INCIDENCE AND REPORTED CAUSES OF STILLBIRTHS IN ARIZONA

Sixth Annual Report
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Executive Summary

This report completes the annual requirement set forth by the Arizona State Legislature to present the incidence and causes of stillbirth. Fetal death certificate data were utilized to draw conclusions about the risks of stillbirth by women's age, race, education, initiation of prenatal care, and tobacco/alcohol use during pregnancy. The report also examined the prevalence and causes of stillbirth, and the use of autopsy by region and county.

The findings of this report indicate that the incidence of stillbirth in Arizona remained unchanged over the past five years. The 2009 rate of stillbirth in Arizona (5.5 per 1,000 live births and fetal deaths) is lower than the last reported U.S. rate in 2005 (6.2).[1] Although the total number of stillbirths in Arizona fell six percent from 2008 (n=544) to 2009 (n=511), the rate of stillbirth in Arizona did not experience a similar decline due to a reduction in live births in 2009.

This report also shows that disparities in the rate of stillbirths persist. Among different racial and ethnic groups, African American women were significantly more likely to experience a stillbirth compared to all other races. The largest preventable risk behavior for stillbirth, tobacco use during pregnancy, was more commonly found in women delivering a stillbirth compared to mothers delivering a live birth. Risk markers such as limited education, pregnancy beyond 35 years of age, and no prenatal care remained significantly associated with stillbirth in Arizona. Maricopa and Pima Counties accounted for the vast majority of stillbirths (74 percent) in 2009. In 2009 the rate of stillbirth among residents of urban counties (5.4 per 1,000 live births plus stillbirths) was lower than the rate in rural counties (6.1 per 1,000 live births plus stillbirths) (see Appendix A).

Gestational age and delivery weight were associated with the incidence and causes of stillbirth. Stillbirths were more likely to occur at early term (52 percent) rather than at term (14 percent), and the majority weighed less than 1,500 grams (64 percent). Malformation was reported as the leading cause of death for early term stillbirths, while cord problems were the leading cause of death in term/late term stillbirths. Autopsy is recognized as the most useful procedure in determining the cause of death; however, only nine percent of stillbirths underwent the procedure in Arizona. This report did not examine the medical, legal or infrastructure barriers to increasing the autopsy rate for stillbirths. Data utilized for this report were obtained from the 1989 U.S. Standard Fetal Death Certificate which limits analysis of the characteristics of women delivering a stillbirth and additional causal factors of stillbirth.

INTRODUCTION

Background

As required by Arizona law (ARS 36-2291), the first annual report on the Incidence and Reported Causes of Stillbirths was completed in May of 2005 using data from the 2003 fetal death cohort. The second annual report examined cases from 2000 through 2004 and the fourth annual report also used a five-year cohort of fetal deaths from 2003 through 2007. This year's report examines a one-year cohort of stillbirth infants delivered in 2009.

Methodology

Arizona electronic fetal death certificate data for deaths occurring between the 1st of January, 2009 and the 31st of December 2009 are summarized in this report. To conduct the analyses, a dataset was created with fetal death and live birth data from tables generated by the Health Status and Vital Statistics Section of the Bureau of Public Health Statistics within the Arizona Department of Health Services. These data were for stillbirths reported to have occurred at or after 20 weeks of gestation, and if gestational age was unknown, the deaths of fetuses of at least 350 grams. Data analysis was restricted to delivering women with Arizona residence only.

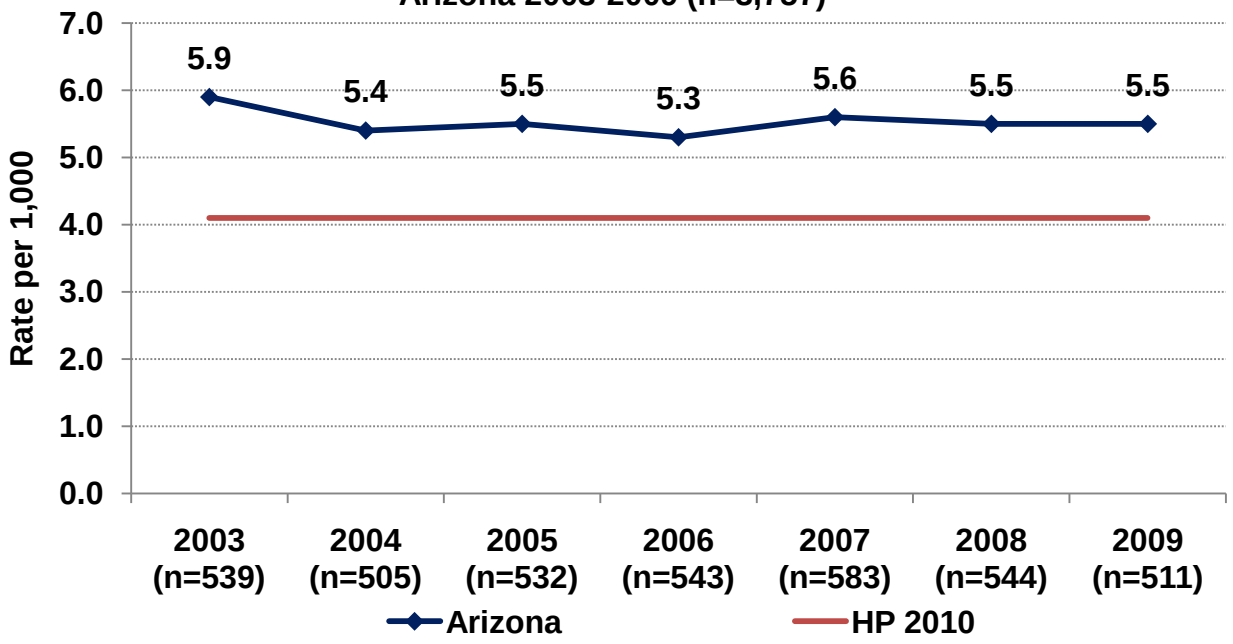
This report focuses on the incidence of stillbirth, maternal risk markers/risk factors for stillbirth, and reported causes of stillbirths. The number of incident deaths and stillbirth rates are useful when looking at trends over time, comparing one geographic population to another and comparing subgroups within a population. In this report, live births from the birth certificate database and fetal deaths (excluding induced abortions) are combined as an estimate of the total pregnancies among Arizona residents that are at risk for a fetal loss. Stillbirth rates are expressed as the number of deaths per 1,000 live births and fetal deaths. Stillbirth rates are presented in this report by race and ethnicity, maternal age, and education level. Two behavioral risk markers, smoking and alcohol consumption, are analyzed in this report. The prevalence of autopsy is examined by weight, age, and geographic region of stillbirths. Finally, the reported causes of stillbirth are addressed, limitations of these data are considered, and input from national and international experts is presented.

Arizona 2009

As per the Arizona Vital Records Fetal Death Certificate database, there were a total of 511 stillbirths reported to have occurred at 20 weeks or more gestation (or if gestational age was unknown, the deaths of fetuses of at least 350 grams) during the 1st of January 2009 through the 31st of December 2009. Figure 1 shows that the stillbirth rate ranged from a high of 5.9 per 1,000 live births and fetal deaths in 2003 to a low of 5.3 in 2006. The 2009 rate is not significantly different from the baseline rate in 2003.* The stillbirth rate in Arizona for the combined seven-year period was 5.5 per 1,000 live births and fetal deaths, which was lower than the U.S. rate of 6.2 per 1,000 for 2005 (see Appendix B).[1] Nevertheless, the stillbirth rate in Arizona for 2009 remains 34 percent greater than the Healthy People 2010 objective of 4.1 per 1,000 live births and fetal deaths.[2] If Arizona had met the Healthy People 2010 standard from 2003 to 2009, approximately 979 stillbirths would have been averted.

