YOLO COUNTY DEPARTMENT OF HEALTH SERVICES

FETAL & INFANT MORTALITY REVIEW

ACTIVITIES OF THE YOLO COUNTY FIMR TEAM

& ANALYSIS OF LOCAL FIMR DATA

2007 - 2011

December 11, 2014

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“Children are our future & their mothers are its guardians”

-Kofi Annan

2001 Nobel Peace Prize Winner

December 2014

Dear Colleagues,

Yolo County has had an active and committed Fetal and Infant Mortality Review (FIMR) Team continuously since 1998. This team reviews fetal and infant deaths, with a particular emphasis on identifying systems level factors that can be improved, leading to better outcomes. A previous report was published in 2008 that chronicled the activities of the FIMR Team and analyzed local FIMR data for the period of 1998 to 2006. This report picks up where that report left off, and covers FIMR activities and data analysis for the period from 2007 through 2011.

Fetal and infant mortality continue to be important indicators of maternal and child health and the health of the community as a whole. The FIMR Program brings together health care providers and other stakeholders to engage in dialogue about the factors impacting the health of mothers and infants. The results of the FIMR Program reviews inform priorities and efforts to improve maternal and infant health. I wish to thank all the members of FIMR over the years for their dedication to improving our health system and the health of the youngest members of our community.

Sincerely,

Constance J Caldwell MD
Health Officer
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We would like to thank all current and past Yolo County FIMR Team members for their commitment to the health of mothers and infants. We would also like to recognize the current and past FIMR PHNs & Coordinators:

Anna Sutton, PHN	2012-present
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Melissa Racy, PHN	2008
Donna Nevraumont, PHN	2006-2008
Carla Hutchison, PHN	2005-2006
Lynne Foster, PHN	2004-2005
Dana Bennett, PHN	2002-2004
Kay Lehr, PHN	2001-2002
Susan Sprinkle, PHN	2000-2001
Jean Treaster, PHN	1999
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CONTENTS

INTRODUCTION

The mission of the Yolo County Department of Health Services is to promote health and wellness, to prevent disease and injury, and to protect people and the environment 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. 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 adverse 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 that help us to identify where we should focus our intervention efforts. This report summarizes the activities of the Yolo County FIMR Team. During the period of 2007-2011, the team met nine times per year. Meetings involved review of select individual fetal and infant death cases and development of actions on identified issues. And the purpose of a 5 year report is to bring awareness of this information to members of the community who may have a role to play in promoting healthy birth outcomes and reducing fetal and infant deaths in Yolo County.

The current 5 year FIMR report is divided in two sections: **Section 1** of this report presents a summary of the FIMR Team Community Action Items carried out from 2007-2011. A summary of the FIMR Team activities for previous years is included in the 2008 FIMR report, available online on the Yolo County Reports & Publications website under the category of Vital Statistics at: http://www.yolocounty.org/health-human-services/health-department/health-statistics/reports-publications#Vitals . **Section 2** analyzes local FIMR data over the past five years (2007 to 2011) and compares results to the previous FIMR report period (2002-2006).

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). The Yolo County FIMR Program receives funds via an allocation from the California Department of Public Health (CDPH), Maternal Child and Adolescent Health (MCAH) 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 under the authority of the local Health Officer. In Yolo County a Senior Public Health Nurse holds the position of FIMR Coordinator. Between 2007-2011, funding provided the position 10 hours per week to collect, maintain and abstract all records pertaining to FIMR cases, conduct FIMR meetings, and follow up on FIMR community action items.

Infant and fetal mortality are indicators of a community's overall health, as well as social and economic well-being. The FIMR Program 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 action plans to address identified risk factors and problems.
- Implementation of primary, secondary and tertiary prevention interventions through system-wide change and the adoption of long-term policies.
- Evaluation and monitoring of program outcomes.

The FIMR Team is community-based, culturally diverse and interdisciplinary. It is comprised of law enforcement officers, coroner staff, medical care providers, midwives, public health professionals, social services staff, and advocacy groups. A list of current Yolo County FIMR Team members is included in APPENDIX A. The FIMR Team has both case review and community action functions. Important to note is that in Yolo County, the Sheriff/Coroner's office facilitates a Child Death Review in which FIMR cases are also sometimes reviewed. While both review teams are multidisciplinary and address system level issues, the primary purpose of the Child Death Review is to discuss possible criminal activities and necessary legal actions related to the death of a child.

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.

Yolo County has had a FIMR team continuously since 1998. A previous report of early archives and analysis of local FIMR data 1998-2006 was published in 2008.

TRANSLATING FIMR TEAM CASE REVIEW INTO COMMUNITY ACTION

In the process of examining the social, economic, cultural, safety and health system factors associated with fetal, neonatal and infant deaths from case review, the FIMR team members prioritize activities and interventions that they feel can be reasonably accomplished. Community action plans are developed from the case reviews, and are evaluated and monitored for ongoing progress. Several persistent themes have emerged over the course of FIMR's existence and are described in the following sections.

It is important to note that during this reporting period (2007-2011), a great deal of funding was lost due to the economic downturn. As a result, staffing for the Yolo County FIMR program was significantly impacted, especially between 2008 and 2011. This loss resulted in the inability to move many issues into action.

SAFE SLEEPING/SIDS EDUCATION

One of the earliest identified, consistently addressed, and most successful community action activities of the FIMR program has been in the area of safe sleep recommendations. This grew from research into risk factors associated with sudden infant death syndrome (SIDS), culminating in the "*Back to Sleep*" Campaign in 1994. From 1998 through 2000 the Yolo County Tobacco Education Program supported a T-shirt campaign, with T-shirts distributed at hospital discharge to all newborns. The message in English and Spanish on the T-shirt 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, after several infants were found dead in unsafe sleep environments, First 5 Yolo funded and developed a tri-fold Safe Sleeping Brochure (APPENDIX B) and distributed approximately 3000 in the community. They are currently included in the First 5 Yolo kit for new parents. In 2011, *4 years after* the Yolo County FIMR program launched its own Safe Sleep campaign and brochure, the National *Back to Sleep* campaign expanded its recommendations and renamed themselves the "Safe Sleep" campaign. Currently, the Yolo County FIMR and SIDS programs work closely together to provide outreach, education, awareness activities and grief & bereavement support to families who have suffered a loss. For more information, please visit the Yolo County SIDS website at http://www.yolocounty.org/health-human-services/health-department/women-children-family-services/maternal-child-adolescent-health-mcah-/sudden-infant-death-syndrome-sids-

INTERPERSONAL VIOLENCE

Concern regarding a lack of screening and referral for interpersonal violence was noted by the FIMR Team as a system issue in 2001. An important addition to the FIMR Team was Empower Yolo (formerly Sexual Assault & Domestic Violence Center, aka SADVC) which collaborated with FIMR to address this issue. Training for key agencies was sponsored by FIMR in 2002 and again in 2007 and provided by a Nurse Educator at Catholic Healthcare West and a Clinical Coordinator with the Sexual Assault & Domestic Violence Center. Training focused on referral guidelines for perinatal providers.

SUBSTANCE USE 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. The following have been implemented since 2007:

A) Managed care to include drug treatment information in provider packets (2008);

B) Providers trained on Screening, Brief Intervention, Referral & Treatment (SBIRT) and Motivational Interviewing (MI) as provided by a grant written by several FIMR CRT members. Two trainings done and 14 Participants were trained.

PERINATAL MENTAL HEALTH

Perinatal anxiety and mood disorders are increasingly recognized as impacting substance use/abuse in pregnancy, interpersonal violence, adoption of healthy behaviors in pregnancy, and the ability of a new mother to care for round-the-clock demands of a young infant as well as older siblings. A review of Yolo County hospital exit data (from the Office of Statewide Planning and Development [OSHPD]) between 2008 and 2011 showed increasing hospitalization rates for females aged 15 to 44 with the principal admitting diagnoses related to mental health or alcohol and drug abuse. Yolo County rates increased from 182 to 211 per 100,000 populations between 2008 and 2011, respectively.

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 neonatal resuscitation procedures as well as procedures related to autopsies of fetal and infant deaths. In 2010, FIMR Team members presented a brief to the Board of Supervisors on the MCAH Policy Platform and the MCAH Title V needs assessment findings were included as part of this brief.

MOVEMENT AND ACCESS TO CARE

Based on case review findings in 2005 a multiyear, multi-agency effort spearheaded by FIMR Team members was launched to develop market and educate providers and stakeholders about the community wide problem of inadequate educational support around the area of fetal kick counts. The FIMR team dedicated numerous hours in designing and developing a refrigerator magnet which could be given to the family along with instructions and the provider's phone number. This bilingual **Kicks Count** magnet and education project served as both an incentive and a reminder of important health education information in hopes that it may prevent delays in seeking care which may prevent a fetal demise. Funding was generously provided by the Kaiser Community Benefits Program for production of 4000 magnets in the first round of distribution. In 2012, Kaiser Community Benefits Program again generously funded a reprint of 2000 magnets, which are currently available from the Yolo County FIMR program.

MATERNAL OBESITY

As early as 2001, maternal obesity was noted as a factor in poor birth outcomes in the FIMR Team case review. Roughly 35% of the reviewed fetal and neonatal cases mentioned maternal obesity in the medical record from 2002 to 2011. Mothers who are obese develop gestational diabetes at higher rates than non-obese mothers based on Yolo County Live Birth Data. In a recent 2014 study published in BMC Endocrine Disorders titled "*The independent effects of obesity and gestational diabetes on the pregnancy outcomes*" Wahabi and his team found that "maternal obesity and GDM were independently associated with adverse pregnancy outcomes . The combination of both conditions further increase the risk". (*BMC Endocrine Disorders* 2014, **14**:47) In 2004, 2007 and 2008, Yolo County FIMR Team members and affiliated programs sponsored and participated in forums on childhood obesity and management of maternal weight during and between pregnancies.

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.

ANALYSIS OF YOLO COUNTY FIMR DATA, 2002 TO 2011

BACKGROUND

This section reviews the risk factors involved in fetal, neonatal and postneonatal death of Yolo County residents, regardless of the place of death. State and national data are presented for comparison where available. Fetal death is the in utero demise or stillbirth of any fetus of gestational age (GA) 20 weeks or older. Neonatal death is the death of a live-born infant in the first 27 days of life, including neonates who lived for only a few minutes. Postneonatal death is the demise of an infant aged 28 days to 12 months old.

Fetal and infant death rates are monitored as an indicator of the overall health status of a community. The federal government has established goals for reducing infant mortality under the Healthy People 2020 (HP2020) umbrella, which addresses a wide range of community health indicators. The HP2020 goal for fetal and infant mortality is to reduce the fetal death rate to 5.6 per 1,000 live births, the neonatal death rate to 4.1 per 1,000 live births, and the postneonatal death rate to 2.0 per 1,000 live births.

DATA SOURCES

This report relies on four sources of information: medical record review, family interview, birth certificate data and death certificate data. The latter two sources originate with CDPH's Center for Health Statistics as birth, fetal death or infant death "Master Statistical Files." The data in this report are presented in summary form to ensure individual anonymity and confidentiality.

DATA ABSTRACTION

Data for the 2007-2011 report was manually abstracted from medical records by a senior year nursing student intern from CSU Sacramento under the direction of the FIMR Coordinator. A data collection template from the previous report was modified to two additional emerging issues: 1) women who enter into pregnancy with diabetes or who were at high risk (aka: prediabetes/impaired glucose tolerance) and 2) maternal mental health. Data was then transferred manually to an Excel spread sheet for analysis.

DATA ANALYSIS

Due to the small numbers of fetal and infant deaths in Yolo County, analysis is based on a multi-year aggregate data. There are inherent limitations in interpreting findings in this situation. There may be significant random variability from year to year, therefore events were aggregated over several years to provide sufficient statistical power for comparison. Ninety-five percent confidence interval (CIs) were calculated according Szklo and Nieto (2001). Their methodology produces positive CIs that are wider for low numbers of events. Rates for the years 2002 to 2006 were compared to rates for the subsequent five-year time period 2007 to 2011. Nonetheless, given the relative rarity of these events, one must be cautious about over-interpreting any apparent trends.

MEDICAL RECORD REVIEW

The Yolo County FIMR staff conducted a comprehensive review of medical records since the prior FIMR reporting period that ended in 2006. In some FIMR cases only partial information was available, particularly when the fetal or infant death occurred outside Yolo County. In most of those instances, data from the CDPH Death Statistical Master File were used, and these data are not as comprehensive as the case reviews conducted by county FIMR staff. In addition, the Death Statistical Master Files for 2001 to 2006 were no longer available and we elected not to spend the time and money to re-extract the data. Existing summary tables published by CDPH were used instead. Missing or unknown data are so indicated in the tables, charts and summaries.

The total number of cases occurring, reported locally to Yolo County FIMR staff, and reviewed by the FIMR Team are shown in Table 1. In the period 2007 to 2011, FIMR reviewed almost twice as many fetal death cases as they did in 2002 to 2006, and the percentage of infant death cases reviewed also increased in the latter time period.

