Washington State Department of Health

Anencephaly Investigation

Central Washington, 2010-2016

Advisory Committee Meeting
December 14, 2016

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PUBLIC HEALTH
ALWAYS WORKING FOR A SAFER AND HEALTHIER COMMUNITY

Surveillance Update

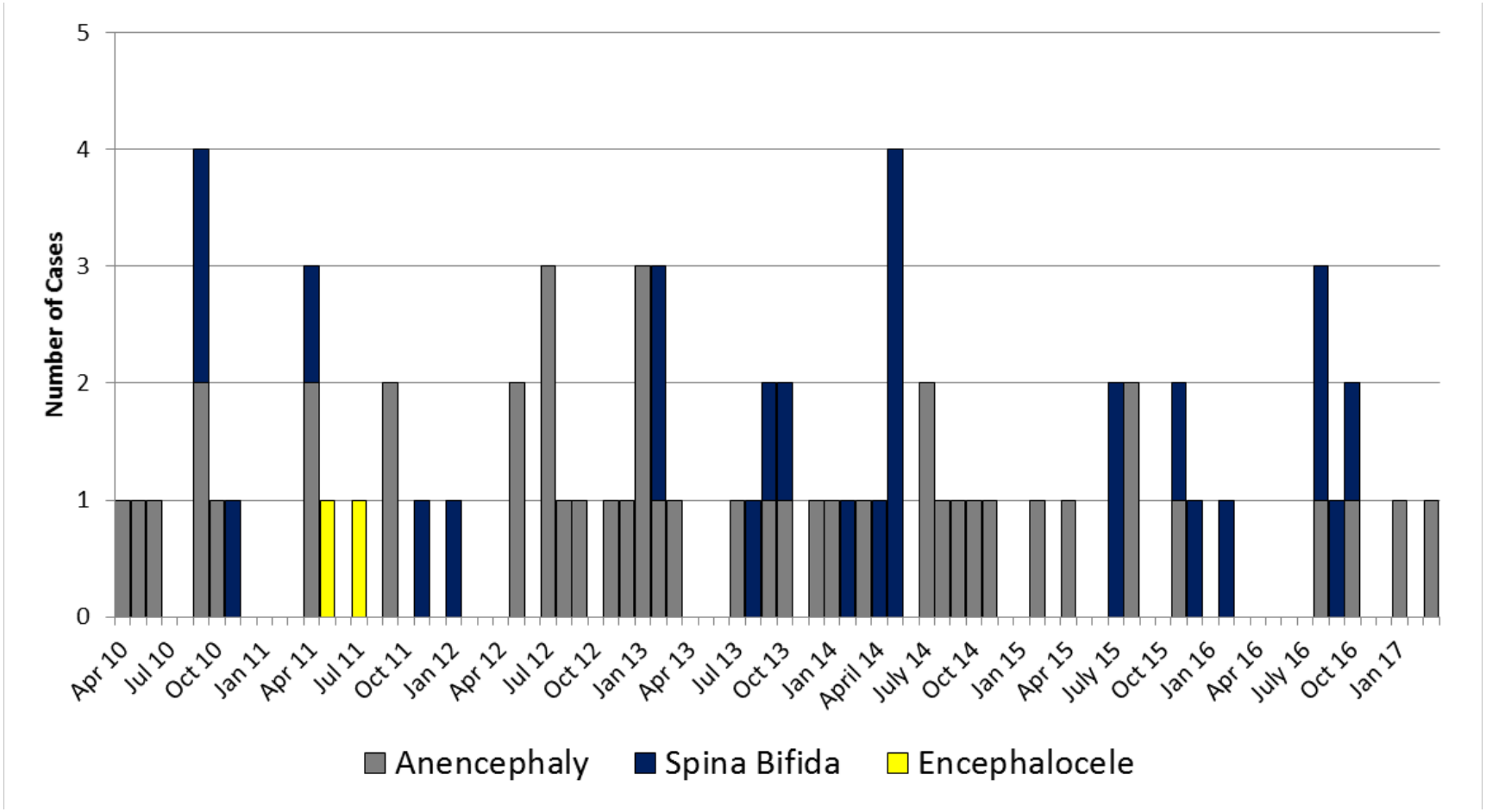
Neural Tube Defects by Year of Delivery or Estimated Year of Delivery[1]

