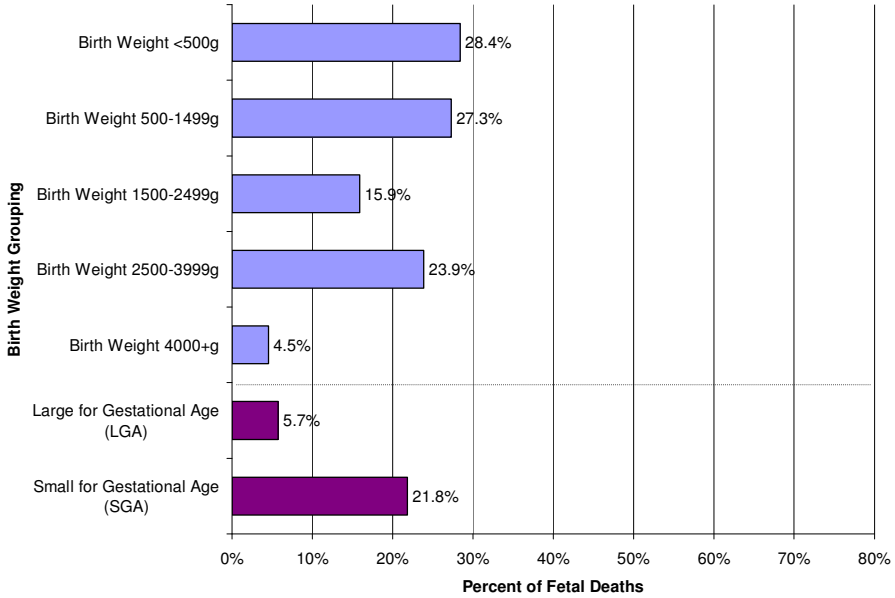
death rate drops to 23 per 1000 births. Over 2500g birth weight this rate drops all the way to 1.7 per 1000 births.(12, 13) This information is shown in Figure 9.

FIGURE 9: Perinatal Death Rate by Birth Weight Group, CALIFORNIA, 2004
Source: CDPH, Center for Health Statistics, Office of Health Information & Research, VSCA Table 1-10



71.6 % of Yolo County fetal deaths were of birth weight less than 2500g (low birth weight), 55.7 % had a birth weight less than 1500g (very low birth weight) and 28.4% of the fetuses weighed less than 500g. 21.8% of the fetal demises were noted to be small for gestational age, i.e. the fetus weighed significantly less than would be expected at that point in gestation. Only 5.7% were noted to be large for gestational age. This information is presented by birth weight category in Figure 10 below.

FIGURE 10: Fetal Death by Birth Weight, YOLO COUNTY
Data Source: Yolo County FIMR Cases, 1998 – 2006.



Prematurity

Infants are considered full term if they are born at 37 through 41 weeks gestation. Infants born at 42 weeks gestation or later are considered post-term. Infants born at less than 37 weeks gestation are premature. Those born at less than 31-32 weeks have a higher risk of long-term complications than older premature infants. Infants born before 24 weeks gestation rarely survive. Premature infants in all age groups have a higher risk of mortality than their term counterparts. (26)

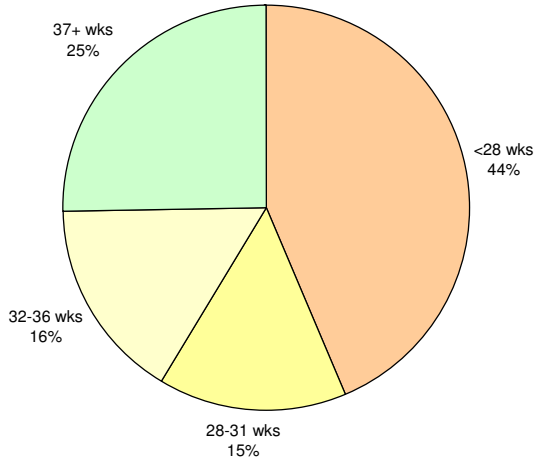
Statewide for 2005, 80% of fetal demises were under 37 weeks gestation, 61% were less than 32 weeks gestation and 46% were under 28 weeks gestation. Statewide 19% of fetal deaths were at term gestation (37 through 41 weeks) and 2% were post-term (at or past 42 weeks). This data excludes fetal deaths for which gestational age was not reported. (12, 13) Prematurity was listed as the primary cause of death for 10.2% of fetal deaths statewide for 2005. (12, 13)

Nationwide for 2004, 81% of fetal demises were preterm (under 37 weeks gestation), 63% of fetal demises were of less than 32 weeks gestation and 51% were under 28 weeks gestation. (27)

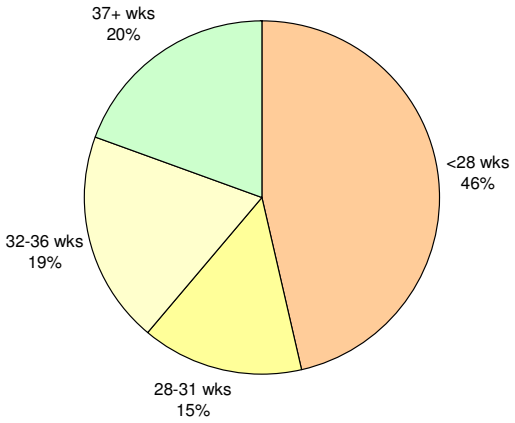
In Yolo County, 75% of fetal demises were premature with a gestational age less than 37 weeks. 59.0% of fetal demises were less than 32 weeks gestation and 44% were less than 28 weeks gestation. Local, state and national data for gestational age of fetal demises is shown in Figure 11 below.

FIGURE 11: Fetal Death by Gestational Age for Yolo County FIMR Cases, California and the United States.

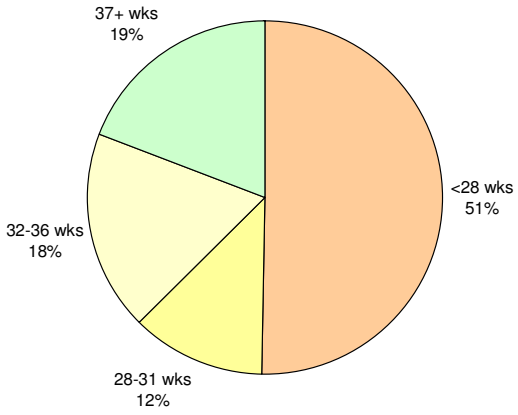
YOLO COUNTY
Data Source: Yolo County FIMR Cases, 1998 – 2006.



CALIFORNIA (2005)
Source: CDPH, Center for Health Statistics, OHIR, VSCA Table 3-4, 2005.



UNITED STATES (2004)
Source: NIHS, National Vital Statistics Reports, Vol. 56, No. 3, Oct. 11, 2007.



Congenital Anomalies

Congenital anomalies, sometimes referred to as “birth defects” or “congenital malformations”, run the gamut from mild, subtle differences to lethal anomalies. Congenital anomalies are an important cause or contributing factor in many fetal and neonatal demises.

Statewide for 2005, 10.5% of fetal deaths listed a congenital malformation as the primary cause of death. The percentage of fetal demises statewide with a congenital anomaly present, though it was not the primary cause of death, is unknown. (12, 13)

At least one congenital anomaly was noted in 18.2% of the Yolo County fetal demises known to FIMR. As illustrated in figure 12A, 8% of the total fetal demises were noted in the medical record to have a lethal anomaly. A lethal anomaly refers to an anomaly known to be inconsistent with extrauterine survival for any period of time. These would include fetuses without properly developed lungs, without kidneys or without a brain, or with some severe cardiac defects. In addition, 8% (not the same 8%) of fetuses were noted to have a cardiac anomaly. Additionally 12.5% of the total fetuses were noted to have multiple congenital anomalies (which may or may not have included a cardiac or a lethal anomaly).

FIGURE 12A: Fetal Death by Congenital Anomaly Type, YOLO COUNTY
Data Source: Yolo County FIMR Cases, 1998 – 2006.