* p =0.25 (CI: -0.30 - 1.10)

Figure 1. Stillbirth Rates (per 1,000 live births + fetal deaths)
Arizona 2003-2009 (n=3,757)



Source: Arizona Birth and Fetal Death Certificates, 2003-2009

MATERNAL RISK MARKERS

Few hypothesized risks have been causally linked to stillbirth.[3] Maternal risk markers include physical, behavioral and environmental risks that are used as proxies for unavailable causal data, or as yet to be discovered "risk factors" that actually cause stillbirth.

Pregnancy History

Previous history of stillbirth has been associated with a higher risk for future stillbirth.[4] Thirty-one percent of women with valid data in the 2009 stillbirth cohort reported between one and eight previous spontaneous or induced terminations of pregnancy. It is unknown what proportion of these "terminations" met the definition of stillbirth (spontaneous termination of pregnancy at 20 or more weeks gestation). In addition, it is possible that some women who delivered a stillbirth in 2009 also delivered a live infant and are part of the 2009 live birth cohort. Therefore, determining the risk for stillbirth based on previous history of stillbirth is not possible in this report.

Multiple gestations have also been associated with stillbirth. Approximately 10 percent of all stillbirths in the United States are delivered by women carrying multiple fetuses. The risk for stillbirth increases with the number of fetuses carried during pregnancy.[3] In Arizona, the rate of multiple gestation stillbirth was 12.4 per 1,000 live multiple births and fetal deaths. The rate of stillbirth among multiple gestations was significantly greater than for singleton gestations (5.3 per 1,000 live singleton births and fetal deaths).*

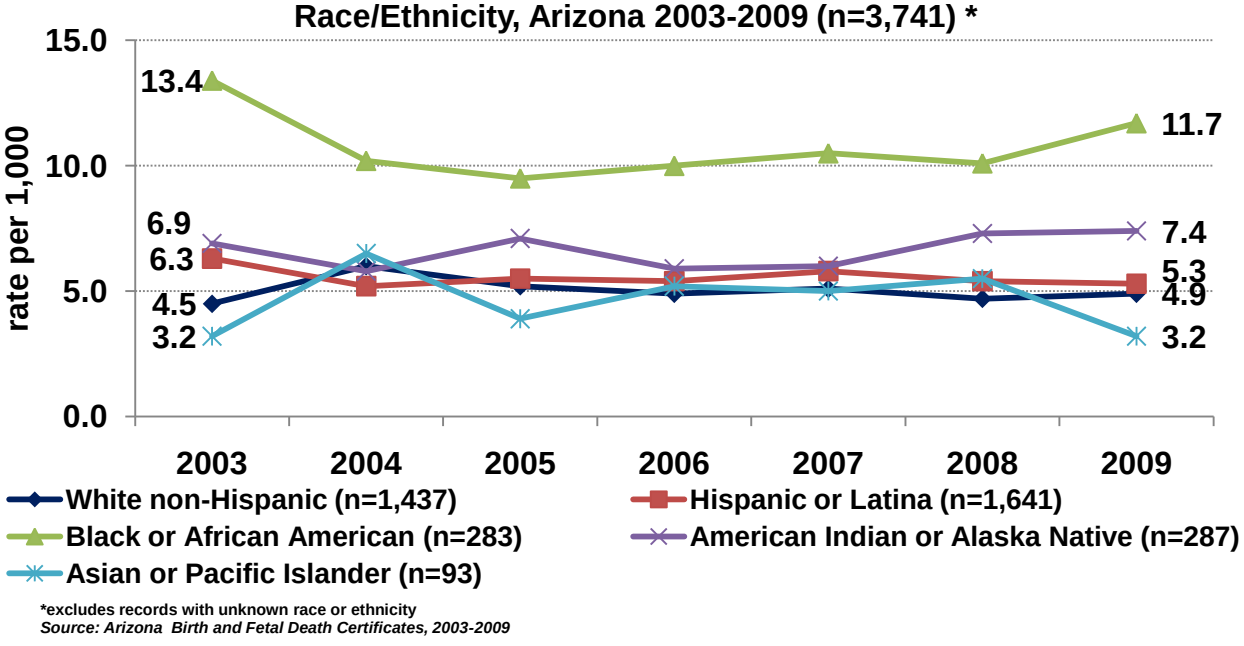
*p<0.0001(CI: 5.9 - 8.3)

Although assisted reproductive technology (ART) has been associated with both multiple gestation and stillbirth, the Arizona fetal and birth certificates do not include data about pregnancy with ART. There is no consensus about whether multiple fetuses have additional risk because they were conceived with ART.[3]

Race/Ethnicity

Figure 2 shows the stillbirth rates by reported race/ethnicity of the mother for the 2003 through 2009 time period in Arizona. The stillbirth rate was lowest for Asian or Pacific Islander women (3.2 per 1,000 live births and fetal deaths) and highest for Black or African American women (11.7 per 1,000 live births and fetal deaths) in 2009. A significant disparity in stillbirth rates persisted between Black or African American women and other racial/ethnic groups in 2009.* Pregnant Black or African American women had more than twice the risk of having a stillbirth as non-African American women. This disparity is also reflected in stillbirth rates across the United States (Appendix B).[5] Healthy People 2010 calls for a significant reduction in the disparity of stillbirth rates across all racial and ethnic groups.[3]

Figure 2. Stillbirth Rates (per 1,000 live births + fetal deaths) by Race/Ethnicity, Arizona 2003-2009 (n=3,741) *



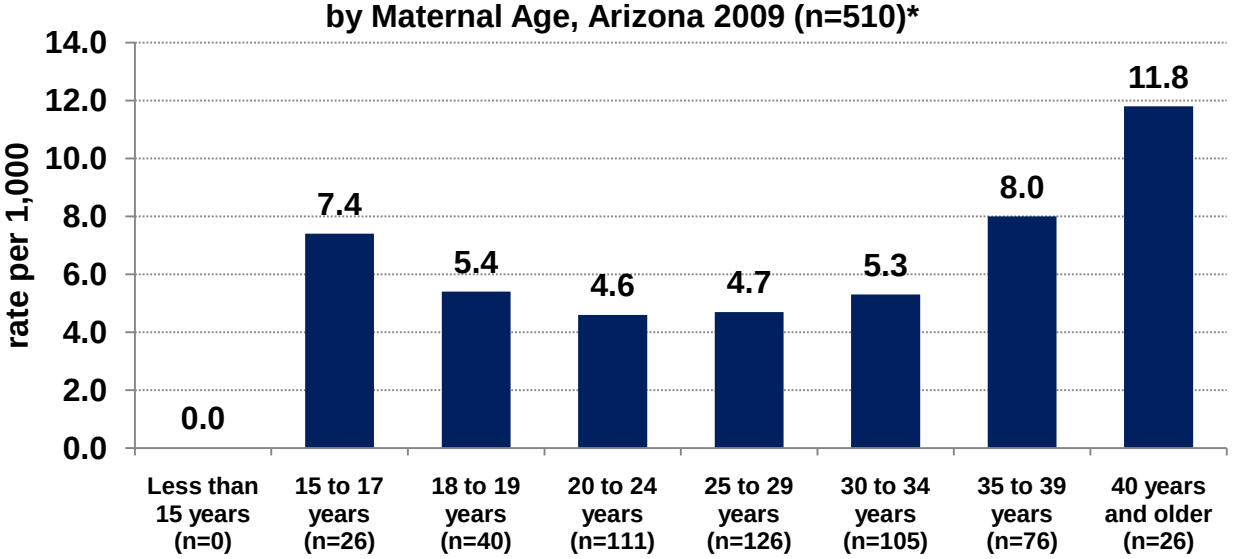
*excludes records with unknown race or ethnicity
Source: Arizona Birth and Fetal Death Certificates, 2003-2009