	Number	Total births	Rate per 10,000 births	95% CI
All Neural Tube Defects				
2010	9	8565	10.5	(4.8, 19.9)
2011	8	8528	9.4	(4.0, 18.5)
2012	10	8352	12.0	(5.7, 22.0)
2013	14	8084	17.3	(9.5, 29.1)
2014	14	8432	16.6	(9.1, 27.9)
2015	9	8332	10.8	(4.9, 20.5)
2016	7	N/A	.	.
2017	2	N/A	.	.
Total to date[2]	73	.	.	.
2010 Through 2015	64	50293	12.7	(9.8, 16.3)
Anencephaly				
2010	6	8565	7.0	(2.6, 15.2)
2011	4	8528	4.7	(1.3, 12.0)
2012	9	8352	10.8	(4.9, 20.5)
2013	9	8084	11.1	(5.1, 21.1)
2014	8	8432	9.5	(4.1, 18.7)
2015	5	8332	6.0	(2.0, 14.0)
2016	2	N/A	.	.
2017	2	N/A	.	.
Total to date [2]	45	.	.	.
2010 Through 2015	41	50293	8.2	(8.9, 11.1)

[1]Estimated year of delivery is used for cases terminated or delivered before 37 weeks gestation.

[2]Total to date reflects cases confirmed by November 14, 2016 with a delivery or estimated date of delivery in 2010-2017.

Neural Tube Defects by Month of Estimated Delivery Date[1]



[1]Estimated delivery date uses delivery date for gestational age ≥ 37 weeks and estimated delivery date for gestational age <37 weeks at delivery. Cases were confirmed through November 14, 2016.