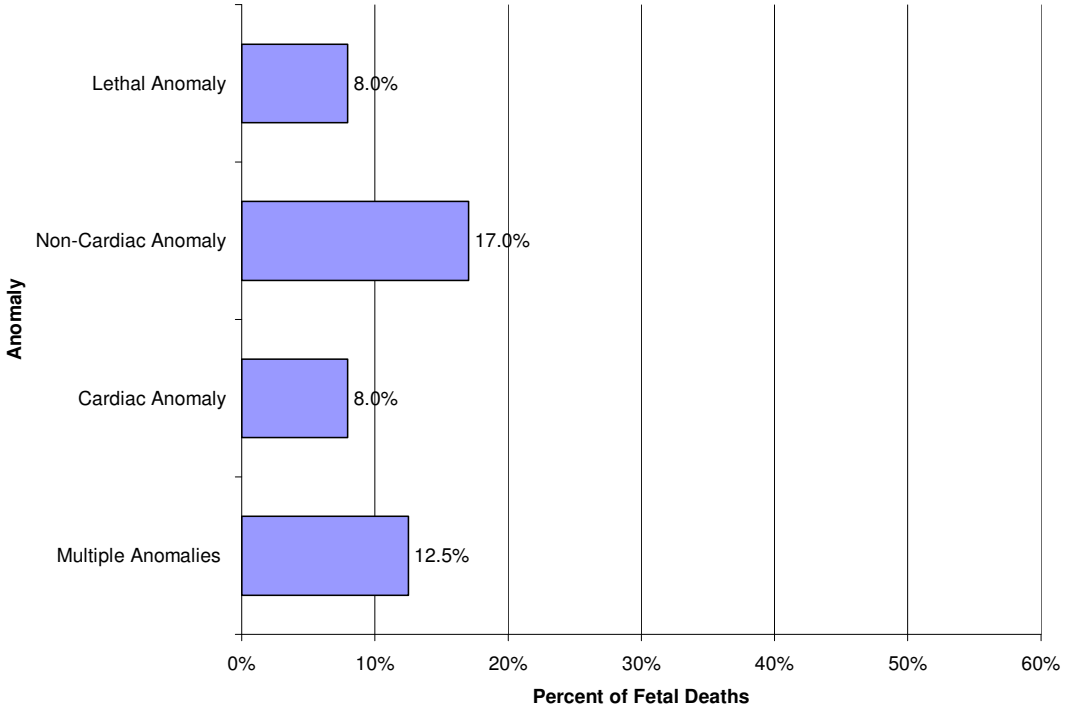
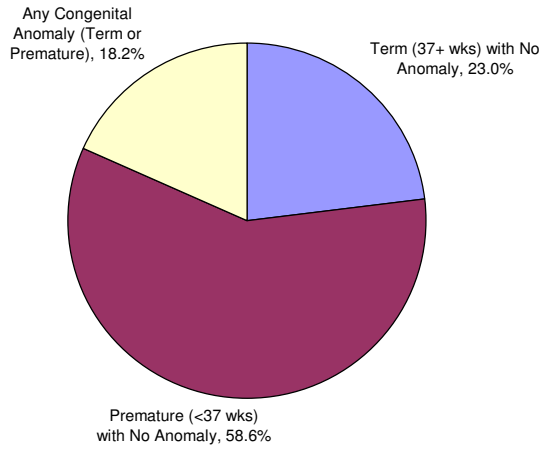


FIGURE 12B: Fetal Death by Presence of Congenital Anomaly and Gestational Age, YOLO COUNTY
Data Source: Yolo County FIMR Cases, 1998 – 2006.



As shown in figure 12B above, 58.6% of the Yolo County fetal demises were premature with no congenital anomaly noted and 23.0% of the fetal demises were at term gestation with no congenital anomaly noted.

Other Risk Factors for Fetal Demise

Pregnancies that involve a multiple gestation (twins, triplets or more) are at much higher risk for death of one or more of the fetuses or neonates than are single gestation pregnancies. Nationwide for 2004, 8.8% of fetal demises involved a multiple gestation while only 3.4% of live births involved a multiple gestation. (27)

In Yolo County FIMR data, 10.3% of fetal demises were associated with a multiple gestation.

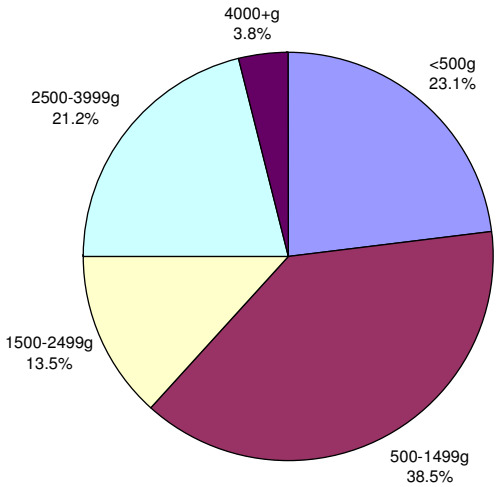
Neonatal Risk Factors

Both neonatal and maternal risk factors can contribute to neonatal deaths. Neonatal factors contributing to neonatal demise are similar to the fetal factors discussed above. They include prematurity, excessively low or high birth weight, congenital anomalies and multiple gestation. In addition, respiratory disease, infection and intraventricular hemorrhage (hemorrhage into the brain) emerge as important factors in neonatal demise. All three of these additional factors are important complications of prematurity, though they can also be seen in term and post-term infants as well.

Birth Weight

Of Yolo County neonatal demises, 75.1% weighed less than 2500g at birth. Of the total neonatal demises, 61.6% weighed less than 1500g and 23.1% weighed less than 500g. Only 3.8% weighed more than 4000g with the remaining 21.2 % in the average birth weight range of 2500 to 3999g. The preceding information is illustrated in Figure 13. 13.7% of the neonates were noted as small for gestational age and only 3.9% were large for their given gestational age.

FIGURE 13: Neonatal Death by Birth Weight, YOLO COUNTY
Data Source: Yolo County FIMR Cases, 1998 – 2006.

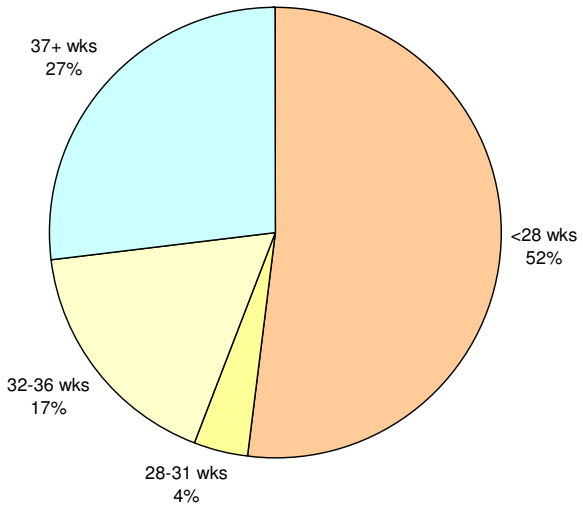


As with fetal deaths, neonatal death rates are highest within the lowest weight groups. Statewide for 2004, the combined fetal and neonatal death rate for birth weight under 500g was 941 per 1000 births. (Separate fetal and neonatal data is not available in this under 500g birth weight category.) The neonatal death rate for infants 500-999 g was 281 per 1000, dropping dramatically to 38 per 1000 with a birth weight of 1000 to 1499g, and dropping again to 8.0 per 1000 for a birth weight of 1500 to 2499 g. For those 2500g and over, the neonatal death rate was only 0.6 per 1000 births. (12, 13)

Prematurity

Of Yolo County neonatal demises, 73% were premature with a gestational age of less than 37 weeks. 56% of neonatal demises were less than 32 weeks gestation, 52% were less than 28 weeks gestation and fully 41% were less than 24 weeks gestation. Refer to Figure 14 below.

FIGURE 14: Neonatal Death by Gestational Age, YOLO COUNTY
Data Source: Yolo County FIMR Cases, 1998 – 2006.



Statewide for 2005, prematurity was the primary cause of death for 22.6% of neonatal deaths. (12, 13) Nationwide for 2004, 36.5% of combined neonatal and infant deaths were related to prematurity even if the primary cause of death was not prematurity itself. (26)

Congenital Anomalies

Statewide for 2005, congenital malformations were listed as the primary cause of death for 23.5% of neonatal deaths. (12, 13)

At least one congenital anomaly was noted in 41.8% of Yolo County neonatal demises. As shown in Figure 15A, 25.5% of neonatal deaths were noted to have a lethal congenital anomaly. 18.2% of the total had a cardiac anomaly noted and 23.6% had multiple congenital anomalies noted.

On the opposite side, 48.1% of Yolo County neonatal deaths were premature with no anomaly noted and 7.7% were at term gestation with no anomaly noted. See Figure 15B below.

FIGURE 15A: Neonatal Death by Congenital Anomaly, YOLO COUNTY
Data Source: Yolo County FIMR Cases, 1998 – 2006.

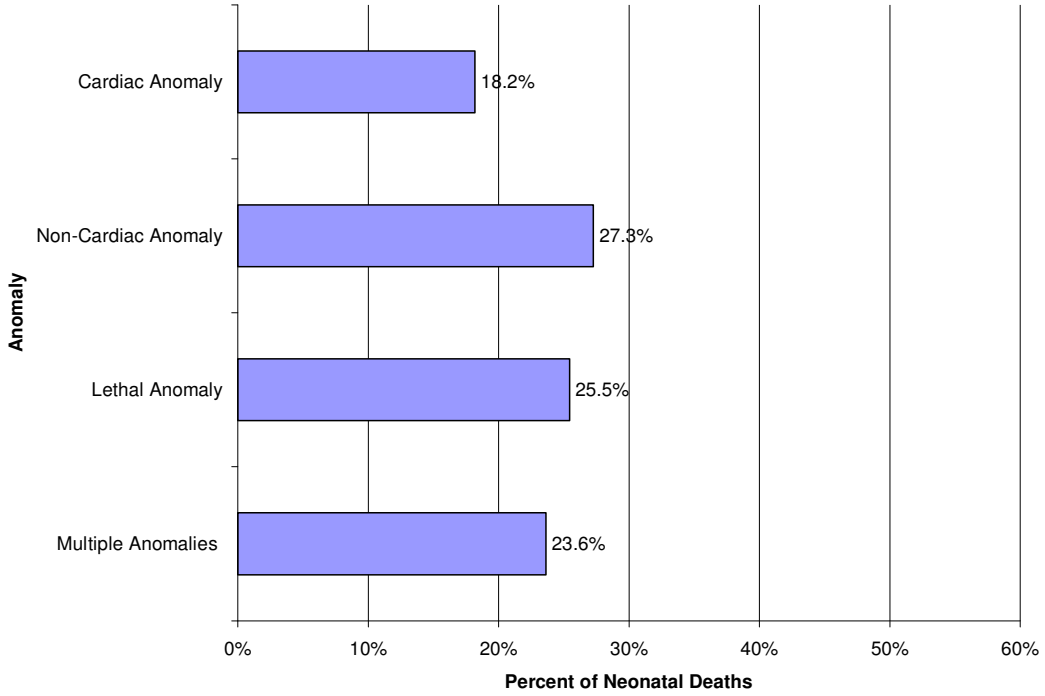
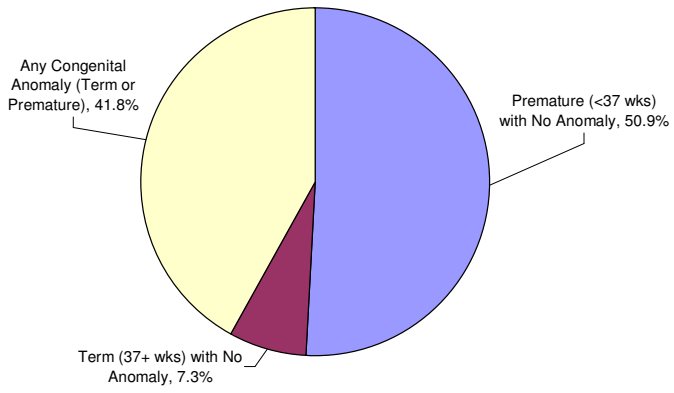