Maternal Age

Age is a risk marker for stillbirth. Maternal age is used as a proxy measure of unknown and unmeasured physiological changes that are associated with stillbirth.[3] Figure 3 indicates the relationship between reported maternal age and stillbirth. It is evident from figure 3 that the highest risks of stillbirth were for older women. The risk of experiencing a stillbirth was significantly greater for pregnant women 35 years of age and older (8.7 per 1,000 live births and fetal deaths) compared to women aged 20 to 34 years (4.9 per 1,000 live births and fetal deaths).**

* p<0.0001, (CI:1.3 - 5.2)
** p<0.0001, (CI:2.0 – 5.6)

Figure 3. Stillbirth Rates (per 1,000 live births + fetal deaths) by Maternal Age, Arizona 2009 (n=510)*

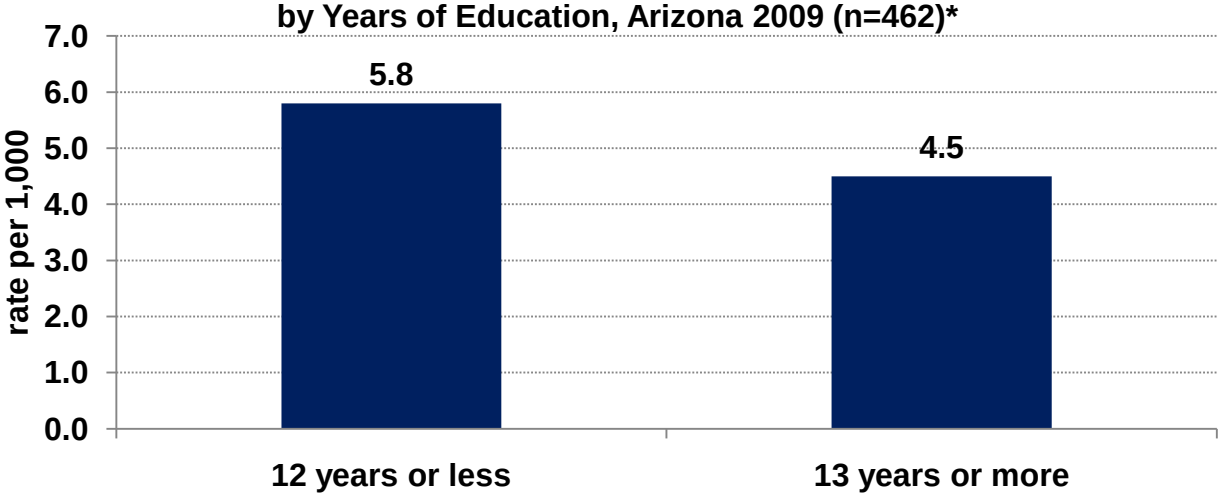


*one record missing mother's age
Source: Arizona Birth and Fetal Death Certificates, 2009

Maternal Education

Figure 4 shows the stillbirth rates by reported level of maternal education. High school education or less is a risk marker for stillbirth that may serve as a proxy measure for other causal risk factors, such as elevated stress associated with lower socio-economic status. Women with 12 years of education or less (5.8 per 1,000 births and fetal deaths) experienced significantly higher rates of stillbirth than women with 13 years or more of education (4.5 per 1,000 live births and fetal deaths).*

Figure 4. Stillbirth rates (per 1,000 live births and fetal deaths) by Years of Education, Arizona 2009 (n=462)*



*excludes women under 19 years of age and those with unknown years of education
Source: Arizona Fetal Death Certificates, 2009

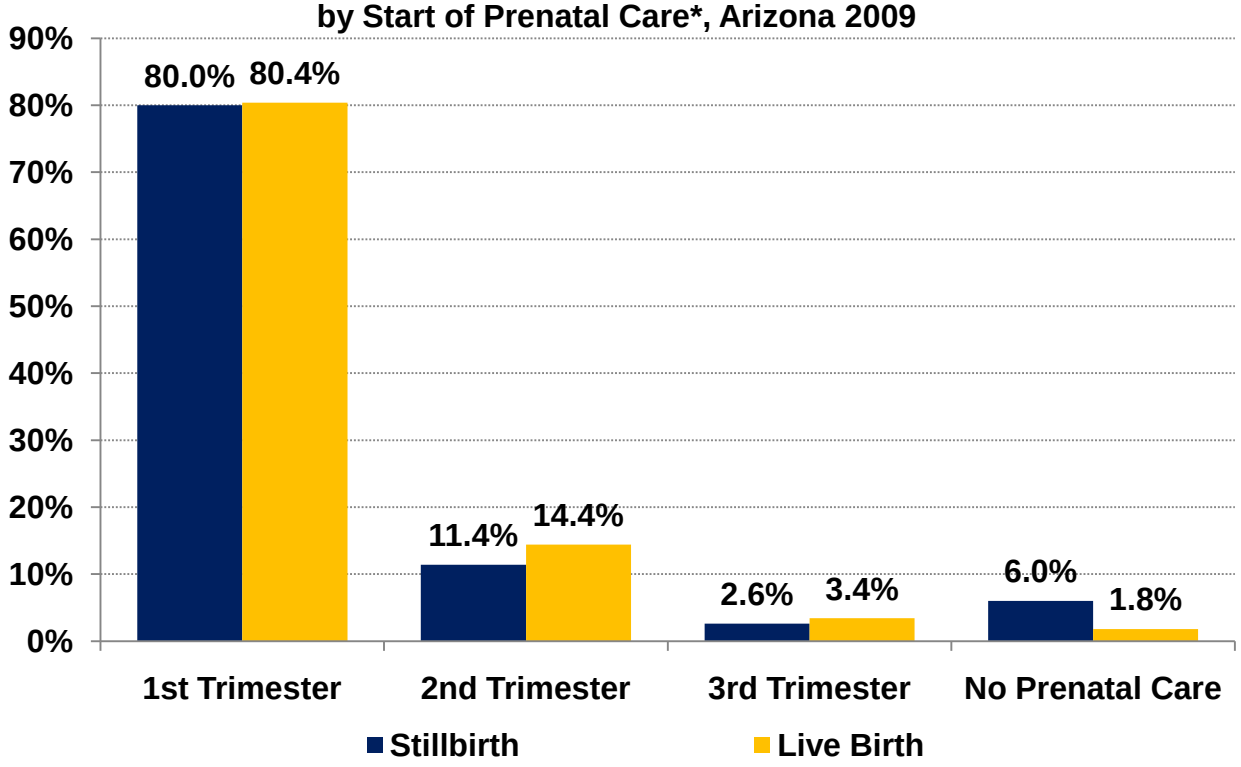
* p<0.0001 (CI:0.40 – 2.2)

Prenatal Care

Determining the adequacy of prenatal care in stillbirths through a review of fetal death certificate data is complicated. Birth certificate data and fetal death certificate data do not contain any information on the quality or content of prenatal care. Methodologies for determining adequacy of prenatal care in live births, such as the Kotelchuck Index [6], look at both the timing of entry into care and the number of prenatal visits received. "Adequacy of care", in terms of the number of expected visits, may be different for women at risk of experiencing a stillbirth. If a woman enters prenatal care early and a risk factor is identified, she may require more prenatal care visits than a woman without an identified risk factor. Conversely, women who receive no prenatal care or enter prenatal care late in pregnancy may be at higher risk for delivering a stillborn infant because a preventable risk factor is not identified and addressed early enough to positively affect the health of the fetus. Therefore, interpreting adequacy of prenatal care measures for fetal deaths is not presented in this report.

