

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

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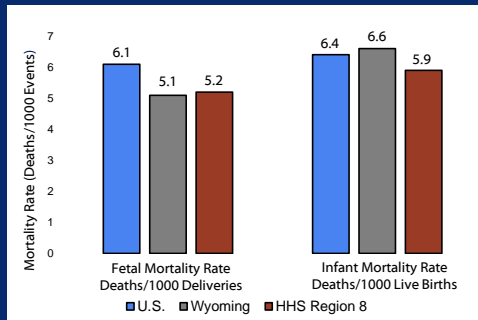


Wyoming

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



Fetal and Infant Mortality Rates — 2008–2010



HHS Region 8 includes CO, MT, ND, SD, UT, and WY
Hirai et al., 2014

Reducing Fetal and Infant Mortality in Wyoming

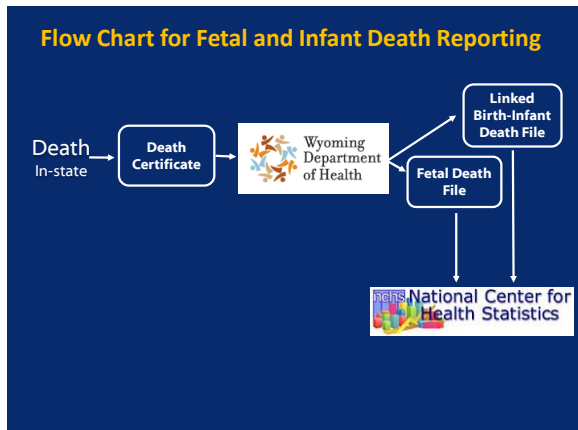
- Prevention of infant mortality is a Title V priority
- In 2014, Wyoming joined the Collaborative Improvement and Innovation Network to Reduce Infant Mortality (COIIN)
- Effective interventions depend on accurate data
 - Numbers of fetal and infant deaths
 - Causes of fetal and infant deaths
- Stakeholder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

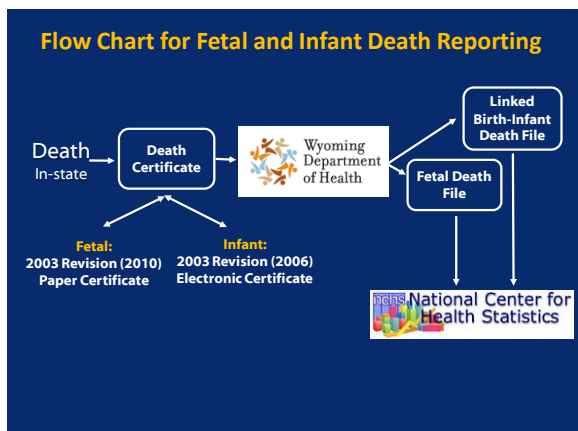
Research Questions

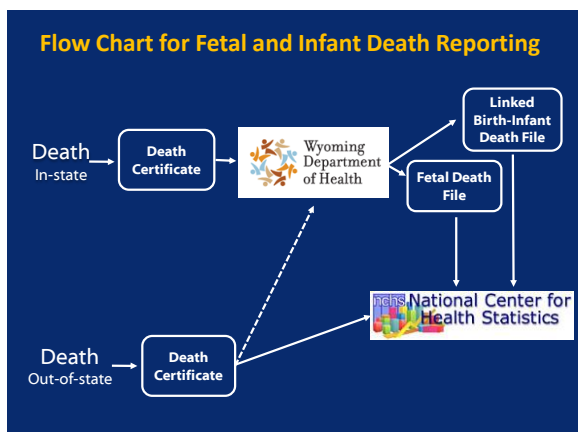
1. Sensitivity for resident deaths?
2. Quality of collected cause-of-death data?
3. How do stakeholders experience completing fetal and infant death certificates?

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







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?

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		

Reported Wyoming Resident Fetal Deaths by Year, 2006–2013



Sensitivity for Resident Fetal Deaths, 2006–2013

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

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

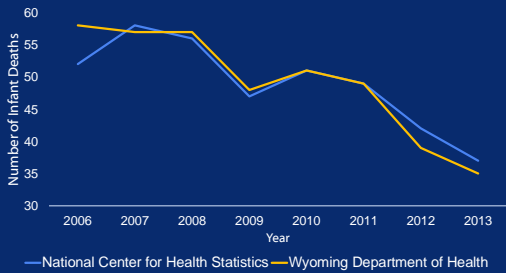
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WDH -	47	-	47
Total	316	-	