FIGURE 15B: Neonatal Death by Presence of Congenital Anomaly and Gestational Age, YOLO COUNTY
Data Source: Yolo County FIMR Cases, 1998 – 2006.



Other Risk Factors for Neonatal Death

Pregnancies involving multiple gestation comprised 14.8% of Yolo County neonatal deaths. As noted previously, nationwide 3.4% of live births involve multiple gestation.

Respiratory disease was listed as the primary cause of death in 11.8% of neonates statewide for 2005. (12, 13)

Respiratory disease was a factor in 81.1% of Yolo County neonatal demises. This includes Respiratory Distress Syndrome (RDS), which is common in premature infants due to lung immaturity, as well as other respiratory problems. Intraventricular hemorrhage (bleeding into the brain), often a complication of prematurity, was noted in 9.6% of neonatal deaths in Yolo County.

Maternal Risk Factors in Fetal and Neonatal Deaths

A wide range of maternal health risk factors affect pregnancy outcome and thus may contribute to fetal or neonatal demise. Maternal health factors known to adversely affect pregnancy outcome include maternal tobacco, drug and alcohol use during pregnancy, maternal diabetes, advanced maternal age, teenage pregnancy, lack of prenatal care and complications of pregnancy. Maternal obesity, other maternal health problems and medications, domestic violence and injury during the pregnancy may also adversely affect outcome. (15, 24, 25, 32)

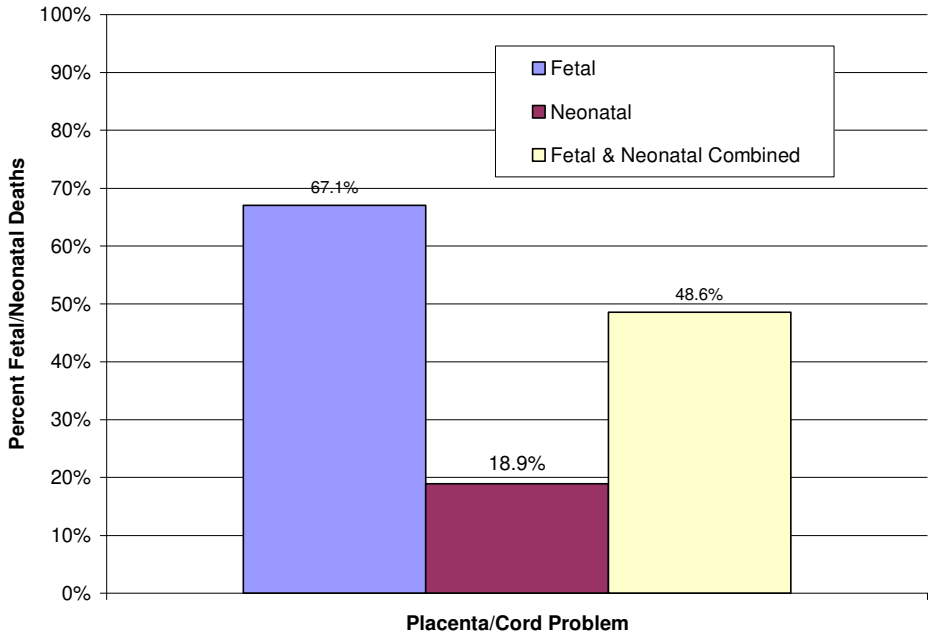
Complications of Pregnancy

Statewide for California in 2005, the primary cause of death was listed as placenta, cord or membranes complication in 29.5% of fetal demises and other maternal complications of pregnancy were listed as the primary cause of death for another 9.9% of demises. (12, 13)

As shown in Figure 16, a placenta or cord problem was noted as a contributing factor (but not necessarily the primary cause of death) in 67.1% of Yolo County fetal demises but only 18.9% of neonatal demises.

Problems with the placenta can include placental insufficiency, inadequate insertion of the cord to the placenta or abruption of the placenta. Cord problems can include tight wrapping of the cord around the fetus' neck or other body part, true knot in the cord or clot in the umbilical cord.

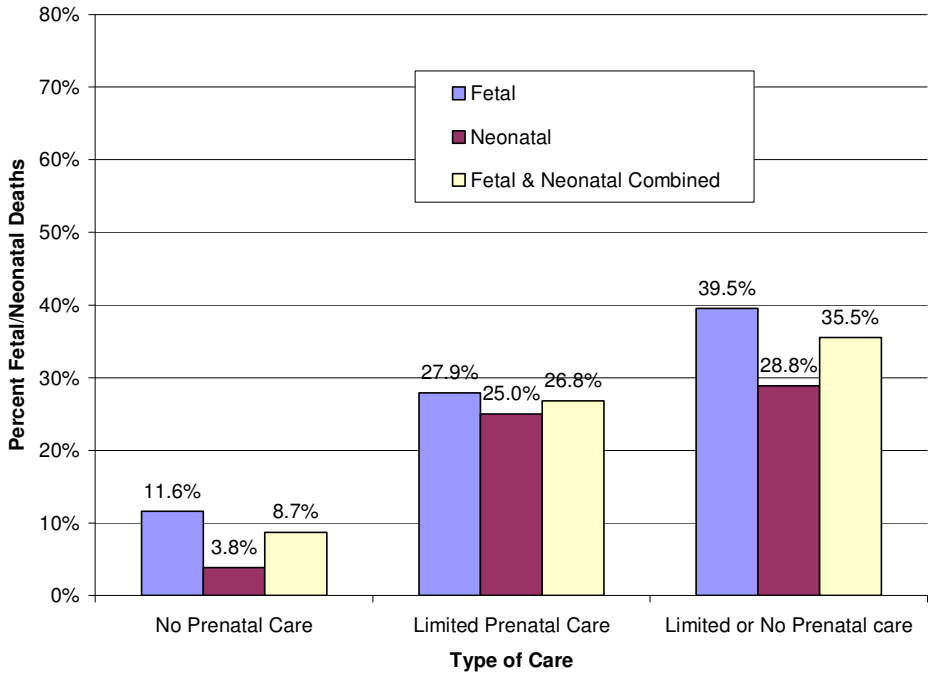
FIGURE 16: Placenta or Cord Problems Associated with Fetal/Neonatal Deaths, YOLO COUNTY
Data Source: Yolo County FIMR Cases, 1998 – 2006.



Prenatal Care

Either limited or no prenatal care was noted in 39.5% of Yolo County fetal demises and 28.8% of neonatal deaths. The percent of mothers with limited prenatal care was very similar in both groups (27.9% fetal and 25.0% neonatal, thus 26.8% overall) but the percent of mothers with no prenatal care was much higher in the fetal demise group (11.6% for fetal demise vs. 3.8%). This is illustrated in Figure 17. It should be noted that "limited prenatal care" in this report is determined based on the medical record. Late entry into prenatal care, multiple missed appointments or a large gap in prenatal care was noted in the medical record when limited prenatal care is noted. The "limited" category is not based on a predetermined ideal number of prenatal visits for a pregnancy since a large number of demises were premature infants and thus the mother could not possibly have had the recommended number of prenatal visits for a term pregnancy.

FIGURE 17: Prenatal Care and Fetal/Neonatal Deaths, YOLO COUNTY
Data Source: Yolo County FIMR Cases, 1998 – 2006.