Figure 5 compares trimester of entry into prenatal care for both women delivering stillbirths and women delivering live births in 2009. Delivery status (stillbirth or live birth) was not associated with first trimester prenatal care. However, no prenatal care was strongly associated with delivery outcome.*

Figure 5. Percent of Women Delivering a Live Birth or Stillbirth by Start of Prenatal Care*, Arizona 2009



*excludes missing records

Source: Arizona Birth and Fetal Death Certificates, 2009

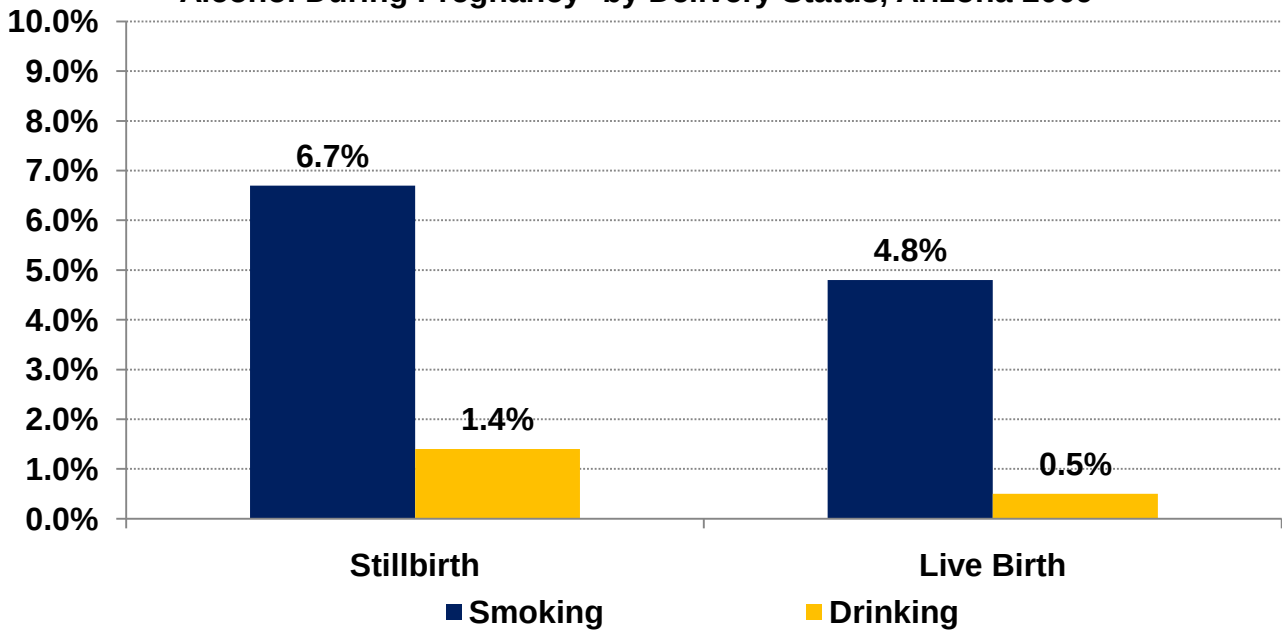
* Chi-square=47.232(1), p<0.0001

Behavioral Risk Markers

Cigarette use is the largest preventable cause of stillbirth. Cessation of smoking during the first trimester has been shown to lower the risk of stillbirth to equivalent rates found in non-smoking women.[3] The consumption of alcohol during pregnancy has also been found to be associated with stillbirth in some, but not all studies. As with tobacco use, the consumption of alcohol may play a larger role in stillbirth later in pregnancy.[3]

Cigarette and alcohol use during pregnancy are recorded on the fetal death certificate. This analysis is restricted to women with known responses to the questions of smoking or drinking in the 2009 stillbirth cohort (n= 493 smoking responses; n= 493 drinking responses) and live birth cohort (n= 92,391 smoking responses; n= 92,083 drinking responses). The Arizona fetal death certificate does not contain information about cigarette or alcohol use by trimester which limits the analysis for use of these substances to any time during pregnancy. Figure 6 shows the percentage of women who reported smoking cigarettes or drinking alcohol during pregnancy for the 2009 stillbirth and live birth cohorts.

Figure 6. Percent of Women Reporting Cigarette Use or Drinking Alcohol During Pregnancy* by Delivery Status, Arizona 2009



*analysis restricted to those women responding "yes" or "no" to each question
Source: Arizona Birth and Fetal Death Certificates, 2009

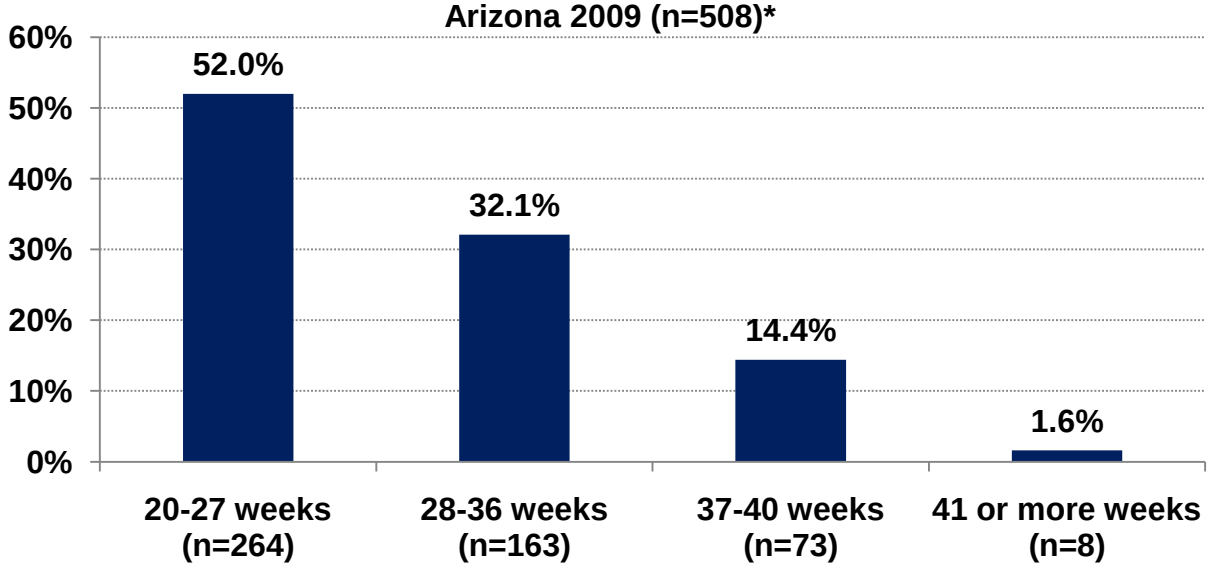
Approximately seven percent of women who had a stillbirth reported smoking and 1.4 percent reported drinking while pregnant. Only 4.8 percent of women delivering a live birth reported smoking and less than one percent reported drinking alcohol during pregnancy. Within this sample, the rate of stillbirth among women who reported smoking during pregnancy (7.3 per 1,000 live births + stillbirths) was not significantly greater than the rate of stillbirth among non-smokers (5.2 per 1,000). The rate of stillbirth for women who reported drinking alcohol during pregnancy is not presented because of limited response size. Response bias due to the stigma of smoking and drinking during pregnancy likely resulted in underreporting of these two behaviors across both the stillbirth and live birth cohorts. If the behavior was stopped early in pregnancy, recall bias may also limit the

reliability of these data. When Arizona adopts the U.S. Revised Fetal Death and Birth Certificates, information about alcohol use during pregnancy will no longer be collected.