Table 1: Yolo County Fetal and Infant Deaths by Reporting and FIMR Team Review Status, 2002-2011

DEATH TYPE	REVIEW STATUS	2002-2006	PERCENTAGE	2007-2011	PERCENTAGE
FETAL	Reviewed	11	16.2%	22	32.8%
	Locally reported	55	80.9%	52	77.6%
	Total cases	68		67	
INFANT	Reviewed	15	28.8%	20	46.5%
	Locally reported	39	75.0%	34	79.1%
	Total cases	52		43	

FETAL AND INFANT DEATH RATES

From 2002 to 2011, **each year Yolo County residents experienced on average 14 fetal deaths, 7 neonatal deaths and 3 postneonatal deaths.** There was no significant difference in the fetal death rate in the years 2002 to 2006 compared to 2007 to 2011 (Table 2). There was also no significant difference in the neonatal, postneonatal or overall infant death rate for the two time periods (Table 3). While neonatal and postneonatal death rates were lower than California's, they did not differ significantly from the state based on the 95% CIs. However, the fetal death rate in Yolo County for 2002 to 2011 exceeded California's rate (5.4 per 1,000 in Yolo County vs. 4.3 per 1,000 statewide). Nonetheless, all Yolo County death rates (fetal, perinatal, neonatal and postneonatal) met or exceeded the HP2020 goal.

Table 2: Fetal and Perinatal death Rates, Yolo County vs. California

FETAL AND NEONATAL DEATH OUTCOMES	YOLO 2002-2006	95% CI 2002-2006	YOLO 2007-2011	95% CI 2007-2011	CA 2006-2010	HP2020 GOAL
At >=20 weeks of gestation	68		67		14153	
FETAL DEATH RATE	5.5	(4.2-9.4)	5.4	(4.1-9.1)	4.3	5.6
No. live births + fetal deaths	12389		12493		3285113	
At >=28 wks of gestation	33		36		7262	
LATE FETAL DEATH RATE	2.7	(1.8-3.8)	2.9	(2.0-4.0)	2.7	none
No. live births + fetal deaths >=28 wks	12354		12450		2724747	
At >=28 wks of gestation or <7 days old	66		59		14774	
PERINATAL DEATH RATE	5.3	(4.1-6.9)	4.7	(3.5-6.2)	5.4	5.9
Death after live birth <7 days	33		23		7512	
EARLY NEONATAL DEATH RATE	2.7	(1.8-3.8)	1.9	(1.2-2.8)	2.8	none
No. live births	12321		12391		2716614	

Table 3: Infant Death Rates, Yolo County vs. California

	YOLO 2002-2006	95% CI 2002-2006	YOLO 2007-2011	95% CI 2007-2011	CA 2006-2010	HP 2020 GOAL
Neonatal deaths	38		29		10514	
NEONATAL DEATH RATE	3.1	(2.1-4.3)	2.3	(1.6-3.4)	3.9	4.1
Postneonatal deaths	14		14		4268	
POSTNEONATAL DEATH RATE	1.1	(0.6-1.9)	1.1	(0.6-1.9)	1.6	2.0
All infant deaths	52		43		14782	
INFANT MORTALITY RATE	4.2	(3.1-5.6)	3.5	(2.0-4.7)	5.4	6.0
No. live births	12321		12391		2716614	

Table 4: Fetal-Infant Mortality Rate Indicators, Five-Year Aggregates Yolo County vs. California and HP2020

MORTALITY RATE	YOLO 2002-2006	YOLO 2007-2011	CALIFORNIA 2010	HP 2020 NATIONAL GOAL	DEFINITION
Fetal	4.8 per 1,000	5.4 per 1,000	5.0 per 1,000	5.6 per 1,000	Number of fetal deaths at 20wks+ gestation per 1,000 live births plus 20wks+ fetal deaths
Perinatal	5.3 per 1,000	4.7 per 1,000	5.3 per 1,000	5.9 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	3.1 per 1,000	2.3 per 1,000	3.5 per 1,000	4.1 per 1,000	Number of neonatal deaths per 1,000 live births
Postneonatal	1.1 per 1,000	1.1 per 1,000	1.5 per 1,000	2.0 per 1,000	Number of postneonatal deaths per 1,000 live births
Infant	4.2 per 1,000	3.5 per 1,000	5.0 per 1,000	6.0 per 1,000	Number of neonatal and postneonatal deaths per 1,000 live births

TRENDS

Trends in the fetal mortality rate and infant mortality rates in Yolo County and California are shown in Figure 1 and Figure 2 below. A three-year rolling average is shown for Yolo County in Figure 1 to smooth out natural variation that occurs from year to year. There was an unexplained spike in the fetal mortality rate in 2007 when about twice the usual number of fetal deaths occurred. Except for the fetal mortality rate, which was largely impacted by the high number of fetal deaths in 2007 (Figure 1), HP2020 goals were met for all other measures of infant mortality and generally are lower than California's rates. Yolo County's infant mortality rate is trending downwards (Figure 2).

Figure 1: Fetal Morality Rates, Yolo County vs. California, 2001-2011

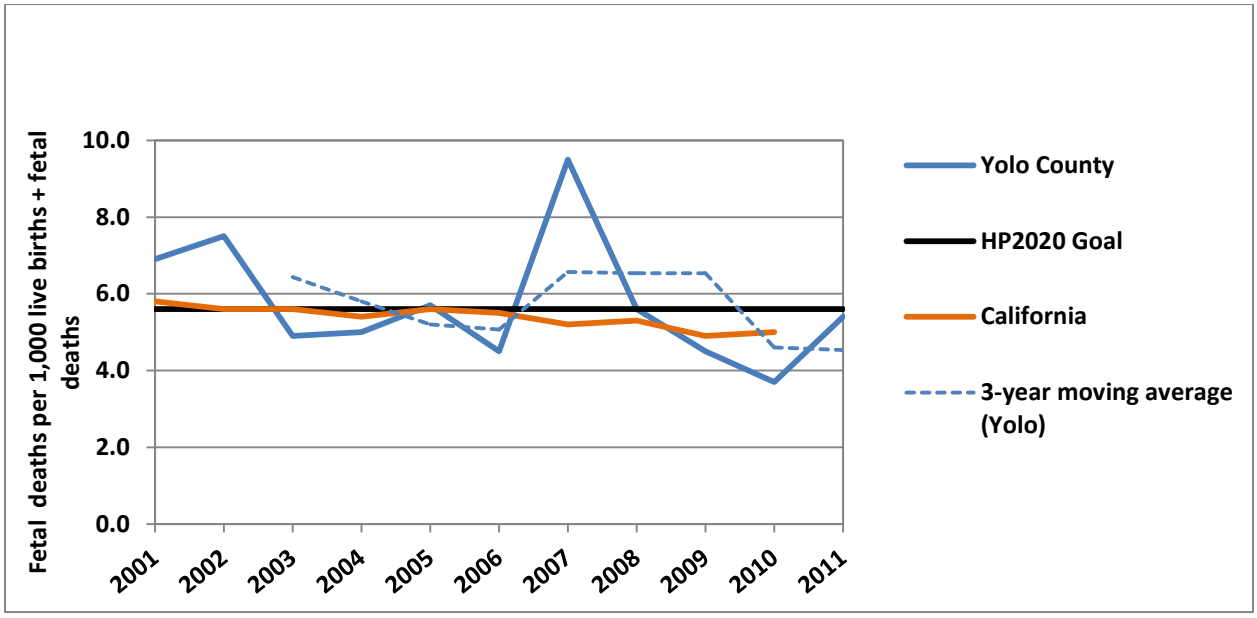
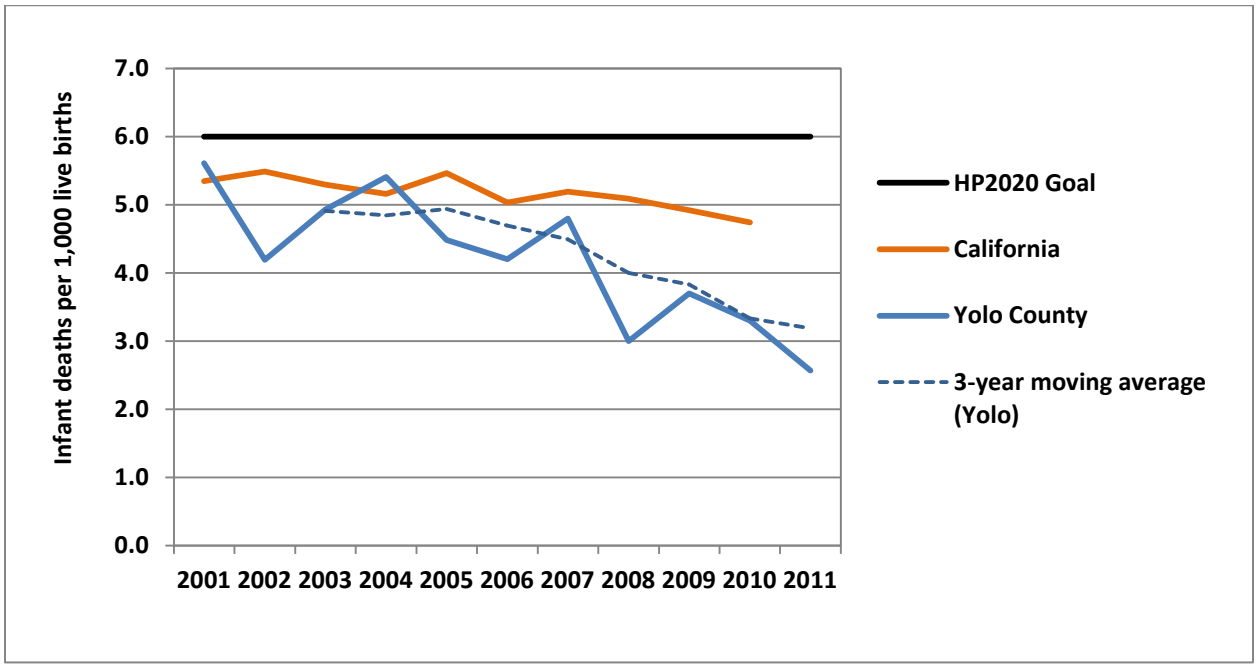


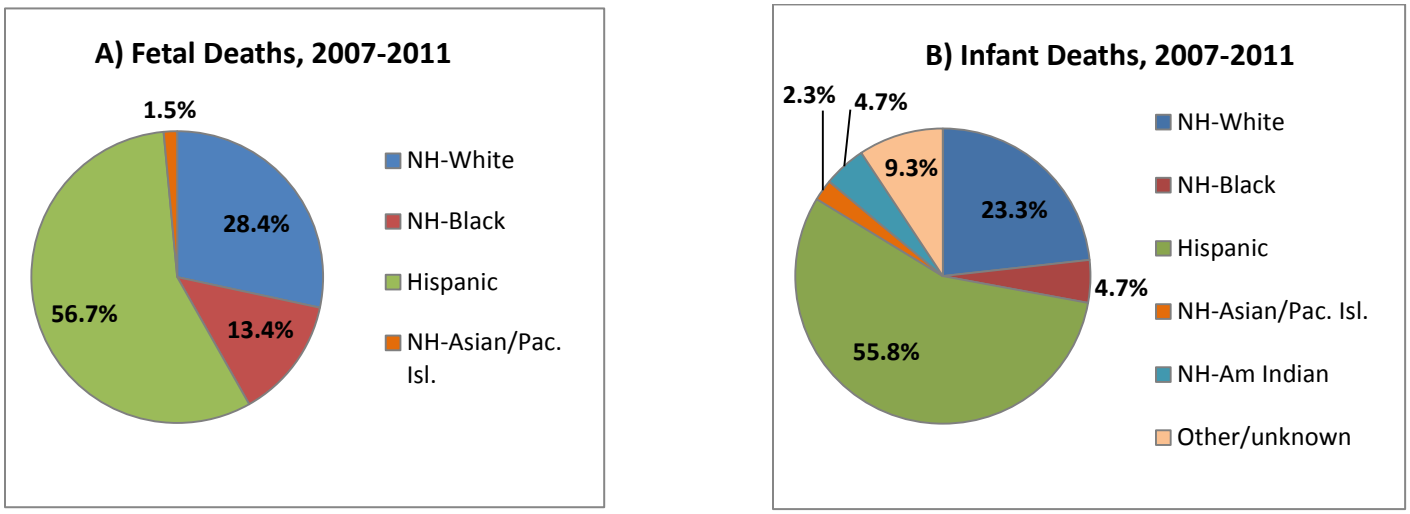
Figure 2: Infant Mortality Rates, Yolo County vs. California, 2001-2011