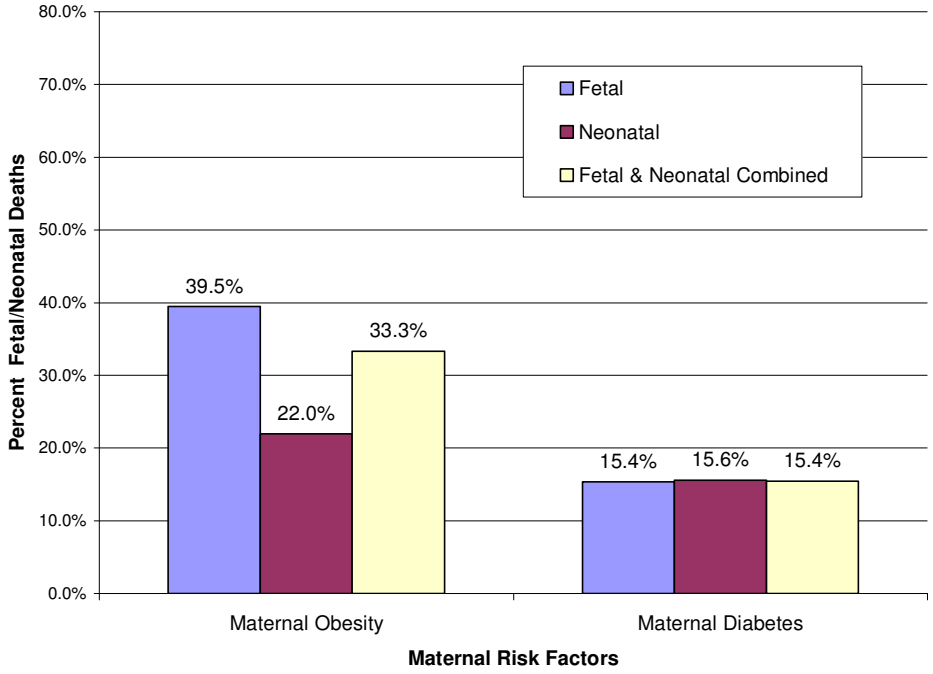


Obesity and Diabetes

As shown in Figure 18, maternal obesity, defined as a body mass index (BMI) greater than 30, was noted in 39.5% of Yolo County fetal demises but with only 22% of neonatal demises. In Yolo County, 20% of Hispanic women and 13% of non-Hispanic White women of childbearing age overall are obese. (8)

Maternal obesity has been demonstrated in several large studies to be associated with increased likelihood of pregnancy complications, complications of labor and delivery and poor neonatal outcome. This effect is seen independently of diabetes or gestational diabetes. Complications include increased likelihood of hypertension, pre-eclampsia, placenta problems, fetal demise after 28 weeks, fetal distress at delivery, large size for gestational age and certain types of congenital anomalies. These congenital anomalies include spina bifida, omphalocele and congenital heart defects. The likelihood of many of these complications increases dramatically with increased overweight (BMI > 30 vs. > 35 vs. > 40). (4, 6, 7, 8, 14, 15, 16, 32)

FIGURE 18: Maternal Obesity & Diabetes and Fetal/Neonatal Deaths, YOLO COUNTY
Data Source: Yolo County FIMR Cases, 1998 – 2006.



Maternal diabetes was noted in 15.4% of Yolo County fetal and neonatal demises. See Figure 18 above. In review of available records, it was not possible to reliably distinguish between pre-existing diabetes and gestational diabetes. Maternal diabetes, particularly if poorly controlled before and during pregnancy, is associated with increased risk for a number of pregnancy complications and adverse outcomes for the fetus or neonate. These risks include maternal hypertension and pre-eclampsia, increased fetal mortality, particularly after 32 weeks, certain congenital anomalies, small or large size for age, and increased neonatal mortality due to a number of complications. (25)

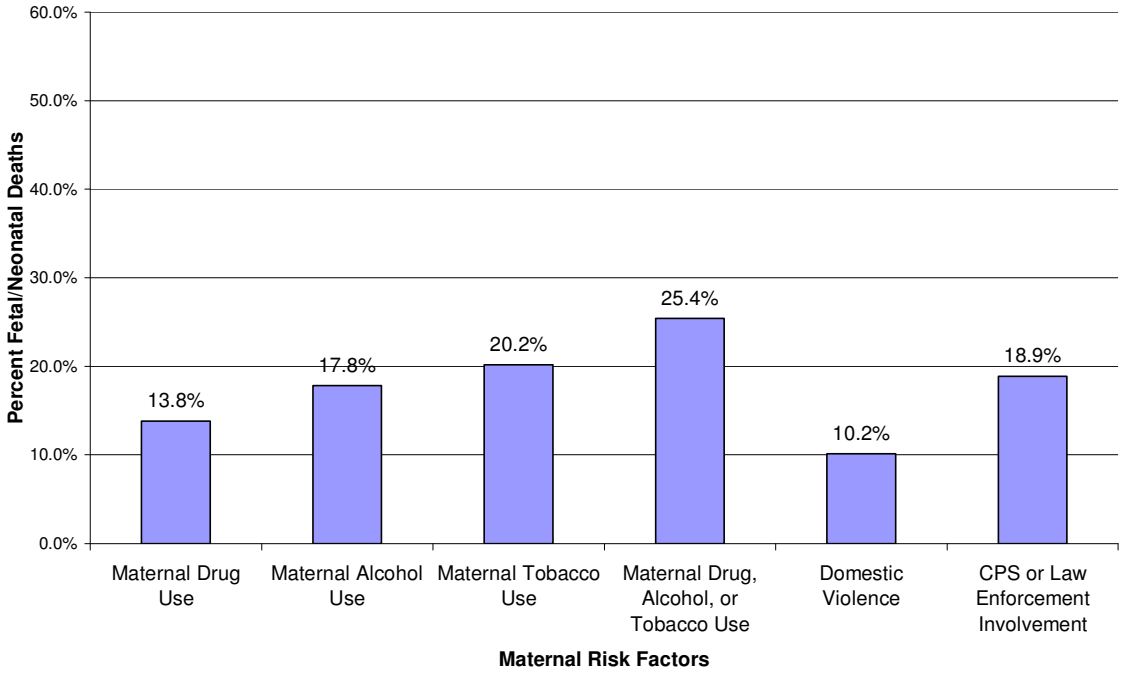
Psychosocial Factors

Maternal drug, alcohol or tobacco use during pregnancy was reported in 25.4% of combined fetal and neonatal deaths in Yolo County. Specifically, maternal use of illegal drugs was noted in 13.8% of deaths, maternal alcohol use was noted in 17.8% of deaths and maternal tobacco use was noted in 20.2% of deaths. See Figure 19 below. It is quite possible that these figures underestimate the scope of the problem for two reasons: (1) Drug screens are not always routinely obtained on all mothers or infants at prenatal visits or at delivery and (2) Multiple studies have shown that self-reporting of maternal tobacco, alcohol and drug use is often inaccurate in an obstetric care setting and is particularly subject to under-reporting. (20, 23, 29)

Maternal alcohol use during pregnancy is well known to be associated with a number of birth defects as well as learning and behavior problems. Maternal alcohol use in pregnancy is a leading cause of mental retardation in children. Maternal smoking during pregnancy is known to be associated with smaller infant size, prematurity and increased respiratory problems in the infant. Use of illegal stimulant drugs, including methamphetamine and cocaine during pregnancy

is associated with a variety of problems including congenital heart disease, low birth weight, prematurity and placenta abruption as well as learning and behavior difficulties. (25)

FIGURE 19: Domestic Violence and Substance Use, Combined Fetal & Neonatal Deaths, YOLO COUNTY
Data Source: Yolo County FIMR Cases, 1998 – 2006.



Prior law enforcement or Child Protective Services involvement was noted for 18.9% of Yolo County families with a fetal or neonatal demise. Domestic violence (current or past) was noted in the history of 10.2% of Yolo County mothers with a fetal or neonatal demise. However, a history of domestic violence may also be under-reported.

Other Maternal Health Problems

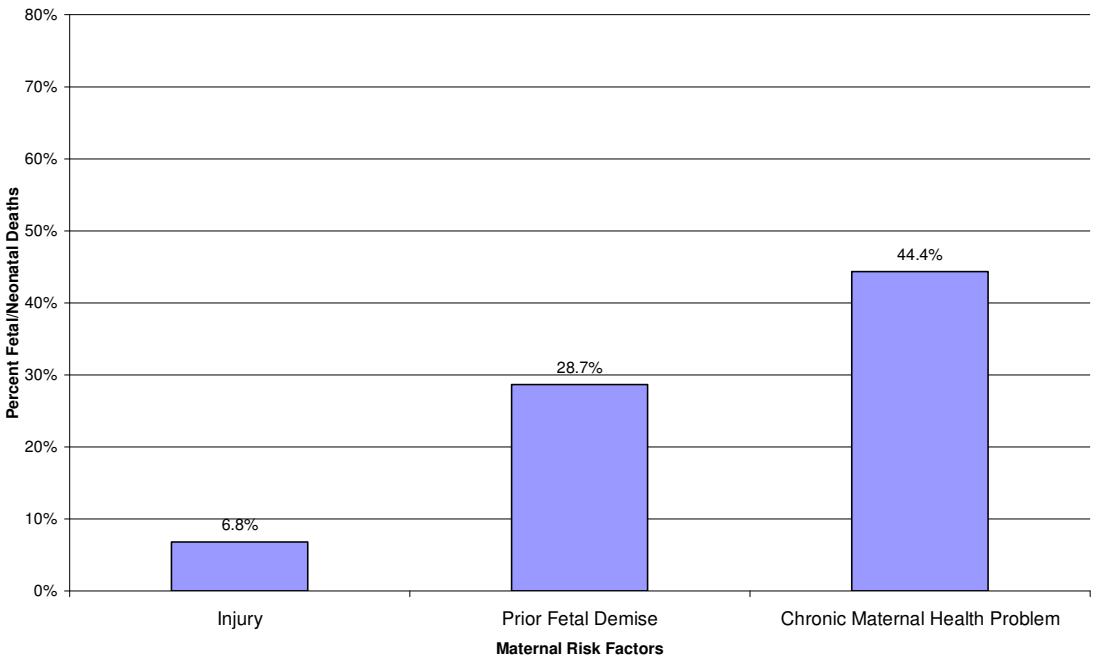
Accidental injury to the mother during pregnancy was a relatively infrequent contributing factor in fetal or neonatal demise, occurring in 6.8% of Yolo County fetal and neonatal demises overall. See Figure 20 below.