CHARACTERISTICS OF STILLBIRTHS

Cases in the fetal death certificates are defined by gestational age, and when age is not available, delivery weight of at least 350 grams is used. Figure 7 shows the breakdown of stillbirths by reported early, late, full term, and post-term gestational ages.[7]

Figure 7. Percent of Stillbirths by Gestational Age
Arizona 2009 (n=508)*

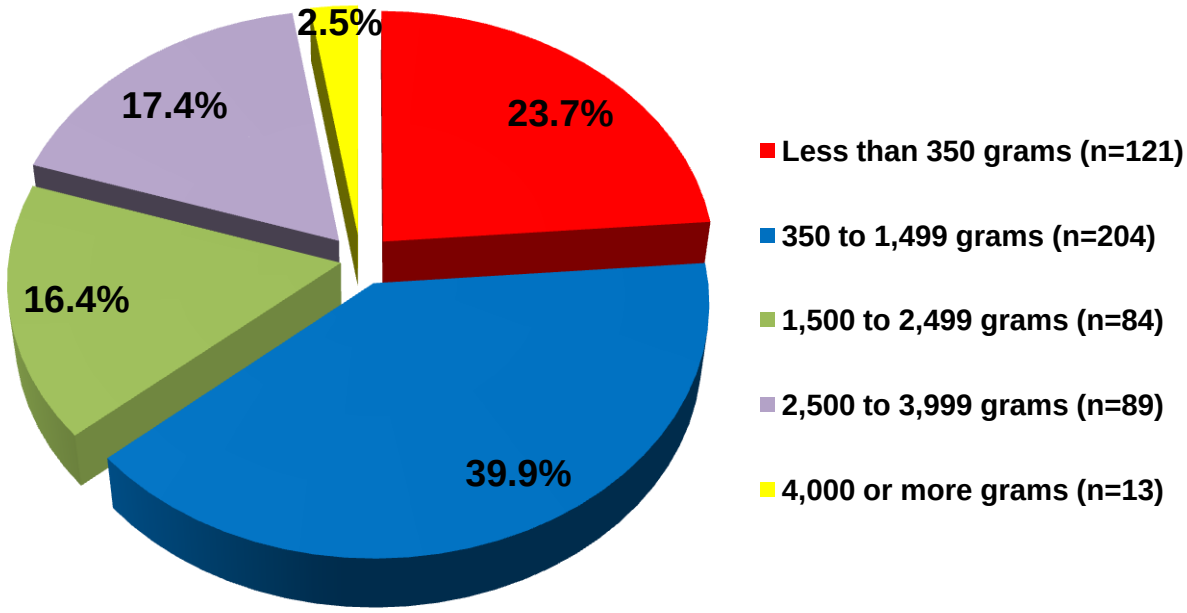


*excludes records with missing gestational age
Source: Arizona Fetal Death Certificates, 2009

Similar to national statistics[3], 52 percent of stillbirths in Arizona occurred prior to 28 weeks gestation and 14.4 percent were 'at term' (37-40 weeks gestation). Although gestational age is determined by physician's estimate (clinical estimate) and not reported by date of last menstrual period, reliability and validity issues persist.[8] Therefore, it is possible that some infants were delivered prior to 20 weeks and were misclassified as stillbirths instead of miscarriages.

Figure 8 shows the reported weight of stillbirths from the 2009 cohort. It is evident from Figure 8 that approximately 40 percent of stillbirths delivered in 2009 were reported to weigh between 350 to 1,499 grams, 16.4 percent weighed between 1,500 and 2,499 grams, and 17.4 percent weighed 2,500 to 3,999 grams. Macrosomic stillbirths (4,000 grams or more) comprised 2.5 percent of the cohort. Another 23.7 percent were reported to weigh less than 350 grams.

Figure 8. Percent of Stillbirths by Delivery Weight
Arizona 2009 (n=511)



Source: Arizona Fetal Death Certificates, 2009

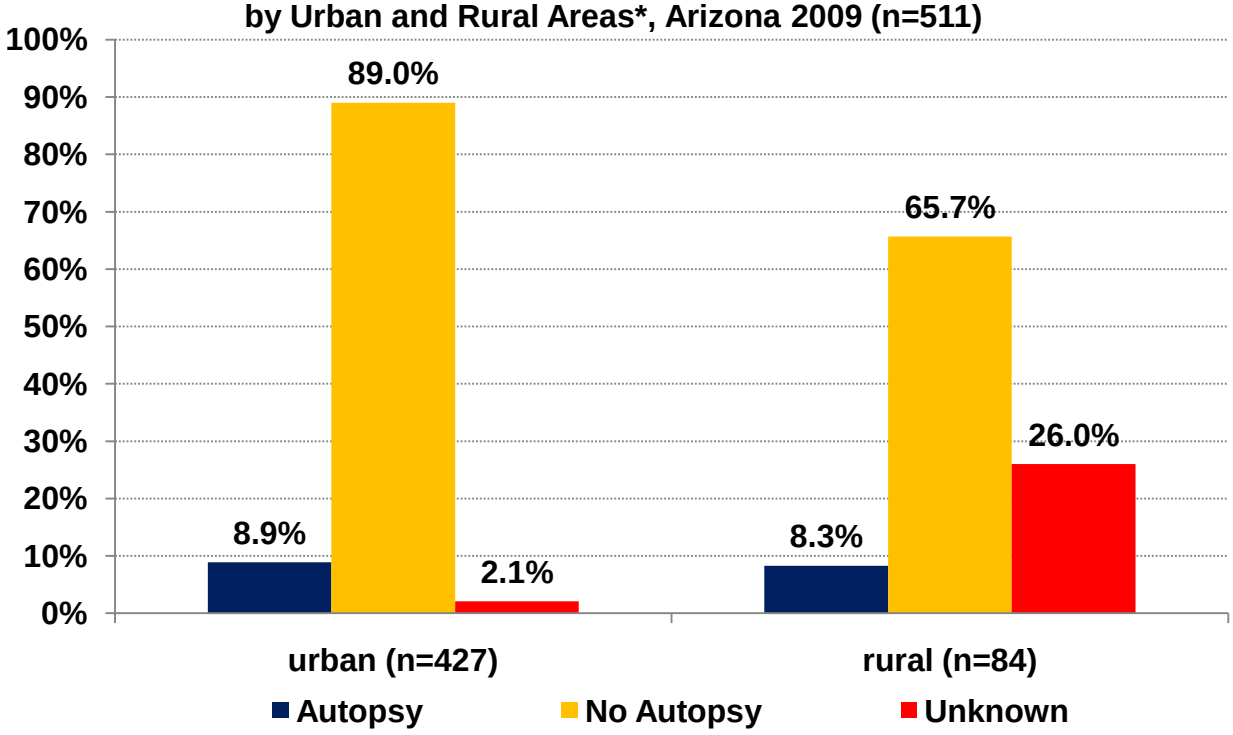
County of Occurrence and Frequency of Autopsy

Although the majority of stillbirths in 2009 continued to occur among female residents of urban counties, rates of stillbirth varied more widely in rural counties (0.0 to 11.2 per 1,000) compared to urban counties (5.3 to 5.5) due to the relatively small size of rural populations (appendix B). In 2009, 61 percent of those stillbirths were delivered by residents of Maricopa County (n=312), 13 percent in Pima county (n=68), and the remainder of stillbirths with known maternal residence occurred in 11 other counties (n=131).

Fetal autopsies are the most useful diagnostic procedure for information on the cause of death.[3,9] However, only nine percent (n=45) of stillbirths with complete data in 2009 received an autopsy. The proportion of stillbirths receiving an autopsy in 2009 has decreased from a high of 16.4 percent in 2004. Additionally, the quality of data has declined over the reported autopsy field. Less than one percent of cases were coded as "unknown" in 2003, but six percent (n=32) were coded as "unknown" in 2009.

Figure 9 shows the proportion of stillbirths delivered in urban and rural counties that received an autopsy. The percentage of "unknown" autopsied cases in rural counties makes it impossible to determine if there was a significant urban/rural difference. The proportion of stillbirths autopsied was greater in Pima County compared to Maricopa County (8.5 percent compared to 12.1 percent), the difference was not significant.

Figure 9. Percent of Stillbirths Receiving Autopsy by Urban and Rural Areas*, Arizona 2009 (n=511)



Source: Arizona Fetal Death Certificate, 2009
*Urban areas include Maricopa, Pima, Pinal and Yuma Counties. All other counties are considered rural.