MATERNAL RACE/ETHNICITY

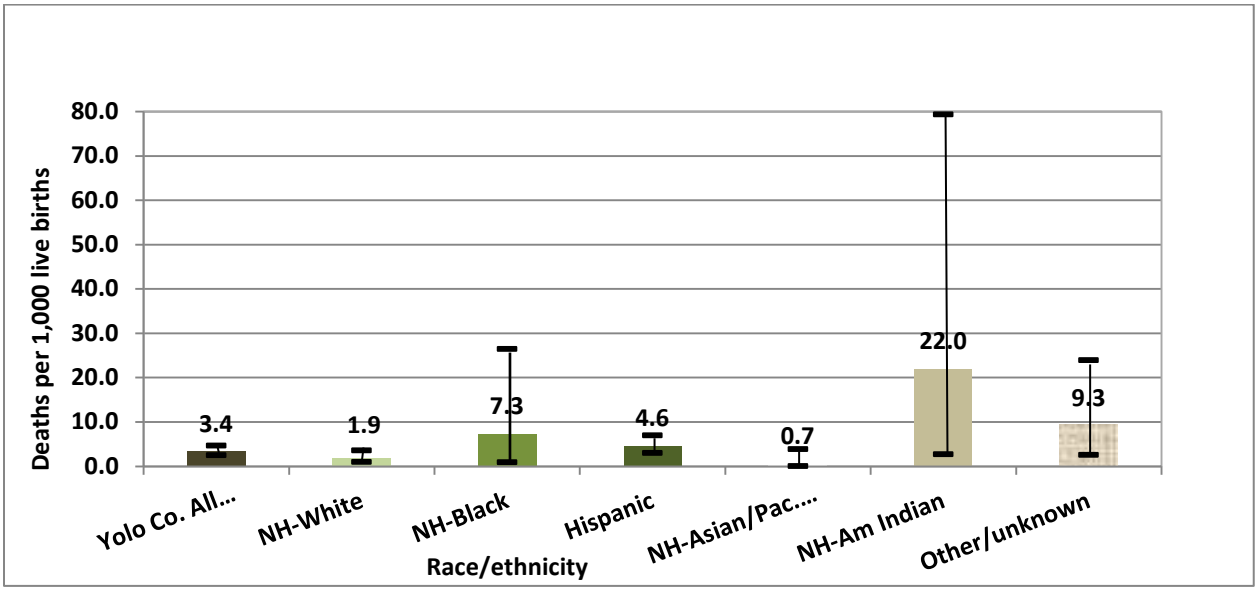
Among Yolo County fetal deaths from 2007 to 2011, 57% occurred among Hispanic mothers, 28% among NH-White mothers and 13% among NH-Black mothers (Figure 3). A low percentage of deaths occurred among NH-Asians, who represented about 11% of 2007 to 2011 live births.

Figure 3: Percentage of Fetal and Infant Deaths by Race/Ethnicity, 2007-2011



Infant mortality rates by racial/ethnic group are shown in Figure 4. While the rates were higher for some populations such as NH-American Natives, they were not statistically significant due to the low number of events. Note the wide confidence intervals depicted in Figure 4.

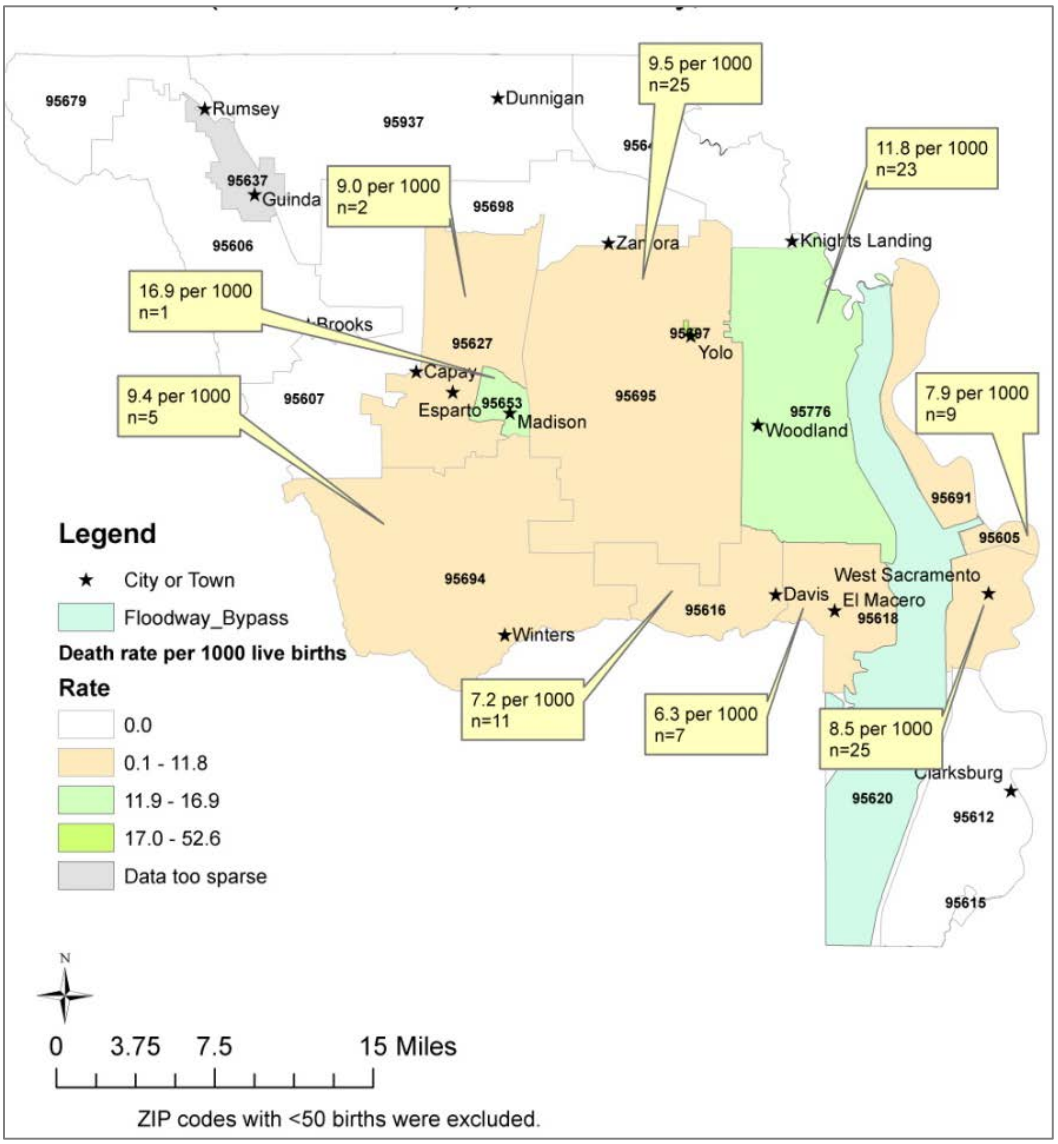
Figure 4: Infant Mortality Rates in Yolo County by Race/Ethnicity, 2007-2011



MATERNAL PLACE OF RESIDENCE

Fetal and infant mortality rates are depicted by ZIP code in Figure 5, excluding ZIP codes with <10 deaths or <50 live births. The countywide rate for 2007 to 2011 was 8.8 cases per 1,000 live birth plus fetal deaths. The eastern side of Woodland (ZIP 95776) had a rate of 11.8 fetal and infant deaths per 1,000, somewhat higher than the rest of the county, due to having the largest number (n=17) of fetal deaths. The higher rate in ZIP 95776 was also noted in the previous 2008 FIMR Report spanning the years 2001 to 2005.

Figure 5: Fetal Infant Mortality Rates by Zip Code, Yolo County, 2007-2011



CAUSES OF DEATH

Figure 6 shows the primary causes of neonatal death from the death certificate. Conditions arising in the perinatal period accounted for 72% and congenital anomalies (birth defects) for 21% of neonatal deaths. Figure 7 shows the primary causes of postneonatal infant death, with congenital anomalies and SIDS or sudden unexpected death of an infant (SUID) both representing 29% of deaths, followed by infectious or parasitic diseases (21% of deaths). In contrast to neonatal death, conditions arising in the perinatal period accounted for only 7% of postneonatal deaths. The proportion of deaths due to "other" causes was low, in contrast to the previous 2008 FIMR Report.

Figure 6: Causes of Death in Neonatal infants (n=29), 2007-2011

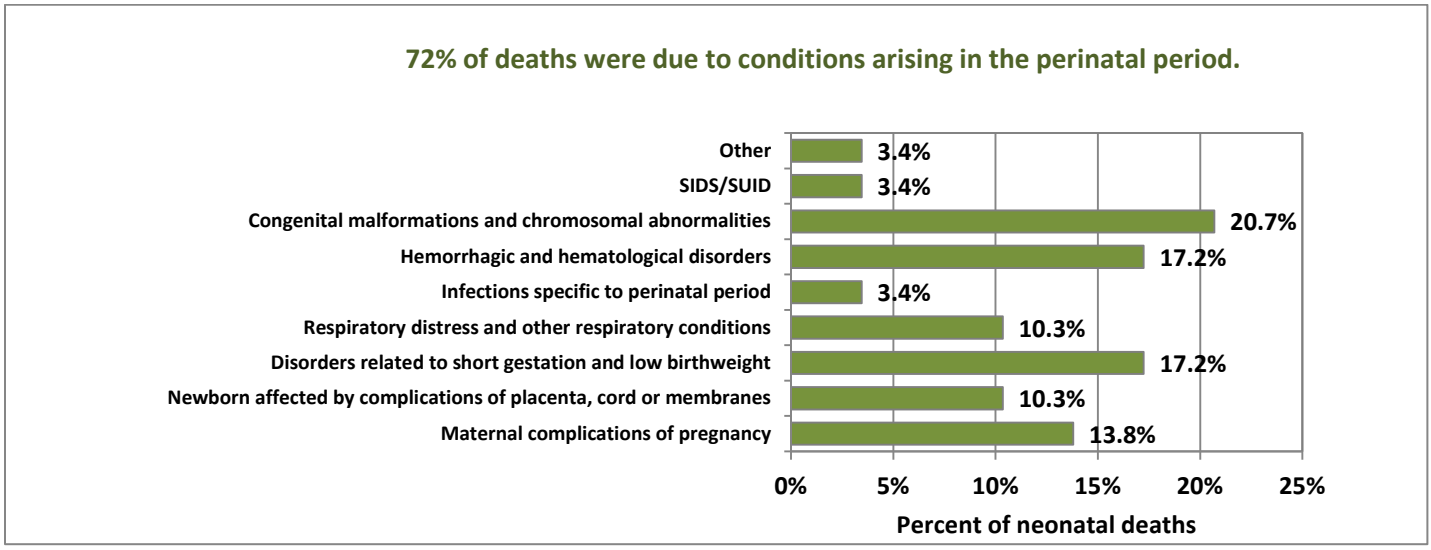
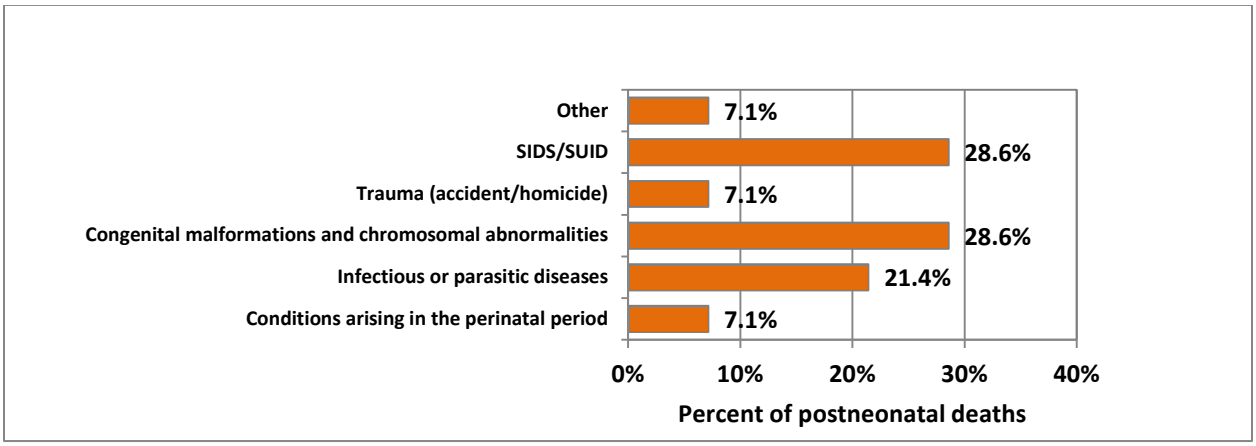


Figure 7: Causes of Death in Postneonatal Infants (N=14), 2007-2011



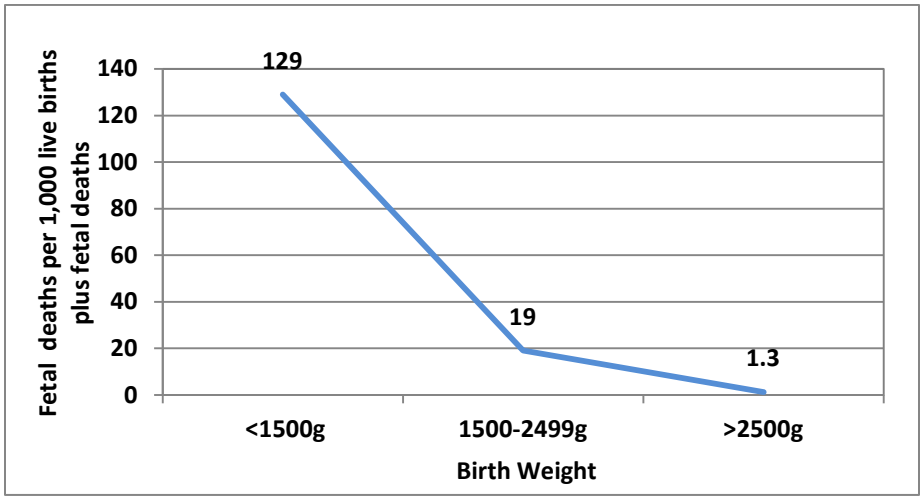
HEALTH RISK FACTORS IN FETAL AND NEONATAL DEATH

Contributing health risk factors for fetal and neonatal death include characteristics of the fetus, maternal health, newborn care and social risk factors. Prematurity, extremely low or high birth weight, congenital anomalies, multiple pregnancy, respiratory disease, neonatal infection and brain hemorrhage are well-known risk factors for fetal and neonatal death. Maternal risk factors include tobacco, alcohol and drug use/abuse during pregnancy, GDM, advanced or very young (early teen) age, lack of prenatal care and complications of pregnancy. Maternal obesity, other maternal chronic conditions, maternal medication use, domestic violence and injury during pregnancy may contribute to fetal or neonatal death.