As shown in Figure 20, other chronic maternal health problems (not related to the pregnancy) were noted as present in 44.4% of Yolo County fetal and neonatal demises. However, these health problems were not necessarily the primary cause of the demise. These health problems included a range of maternal conditions, including maternal infection, dental disease, uncontrolled hypertension, thyroid disease, mental health problems, fertility problems and uterine anomalies. Many of these conditions may have contributed to the demise.

Prior Fetal Demise

A maternal history of at least one prior fetal demise was noted in 28.7% of the fetal and neonatal demises in Yolo County (Figure 20). Prior fetal demise is important because it may indicate either a recurring genetic abnormality in the fetuses or a recurring maternal problem affecting viability of the pregnancy. Such maternal problems might include an abnormally formed uterus (such as a bicornuate or didelphic uterus), cervical incompetence or a maternal tendency to abnormal blood clotting.

FIGURE 20: Injury, Prior Fetal Demise & Other Maternal Health Problems,
Combined Fetal & Neonatal Deaths, YOLO COUNTY
Data Source: Yolo County FIMR Cases, 1998 – 2006.

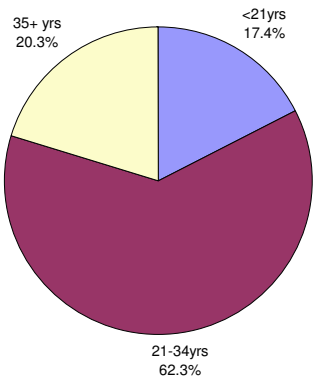


Maternal Age

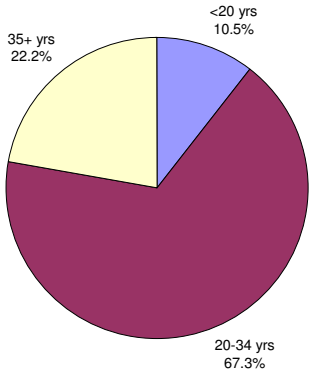
Advanced maternal age, defined as maternal age of 35 years or more at time of delivery, was noted in 20.3% of Yolo County fetal and neonatal demises. Refer to Figure 21 below for county and state maternal age group data.

Figure 21: Fetal Death by Maternal Age Group, Yolo County FIMR Investigations & California.
Note: Age groupings vary by location.

YOLO COUNTY
Data Source: Yolo County FIMR Cases, 1998 – 2006.



CALIFORNIA, 2005
Source: CDPH, Center for Health Statistics, OHIR, VSCA Table 3-1.

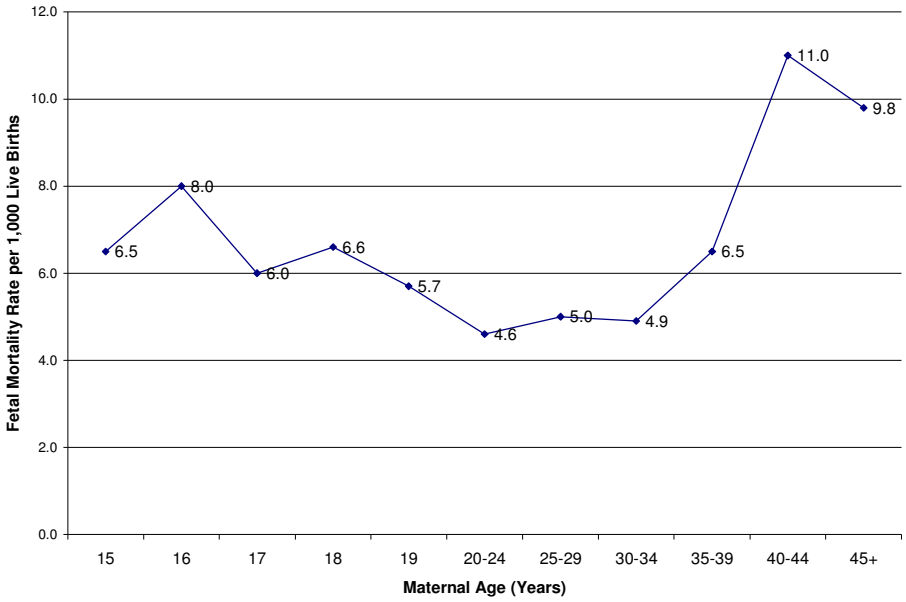


Statewide for 2005 , maternal age of 35 years or more was noted in 22.2% of fetal demises with a fetal mortality rate in this age group that was much higher than the overall state average fetal mortality. As shown in Figure 22, the fetal mortality rate was 6.5 per 1000 for 35 to 39 year old mothers and 11.0 per 1000 for those age 40 to 44 years. This is compared to a statewide overall average of 5.5 per 1000 and a rate of 4.6 per 1000 for the lowest group, 20 to 24 year olds. (12, 13)

Teen pregnancy (under 21 years in this report) was noted in 17.4% of Yolo County fetal and neonatal demises overall.

Teen pregnancy (under 20 years) was noted in 10.5% of fetal demises statewide in 2005 with a particularly elevated fetal mortality rate in those youngest mothers, ages 15 to 17 years, with a mortality rate as high as 8.0 per 1000 in 16 year olds and declining with each increased year of age of these young mothers. (12, 13)

Figure 22: Fetal Mortality Rate by Maternal Age Group, CALIFORNIA, 2005
Source: CDPH, Center for Health Statistics, OHIR, VSCA Table 3-1.



Postneonatal Infant Deaths

Postneonatal infant deaths comprise those deaths of infants from 1 month (29 days) to 12 months of age. Deaths of children over 1 year of age are reviewed only by the county's Child Death Review Team and not by FIMR.

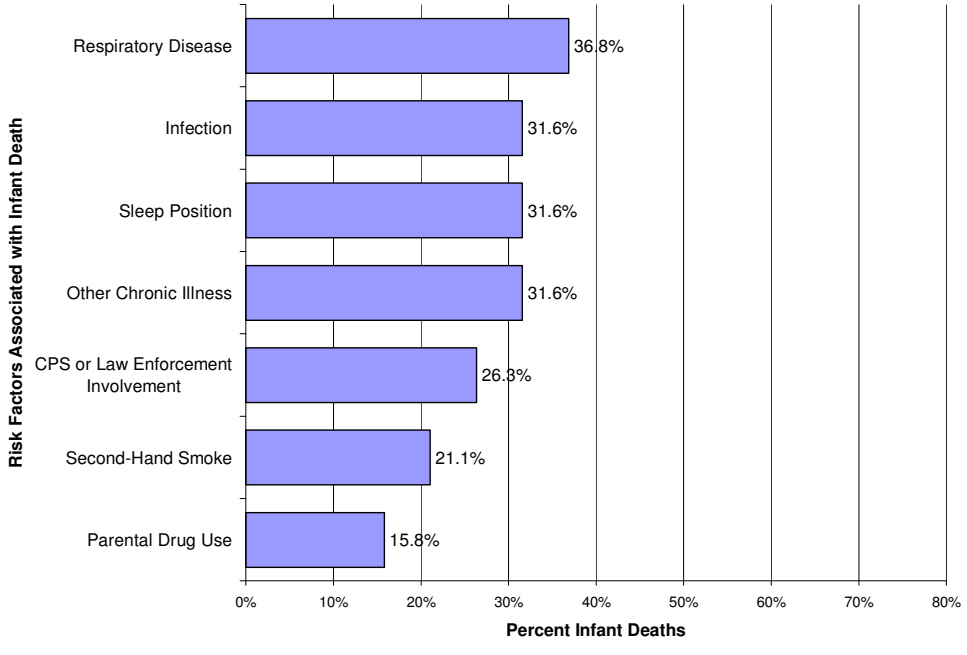
The Yolo County FIMR Team reviewed 19 postneonatal infant deaths that occurred from 1998 through 2006. Most of these Yolo County infants were born at term gestation (82.4%) and most were of birth weight greater than 2500g (70.6%). A small minority, 11.8%, were very small premature infants from 24 to 30 weeks gestation and weighing less than 1500 grams at birth.

Congenital anomalies continued to be an important contributing factor in Yolo County postneonatal infant deaths as they were in fetal and neonatal demises. 31.6% of Yolo County postneonatal infants who died had some type of congenital anomaly noted and 21.1% had a cardiac anomaly. 15.8% had multiple congenital anomalies noted.

Respiratory disease, acute or chronic, was either the primary cause or a contributing factor in 36.8% of Yolo County postneonatal infant deaths. Infection was the primary cause or a contributing factor in 31.6% of postneonatal infant deaths though some of these children had other complex chronic illnesses as well. 31.6% of postneonatal infants had a chronic illness that contributed to their demise. See Figure 23. Malignancy was an uncommon contributing factor in postneonatal infant death. Trauma, both accidental and non-accidental, was also an uncommon cause or contributing factor in postneonatal infant deaths in Yolo County for this period.

Statewide for 2005, congenital malformations are listed as the primary cause of death for 23.0% of postneonatal infant deaths. Respiratory disease (including respiratory disease related to prematurity as well as pneumonia, asthma and other respiratory illness) was listed as the cause of death in 9.8% of postneonatal deaths. Malignancy accounted for 1.6% of postneonatal deaths. Trauma, both accidental and non-accidental, accounted for 9.1% of postneonatal mortality statewide. Non-accidental trauma accounted for 2.2% of the total postneonatal deaths statewide. (12, 13)

FIGURE 23: Risk Factors Associated with Postneonatal Infant Death
Data Source: Yolo County FIMR Cases, 1998 – 2006.



