

## Fetal and Infant Mortality Reporting: Are Data Complete? — Wyoming, 2006–2013

Ali Harrist MD, PhD  
Wyoming Department of Health

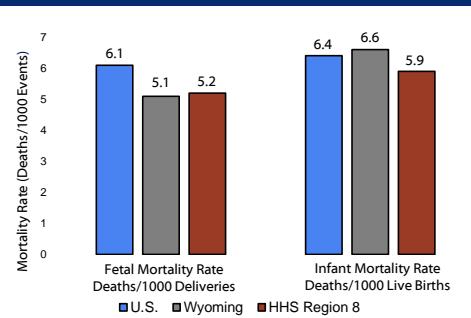


### Wyoming

- Rural (Pop. < 600,000)
- ~ 8000 births per year
- Low physician density (47<sup>th</sup>)
- No Neonatal Intensive Care Units
- 19% of residents live in a Medically Underserved Area (42<sup>nd</sup>)



### Fetal and Infant Mortality Rates — 2008–2010



## Reducing Fetal and Infant Mortality in Wyoming

- Prevention of infant mortality is a Title V priority
- In 2014, Wyoming joined the Collaborative Improvement and Innovation Network to Reduce Infant Mortality (CoIIN)
- Effective interventions depend on accurate data
  - Numbers of fetal and infant deaths
  - Causes of fetal and infant deaths
- Stakeholder investment critical for quality data

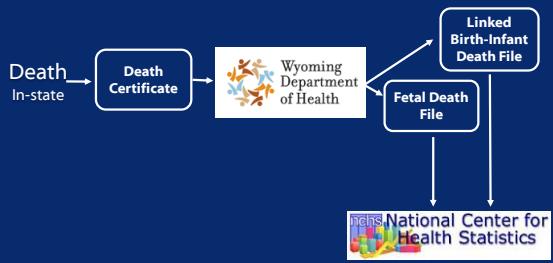
## Research Questions

1. Sensitivity for resident deaths?
2. Quality of collected cause-of-death data?
3. How do stakeholders experience completing fetal and infant death certificates?

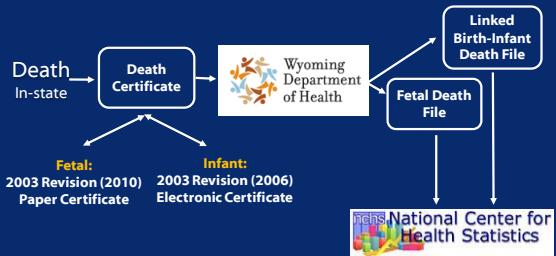
## **Fetal and Infant Mortality Surveillance in Wyoming — Case Definitions**

- **Fetal Death**
  - Delivery  $\geq$  20 weeks completed gestation
  - Fetus shows no evidence of life after complete birth
- **Infant Death**
  - Death of live-born infant in 1st year of life

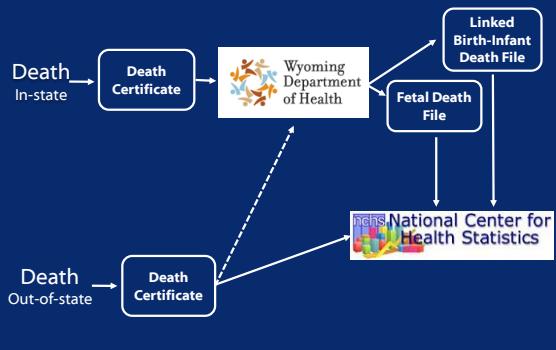
## Flow Chart for Fetal and Infant Death Reporting



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### Sensitivity — Methods

- National Center for Health Statistics used as gold standard
- Compared number of resident deaths detected by:
  - Wyoming Department of Health (WDH)
  - National Center for Health Statistics (NCHS)
- Sensitivity calculation:

	NCHS +	NCHS -	Total	
WDH +	a	b	a+b	Sensitivity = $\frac{a}{a+c}$
WDH -	c	d	c+d	
Total	a+c	b+d		

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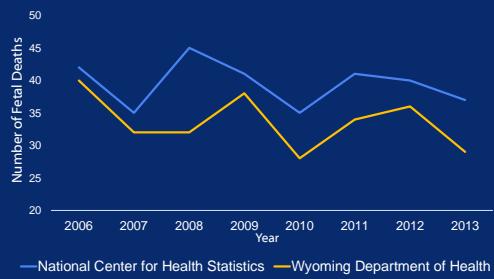


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**Reported Wyoming Resident Fetal Deaths by Year, 2006–2013**




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### Sensitivity for Resident Fetal Deaths, 2006–2013