BIRTH WEIGHT

Seventy-six percent (about three out of four) Yolo County fetal deaths in the 2007 to 2011 time period were of birth weight <2500g (low birth weight), 60% had a birth weight <1500g (very low birth weight) and 28% weighed <500g. Fetal death rates were much higher for all birth weights <2500g, especially those <1500g (Figure 8).

Figure 8: Fetal Death Rates by Birth Weight, Yolo County 2007-2011



PREMATURITY

Compared to California's published Gestation Age (GA) groups, Yolo County fetal deaths occurred at similar GAs (Figure 9). However, stratification into smaller GAs showed that almost half (46%) of fetal deaths occurred at <28 weeks GA, 18% were at 28 to 33 weeks GA, **34% at 34 to 40 weeks GA,** and less than 2% at >40 weeks GA (Figure 10). Of concern is the relatively high proportion (~24%) of fetal deaths occurring at late preterm (34—36 weeks) or early term (37-78 weeks) in the pregnancy.

Figure 9: Yolo County (2007-2011) vs. California (2010) by Major Gestational Age group

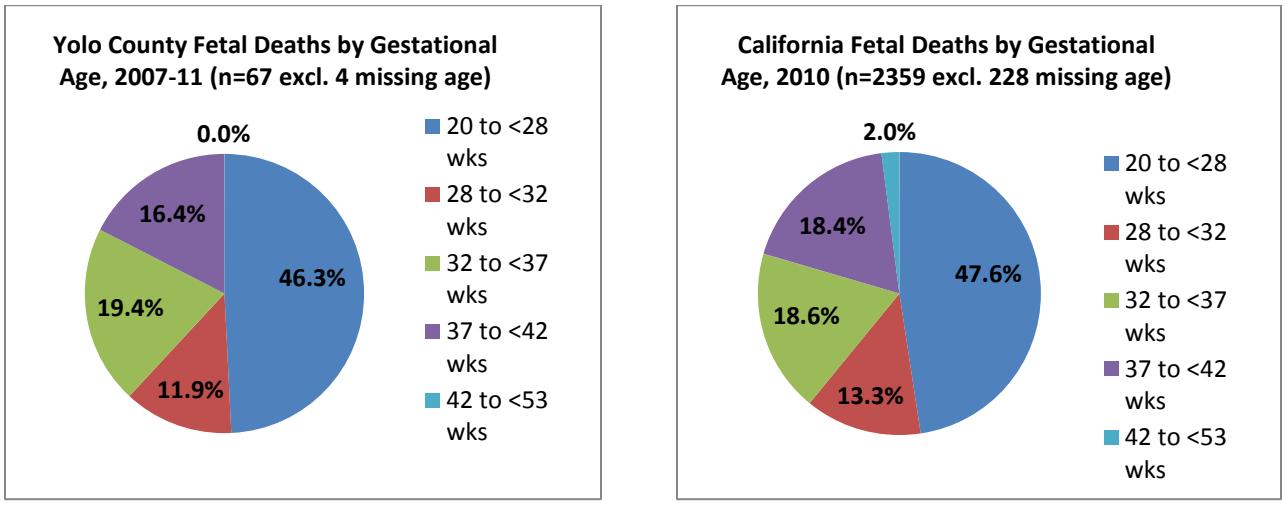
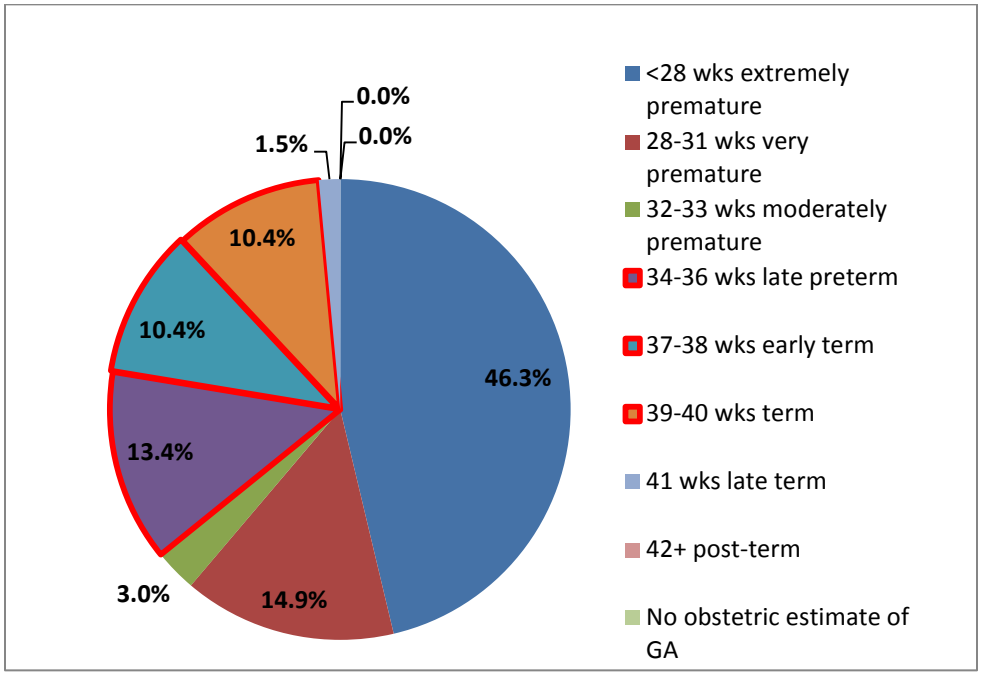


Figure 10: Yolo County Fetal Deaths Stratified by Smaller Gestational age Groups, 2007-2011



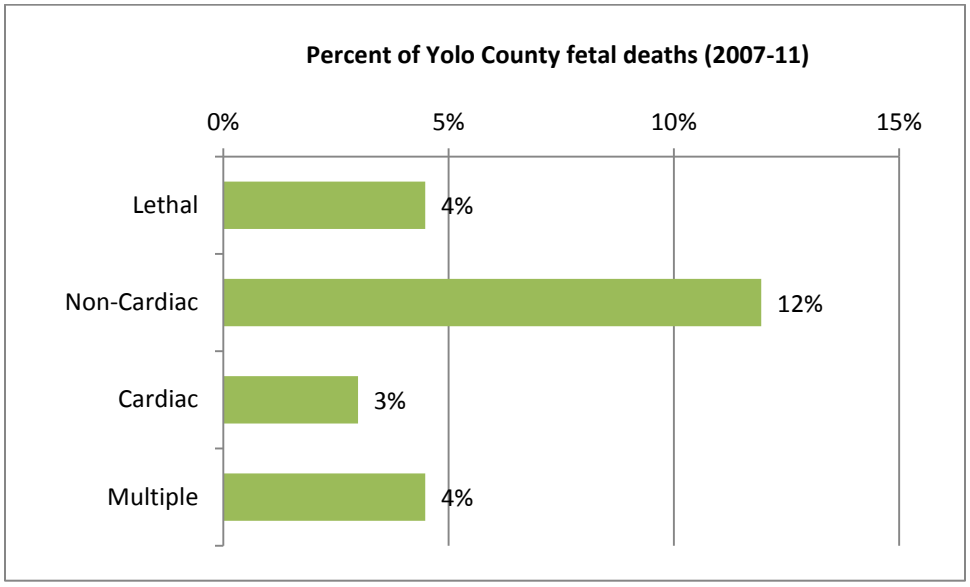
CONGENITAL ANOMALIES

Comparing the years 2002 to 2006 with 2007 to 2011, fewer Yolo County fetal deaths in the latter period had anomalies (Table 5). The type of anomaly present is depicted in Figure 11.

Table 5: Fetal Deaths by Presence of Congenital Anomalies, 2002-2006 vs. 2007-2011

PREMATURITY/ANOMALY	NUMBER IN 2002-2006	PERCENT 2002-2006	NUMBER IN 2007-2011	PERCENT 2007-2011
Premature (<37 wks) without anomaly	30	44%	42	63%
Term/premature with anomaly	11	16%	9	13%
Term (37+ wks) without anomaly	13	19%	9	13%
Unknown GA or anomaly	14	21%	7	10%
Total Fetal Deaths	68		67	

Figure 11: Fetal Deaths by Type of Anomaly, Yolo County 2007-2011



MULTIPLE GESTATION

Nine percent of fetal deaths from 2007 to 2011 involved multiple gestation (twins, triplets or more). This is similar to the findings of the previous 2008 FIMR Report (10%).

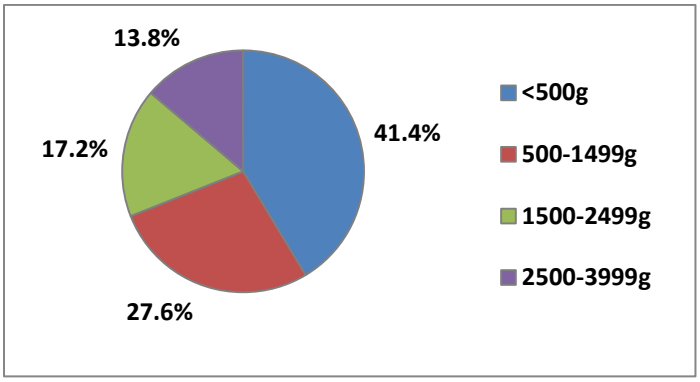
NEONATAL RISK FACTORS

Both neonatal and maternal risk factors can contribute to neonatal deaths and 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, infections and brain hemorrhage emerge as important factors in neonatal demise. The latter three factors are usually complications of prematurity, though they can also be seen in term and post-term infants.

BIRTH WEIGHT

Among the 29 neonatal demises from 2007 to 2011, 86% weighed <2500g at birth, with 69% weighing <1500g and 41% weighing <500g (Figure 12). Fourteen percent were of average birth weight (2500 to 3999g) and none weighed >4000g.

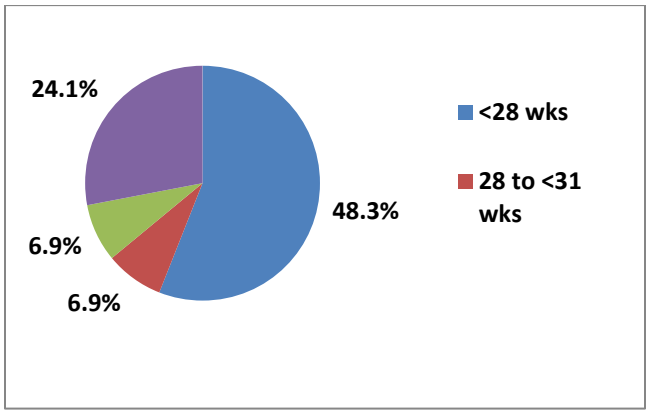
Figure 12: Neonatal Deaths (n=29) by Birth Weight, Yolo County 2007-2011



PREMATURITY

Of the 29 neonatal demises (n=4 missing GA) between 2007 and 2011, 62% were premature (<37 weeks GA), 55% were <32 weeks GA, and about half (48%) were <28 weeks GA (Figure 13).