Referring again to Figure 23, sleep position appeared to be a contributing factor in 31.6% of Yolo County infant demises. Sleep position was considered a factor if there was entrapment, co-sleeping with a parent, sleeping on a couch or chair, or sleeping prone (face down) observed or reported in the records.

The increased incidence of Sudden Infant Death Syndrome (SIDS) in infants sleeping in a prone position has been well established in the literature since 1992. In addition, the increased incidence of SIDS in infants sleeping on a soft surface (pillow, comforter or couch) has likewise been well-demonstrated. Further, the increased incidence of SIDS for infants who are co-sleeping with a parent is well-supported, especially when that co-sleeping occurs in certain circumstances (parent alcohol use, parent over-tired, co-sleeping with parent on a couch, very young infants & infants whose mothers smoke). (1)

Most of the Yolo County infant deaths where sleep position was a factor were not reported as SIDS deaths. Asphyxia (in cases of actual entrapment) or "undetermined" were the usual primary causes of death listed by the coroner in such cases. SIDS is rarely listed as the cause of death by the Yolo County Coroner due to the difficulty of completely excluding all other causes of death. (33) Statewide for 2005, SIDS was the reported cause of death for 13.8% of postneonatal demises. (12, 13) Nationwide for 2004, SIDS was the cause of death listed for 8% of infant deaths. (22)

In 21.1% of infant deaths, exposure to secondhand smoke (one or both parents smoking) was noted. Exposure of infants and children to secondhand smoke is known to be associated with increased rates of lower respiratory illness (pneumonia and bronchitis), increased rates of ear infections, and increased rates of and increased severity of asthma. Childhood exposure to secondhand smoke may be linked to increased rates of leukemia and lymphoma later on. An increasing body of literature links exposure to secondhand smoke in fetuses and infants to later SIDS. (2, 37)

In 15.8% of Yolo County infant deaths, parental drug use (by mother or father) was noted in the record. In 26.3% of infant deaths in Yolo County there was law enforcement or Child Protective Services involvement with one or both parents noted prior to the demise.

Preventable causes of, or contributing factors to, infant deaths are of particular interest to FIMR. Unsafe sleep position, accidental and non-accidental trauma, exposure to secondhand smoke and exposure to unsafe environments related to illegal drug abuse are all important potentially preventable causes of or contributing factors to infant death. Of the Yolo County infant deaths, 42% involved at least one of these potentially preventable factors.

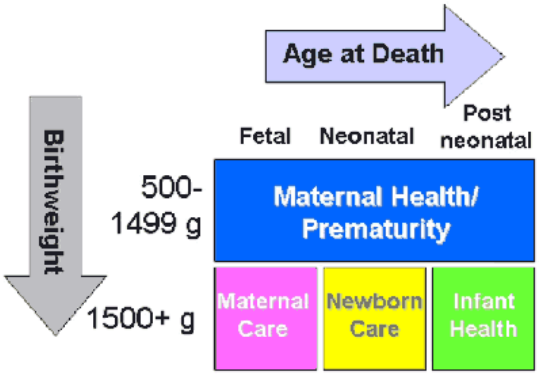
Perinatal Periods of Risk

"Perinatal Periods of Risk", also known as PPOR, is a tool widely used by FIMR teams throughout the country to identify possible disparities and gaps in maternal, neonatal and infant health care. This tool was developed by Brian McCarthy MD while he was at Centers for Disease Control and Prevention. (17) PPOR can be used to promote better infant and maternal health systems by identifying those areas most in need of improvement. Fetal and infant death

rates are "mapped" by birth weight and age at death. Filling in the cells in this "map" can be used to identify excessively high rates in any one category. Once problems are identified, targeted efforts for prevention of fetal and infant mortality can be developed and implemented. Excessively high rates are determined by comparison to State or national data or by comparison to an "ideal" low-risk group. See Figure 24 below. (17, 18, 30)

For the greatest level of reliability, PPOR analysis requires a minimum mapping of 60 deaths overall and 10 deaths in each category. Even taken over a period of 5 years from 2001 to 2005, Yolo County's numbers are still small with a total of 82 fetal and infant deaths for analysis. Nonetheless, it is a worthwhile exercise to see how Yolo County compares to the State and the nation and see if there are any obvious discrepancies.

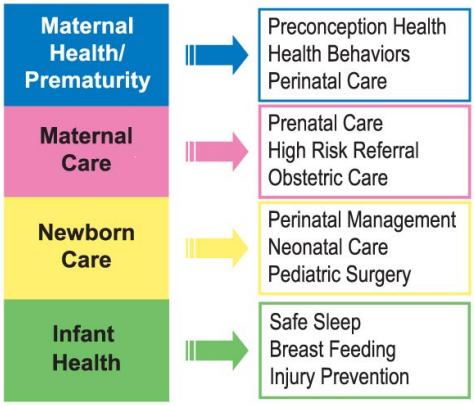
FIGURE 24: Perinatal Periods of Risk (PPOR) Map (Courtesy of CityMatCH.)



For PPOR analysis, the overall fetal and infant mortality rate is broken into four component rates:
(1) Maternal Health/Prematurity, which includes all fetal and infant deaths with birth weight from 500 to 1499 grams,
(2) Maternal Care, which includes fetal deaths of weight 1500 grams and greater,
(3) Newborn Care, which includes neonatal (first 28 days) deaths of 1500 grams and greater, and
(4) Infant Health, which includes infant (29 days to one year) deaths with birth weight of 1500 grams and greater.
Fetal deaths before 24 weeks and fetal, neonatal and infant deaths with birth weight under 500 grams are excluded from this type of analysis.(17, 18)

Each component period of risk can then be associated with suggested potential areas of focus for prevention strategies, as shown in Figure 25 that follows.

FIGURE 25: The PPOR periods of risk labeled by primary prevention areas and potential prevention strategies (Courtesy of CityMatCH.)



In Figure 26, Yolo County fetal, neonatal and infant death data have been entered into each weight and age category as per this model. The number of deaths in each category is noted as "n=". The death rate has been calculated for each category for Yolo County for 2001 to 2005 (using CDPH Death Statistical Master File and Fetal Death Master File for this county). This rate is then compared to data for the State of California and for the United States for 2003 (most recent available).

FIGURE 26: Perinatal Periods of Risk Map, Yolo County (2001-05), CA & US
NOTE: Fetal-infant death rate = number of fetal-infant deaths per 1,000 live births + fetal deaths; overall rate (all categories): Yolo (6.8), CA (7.9), US (9.1)
Source: California Department of Public Health, Center for Health Statistics, 2001-05 Fetal Death Statistical Master Files & 2001-05 Death Statistical Master Files; CA and US rates: CityMatCH, 2003.

BIRTH WEIGHT	FETAL	NEONATAL	POSTNEONATAL
500 – 1499 g	*Maternal Health/Prematurity* Yolo 2.0 (n=24) CA 3.0 US 3.7		
1500+ g	*Maternal Care* Yolo 2.6 (n=31) CA 2.2 US 2.2	*Newborn Care* Yolo 0.9 (n=11) CA 1.2 US 1.3	*Infant Health* Yolo 1.3 (n=16) CA 1.4 US 1.8

Yolo County death rates for each age and weight category are less than or equal to state and national rates in all categories except for the category of fetal demises of birth weight over 1500 grams. A higher death rate in this category points to maternal care issues, particularly issues relating to prenatal and obstetric care. Yolo County's perinatal mortality rate (noted in Figure 1) provides further evidence that this is an area of concern. As noted earlier in this report, the Yolo County FIMR Team has repeatedly noted problems with early and adequate access to prenatal care as a contributing factor in many of the fetal demises of larger (and later gestation) infants. Access to prenatal care can be particularly difficult for lower income women. Access to care may be difficult for a variety of reasons, including lack of health insurance, lack of knowledge about how to obtain publicly funded prenatal care, lack of transportation, inability to take time off from work, delayed availability of appointments, language barriers and a variety of other social factors.

Yolo County's death rate for infants (age 1 month to 12 months) with birth weight over 1500 grams is nearly equal to the State rate for this category. An elevated death rate in this category points to issues of infant health, including sleep position, accident prevention and breast-feeding. While Yolo County's death rate in this category is not higher than the State, we have already seen that sleep position or location is a frequent factor in infant demises in this county. As previously discussed, one or more preventable contributing factors were noted in over 40% of Yolo County infant demises.

Summary and Recommendations

In summary, this report has presented information and detailed analysis essential for understanding the issues around fetal and infant mortality in Yolo County. Some of the key points regarding fetal, neonatal and infant mortality are summarized as follows:

Fetal, Neonatal and Infant Mortality Rates

- Fetal, neonatal and infant mortality rates have trended generally downward over the past 20 years. These mortality rates are at or below the State average in all age groups except the perinatal period.
- PPOR analysis shows fetal mortality with weight over 1500 grams above the State and national rates but mortality rates in all other groups at or below State and national rates.

Prematurity and Low Birth Weight

- 75% of fetal and 73% of neonatal demises were born premature. Of fetal demises 59% were less than 32 weeks and 44% were less than 28 weeks. For neonatal deaths, 56% were less than 32 weeks and 52% were less than 28 weeks.
- 56% of fetal demises and 62% of neonatal demises weighed less than 1500 grams.