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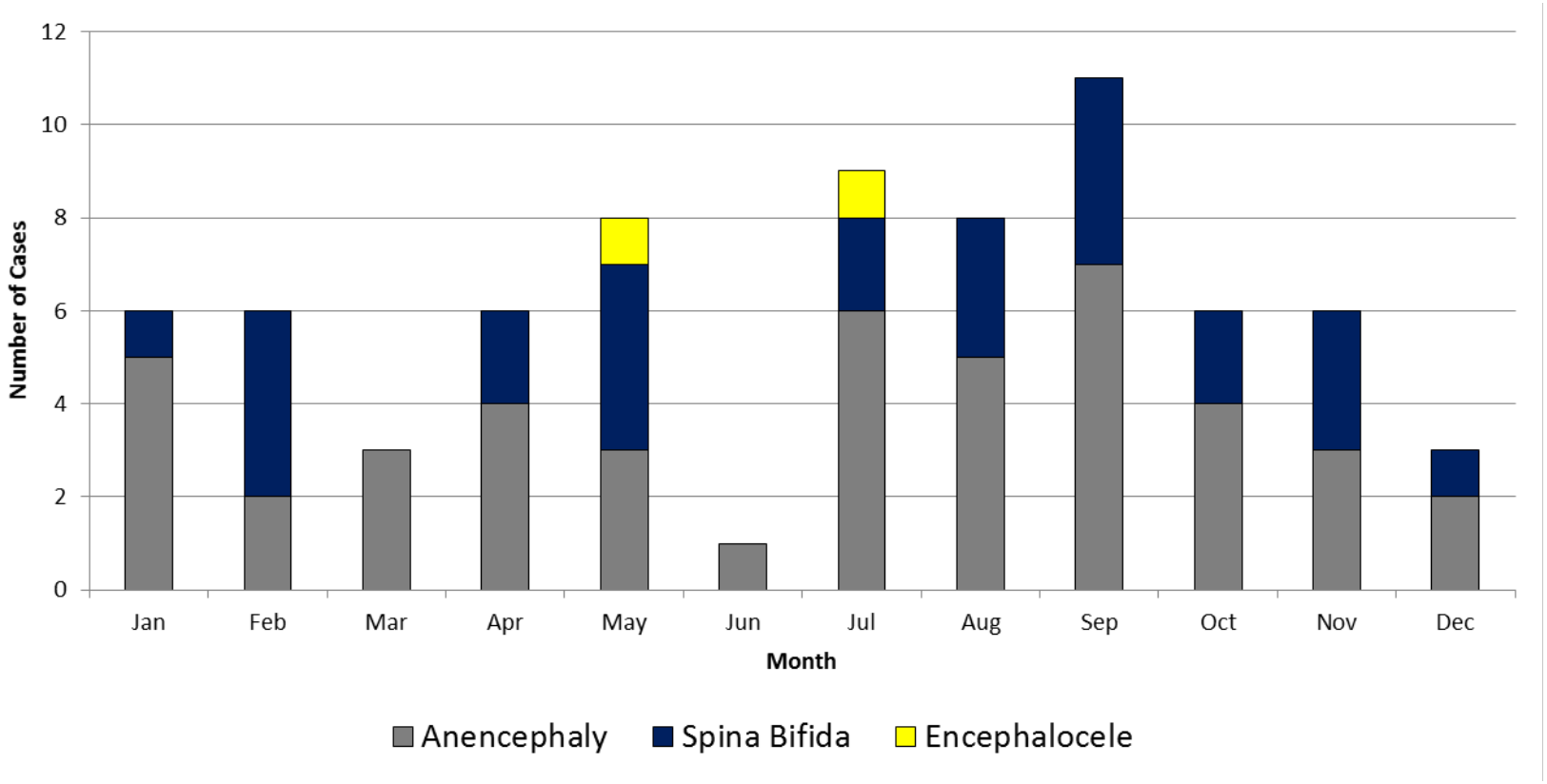
Neural Tube Defects by Month of Estimated Delivery Date 2010-2017 Combined[1]



[1]Estimated delivery date uses delivery date for gestational age ≥ 37 weeks and estimated delivery date for gestational age <37 weeks at delivery. Cases were confirmed through November 14, 2016.

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Interview Update

Characteristics of Interviewed Mothers[1]

	Mothers of Infants with any NTD (n=17)	%	Mothers of Infants with Anencephaly (n=12)	%	California and Texas Controls (n=1364)	%	California and Texas Anencephaly Cases (n=114)	%
Mean Age at Conception	29 Years	.	28 Years	.	25 Years	.	26 Years	.
Median Age	30 Years	.	28 Years	.	TBD	.	TBD	.
Race								
Hispanic	7	41%	6	50%	1097	81%	92	81%
Non-Hispanic White	10	59%	6	50%	184	14%	16	14%
Other	0	0%	0	0%	81	6%	6	5%
Missing	0	0%	0	0%	2	0%	0	0%
Language Spoken at Home								
English	12	71%	8	67%	592	49%	49	47%
Spanish	5	29%	4	33%	625	51%	56	53%
Missing	0	0%	0	0%	147	11%	9	8%
Birthplace								
US Born	13	76%	9	75%	709	58%	54	53%
Mexico Born	4	24%	3	25%	503	42%	47	47%
Missing	0	0%	0	0%	152	11%	13	11%
Education								
Less than HS	5	29%	4	33%	438	35%	37	34%
HS degree	1	6%	1	8%	346	28%	35	32%
More than HS	11	65%	7	58%	460	37%	36	33%
Missing	0	0%	0	0%	120	9%	6	5%
Prior Pregnancy	16	94%	12	100%	956	70%	81	71%
Prior NTD Pregnancy	3	18%	2	17%	0	0%	2	2%
Body Mass Index								
Overweight (BMI 25-29.9)	3	20%	2	20%	301	22%	22	19%
Obese (BMI≥30)	5	33%	2	20%	320	23%	32	28%
Missing BMI	2	12%	2	17%	.	.	.	.