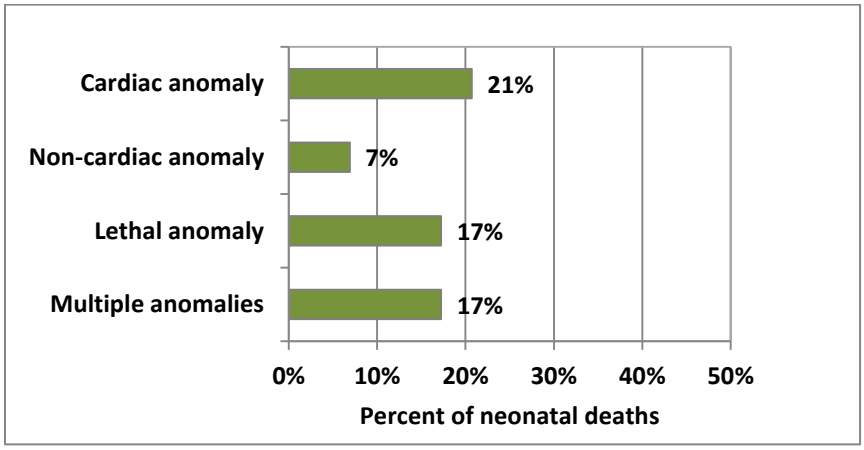
Figure 13: Neonatal Deaths by Gestational Age, Yolo County, 2007-2011



CONGENITAL ANOMALIES

Based on abstracted medical records, at least one congenital anomaly was noted in 21% of Yolo County neonatal deaths from 2007 to 2011, which was similar to the percentage from 2002 to 2006 (26%). There were fewer neonatal deaths with lethal anomalies (17%) than the 26% reported in the 2008 FIMR Report, but this was not statistically significant. All neonatal deaths for which medical records were abstracted (21%) had a cardiac anomaly and 17% had multiple anomalies. Most neonatal deaths (79%) had no anomalies, and some (17%) occurred at term gestation, despite the absence of congenital anomalies (Figure 14).

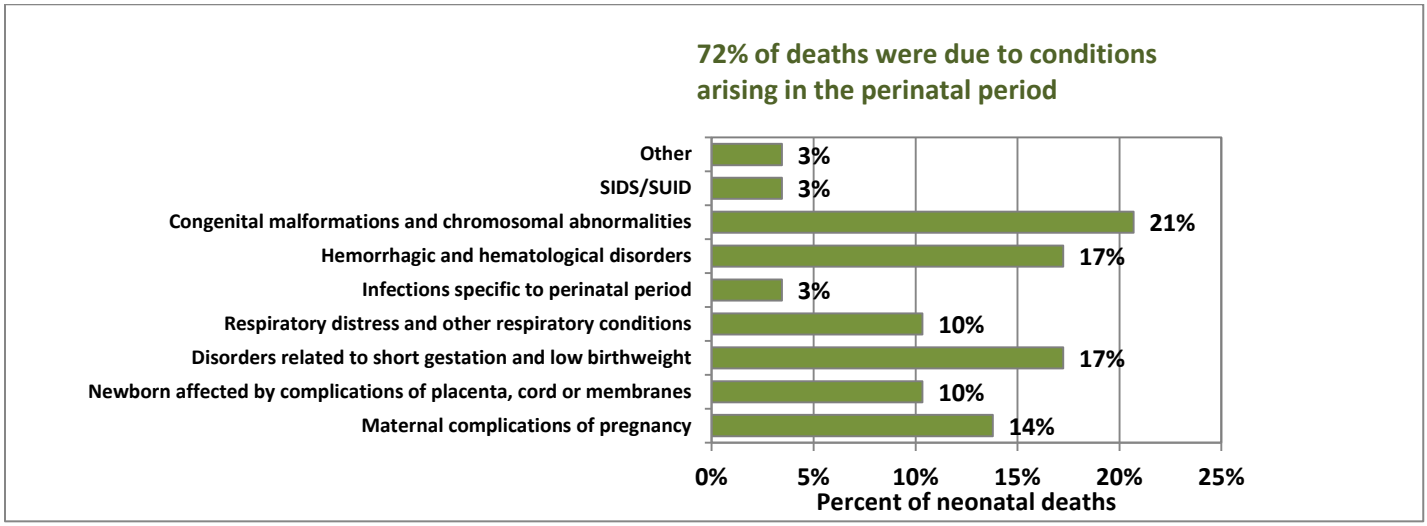
Figure 14: Neonatal Deaths (n=22 of 29 abstracted from medical records) by Type of Anomaly, Yolo County, 2007-2011



OTHER FACTORS ASSOCIATED WITH NEONATAL DEATH

A high proportion of neonatal deaths from 2007 to 2011 involved multiple gestation (25%), compared to only 3.2% of pregnancies in Yolo County during the same time period. The majority of deaths occurred due to conditions arising in the perinatal period (Figure 15).

Figure 15: Primary Causes of Neonatal Death based on the Death Certificate, Yolo County, 2007-2011



SUMMARY OF PRIMARY CAUSES OF POSTNEONATAL DEATH FROM THE DEATH CERTIFICATE

Compared with 2002 to 2006, higher percentages of deaths in the years 2007 to 2011 were represented by congenital anomalies, SIDS or SUID, maternal complications of pregnancy, complications of the cord or placenta, and necrotizing enterocolitis. A lower percentage of deaths due to short gestation and low birth weight occurred in the latter period, suggesting critical care of low birth weight infants in the healthcare system has improved. In the earlier time period, a greater percentage of deaths were listed due to "other causes" that fall outside the major causes of death tracked statewide, shown in Table 6.

Table 6: Primary Causes of Yolo County Infant Death, 2002-2011

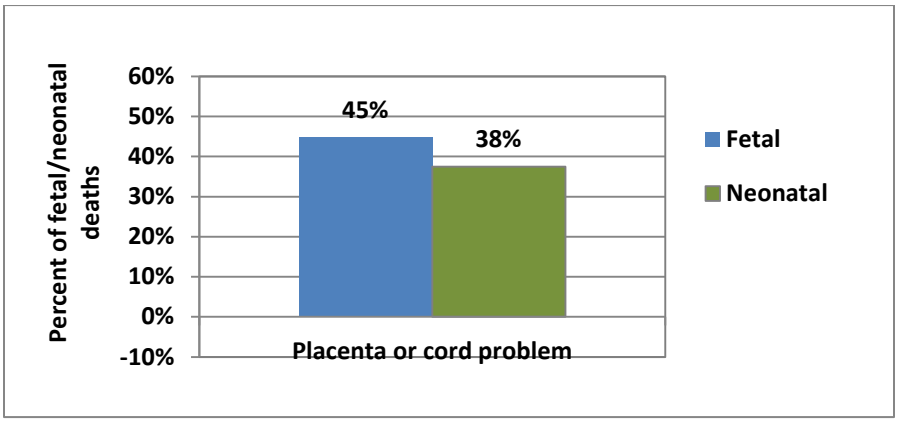
ICD-9 CODE	CAUSE OF DEATH GROUP	2002-2006	2007-2011	PERCENT OF 2002-2006 DEATHS	PERCENT OF 2007-2011 DEATHS
Q00-Q99	Congenital malformations, deformations and chromosomal abnormalities	10	10	19%	23%
P07	Disorders of short gestation and low birth weight	8	5	15%	12%
R95	Sudden infant death syndrome (SIDS)/SUID	0	5	0.0%	12%
P01	Effect of maternal complications of pregnancy	3	4	6%	9%
P02	Complications of placenta, cord and membranes	0	3	0%	7&
P77	Necrotizing enterocolitis	0	3	0%	7%
P22	Respiratory distress of the newborn	2	1	4%	2%
P50-52, P54	Neonatal hemorrhage	3	1	6%	2%
I00-I99	Diseases of the circulatory system	2	1	4%	2%
K29,K50-55	Gastritis, duodenitis and noninfective enteritis	1	0	2%	0%
A00-B99	Zoonotic/infectious diseases excl. pneumonia	0	3	0%	7%
U01,X85-Y09	Assault (homicide)	0	0	0%	0%
P36	Bacterial sepsis of newborn	2	0	4%	0%
P28	Atelectasis (lung collapse)	1	0	2%	0%
E00-E88	Endocrine, nutritional or metabolic disease	0	1	0%	2%
V01-X59	Accidents	2	0	4%	0%
	All other causes	18	6	35%	14%
	Total	**52**	**43**		

COMPLICATIONS OF PREGNANCY

Maternal complications of pregnancy include hypertension (high blood pressure), chronic underlying maternal health conditions, incompetent cervix, placenta and cord problems and complications occurring during labor and delivery. Problems with the **placenta** can include a poorly formed and/or functioning placenta (insufficiency), inadequate insertion of the cord to the placenta or tearing away of the placenta from the uterine wall (abruptia). **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. Statewide in 2010, the primary cause of fetal death was listed as placenta or cord complications in 27% of fetal deaths and as other maternal complications of pregnancy in 13%. A similar percentage of fetal deaths (29%) in Yolo County from 2007 to 2011 indicated placenta or cord problems as the primary cause of death and they were a contributing factor in 45% of fetal deaths.

Placenta or cord problems were less commonly the primary cause of neonatal death (10%) from 2007 to 2011 but were a contributing factor in 38% of neonatal deaths (Figure 16). Other maternal complications of pregnancy were the primary cause in 14% of neonatal deaths.

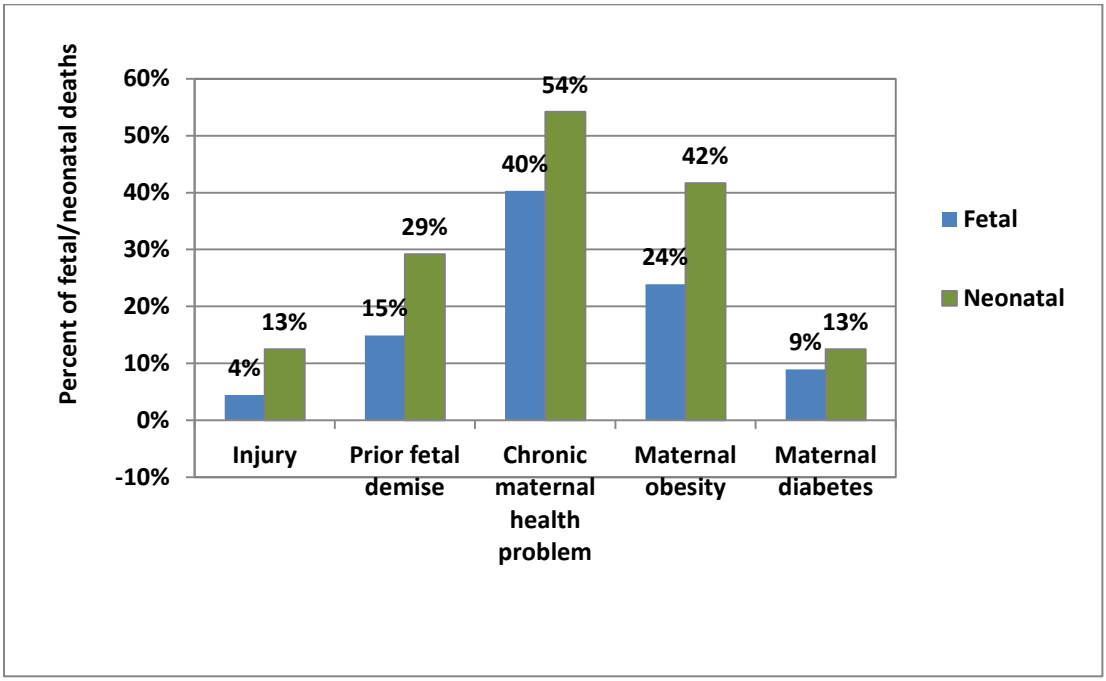
Figure 16: Placenta or Cord Problems as a Contributing Factor in Fetal or Neonatal Death, Yolo County 2007-2011



ACCIDENTAL INJURY

Accidental injury to the mother during pregnancy was a relatively infrequent contributing factor in fetal or neonatal death cases, occurring in only 4% of fetal and 13% of neonatal death cases (Figure 17).

Figure 17: Other maternal risk factors associated with fetal or neonatal deaths in Yolo County, 2007-2011



PRIOR FETAL DEMISE

Prior fetal demise is important because it may indicate either a recurring genetic abnormality or maternal problem affecting the 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. A maternal history of one or more prior fetal demises was noted in 15% of fetal and 29% of neonatal death cases from 2007 to 2011 (Figure 17).

OTHER CHRONIC MATERNAL HEALTH PROBLEMS IN FETAL DEATHS

These health problems (not related to the pregnancy) are not necessarily the primary cause of death but are likely contributing factors. They include a range of maternal conditions such as maternal infection, dental disease, uncontrolled hypertension, thyroid disease, perinatal mood and anxiety disorders, fertility problems, and uterine anomalies. Chronic maternal health problems in this reporting period 2007-2011 (Figure 17) were noted in approximately the same number of fetal deaths as the prior reporting period 2002-2006.

OBESITY AND DIABETES

Obesity and maternal diabetes, particularly if poorly controlled before and during pregnancy, are associated with increased risks for a number of pregnancy complications and adverse outcomes. These risks include maternal hypertension, pre-eclampsia, cord or placental abnormalities, congenital anomalies, small or large size for GA, preterm delivery, and increased mortality. Obesity was noted in 24% of fetal and 42% of neonatal death cases between 2007 and 2011. These percentages are the opposite of what was reported in the 2008 FIMR Report, where 39% of fetal and 22% of neonatal death cases had obese mothers. It is concerning that almost double the percentage of mothers who experienced a neonatal death were obese in the latest time period. Maternal diabetes, of which 89% was GDM, was noted in 9% of fetal and 13% of neonatal death cases between 2007 and 2011, approximately the same percentage as the 2008 FIMR Report (15% and 16%, respectively).