Birth defects

- 8% of fetal and 25% of neonatal deaths had a lethal congenital anomaly noted.
- 18% of fetal and 42% of neonatal demises had at least one congenital anomaly noted.

Maternal Health

- Obesity: 39% of mothers with a fetal demise were obese. This area is a FIMR Team action item.
- Diabetes: 15% of mothers with a fetal or neonatal demise had diabetes.
- Substance use: Maternal drug, alcohol or tobacco use was noted in 25% of fetal and neonatal deaths. This area is a FIMR Team action item.
- Domestic Violence: 10% of mothers with a fetal or neonatal demise had a history of domestic violence, 19% had a history of CPS or law enforcement involvement. This area is a FIMR Team action item.
- Chronic maternal health problems were noted in 44% of mothers with a fetal or neonatal demise.

Infant Health

- Sleep position was a contributing factor in over 31% of infant deaths. This area is a FIMR Team action item.
- Preventable risk factors: 42% of infant deaths in Yolo County involved one or more potentially preventable contributing factors.

Barriers to care

- 35% of mothers with a fetal or neonatal demise had limited or no prenatal care.
- 23% of fetal demises were at term gestation with no congenital anomaly noted.
- PPOR analysis indicates need for attention to the general area of maternal care issues.
- This area is a FIMR Team action item.

Based on these findings, some key recommendations have been developed:

1. Efforts should be undertaken to increase community awareness of the importance of good health and lifestyle practices prior to pregnancy and how preconceptual reduction of health risks leads to healthier birth outcomes.

2. Health care agencies should assure that preconception care in compliance with national recommendations is provided for couples and women of child-bearing age when they receive health services.

3. All health and social services agencies should work to develop streamlined and coordinated systems of health insurance enrollment for pregnant women to ensure early entry to prenatal care and adequate availability of the level of care needed based on health risk.

4. All agencies serving pregnant women should develop service models that reduce barriers to utilization of perinatal services. This includes efforts to improve cultural competency, provide flexible scheduling, improve transportation options and offer health education in appropriate languages and literacy levels.

5. Resources to promote healthy weight for families should be available in our community through a wide range of strategies: community nutrition and physical activity education programs, WIC and other nutrition programs for low income families, and community planning for a healthy built environment.

6. Women should be universally screened and counseled by their prenatal care provider for substance use including tobacco, alcohol, legal and illegal drug use.

7. Women should be routinely screened and offered resources regarding domestic violence issues during the perinatal period.

8. Resources should be directed toward continuing and expanding public health campaigns that address safe sleeping practices for infants.

9. Yolo County agencies, both private and public, should continue to support the FIMR process as a high priority both for healthcare systems and public health. This includes both dedication of time and funding towards this program.

Healthy birth outcomes are closely related to the collective well-being of the entire population. Our community has the advantage of an active, thoughtful and concerned group of community experts who continue the important work of the FIMR Team. The FIMR process leads to ongoing planning, intervention and evaluation to address system issues linked to fetal and infant mortality. A concerted effort by multiple sectors of the community is necessary in order to improve service systems and resources. Further appreciation of these issues comes via close examination and surveillance of available fetal and infant death data. The importance of good health and lifestyle practices as well as the availability of early and adequate prenatal care can

not be overstated. Improvements in our systems that address these areas will most assuredly impact the well being of all Yolo County families throughout the life course.

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This report is also posted on-line at the Yolo County Website
www.yolocounty.org

References

1. American Academy of Pediatrics (2005). The changing concept of Sudden Infant Death Syndrome. Pediatrics, 116:1245-1255

2. American Academy of Pediatrics (1997). Environmental tobacco smoke: a hazard to children. Pediatrics, 99: 639-642

3. American College of Obstetricians and Gynecologists (2001). The fetal and infant mortality review (FIMR) process: a decade of lessons learned. The National Fetal and Infant Mortality Review program (NFIMR).

4. Anderson J, Waller D et al. (2005). Maternal obesity, gestational diabetes and central nervous system defects. Epidemiology, 16(1): 87-92.

5. Atrash H, Johnson K, Adams M et al. (2006). Preconception care for improving perinatal outcomes: the time to act. Maternal and Child Health Journal, 10(5): S3-S11.

6. Baeten J, Bukisi E and Lambe M. (2001). Pregnancy complications and outcomes among overweight and obese nulliparous women. American Journal of Public Health, 91(3): 436-440.

7. Bhattacharya S, Campbell D et al. (2007) Effect of Body Mass Index on pregnancy outcomes in nulliparous women delivering singleton babies. BMC Public Health, 7(147): 168.

8. Brodsky J and Jocson M. (2008). Birth outcomes and the status of preconception health among women in California and Yolo County. Presentation to Preconception Care Conference, Yolo County Health Department, Woodland CA March 20, 2008. Data presented is from California Health Interview Survey (CHIS).

9. California Department of Public Health, Center for Health Statistics, 1992-2005 Birth Statistical Master Files.

10. California Department of Public Health, Center for Health Statistics, 1992-2005 Death Statistical Master Files.

11. California Department of Public Health, Center for Health Statistics, 1992-2005 Fetal Death Statistical Master Files.

12. California Department of Public Health, Center for Health Statistics, Office of Health Information and Research. Vital Statistics of California 2004.

13. California Department of Public Health, Center for Health Statistics, Office of Health Information and Research, Vital Statistics of California 2005 (unpublished preliminary tables, 2008).

14. Cedergren M (2008). Total weight gain and pattern of weight gain in pregnancy. PowerPoint presentation on 3-10-08; handout provided by C Peck MD on 3-20-08.

15. Cedergren M (2004). Maternal morbid obesity and the risk of adverse pregnancy outcome. Obstetrics and Gynecology, 103(2): 219-24. Abstract retrieved from www.ncbi.nlm.gov/pubmed on 3-21-08 and article cited by C Peck MD on 3-20-08.

16. Cedergren M and Kallen B (2003). Maternal obesity and infant heart defects. Obesity Research 2003; 11(9): 1065-71.

17. CityMatCH (2005). Feto-infant mortality in selected US cities and counties (2000-2002) using perinatal periods of risk (PPOR) mapping. City Lights, 14(3-4): A1-A5.

18. CityMatCH (2007). What is PPOR? Retrieved from www.citymatch.org/ppor 10-23-07.

19. Cnattinglus S Bergstrom R et al. (1998). Prepregnancy weight and risk of adverse pregnancy outcomes. New England Journal of Medicine, 338(3): 147-52.

20. Derauf C, Katz AR, Easa D. (2003). Agreement between maternal self-reported ethanol intake and tobacco use during pregnancy and meconium assays for fatty acid ethyl esters and cotinine. American Journal of Epidemiology, 158(7):705-9.

21. Forum on Child and Family Statistics (2007). America's Children: Key national indicators of well-being, 2007. Retrieved from www.childstats.gov/ america's children on 12-12-07.

22. Hamilton B, Minino A, Martin J et al. (2007). Annual summary of vital statistics: 2005. Pediatrics 2007; 119: 345-360

23. Hessol NA, Missett B, Fuentes-Afflick E. (2004). Lower agreement on behavioral factors than on medical conditions in self-reported data among pregnant Latina women. Arch Med Res. 2004; 35(3):241-5 (Abstract retrieved from www.ncbi. nlm.nih.gov/ pubmed on 1-23-08.)

24. Kesmodel U, Wisborg K et al. (2002). Moderate alcohol intake during pregnancy and risk of stillbirth and death in the first year of life. American Journal of Epidemiology 155(4): 305-12.

25. Kliegman R, Behrman R et al. (2007). Nelson textbook of pediatrics. Philadelphia: Saunders, pg 671-693 and 778-88.

26. MacDorman M, Callaghan W, Mathews TJ et al. (2007). Trends in preterm-related infant mortality by race and ethnicity: United States, 1999-2004. Retrieved from www.cdc.gov/ nchs/ products/ pubs/ pubd/ hestats/ infantmort99-04 on 12-12-07.

27. MacDorman M, Munson M, Kirmeyer S. (2007). Fetal and perinatal mortality, United States, 2004. National Vital Statistics Reports, vol 56 no 3.

28. Mathews TJ, MacDorman M. (2007). Infant mortality statistics from the 2004 period. National Vital Statistics Reports, vol 55 no 15.

29. McNamara TK, Orav EJ, Wilkins-Haug L et al. (2005). Risk during pregnancy - self-report versus medical record. American Journal of Obstetrics and Gynecology, 193(6):1981-5.

30. Mittal, M. (2005) Perinatal periods of risk (PPOR): a useful tool for analyzing fetal and infant mortality. Statistical Brief, North Carolina State Center for Health Statistics. Retrieved from www.schs.state.nc.us/SCHS on 10-23-07.

31. National Center for Health Statistics (2007). National Vital Statistics Reports, vol 56 no 3.

32. Peck C. (2008). A healthy baby is worth the weight. Presentation to Preconception Care Conference, Yolo County Health Department, Woodland CA 3-20-08.

33. Personal communication with Yolo County Coroner and District Attorney representatives, Jan 17, 2008.

34. Reduce fetal and infant deaths. Retrieved 2-14-08 from www. healthypeople.gov/ document/ html/ objectives/16-01.htm.

35. Takahashi E, Libet M, Ramstrom K, Jocson M et al. eds. (2007) Preconception health: selected measures, California 2005. Maternal, Child and Adolescent Health Program, California Department of Public Health, Sacramento CA.

36. U.S. Department of Health and Human Services (2005). Child health USA 2005. Retrieved from www.mchb.hrsa.gov/ mchirc/ chusa_05 on 12-12-07.