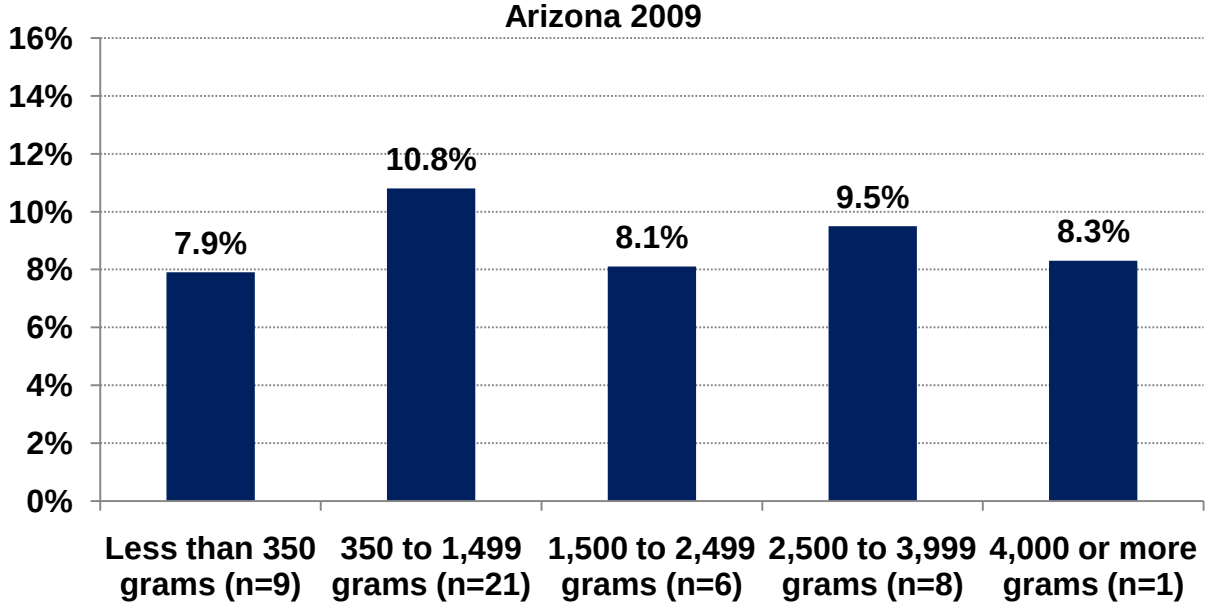
The proportion of autopsies for cases with complete data was also analyzed by race, ethnicity, gestational age, and reported weight of the fetus. In terms of race and ethnicity, the percentage of stillbirths delivered by non-Hispanic women that received an autopsy was 11.5 percent compared to six percent of stillbirths delivered by Hispanic women. Greater proportions of stillbirths were autopsied for White (12.1 percent), and African American (15.4 percent) women than for stillbirths delivered by American Indian women (7.1 percent), and

Asian or Pacific Islander (zero percent). However, the high proportion of stillbirths with 'unknown autopsy status' limits interpretation of any disparity based on race or ethnicity.

Although half of all stillbirths were delivered prior to 28 weeks gestation in 2009, only 9.9 percent of these very early term stillbirths received an autopsy.* There was no significant difference in autopsy rates between stillbirths occurring at or after 28 weeks gestation (8.9 percent) and those occurring very early term.

Figure 10 shows the percentage of stillbirths that were autopsied by reported gestational weight. In 2009 there was no discernible trend in autopsy by weight of stillbirth.

Figure 10. Percent of Stillbirths Autopsied by Delivery Weight Arizona 2009

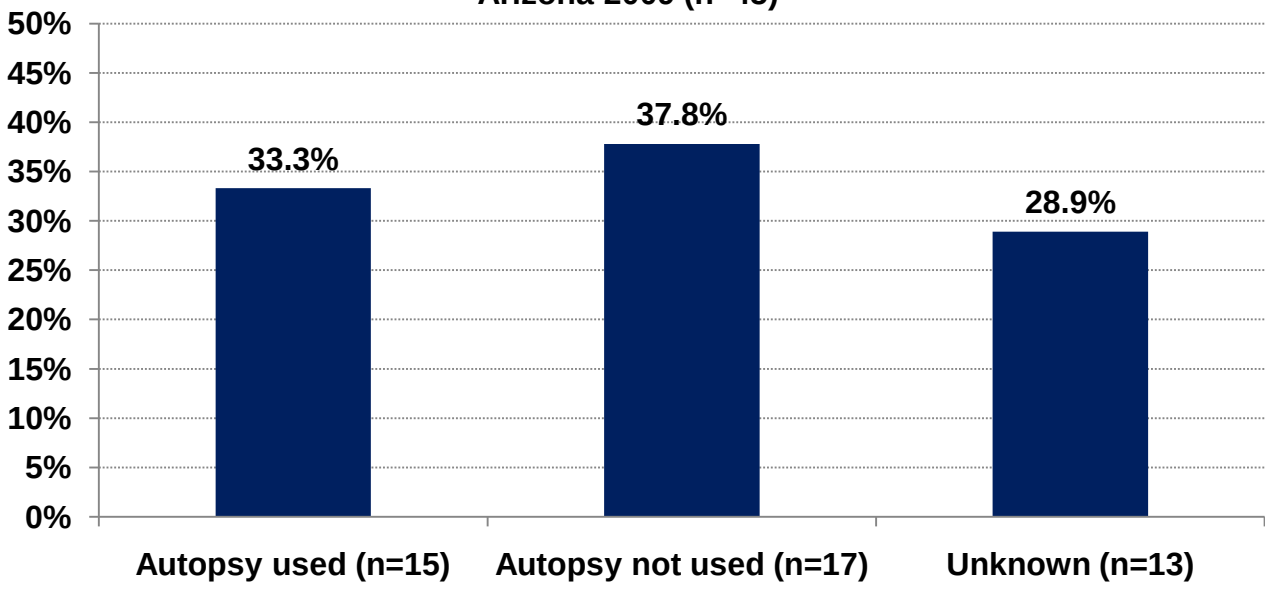


Source: Arizona Fetal Death Certificates, 2009

* includes only records with complete data over autopsy field.

Figure 11 shows the percentage of autopsies that were actually used to determine the cause of death among stillbirths that received an autopsy. Although autopsy is considered the most useful procedure in determining the cause of stillbirth,[3,4] the procedure was only used one-third of the time to ascertain the cause of fetal demise in Arizona.

Figure 11. Percent of Autopsies Used to Determine Cause of Death among those Stilbirths Receiving Autopsy Arizona 2009 (n=45)