The most current live birth data from 2013 show that a higher proportion of obese mothers develop GDM during pregnancy than non-obese mothers (Table 7). Furthermore, mothers with GDM are at increased risk for preterm deliveries at 36 weeks or earlier and have higher C-section rates (Table 7 and Table 8). In addition, "other complications" (not elsewhere classified) as a proportion of live births during labor and delivery are increasing for obese mothers (ρ^2=0.79), whereas they are decreasing countywide (ρ^2=0.63). The overall and continuous trending up of obesity and diabetes in mothers is concerning and worthy of great consideration as the health of both baby and mother is at risk.

Table 7: Maternal Body Mass Index (BMI) by Presence of GDM, Yolo County, 2013

BMI	BIRTHS WITH GDM	PERCENT OF BIRTHS WITH GDM
18.5 to 24.9 – Normal	50	22.4%
25 to 29.9 – Overweight	63	28.3%
30+ - Obese	***92***	***41.3%***
Missing/masked	18	8.1%
Total	**223**	**100%**

Table 8: Births with GDM by Infant Gestational Age, Yolo County 2013

GESTATIONAL AGE	BIRTHS WITH GDM	NUMBER OF BIRTHS	% WITH GDM
<28 weeks	2	8	25.0%
28-31 weeks	4	22	18.2%
32-33 weeks	6	30	20.0%
34-36 weeks	22	141	15.6%
37-39 weeks	133	1363	9.8%
40 weeks	42	643	6.5%
41 weeks	11	269	4.1%
42+ weeks	3	37	8.1%
Total	223	2513	8.9%

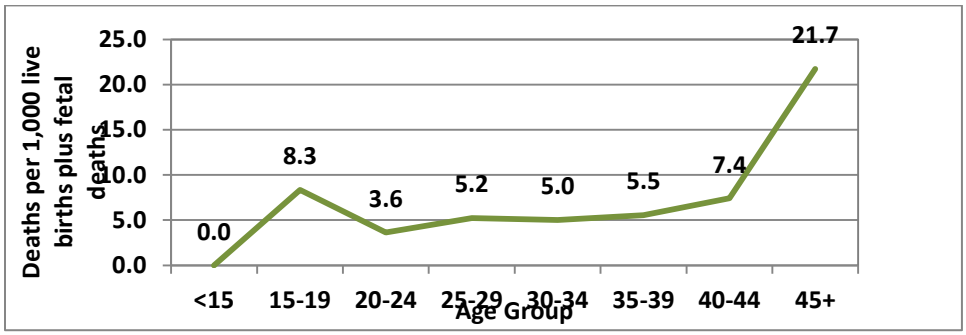
Table 9: Births with GDM by Delivery Method, Yolo County 2013

DELIVERY TYPE	BIRTHS WITH GDM	NUMBER OF BIRTHS	PERCENT WITH GDM	95% LCI	95% UCI
C-Section	83	646	12.8%	10.5%	15.7%
Vaginal	140	1867	7.5%	6.4%	8.8%
Total	223	2513	8.9%		

MATERNAL AGE

Statewide in 2010, fetal mortality rates were highest for maternal ages of under 15 or over 39 years (14.1 and 8.0 per 1,000, respectively). In Yolo County (Figure 18), the fetal mortality rate varied between 3.6 and 8.3 per 1,000 for all mothers aged under 45 but was substantially higher at 21.7 per 1,000 for mothers aged 45 and up. Slightly higher but not significantly different fetal mortality rates were observed for 15- to 19-year-olds and 40- to 44-year-olds in Yolo County.

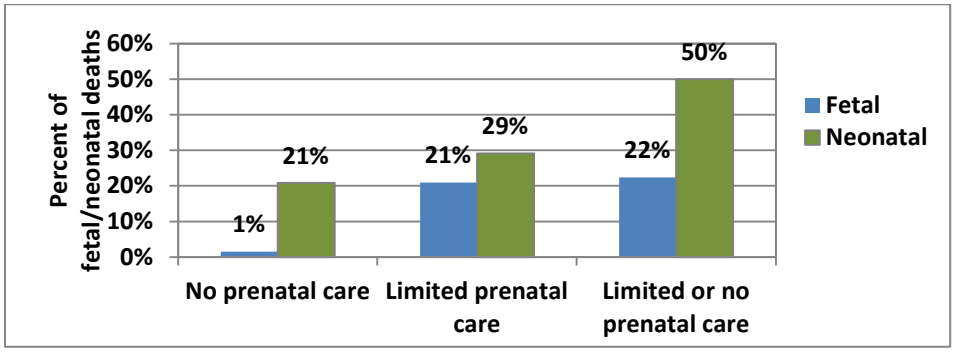
Figure 18: Fetal Death Rates by Maternal Age Group, Yolo County, 2007-2011



PRENATAL CARE

"Limited prenatal care" in Yolo County FIMR reports was determined by medical record review, since a large number of deaths were premature infants and the mother could not possibly have had the recommended number of prenatal visits for a term pregnancy. Thus limited prenatal care included late entry into prenatal care, multiple missed appointments or a large gap between visits. The percent of mothers with no prenatal care was much higher for neonatal death cases than fetal death cases (21% vs. 1.4%, respectively), which is the opposite of what was noted in the 2008 FIMR Report (Figure 19). Limited or no prenatal care for fetal death cases occurred less frequently in 2007 to 2011 (22%) than the 39% observed in the prior 2008 FIMR Report. In contrast, a much higher percentage (50%) of neonatal death cases in the current period had limited or no prenatal care compared to the 29% in the prior 2008 FIMR Report.

Figure 19: Prenatal Care for Fetal and Neonatal Death Cases, Yolo County, 2007-2011



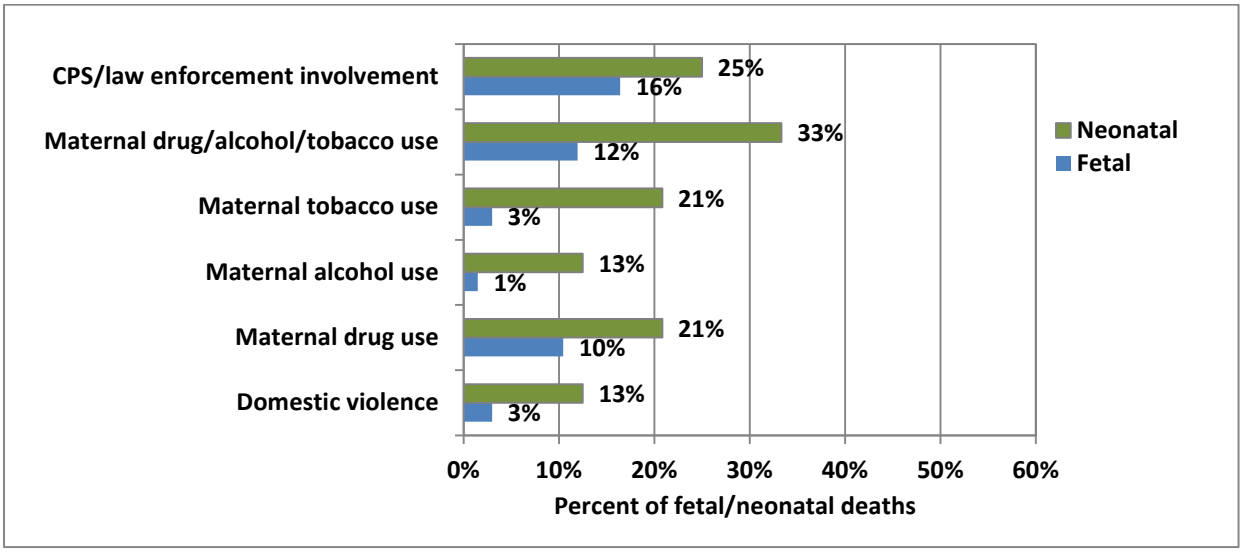
PSYCHOSOCIAL FACTORS

Maternal alcohol use during pregnancy is well known to be associated with a number of birth defects as well as learning and behavioral problems in childhood. Maternal alcohol use in pregnancy is a leading cause of mental retardation in children. Maternal smoking during pregnancy is associated with smaller infant size, prematurity, increased respiratory problems in infancy and SIDS. 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 behavioral difficulties.

Maternal drug, alcohol or tobacco use during pregnancy was reported in 12% of fetal and 33% of neonatal deaths in Yolo County from 2007 to 2011 (Figure 20). Specifically, maternal use of illegal drugs, alcohol and tobacco was noted in 10%, 1% and 3% of fetal deaths, respectively. The prevalence was higher for mothers who experienced a neonatal demise, with 21%, 13% and 21% of mothers reporting illegal drug, alcohol or tobacco use, respectively. This finding suggests that drug, alcohol and tobacco use has effects late into pregnancy and OB/GYNs should screen for use throughout pregnancy. It is quite possible that these figures underestimate the scope of the problem because

(a) Drug screens are not routinely obtained on all mothers and infants at prenatal visits or delivery.
(b) Multiple studies have shown that self-reported maternal tobacco, alcohol and drug use is often under-reported.
(c) Referral to and treatment options as a result of screening are often inaccessible or unavailable.

Figure 20: Domestic Violence and Substance Use for Fetal and Neonatal death Cases, Yolo County, 2007-2011

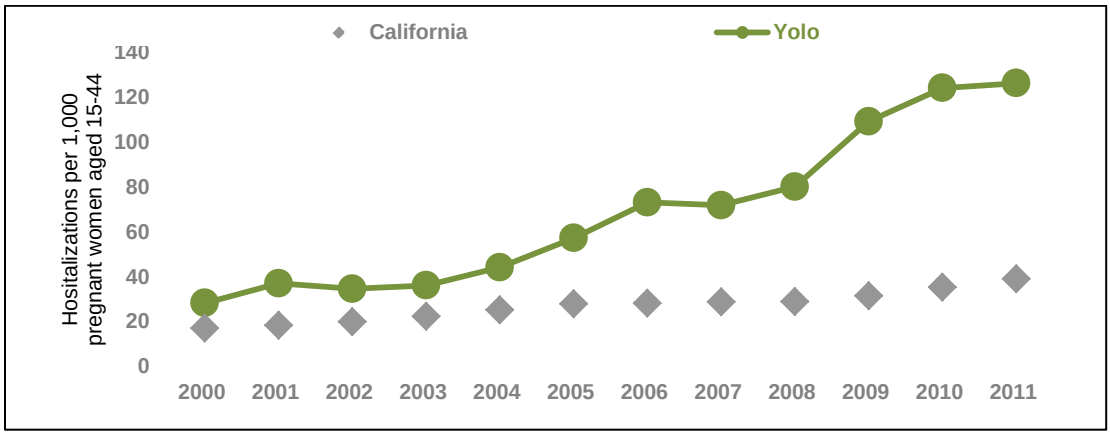


Prior law enforcement or CPS involvement was noted in 16% of fetal and 25% of neonatal death cases from 2007 to 2011. Domestic violence (current or past) was noted in the history of only 3% of fetal death cases but was noted in 13% of neonatal death cases (Figure 20). However, a history of domestic violence may also be under-reported.

MATERNAL MENTAL HEALTH ISSUES AND/OR MULTIPLE STRESSORS

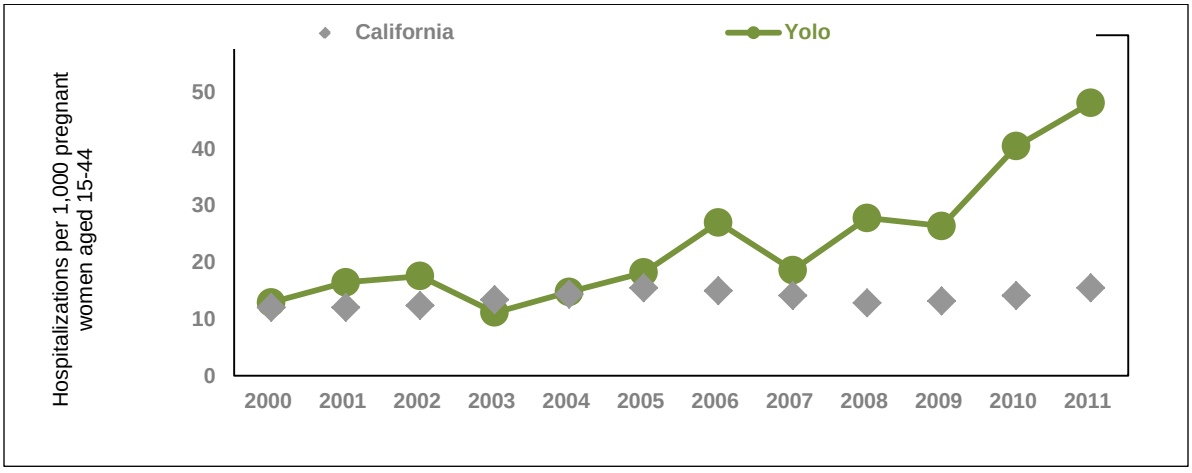
The rate of hospitalizations for pregnant women aged 15 to 44 residing in Yolo County with a concurrent mental health diagnosis more than quadrupled from 28 admits per 1,000 in the year 2000 to 126 per 1,000 in 2011, an increase of 344%. In the same time period, the state rate increased from 17 admits per 1,000 in 2000 to 39 per 1,000 in 2011. Yolo County's rate is significantly higher than the state in 2009-11 (P<0.001) and increased at a much faster rate (Figure 21). The data sources for Figures 21 and 22 are the Family Health Outcomes Project (FHOP) hospital exit data extracted from the Office of Statewide Health Planning and Development (OSHPD).