37. U.S. Department of Health and Human Services (2007). Children and secondhand smoke exposure: excerpts from the health consequences of involuntary exposure to tobacco smoke: a report of the Surgeon General. Retrieved from www.surgeongeneral.gov on 1-28-08.

38. Yolo County Fetal and Infant Mortality Review Team (FIMR), Meeting minutes and archives, Yolo County Health Department 1998-2007.

Appendix A
Yolo County FIMR Team Members

Current Members

Name	Years Served
Djina Ariel, CNM Woodland Health Care	2008
Jan Babb, RN, PNP, MSN Yolo County Health Department	2003 – 2008
Rick Baker, MD Kaiser Permanente Health	2002 – 2008
Barb Boehler, CNM CommuniCare Health Centers	2005 – 2008
Traci Brewer Yolo County CWS Social Worker Practitioner	2005 – 2008
Sarah Burke, MSW CommuniCare Health	2008
Constance Caldwell, MD Yolo County Health Department	2006-2008
Bette Hinton, MD Yolo County Health Department	1999 – 2008
Marian Hull Yolo County Health Department	2003 - 2008
Cathy Jang, MD Woodland Healthcare	2006 – 2008
Carrie Jones, MD Yolo County Health Department	2008
Jan Jursnich SIDS Grandparent	2002 – 2008
Robert LaBrash Yolo County Coroner	2008
Karen Larsen, MFT John H. Jones Clinic	2005 – 2008
Pete Martin Yolo County District Attorney's Office	1998 – 2008
Bruce Naliboff Yolo County District Attorney's Office	2002 – 2008
Donna Nevraumont, PHN FIMR Coordinator Yolo County Health Department	2001 – 2008

Name	Years Served
Phyllis Pratt Partnership Healthplan	2004 – 2008
Leah Russo, RN Sutter Davis Birthing Center	2006 – 2008
Sajiv Saxena, MD Woodland Healthcare	2005 – 2008
Leon Schimmel, MD Sutter Davis Hospital	2007 – 2008
LaRae Shaw-Meadows, M.Div. Yolo Co Dept Employment & Social Svcs	2005 – 2008
Deborah Soliz, MSW CommuniCare Health	2000 – 2008
Judy Tischer, LMFT Sexual Assault & Domestic Violence Ctr	2006 – 2008

Past Members

Name	Years Served
James Andrade Yolo County Coroner's Office	2005 – 2008
Aaron Ashley Yolo County Coroner's Office	2003
Dana Bennett, FIMR Coordinator Yolo County Health Department	2002 – 2004
Marilyn Benton SIDS Parent	1998 – 2003
Cheryl Boney Yolo County Health Department	1998 – 2000
Christine Burns Sexual Assault & Domestic Violence Ctr	2001
Denise Burns	2002
Amy Cameron Board of Supervisors Aide	1998 - 2000
Melaine Clark-Anibaba Yolo County Health Department	2002
Alma Collazo Sexual Assault & Domestic Violence Ctr.	2002 – 2004

Name	Years Served
Kathy Coulter American Red Cross	2001
Ashley Curry Yolo County Coroner's Office	2007
Ami Diller Certified Nurse Midwife	2001
Myrna Epstein, FIMR Coordinator Yolo County Health Department	2001 – 2002
Roberta Femrite Yolo County Health Department	2002
Denise Boroughs Fitch Yolo County Health Department	1998 - 2000
Lynne Foster, FIMR Coordinator Yolo County Health Department	2004
Sarah Galetti Sexual Assault & Domestic Violence Ctr.	2005
Rebecca Gandara Yolo Connections	1999 - 2001
Judy Gilchrist Yolo County Child Welfare Services	1998 - 2001
Michael Golden Woodland Healthcare	1998 - 2001
Beverly Granda Yolo County Health Department	2002
Barbara Graves Yolo County Child Welfare Services	2004
Kathleen Haley Partnership Healthplan	2001 – 2003
Bridgette Hankerson Yolo Co Dept Employment & Social Svcs	2004
Flora Hernandez Yolo County Health Department	1998 - 2001
Alida Hrivnak Yolo County Health Department	2002 – 2007
Carla Hutchison, FIMR Coordinator Yolo County Health Department	2005 – 2006
Elena Jaime Alcohol & Drug Prevention Program	1998 – 2000

Name	Years Served
Beth Johnson, MD Sutter Davis Hospital	2006
Don Jordan Community Member	1998 – 2003
Peter Kenner, DVD Family Violence Prevention Council	1998 - 2002
Mary Koompin-Williams Yolo County Coroner	1998 – 2003
Lisa LaBute Sutter Birthing Center	2001
Alison Jancich Lehman CASA	1998 - 2000
Martha Lehman Yolo County CPS	1998 – 2003
Kay Lehr, FIMR Coordinator Yolo County Health Department	1998 – 2002
Sharman Loredo Woodland Healthcare	2000 – 2007
Samrina Marshall, MD Yolo County Health Department	2003 – 2005
Joanne Milberger Yolo County CASA	2002
Janet O'Brien, MD Yolo County Health Department	1998 – 2000
Jim Redfield Pastor	1998 – 2000
Michael Reinhart, MD Sutter West Pediatrics	1998 – 2003
Bonnie Rose Yolo County Health Department	1998 - 2001
Marlene Rubio-Damien CommuniCare Health	1999 – 2002
Stacie Sanborn-Joellenbeck Yolo County Health Department	2002 – 2003
Kate Seiberth School Nurse – Cache Creek High School	1998 – 2000
Gary Selby Yolo Wayfarer Center	1998 - 2001

Name	Years Served
Susan Sprinkle, FIMR Coordinator Yolo County Health Department	2000 – 2001
Zoe Tilton, MD Sutter Davis Hospital	1998 - 2003
Shauna Urness	2002
Frances Vasquez Yolo Co Dept Employment & Social Svcs	2004
Christine Ward Sexual Assault & Domestic Violence	2001
Melinda Waring Sister Friend Project	1998 – 1999
Alissa Wilfrid, MSW Yolo County Child Welfare Services	2004
Rachel Woody Cal-Safe Program Yolo High School	2002

Appendix B
Babies Sleeping Safely Brochure

Be careful with your baby's sleep environment!

- If you are extremely tired, a heavy sleeper, overweight, or you are taking medications that cause drowsiness, there is a chance of mistakenly laying on or smothering a sleeping baby.

- Do NOT have your baby sleep with you if you or your partner have been drinking alcohol, using drugs or smoking.

- Alcohol and drugs affect your ability to awaken and respond to your baby. Second- hand smoke affects the normal breathing and health of an infant.
- Do NOT let anyone smoke around your baby.
- It is unsafe for infants to bed-share with other children, including brothers and sisters.
- The American Academy of Pediatrics recommends that infants NOT bed-share during sleep.

For more information please call:

Yolo County Health Department
Maternal, Child, Adolescent Health Program
SIDS Program
(530) 666-8645
(916) 375-6380
1(800) 794-6517

Community Breastfeeding Support Line of Yolo County:
1(800) 663-8658

Brochure Developed by:
Fetal Infant Mortality Review Team of Yolo County

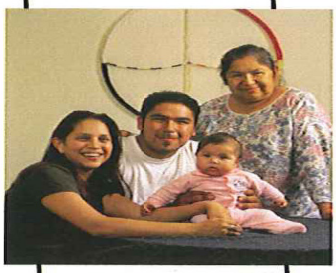
Adapted from Contra Costa County and the National Back to Sleep Campaign

Brochure Published 4/05; revised 5/07

This brochure was paid for in part by a grant from:

FIRST 5 YOLO
Children and Families Commission

Babies Sleeping Safely Every Time



Guidelines for Safe Sleeping for Your Baby

ENJOY YOUR BABY

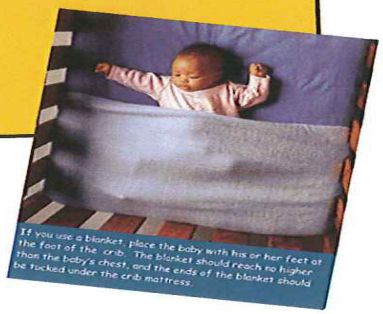
- Studies show that creating a safe sleep environment for babies can help save lives and reduce the number of infant deaths, especially from Sudden Infant Death Syndrome (SIDS), the sudden, unexplained death of an otherwise healthy baby under one year of age.
- Families and caregivers must be aware of the potential risks of sleeping with an infant.
- The following guidelines acknowledge the importance of family bonding and support actions that promote infant health and survival.

SAFETY GUIDELINES

Always place your baby on his/her back to sleep

- For a healthy baby, this is considered the best and safest sleeping position.
- Use nothing, such as pillows, to prop or hold your baby in place.
- Infants should sleep on a firm, flat surface covered by a tight fitting sheet.
- No fluffy, loose bedding.
- No stuffed toys, pillows, sheepskins, beanbags, and plastic material.
- Avoid sofas and waterbeds.
- Avoid overheating your baby. Keep the room temperature comfortable for a lightly clothed adult.
- Make sure your baby's head and face are uncovered during sleep.
- When purchasing a crib look for one that conforms to safety standards.
- Always place cribs away from heaters, windows, and dangling cords.

Parents, especially breastfeeding mothers, can keep their baby close to them by moving the baby's crib, bassinet, or sleeping surface close to their bed.



If you use a blanket, place the baby with his or her feet at the foot of the crib. The blanket should reach no higher than the baby's chest, and the ends of the blanket should be tucked under the crib mattress.