1Three County Area 2012-2015; NBDPS California and Texas 2004-2013

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Vitamin Use of Interviewed Mothers[1]

	Mothers of Infants with any NTD (n=17)	Mothers of infants with anencephaly (n=12)	California and Texas Controls (n=1715)	California and Texas Anencephaly Cases (n=143)
Any Folic acid supplement use at some point from three months before through the end of pregnancy (from prenatal vitamins, multivitamins, or single ingredient folic acid supplements)	17 (100%)	12 (100%)	1205 (70%)	98 (69%)
Any Folic acid supplement use in month before through the first month of pregnancy (from prenatal vitamins, multivitamins, or single ingredient folic acid supplements)	10 (59%)	8 (75%)	510 (30%)	45 (31%)

1Three County Area 2012-2015; NBDPS California and Texas 2004-2013

Dietary Folate of Interviewed Mothers[1]

	Mothers of Infants with any NTD (n=17)	Mothers of infants with anencephaly (n=12)	California and Texas Controls (n=1364)	California and Texas Anencephaly Cases (n=114)
Mean Dietary Folate	347 mcg	317 mcg	573mcg	514mcg
Median Dietary Folate	359 mcg	363 mcg	TBD	TBD
Range Dietary Folate	50-775 mcg	50-496 mcg	0-3865mcg	0-1952
< 100 mcg	1 (6%)	1 (8%)	32 (2%)	3 (3%)
100-199 mcg	3 (18%)	1 (8%)	82 (6%)	11 (10%)
200-299 mcg	3 (18%)	2 (17%)	161 (12%)	21 (18%)
300-399 mcg	5 (29%)	5 (42%)	194 (14%)	14 (12%)
≥400 mcg	5 (29%)	3 (25%)	826 (61%)	60 (53%)
missing	0 (0%)	0 (0%)	69 (5%)	5 (4%)

1Three County Area 2012-2015; NBDPS California and Texas 2004-2013

Occupational Expos. of Interviewed Mothers[1]

	Mothers of Infants with any NTD (n=17)	Mothers of infants with anencephaly (n=12)
Mother worked month before through 2 months of pregnancy	11 (100%)	9 (100%)
Mother had multiple jobs	1 (9%)	1 (11%)
Solvent exposure	1 (9%)	0
Polycyclic Aromatic Hydrocarbon	2 (18%)	1 (11%)
Pesticides	5 (45%)	4 (44%)
High Physical Demands	3 (27%)	3 (33%)
Insecticide	4(36%)	4 (44%)
Fungicide	4(36%)	4 (44%)
Herbicide	5 (45%)	4 (44%)
Exposed to insecticides, fungicides and herbicides through farm work	3 (27%)	3 (33%)

1Three County Area 2012-2015

Investigation Conclusions

- Anencephaly rates elevated in three county area, and atypical predominance of anencephaly among NTDs
- Elevated anencephaly rate likely due in part to more complete ascertainment of cases in three county area
- Case-control analyses and interviews of cases have not identified single preventable cause
- Despite pursuing multiple hypotheses, there is still no evidence that the elevated rate is due to folic acid insufficiency, nitrates in drinking in water, specific pesticides or radiation from Hanford
- No identified prevention opportunity beyond promotion of preconception folic acid use

Future Activities

- Suspend additional investigation into the cause of the elevated rate of anencephaly
- Focus future public health efforts on surveillance, outreach, and prevention of NTDs.
- Continue enhanced surveillance in three-county area through January 2018. Determine whether to continue at that time.
- Incorporate lessons learned from intercept interviews into continued outreach, development of preconception and pregnancy materials, and efforts to improve access

Gruma, Corporation

Questions/Comments?

To provide comments or questions, please contact:

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