Figure 21: Hospitalizations per 1,000 Pregnant Women Aged 15 to 44 with a Concurrent Mental Health Diagnosis, Yolo County vs. California



Furthermore, hospitalizations for pregnant women aged 15 to 44 residing in Yolo County with any substance use diagnosis also increased exponentially by 272%, from 13 admits per 1,000 in the year 2000 to 48 per 1,000 in 2011 (Figure 22). Again, the state rate was significantly lower than the Yolo County rate for 2009-2011 (P<0.001).

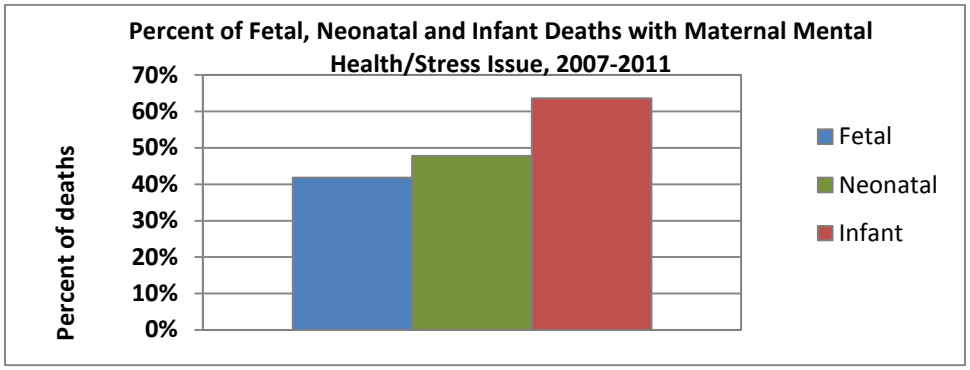
Figure 22: Hospitalizations per 1,000 Pregnant Women Aged 15 to 44 with a Concurrent Substance Use Diagnosis, Yolo County vs. California



In Yolo County, across all fetal, neonatal and infant deaths between 2007 and 2011, **over 40%** of all mothers were noted to have documented mental health conditions and/or multiple stressors during pregnancy (Figure 23). It is of great concern that **nearly half (48%) of all neonatal deaths and 64% of all infant deaths** involved notable maternal mental conditions documented by the prenatal care provider. The percentage of mothers in Yolo County with mental illness or who are at high risk for developing a perinatal anxiety & mood disorder is likely to be under reported at this time for several reasons:

(a) Providers are not screening because of various reasons including lack of time, financial incentive, training, and referral/treatment options.
(b) Providers, insurers, hospitals and women themselves lack knowledge around maternal mental health symptoms and treatment.
(c) Lack of policies that support screening, referral and treatment of maternal mental health issues across the county.

Figure 23: Neonatal and Infant Deaths with Maternal Mental Health/Stress Issues, 2007-2011



"Maternal mental health is a public health priority due to its impact on both maternal and child health. Once considered a time of emotional wellbeing, research has well established that several psychiatric disorders are common during pregnancy, with depression being the most common.

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3267349/

The consequences of unidentified, undiagnosed and untreated mental health conditions from preconception through interconception can lead mother and baby to face a lifetime of challenges and negative, if not fatal health outcomes.

POSTNEONATAL INFANT DEATHS

Postneonatal infant deaths comprise those deaths of infants aged 1 month (28 days) to 12 months (365 days) of age. Deaths of children over one year of age are reviewed by the Yolo County Child Death Review Team and not by FIMR.

Fourteen postneonatal infant deaths occurred from 2007 to 2011 in Yolo County. Most of these infants were born at term gestation (71%) and about two-thirds were of birth weight greater than 2500g (64%). Only one infant was extremely premature and weighed less than 1500 grams at birth.

As for fetal and neonatal demise, congenital anomalies continued to be an important contributing factor in Yolo County postneonatal infant deaths, with 29% of postneonatal death cases dying from some type of congenital anomaly. In all cases, they had multiple anomalies, including cardiac anomalies. Statewide in 2009, congenital malformations were listed as the primary cause of death for 24% of postneonatal infant deaths.

In contrast to the previous five-year period 2002 to 2006 during which no deaths were attributed to SIDS/SUID, they were listed as the primary cause of death for 29% of postneonatal infant deaths between 2007 and 2011. The difference may be due to changes in the way coroners code death certificates or a true increase in postneonatal deaths due to SIDS/SUID. Previously these deaths may have been recorded as asphyxia (in cases of actual entrapment) or "undetermined."

Infectious disease, especially respiratory disease, was the primary cause in 21% of postneonatal deaths and a contributing factor in 43% of Yolo County postneonatal deaths. Between 2007 and 2011, 29% of postneonatal death cases had a chronic illness that contributed to their demise. Trauma and malignancy were rare (7% of postneonatal deaths from 2007 to 2011). Statewide in 2009, malignancy accounted for 1.5% and trauma (accidental and non-accidental) for 11% of postneonatal infant deaths.

PERINATAL PERIODS OF RISK

Perinatal Periods of Risk (PPOR) is a tool widely used by FIMR teams throughout the country to help communities *use data to reduce infant mortality* by identifying gaps in maternal, newborn and/or infant care. This tool was adapted from the "Periods of Risk" model by Dr. Brian McCarthy and 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 classified by birth weight and GA at death so that higher rates in any one category compared to state or national data can be identified. After identification of high-risk categories, targeted efforts for prevention of fetal and infant mortality can be developed and implemented.

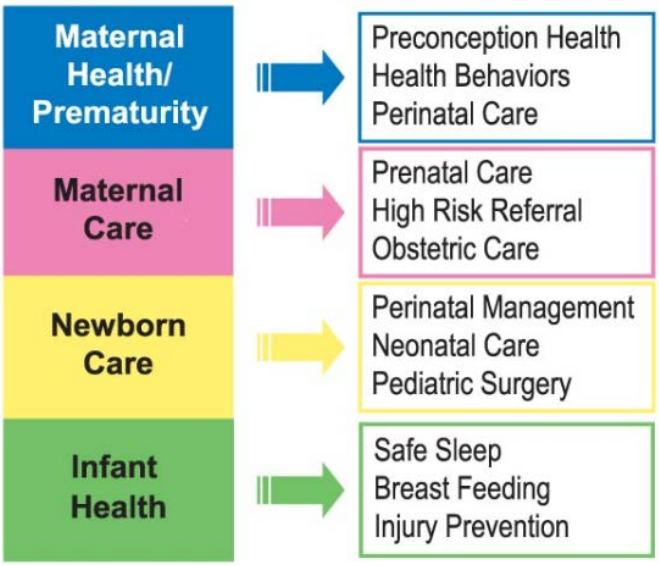
For PPOR analysis, the overall fetal and infant mortality rate is broken into four component rates:

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 24 that follows.

Figure 24: The PPOR periods of Risk Labeled by Primary Prevention Areas and Potential Prevention Strategies (Courtesy of CityMatCH)



For the greatest level of reliability, PPOR analysis requires a minimum mapping of 60 deaths overall and 10 deaths in each category. Even aggregated over the five-year period 2007 to 2011, Yolo County's numbers are small with a total of 67 fetal and 43 infant deaths for analysis, of which four were missing GA. Yolo County's rates were compared to the state in 2010 and the nation to evaluate differences. The California rates are based on 2010 data kindly provided by the CDPH's Epidemiology, Assessment and Program Development Branch, Maternal Child and Adolescent Program (n=95 fetal or infant deaths missing birth weight). The nationwide rates are based on 2006 data for rates associated with fetal mortality and 2007 to 2010 data for rates associated with infant mortality (accessed at http://wonder.cdc.gov/).

Table 10: Perinatal Periods of Risk Model of Fetal and Infant Mortality Rates, Yolo County, 2007-2011 vs. California and United States

BIRTH WEIGHT	FETAL	NEONATAL	POSTNEONATAL
500 – 1499 g	*Maternal Health/Prematurity* Yolo 4.7 (n=59) 2010 CA 5.8 (n=2,976) US 7.6		
1500+ g	*Maternal Care* **Yolo 2.1 (n=26)** **2010 CA 1.7** **US 2.1**	*Newborn Care* Yolo 0.7 (n=9) 2010 CA 1.0 US 1.0	*Infant Health* Yolo 1.0 (n=12) 2010 CA 1.0 US 2.1

Yolo County death rates for each age and weight category are less than or equal to state and national rates in all categories. **Notably, in the area of maternal care the Yolo County rate is higher than California and equal to the national rate, suggesting an area for improvement.**

SUMMARY OF LOCAL FIMR FINDINGS

Fetal and infant mortality rates have remained stable over the past 10 years.
Yolo County mortality rates are below the State mortality rates in all categories except for fetal mortality (5.4 per 1000 for 2007-11), which is slightly higher but not significantly different from the State (5.0 per 1000 in 2010). Overall, fetal and infant death rates remain *unchanged* between the two FIMR reporting periods.

Prematurity is still a factor in fetal and infant deaths, especially for fetal deaths.
The percentage of fetal and infant deaths associated with prematurity *increased* from the previous reporting period (2002-2006) compared to the current reporting report (2007-2011). In particular, fetal deaths associated with prematurity rose significantly from 54% (2002-2006) to 78% (2007-2011).

Abnormalities seen at the time of birth are still a factor in fetal and infant deaths.
Rates of fetal and infant deaths associated with abnormalities seen at the time of birth (congenital abnormalities) remained *unchanged* between the two FIMR reporting periods.

Maternal health issues associated with fetal deaths remained unchanged between the two reporting periods, but a *notable increase was seen in rates of infant deaths associated with maternal health issues*. Important to note is that the following are all preventable risk factors.

Maternal Obesity: Rates of infant deaths associated with an obese mother **tripled** between the first reporting period (2002-2006) and second reporting period (2007-2011). In the first reporting period, **11%** of mothers were reported to be obese versus **34%** in the current period.

Gestational Diabetes: Rates of infant and fetal deaths associated with gestational diabetes **remained unchanged** between the two five year reporting periods. *However*, with rising rates of maternal obesity, the risk for gestational diabetes also goes up. Women with gestational diabetes and their offspring are at increased risk for diabetes later in life.

Chronic maternal health problems: Rates of infant deaths associated with chronic maternal health problems **more than doubled** between the two reporting periods. Rates went from 21% (2002-2006) to 45% (2007-2011).

Maternal drug, alcohol or tobacco use: Rates of infant deaths associated with maternal use of drugs, alcohol or tobacco use **doubled** between the two reporting periods. Rates went from 13% (2002-2006) to 28% (2007-2011).

Interpersonal Violence, Child Welfare (CWS) and/or Law Enforcement Involvement: Despite numbers being small, the prevalence of interpersonal violence/CWS and/or Law Enforcement involvement continues to be an issue and is now at 21% or one in five, higher than the previous 5-yr period. This particular maternal health issue is worth much discussion as there is tremendous opportunity for prevention and intervention.

Access to and continuity of healthcare between pregnancies: Rates for infant deaths associated with mothers having limited or no prenatal care **more than tripled** between the first and second FIMR reporting periods. Rates went from 13% (2002-2006) to 41% (2007-2011).

Analysis using the **Perinatal Period of Risk (PPOR)** model indicates a possible shortfall in the area *of maternal health and maternal care* further supporting the trends seen in maternal health issues between the two FIMR reporting periods.

RECOMMENDATIONS

Based on the work of the FIMR Program, community and health system activities to improve birth outcomes and decrease fetal and infant deaths should focus on the following:

1) Include the **preconception & interconception** time period.

2) Efforts to reduce **barriers to early prenatal care** should continue

3) Invest in **evidence based models** of intervention and support healthcare providers to help women achieve healthy weights and lifestyles **before, during AND in-between pregnancies.**

4) Develop policies and support a **system of care** to address **maternal mental health issues, substance use/abuse, interpersonal violence and trauma.**

5) Develop policies and programs that promote comprehensive **maternal health and wellness** from a ***Life Course Prospective***. Systems of care must be multidisciplinary in their approach to serving the *mental, physical and social needs* of a woman of reproductive age. This approach takes into account the *lifespan and life stage* of the woman in determining a woman's health trajectory.