Source: Arizona Fetal Death Certificates, 2009

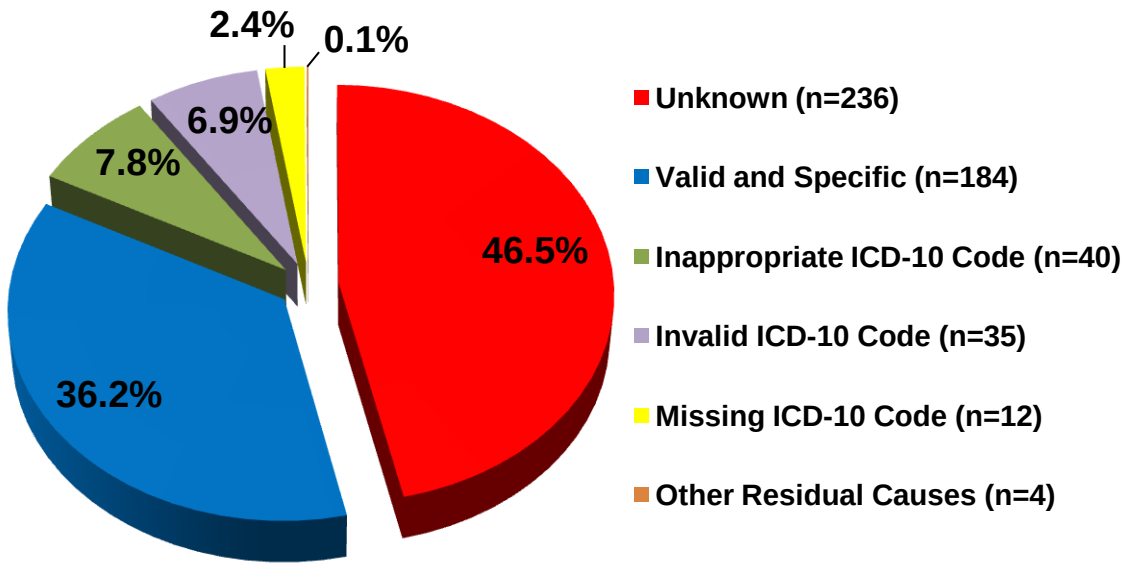
Reported Cause of Death

Most conditions that have been linked to stillbirth can be classified as associations rather than unequivocal causes.[3] As reported in the first Incidence and Reported Causes of Stillbirth Report (2005), the cause of stillbirth often remains unknown, even when a concerted effort is made to determine the cause of death. In Arizona, three causes of death can be entered onto the fetal death certificate – a primary cause of death and two contributing factors. Since 2000, the cause of death has been coded using ICD-10 codes in Arizona.

Coding for fetal death certificates is completed by Arizona Department of Health Services Vital Records staff. The staff person responsible for coding fetal deaths reviews a hard copy of the fetal death certificate and, using all three fields on the death certificate, makes a determination of the most appropriate ICD-10 code. In 2009 there were 58 distinct ICD-10 codes used to classify cause of death in the fetal death certificate data. The ICD-10 codes and their associated descriptions were reclassified into categories based on their similarities and potential prevention efforts.

Figure 12 shows causes of stillbirths for the 2009 reporting period.* As is true in many studies on the causes of stillbirths[3], the cause of death was unknown in 46 percent of stillbirths for this time period. The lack of a definitive cause of death is often the result of insufficient medical knowledge regarding the etiology of stillbirth.** Additionally, eight percent of the stillbirths had an inappropriate ICD-10 code, seven percent of the stillbirths had an invalid ICD-10 code, and two percent of the stillbirths did not have an ICD-10 code listed under cause of death. The remaining 36 percent of fetal deaths had ICD-10 codes indicating a valid and specific cause of deaths.

Figure 12. Percent of Stillbirths by Recoded Cause of Death*
Arizona 2009 (n=511)

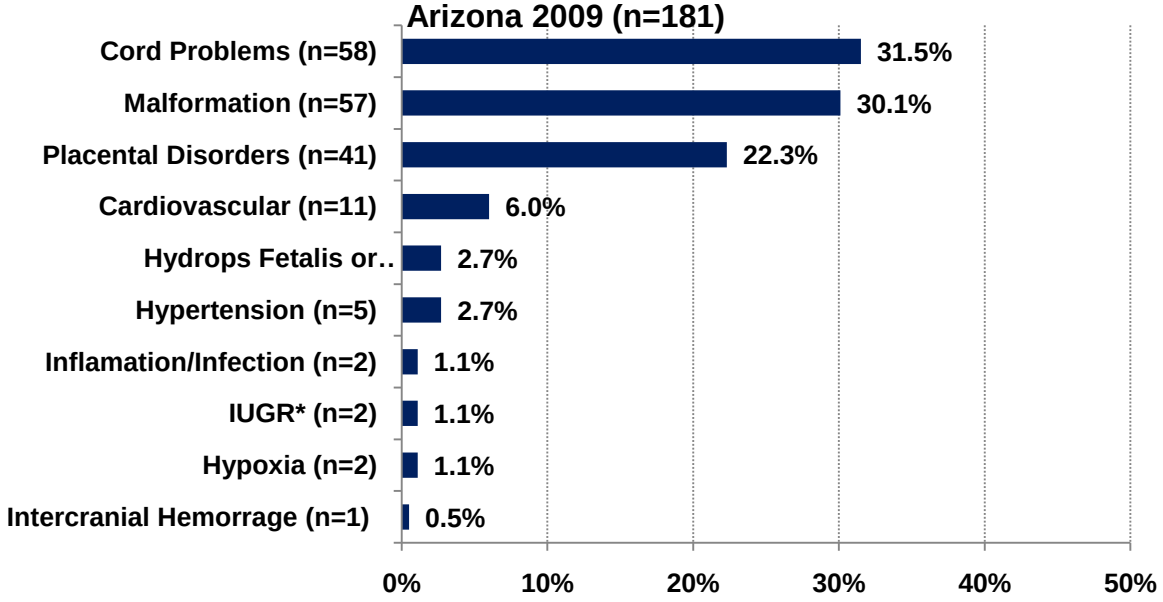


***recoded ICD-10 groupings developed by Dr. Mike Clement of the Arizona Perinatal Trust in 2006**
Source: Arizona Fetal Death Certificates, 2009

* ICD-10 codes were reclassified according to a matrix created by Dr. Mike Clement of the Arizona Perinatal Trust in 2006. The use of other classification systems, such as Gardosi's ReCoDe[4], was not possible due to the absence of key variables in the 1989 U.S. Standard Fetal Death Certificate which is still used by Arizona.
** As per correspondence with Donna Hoyert, PhD, Division of Vital Statistics, NCHS, CDC, on November 25th, 2008

Of the stillbirths with a known and specific cause of death (Figure 13), the most common causes were cord problems (31.5 percent), malformation (30 percent), and placental disorders (22 percent). None of the other recoded causes of death accounted for more than six percent of stillbirths with valid ICD-10 data.

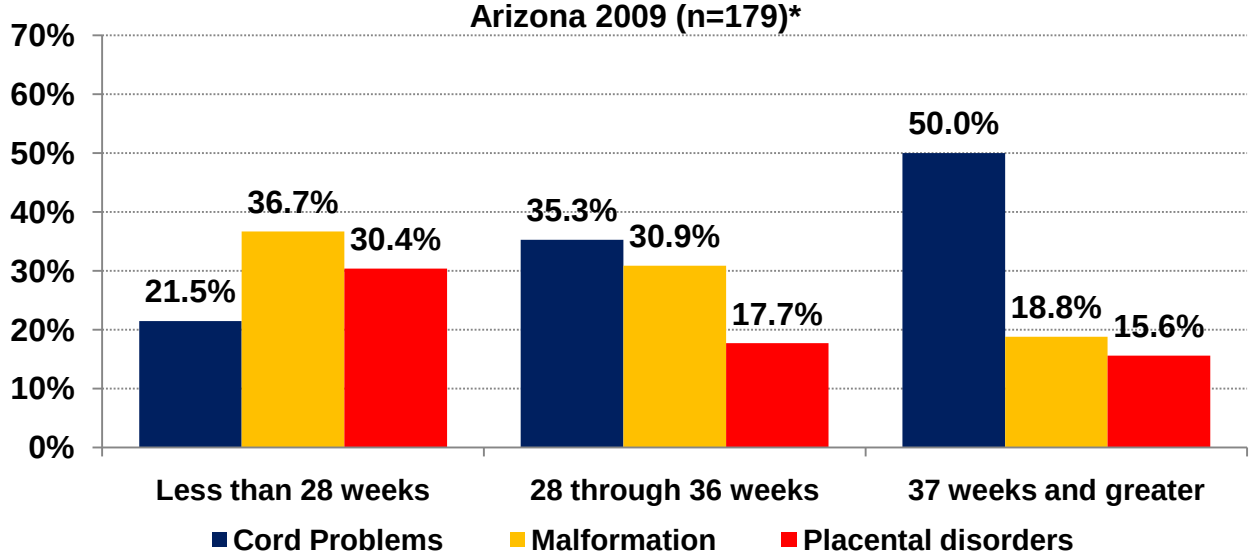
Figure 13. Specific and Valid Causes of Stillbirth
Arizona 2009 (n=181)



*Intrauterine growth restriction refers to a fetus whose weight is below the 10th percentile for its gestational age.
Source: Arizona Fetal Death Certificates, 2009

Figure 14 shows the top three reported causes of death by gestational age categories.