	NCHS +	NCHS -	Total
WDH +	269	-	269
WDH -	47	-	47
Total	316	-	

Sensitivity =  $269/(269+47) = 85\%$

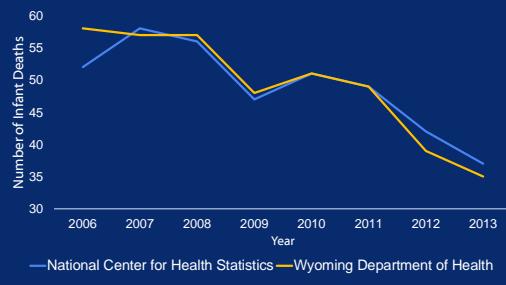
### Sensitivity for Resident Fetal Deaths, 2006–2013

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WDH -	47	-	47
Total	316	-	

Sensitivity =  $269/(269+47) = 85\%$

0% of fetal deaths reported by WDH occurred out-of-state

### Reported Wyoming Resident Infant Deaths by Year, 2006–2013



### Sensitivity for Resident Infant Deaths, 2006–2012

	NCHS +	NCHS -	Total
WDH +	392	2	394
WDH -	0	-	0
Total	392	2	

Sensitivity =  $392/(392+0) = 100\%$

### Sensitivity for Resident Infant Deaths, 2006–2012

	NCHS +	NCHS -	Total
WDH +	392	2	394
WDH -	0	-	0
Total	392	2	

Sensitivity =  $392/(392+0) = 100\%$

46% of infant deaths reported by WDH occurred out-of-state

### Quality of Cause-of-Death Data — Methods

- Measures used:
  - Percent Missing
  - Percent Ill-Defined
- NCHS versus Wyoming infant death file
- Wyoming fetal versus neonatal death certificates
  - 2011-2013

### III-Defined Causes of Fetal Death

Category	Cause of Death
Prematurity-related	Extreme fetal prematurity
	Premature birth or labor
	Prematurity
	Preterm birth/labor/delivery
	Previable gestation
Unspecified causes	Fetal demise
	Fetal non-viability
	Intrauterine fetal demise

### III-Defined Causes of Infant Death

Category	ICD-10 Code*	Cause of Death
Prematurity-related	P07.2	Extreme immaturity
	P07.3	Preterm Newborn
Unspecified causes	R99	Other ill-defined and unspecified causes of mortality
	Y33	Other unspecified events, undetermined intent
	Y34	Unspecified event, undetermined intent

\* International Classification of Diseases, 10<sup>th</sup> Revision

### Quality of Infant Cause-of-Death Data NCHS vs WDH Infant Files, 2006-2013

Entry Type	NCHS		WDH	
	No./Total	(%)	No./Total	(%)
Missing Cause of Death	0/141344	(0)	1/365	(0.3)

**Quality of Infant Cause-of-Death Data  
NCHS vs WDH Infant Files, 2006-2013**

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	No./Total	(%)	No./Total	(%)
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III-Defined Cause of Death	29193/141344	(21)	58/364	(16)

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	No./Total	(%)	No./Total	(%)
Missing Cause of Death	0/141344	(0)	1/365	(0.3)
III-Defined Cause of Death	29193/141344	(21)	58/364	(16)
Prematurity	23496/29193	(80)	37/58	(64)
Unspecified	5697/29193	(20)	21/58	(36)

**Quality of Cause-of-Death Data  
Wyoming Fetal versus Neonatal Deaths, 2011–2013**

Entry Type	Fetal		Neonatal	
	No./Total	(%)	No./Total	(%)
Missing Cause of Death	40/101	(40)	0/71	(0)

**Quality of Cause-of-Death Data**  
**Wyoming Fetal versus Neonatal Deaths, 2011–2013**

Entry Type	Fetal		Neonatal	
	No./Total	(%)	No./Total	(%)
Missing Cause of Death	40/101	(40)	0/71	(0)
III-Defined Cause of Death	2/61	(3)	9/71	(13)

**Quality of Cause-of-Death Data**  
**Wyoming Fetal versus Neonatal Deaths, 2011–2013**

Entry Type	Fetal		Neonatal	
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Missing Cause of Death	40/101	(40)	0/71	(0)
III-Defined Cause of Death	2/61	(3)	9/71	(13)
Prematurity	1/2	(50)	9/9	(100)
Unspecified	1/2	(50)	0/9	(0)