6) Communities, stakeholders and providers need policies and partnerships to foster and grow **protective factors** for mothers and their families. Understand the concept of the **Social Determinants of Health** which are a set of conditions that a person is born into that both promote and negatively impact an individual's health and life.

7) Think of mom and baby as ONE: as the science of **toxic stress** continues to grow, it becomes imperative for our community to view the mother and her child as a single unit even beyond birth. Breaking down medical silos that serve only the mother or only the child, especially in the first year of life is an important first step in promoting the health of an entire community.

8) **Promote Safe Sleep environments** to decrease the risk of SUIDS and SIDS. Agencies and providers need to work together to provide **consistent** and **evidence based recommendations and support** around the *safest sleep environment* for the baby.

REFERENCES

2008 FIMR 5 year Report (Data years: 1998-2006)

FIMR Annual reports FY 2006-2012

FIMR Case Review Minutes FY 2006-2012

FIMR Community Action Plans FY 2006-2012

Perinatal Periods of Risk (PPOR) Projects; CityMatCH, The National Organization of Urban MCH Leaders: http://www.citymatch.org/projects/perinatal-periods-risk-ppor

APPENDIX A – FIMR TEAM MEMBERS

CURRENT FIMR TEAM MEMBERS

- Sheik Ali, Yolo County Coroner's Office
- Flora Alvarez, Yolo County Department of Health Services, Vital Records
- Djina Ariel, Dignity Health/Woodland Healthcare
- Jan Babb, Yolo County Department of Health Services
- Rick Baker, Community Member
- Sarah Burke, CommuniCare Health Centers
- Constance Caldwell, Yolo County Department of Health Services
- Priya Chib, Dignity Healthcare/Woodland Healthcare
- Haydee Dabritz, Yolo County Department of Health Services
- Katherine Eastham, Kaiser Permanente
- Rachel Fox-Tierney, Birthstream Midwifery
- Julie Gallelo, First 5 Yolo
- Jessica Hackwell, Partnership HealthPlan of California
- Kelly Hood, Yolo County Department of Employment and Social Services
- Ashley Logins-Miller, Yolo County Department of Health Services
- Thom Mahoney, CommuniCare Health Centers
- Holly Moen, Winters Healthcare Foundation
- Gina Moya, Yolo County Coroner's Office
- Donna Nevraumont, Community Member
- Laura Nielsen, Yolo County Department of Employment and Social Services
- Amina Richards, Partnership HealthPlan of California
- Mary Ann Robinson, CommuniCare Health Centers
- Zach Romawac, Partnership HealthPlan of California
- Sajiv Saxena, Dignity Health/Woodland Healthcare
- Leon Schimmel, CommuniCare Health Centers
- Craig Seelig, Yolo County Probation
- LaRae Shaw-Meadows, Yolo County Department of Employment and Social Services
- Shawntel Simeone, Dignity Health/Woodland Healthcare
- Nancy Stone, Yolo County Coroner's Office
- Rob Strange, Yolo County District Attorney's Office
- Anna Sutton, Yolo County Department of Health Services
- Laura Valdes, Yolo County District Attorney's Office
- Judi Vallero, Sutter West Medical Group
- Tia Will, Kaiser Permanente

PAST FIMR TEAM MEMBERS 1998-2013

COMMUNICARE HEALTH CENTERS

- Christina Andrade-Lemus
- Barb Boehler
- Sarah Burke
- Dr. Janice Kim
- Dee Langley
- Karen Larsen
- Taylor Priestley
- Deborah Soliz

COMMUNITY MEMBERS

- Jan Jursnich

CSUS NURSING STUDENTS

- Katrina Nguyen
- Kimberly Noble

KAISER PERMANENTE

- Dr. Rick Baker
- Dr. Suzanne Hernried
- Dr. Yvonne Otani
- Dr. Tia Will

PARTNERSHIP HEALTHPLANS OF CALIFORNIA

- Amina Richards
- Phyllis Pratt

SADVC (NOW KNOWN AS EMPOWER YOLO)

- Judy Tischer

SOLANO COUNTY FIMR

- Sara Jane Bolger

SUTTER DAVIS

- Tiffany Allen
- Leah Russo (Birthing Center)
- Dr. Leon Schimmel
- Dr. Zoe Tilton
- Dr. Judi Vallero

UCD MEDICAL STUDENTS

- Jolene Chang
- Sandy Lee
- Adam Simons

WOODLAND HEALTH CARE

- Djina Ariel
- Valerie Froman
- Stephanie Gomez
- Dr. Cathy Jang
- Dr. Ripon Paul
- Dr. Sajiv Saxena
- Shawntel Simeone

YOLO COUNTY CORONER'S OFFICE

- James Andrade
- Ashley Curry
- Katie Harder/Harper
- Robert LaBrash
- Jennifer Plasse
- Beth Sherman
- Laurel Weeks

YOLO COUNTY DEPARTMENT OF EMPLOYMENT AND SOCIAL SERVICES

- Traci Brewer
- Barbara Madsen
- Laura Nielsen
- Patty Paragas
- Leslie Scott
- LaRae Shaw-Meadows
- Alissa Wilfrid

YOLO COUNTY DISTRICT ATTORNEY'S OFFICE

- Bruce Naliboff
- Rob Strange
- Laura Valdez

YOLO COUNTY HEALTH DEPARTMENT (NOW KNOWN AS YOLO COUNTY DEPARTMENT OF HEALTH SERVICES)

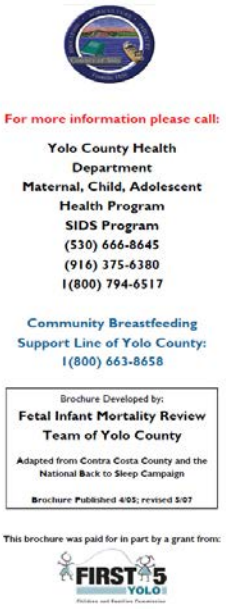
- Flora Alvarez
- Jan Babb
- Dr. Constance Caldwell
- Lynne Foster
- Gina Harrell
- Dr. Bette Hinton
- Rachel Hollander
- Marian Hull
- Dr. Carrie Jones
- Donna Nevraumont
- Marisa Previde
- Melissa Racy
- Rosa Ramirez
- Norma Springsteen
- Linda Uno

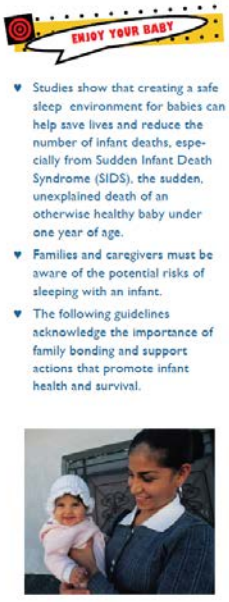
YOLO HOSPICE

- Robyn Burris
- Douglas Jena
- Gila Libet

APPENDIX B – PRODUCTS DEVELOPED

YOLO COUNTY FIMR – SAFE SLEEPING BROCHURES





Tenga Cuidado Con El Medio Ambiente en el que Duerme su Bebé!

- Si usted está extremadamente cansado, si duerme profundamente, si está sobre peso, o si está tomando algún medicamento que le cause mareos, hay la probabilidad que por error usted apachurre a un bebé que duerme.

- NUNCA duerma a su bebé con usted si usted o su pareja han estado tomando alcohol, usando drogas o fumando.
- El alcohol y las drogas afectan la habilidad para despertar y responder a su bebé. El humo-de-segunda-mano afecta la respiración normal y la salud de un infante.
- NO PERMITA que nadie fume alrededor de su bebé.
- No es seguro para los bebes compartir la cama con otros niños, incluyendo hermanos o hermanas.
- La Academia Americana de la Pediatría recomienda que niños no compartan cama durante el Sueño.

Para más información por favor llame al:

Departmento de Salud del Condado de Yolo
Programa de Salud Maternal, Niño, Adolescente
Programa de SIDS
(530) 666-8645
(916) 375-6380
1(800) 794-6517

Community Breastfeeding Línea de Apoyo del Condado de Yolo:
1(800) 663-8658

Este folleto ha sido creado por:
Fetal Infant Mortality Review Team of Yolo County
Adaptado del Condado de Contra Costa y la Campaña Nacional de "Back to Sleep"
Folleto publicado 4/05; revisado 5/07

Este folleto fue pagado en parte por una beca de:
FIRST 5 YOLO
Children and Families Commission

Los Bebés Duermen Cada Vez Mas Seguros

La Pautas para Dormir Seguro para Su Bebé

DISFRUTE A SU BEBÉ

- Los estudios revelan que el crear un medio ambiente seguro para dormir para su bebé, puede ayudar a salvar vidas y reducir el número de muertes en los infantes, especialmente la Muerte de Cuna (SIDS), El Síndrome de Muerte Infantil Repentina, la muerte repentina e inexplicable de un bebé sumamente saludable menor de un año de edad.
- Las familias y los proveedores de cuidado deben estar informados del potencial riesgo del dormir con un bebé.
- Las siguientes recomendaciones certifican la importancia de la unión familiar y las acciones de apoyo para promover la salud y sobre vivencia infantil.

GUIA DE SEGURIDAD

SIEMPRE que su bebé duerma, acuestelo(a) de espalda (boca arriba)

- Para un bebé saludable, ésta es la posición mejor considerada y más saludable para dormir.
- No use nada, de cosas tales como almohadas para mantener a su bebé en cierto lugar o posición.
- Los bebés deben dormir en superficies planas y firmes cubiertas por una sabana apretada al colchón.
- Nada de cobijas o sabanas flojas.
- Nada de muñecos de peluche, almohadas, pieles de borrego, o cualquier producto de material plástico.
- Evite acostarlos o ponerlos en los sofás o camas de agua.
- Evite que su niño(a) esté arropado de más y que le de calentura. Mantenga la temperatura confortable como para un adulto con ropa ligera.
- Asegúrese que la cabeza y la cara de su bebé estén descubiertas mientras el/ella duerme.
- Cuando compre una cuna busque una que cumpla las normas de seguridad.
- Siempre coloque las cunas lejos de los calentones, ventanas, y cordones que cuelgan.

Padres de familia, especialmente las mamás que están lactando pueden mantener a su bebé cerca de ellas al mover la cuna, el moisés, o la superficie donde duerme el bebé junto a la cama.

Si usted usa una cobija coloque al bebé con sus pies al final de la cuna la cobija no debe de cubrirle mas arriba del pecho, y los lados de la cobija deben de meterse debajo del colchón de la cuna.

YOLO COUNTY FIMR KICKS COUNT MAGNET & PROVIDER LETTER

Joseph P. Iser, MD, DrPH, MSC
Director-Health Officer

County of Yolo

HEALTH DEPARTMENT

Maternal Child & Adolescent Health (MCAH) Program
Fetal Infant Mortality Review Program
137 N. Cottonwood Street, Suite 2450, Woodland, CA 95695
PHONE - (530) 666-8645 FAX - (530) 666-7447

September 1, 2009

Dear Colleagues:

The Yolo County Fetal Infant Mortality Review (FIMR) Program is pleased to announce the release of the "Kicks Count" fetal movement magnet. FIMR Team members have developed an appealing health education tool which provides clear information and a reminder to families about fetal kick counts. The occurrence of frequent baby movements during pregnancy is an excellent indicator of fetal well-being. Early identification of significant changes in the fetal movement pattern warrants further evaluation and treatment.

The FIMR Team has developed a refrigerator magnet to assist providers in their efforts to educate expectant mothers and their families about the importance of fetal kick counts. This magnet comes in both English and Spanish and is intended be given to families along with instructions and the provider's phone number. Serving as both an incentive and a reminder of important health education information, the magnet may prevent delays in seeking care which in turn may prevent fetal demise. This project was supported in part by the California Department of Public Health, the Yolo County Health Department and Kaiser Permanente.

To obtain a free supply of Kicks Count magnets for your practice, contact Marisa Previde, PHN, Yolo County FIMR Coordinator at (530) 666-8645.

Sincerely,

Joseph P. Iser, MD, DrPH, MSc
Director - Health Officer

APPENDIX C - ABBREVIATIONS

ACOG	American Congress of Obstetricians and Gynecologist
BMI	Body mass index
CDPH	California Department of Public Health
CI	Confidence interval
CPS	Child Protective Services
CPSP	Comprehensive Perinatal Services Program
ED	Emergency Department
FIMR	Fetal and infant mortality review
GA	Gestational age
GDM	Gestational diabetes mellitus
HIPAA	Health Insurance Portability and Accountability Act
HP2020	Healthy People 2020
HVP	Home Visitation Program
LCI	Lower Confidence Interval
MCAH	Maternal Child and Adolescent Health
OSHPD	Office of Statewide Planning and Development
PHN	Public health nurse (nursing)
PPOR	Prenatal Periods of Risk
SBIRT	Screening, Brief Intervention, and Referral to Treatment
SIDS	Sudden infant death syndrome
SUID	Sudden and unexplained infant death
UCI	Upper Confidence Interval

APPENDIX D – INDEX OF FIGURES

APPENDIX E – INDEX OF TABLES