Figure 14. Top Three Causes of Stillbirth by Length of Gestation
Arizona 2009 (n=179)*



*two records with specific causes of death were missing gestational weight and are not included in this analysis
Source: Arizona Fetal Death Certificates, 2009

Forty percent of stillbirths delivered at term or late term had a specific cause of death, while only 35 percent delivered at less than 28 weeks had a valid cause of death.[*] The most common causes of death were cord problems, malformations and placental disorders for both age categories. For stillbirths delivered at term or late term, cord problems (50 percent) accounted for the greatest proportion of deaths, while malformation (36.7 percent) was the most common cause of death for very early term stillbirths.

Study Limitations

The analysis for the 2009 Incidence and Reported Causes of Stillbirth in Arizona consisted of a review of frequencies of selected variables to determine the percentage of cases with out-of-range, invalid, and missing values. Fields were chosen for this analysis based on the likelihood that they would be used in an analysis of stillbirths. In addition to reviewing frequencies as described above, the data were reviewed to determine if the cases included in the fetal death files were appropriate for an analysis of fetal deaths.

Case Inclusion

ARS 36-2291 stipulates that a report on the incidences of stillborn infants and the reported causes of deaths will be produced each year. Fetal weights and reported gestational age were reviewed to determine if all records included in these files would be appropriate for a report on the incidence and causes of stillbirths. Of the 511 cases reported in these files, three records did not have data in the field for reported gestational age. These records had weights of at least 350 grams indicating that the stillbirths were likely of an appropriate gestational age for inclusion in this report. The remaining 508 cases had gestational ages of 20 weeks or more according to clinical estimates. Both clinical and calculated estimates of gestational age are subject to reliability issues.[8] Calculation of gestational age by reported last menstrual period is complicated by missing and unreliable data over 14 percent of cases. When using date of last menses to measure gestational age for those records with complete and reliable data, approximately four percent (n=17) of stillbirths were less than 20 weeks old and nearly one-third of these cases (n=5) also had reported delivery weights under 350 grams. These cases would not have been included in this report had last menses been used instead of clinical estimate to determine gestational age.

Gestational age is the primary criteria used to determine case inclusion in this report. However, the reported weight of all cases was also reviewed to determine whether or not the case was appropriate for inclusion in an analysis of incidence and reported causes of stillbirth. Twenty-four percent (n=121) of stillbirths in the data set were reported to weigh less than 350 grams, but all were of an appropriate gestational age (> 20 weeks) to be included in this report.

[*] Chi-square 0.491(1) p=0.48

Quality of Available Data

Additional variables collected on a revised fetal death certificate would improve the quality of this report. These variables include; the amount of cigarettes smoked per week, self-reported exposure to second hand smoke, the number of alcoholic drinks consumed per day by trimester, and the weight and height (or calculated BMI) of the mother at first prenatal care visit. Although the prevalence of obesity has increased among reproductive aged women in Arizona[10] and has been demonstrated as a risk factor for stillbirth,[3,4,5] neither maternal baseline weight nor height is collected for the Arizona fetal death certificate. These missing variables limit the findings of this report.

The revised 2003 U.S. Standard Fetal Death Certificate (see http://www.azdhs.gov /plan/cert/ pdf/fetal.pdf) includes data fields for BMI, pre-pregnancy weight, and trimester/frequency of cigarette use. However, Arizona will not adopt this certificate until 2012. The 2003 Fetal Death Certificate will bolster future analyses of the risks for stillbirth. For instance, Gardosi's classification of stillbirth by relevant condition of death (ReCoDe) utilizes mother's first trimester BMI as a covariate to determine customized fetal delivery weight percentiles. If delivery weight for gestational age is extremely low (< 10th percentile) and no valid cause of death is noted, then the fetal death is reclassified as due to fetal growth restriction. Use of the ReCoDe classification system has resulted in valid coding of up to 85 percent of fetal deaths.[11,12] Classification systems that rely on data collected in the 2003 U.S. Standard Fetal Death Certificate would improve the validity of the underlying causes of stillbirth.

Appendix A

	Total Number of Stillbirths*						Rate of Stillbirths**					
	2004	2005	2006	2007	2008	2009	2004	2005	2006	2007	2008	2009
ARIZONA	505	532	543	583	544	511	5.4	5.5	5.3	5.6	5.5	5.5
Apache	5	7	4	9	8	2	3.7	5.4	3.4	7.7	6.6	1.6
Cochise	10	14	12	13	7	16	5.5	7.9	6.6	7.0	3.9	8.7
Coconino	7	9	14	9	7	12	3.4	4.3	6.8	4.2	3.5	6.3
Gila	2	3	11	4	6	8	3.0	4.6	16.5	5.7	8.5	11.2
Graham	2	2	2	0	5	2	4.4	4.4	3.7	0.0	7.7	3.1
Greenlee	1	1	0	0	1	0	9.6	10.0	0.0	0.0	7.6	0.0
Maricopa	339	330	351	360	350	312	5.6	5.3	5.3	5.4	5.6	5.4
Mohave	11	19	15	17	9	14	5.0	8.4	6.1	6.9	3.9	6.3
Navajo	12	15	13	15	15	11	6.7	7.8	6.9	7.4	7.7	5.8
Pima	54	68	79	88	73	68	4.1	5.2	5.7	6.3	5.4	5.3
Pinal	14	21	17	39	33	29	4.5	5.7	3.8	7.3	5.7	5.4
Santa Cruz	4	5	3	0	6	3	4.9	6.4	4.0	0.0	7.5	3.9
Yavapai	15	7	10	14	3	16	7.4	3.3	4.2	5.7	1.4	7.7
Yuma	25	30	12	14	18	18	7.5	9.0	3.6	4.3	5.3	5.5
La Paz	4	0	0	0	2	0	17.1	0.0	0.0	0.0	8.1	0.0
Unknown	0	0	0	0	1	0	NA	NA	NA	NA	NA	NA

*Includes spontaneous terminations of pregnancy at 20 or more weeks of gestation (or if gestational age is unknown, the deaths of fetuses of at least 350 grams in weight). Excludes induced terminations of pregnancy.

**Per 1,000 live births plus stillbirths.

Note: Urban counties include Maricopa, Pima, Pinal and Yuma. All other counties are considered rural.
Source: Arizona Birth and Fetal Death Certificates, 2004-2009

Appendix B

Stillbirths: Arizona and the U.S.

Characteristic	Arizona 2009	U.S. 2005*
Total number	511	25,894
Total rate (per 1,000 live births and fetal deaths)	5.5	6.2
Rate by race:		
Black or African American	11.7	11.1
American Indian or Alaskan Native	7.4	6.2
Asian or Pacific Islander	3.2	4.8
Hispanic or Latina	5.3	5.4
White non-Hispanic	4.9	4.8
Rate by Plurality:		
Triplet or more	16.1**	27.2
Twin	12.1	16.1
Singleton	5.3	5.9
Rate by maternal age:		
< 15 years old	0.0	12.2
15 thru 17 years old	6.1	7.5
20 thru 24 years old	4.6	5.9
25 thru 29 years old	4.7	5.5
30 thru 34 years old	5.3	5.8
35 thru 39 years old	8.0	7.3
40 thru 44 years old	11.8	11.1
45 years and older	11.6**	15.5

* most recent data available through the NCHS [1]

** interpret rate with caution due to low sample size

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