Report of the Panel  
to Evaluate the U.S.  
Standard Certificates,  
April 2000

<b>Report of Fetal Death 1989</b> <small>Underlined check box items recommended for retention in same or modified form in 2003</small>	<b>Proposed Report of Fetal Death 2003</b> <small>Indicated items or check boxes differ from 1989</small>
<b>CAUSE OF FETAL DEATH</b> 28. <b>PART I</b> Fetal or maternal condition directly causing fetal death <input type="checkbox"/> Enter only one cause per line for a, b, and c. a. <b>IMMEDIATE CAUSE</b> (Specify Fetal or Maternal) <input type="checkbox"/> Due to or AS A CONSEQUENCE OF fetal and/or maternal conditions, if any, giving rise to death, including complications of the underlying cause line. (Specify Fetal or Maternal)  <b>INITIATING CAUSE/CONDITION</b> <input type="checkbox"/> Select one or specify <input type="checkbox"/> <b>Maternal Conditions/Diseases</b> <input type="checkbox"/> Specify <input type="checkbox"/> Complications of Placenta, Cord, or Maternal <input type="checkbox"/> Rupture of membranes prior to onset of labor <input type="checkbox"/> Abruptio placenta <input type="checkbox"/> Placental insufficiency <input type="checkbox"/> Prolapsed cord <input type="checkbox"/> True knot in cord <input type="checkbox"/> Chorioamnionitis <input type="checkbox"/> Other <input type="checkbox"/> Specify <input type="checkbox"/> Other (Specify) or Pregnancy Complications <input type="checkbox"/> Specify <input type="checkbox"/> Fetal anomaly <input type="checkbox"/> Specify <input type="checkbox"/> Fetal injury <input type="checkbox"/> Specify <input type="checkbox"/> Fetal infection <input type="checkbox"/> Specify <input type="checkbox"/> Other Fetal Conditions/Disorders <input type="checkbox"/> Specify  <input type="checkbox"/> Unknown	
<small>Arrows: Check box and open-ended question formats are combined to capture the most accurate information being reported, while concurrently meeting the WHO reporting requirements.</small>	

**Quality of Wyoming Fetal Cause-of-Death Data**  
**1989 Report vs 2003 Report, 2006-2013**

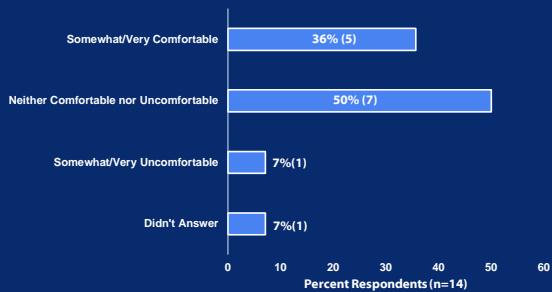
Entry Type	1989 Fetal Report (2006-2009)		2003 Fetal Report (2011-2013)	
	No./Total	(%)	No./Total	(%)
Missing Cause of Death	30/138	(22)	40/101	(40)
III-Defined Cause of Death	17/108	(16)	2/61	(3)
Prematurity	10/17	(59)	1/2	(50)
Unspecified	7/17	(41)	1/2	(50)

## Stakeholder Experience Completing Death Certificates — Methods

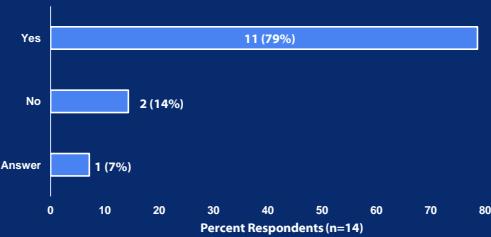
- Survey emailed to all stakeholders registered with WDH



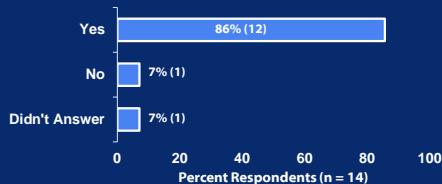
### How comfortable do you feel with the definitions of fetal and infant death?



### If training regarding the distinction between fetal death and infant death were available, would you be interested?



If training on assigning causes of fetal and infant death were available, would you be interested?



**Summary**

- **Sensitivity**
  - Detection of resident fetal deaths — 85%
  - Detection of resident infant deaths — 100%
- **Quality of cause-of-death data**
  - Fetal Deaths — 40% cause of death missing
  - Infant Deaths — 16% cause-of-death ill-defined
- **Stakeholder experience**
  - Distinction between fetal and infant death is challenging
  - Most responders are interested in further training

**Limitations**

- NCHS surveillance is not independent of WDH
- Unable to match WDH and NCHS records to identify missing fetal deaths
- Low response rate to stakeholder survey

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### Conclusions

- Wyoming surveillance failed to detect 15% (47/316) resident fetal deaths
  - Undetected deaths likely occurred out-of-state
  - High-risk pregnancies underrepresented
- Cause-of-death reporting can be improved
  - Fetal deaths: Missing entries
  - Infant deaths: Unspecific causes
- Stakeholders willing to undergo training

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### Recommendations

- Improve sharing of fetal death data among states
  - State and Territorial Exchange of Vital Events (STEVE)
  - Data-sharing agreements
  - Compatible data systems
- Train certifiers
  - Distinction between fetal and infant death
  - Assigning causes of fetal and infant death
- Electronic fetal death reporting

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### Acknowledgements and Citations

#### Wyoming Department of Health

Ashley Busacker, PhD

Mariah Storey, MS

Clay Van Houten, MS

Tracy Murphy, MD



#### Epidemiology Workforce Branch

Kris Bisgard DVM, MPH, Diplomate ACVPM



#### Sources

Lee et al., *Matern Child Health J* 2014; 1945-1954

*MMWR* 2001; 50(RR13): 1-35.

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