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	

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

Sensitivity for Resident Infant Deaths, 2006–2012

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

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

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
	Previaible 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, 10th 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**

Entry Type	NCHS		WDH	
	No./Total	(%)	No./Total	(%)
Missing Cause of Death	0/141344	(0)	1/365	(0.3)
Ill-Defined Cause of Death	29193/141344	(21)	58/364	(16)

**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)
Ill-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)
Ill-Defined Cause of Death	2/61	(3)	9/71	(13)

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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)
Ill-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

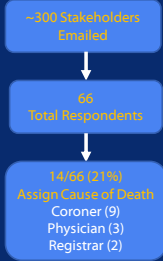
Report of Fetal or Neonatal Death 1989	Proposed Report of Fetal Death 2003
<i>Underlined check box items recommended for retention in same or modified form in 2003.</i>	<i>Italicized items or check boxes differ from 1989.</i>
CAUSE OF FETAL DEATH	CAUSE/CONDITIONS CONTRIBUTING TO FETAL DEATH
24. PART I Fetal or maternal condition directly causing fetal death	INITIATING CAUSE/CONDITION
<i>Enter only one cause per line for a, b, and c.</i>	<i>(Select one or specify)</i>
a. IMMEDIATE CAUSE (Specify Fetal or Maternal)	<i>Maternal Conditions/Disorders</i>
b. DEB TO (OR AS A CONSEQUENCE OF) fetal and/or maternal conditions, if any, giving rise to the immediate cause(s), stating the underlying cause last. (Specify Fetal or Maternal)	<i>Complications of Placenta, Cord, or Membranes</i>
	<input type="checkbox"/> <i>Rupture of membranes prior to onset of labor</i>
	<input type="checkbox"/> <i>Abnormal placentation</i>
	<input type="checkbox"/> <i>Placental infarct</i>
	<input type="checkbox"/> <i>True knot in cord</i>
	<input type="checkbox"/> <i>Clot thromboses</i>
	<input type="checkbox"/> <i>Other _____</i>
	<i>Specify: _____</i>
	<i>Other (Obstetrical or Pregnancy Complications)</i>
	<i>Specify: _____</i>
	<i>Fetal Anomaly</i>
	<i>Specify: _____</i>
	<i>Fetal Injury</i>
	<i>Specify: _____</i>
	<i>Fetal Infection</i>
	<i>Specify: _____</i>
	<i>Other Fetal Conditions/Disorders</i>
	<i>Specify: _____</i>
	<input type="checkbox"/> <i>Unknown</i>
	<i>Action: Check box and open-ended question formats are combined to capture the most clinically relevant information being reported, while concurrently meeting the WHO reporting requirements.</i>

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

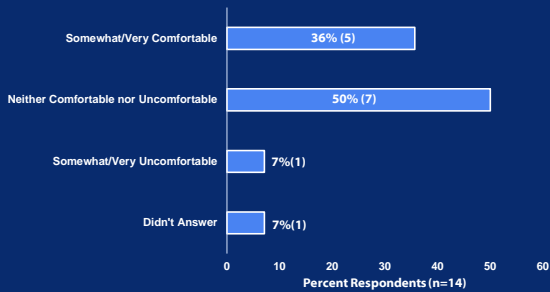
Entry Type	1989 Fetal Report (2006–2009)		2003 Fetal Report (2011–2013)	
	No./Total	(%)	No./Total	(%)
Missing Cause of Death	30/138	(22)	40/101	(40)
Ill-Defined Cause of Death	17/108	(16)	2/61	(3)
Prematurity	10/17	(59)	1/2	(50)
Unspecified	7/17	(41)	1/2	(50)

Stakeholder Experience Completing Death Certificates — Methods

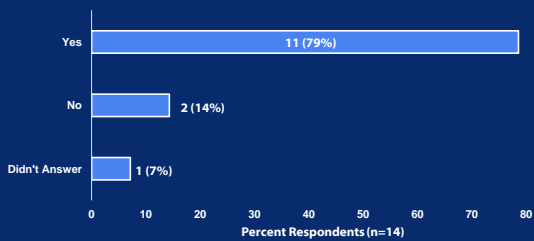
- Survey emailed to all stakeholders registered with WDH



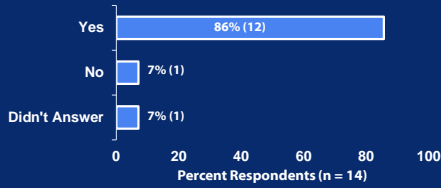
How comfortable do you feel with the definitions of fetal and infant death?



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 of 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

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

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

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; 19:45-1954
MMWR 2001; 50(RR13): 1-35.
