



**DEPARTMENT OF THE NAVY**

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IN REPLY REFER TO:  
3900  
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From: Commanding Officer, Naval Health Research Center, San Diego  
To: Commanding Officer, Navy and Marine Corps Public Health Center, 620 John Paul Jones Circle, Ste 1100, Portsmouth, VA 23708-2103

Subj: ANALYSIS OF RECENT MILITARY BIRTH DEFECTS FROM NAPLES

Encl: (1) Characteristics of Navy gestated infants, 2000 – 2005  
(2) Multivariable Logistic Regression Modeling Results

1. The following summary and enclosure (1) are forwarded per your request.
2. There are concerns the dumping and burning of trash in and around Naples, Italy, poses a public health risk to the health of US military personnel and their families living in the region. Recent studies conducted by the Italian government appear to suggest an increased risk of cancer and birth defects among their citizens in this area of Italy. As part of efforts to assess the public health risk to US military personnel and their families living in the region, the DoD Birth and Infant Health Registry, located at Naval Health Research Center, was asked to conduct a study of birth defects among infants who gestated in and around Naples.
3. This study included infants born to active-duty military women and spouses of active-duty military in the calendar years 2000 through 2005 where the mother showed continuous enrollment to an overseas Navy Military Treatment Facility (MTF) or Clinic (under the same parent DMIS) for the month prior to conception and the following three months of pregnancy. The final cohort included 8,678 infants. An infant was considered exposed if all four months of the mother's enrollment were at an MTF or clinic in the Naples area (Naval Hospital Naples and the clinics in Gaeta and Capodichino), regardless of the infant's birth location.
4. Analyses included descriptive investigations of demographic and occupational characteristics stratified by maternal enrollment location. Preliminary univariate analyses, including chi-square and odds-ratio were performed to assess the significance of associations between the outcome of interest and exposure. An exploratory model analysis was completed to assess regression diagnostics, significant associations, and collinearity, while simultaneously adjusting for all other variables in the model. Multivariable logistic regression models were used to estimate the adjusted odds ratios (ORs) and 95% confidence intervals (CIs) of birth defects among infants with the exposure of concern. All statistical analyses were performed using SAS software (Version 9.2, SAS Institute, Inc., Cary, NC).
5. Among the 8,678 infants, 894 showed first trimester exposure to the Naples area and 7,784 showed first trimester exposure to other overseas Navy enrollment sites. The overall rate of birth defects in the Navy is 3.6 per hundred births for the study time period. The rate of birth defects for infants exposed to Naples was 3.13 per hundred births vs. 2.35 per hundred births for other Navy overseas sites (Table 1). The unadjusted odds ratio between the two was 1.34 but was not statistically significant (95% CI: 0.90 – 2.01). After adjusting for birth plurality, infant gender, maternal age, sponsor race/ethnicity, maternal military status, sponsor pay grade, sponsor duty

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occupation, and sponsor duty status the adjusted odds ratio was 1.36 and was not statistically significant (95% CI: 0.90 – 2.06) (Table 2).

6. Other associated factors included increased odds of birth defects in military mothers when compared to dependent mothers, and advanced maternal age ( $\geq 35$  years). Sponsor's race/ethnicity of Black, not Hispanic vs. White, not Hispanic was significantly associated with decreased odds of a major birth defect (Table 2).

7. Overall, these analyses do not suggest a statistically significant increase in the birth defect rate of infants who gestate in the first trimester of their development in the Naples area compared to infants who gestate in the first trimester of their development in other overseas Navy areas. Although reassuring, additional surveillance in the region should continue in order to further evaluate the effect of specific exposures potentially influenced by the trash situation such as air and water. Identifying the individuals' various exposure levels could also provide additional insight into this potential environmental problem affecting a specific subset of the military population. As always, the DoD Birth and Infant Health Registry will be standing by to assist in these future investigations.

8. My scientific point of contact for this report is Dr. Ava Marie S Conlin, DO, MPH, telephone (619) 767-4489.



K. R. THOMPSON

Copy to:  
CO, Naval Medical Research Center  
COM, Navy Medicine Support Command

Characteristics of Navy gestated infants, 2000 – 2005

	Enrollment to Navy site							
	Enrolled in US Navy Site		Enrolled in Other Over-Seas Navy Site		Enrolled in Naples		All	
	Count	Percent in group	Count	Percent in group	Count	Percent in group	Count	Percent in group
All	72683	100	7784	100	894	100	81361	100
Any birth defect								
No	69984	96.29	7601	97.65	866	96.87	78451	96.42
Yes	2699	3.71	183	2.35	28	3.13	2910	3.58
Estimated gestational age								
Full term	66746	91.83	7340	94.3	859	96.09	74945	92.11
Preterm	5937	8.17	444	5.7	35	3.91	6416	7.89
Birth plurality								
Singleton	71870	98.88	7698	98.9	886	99.11	80454	98.89
Multiple	813	1.12	86	1.1	8	0.89	907	1.11
Infant gender								
Male	37407	51.47	4069	52.27	458	51.23	41934	51.54
Female	35276	48.53	3715	47.73	436	48.77	39427	48.46
Maternal age								
< 35	65545	90.18	6852	88.03	766	85.68	73163	89.92
>=35	7138	9.82	932	11.97	128	14.32	8198	10.08
Sponsor race/ethnicity								
white, not Hispanic	46988	64.65	4241	54.48	548	61.3	51777	63.64
Black, not Hispanic	10762	14.81	1435	18.44	157	17.56	12354	15.18
Hispanic	8638	11.88	967	12.42	95	10.63	9700	11.92
Other/Unknown	6295	8.66	1141	14.66	94	10.51	7530	9.26
Maternal military/marital status								
Dependent spouse	61082	84.04	5553	71.34	614	68.68	67249	82.66
Military sponsor	11601	15.96	2231	28.66	280	31.32	14112	17.34
Sponsor service branch								
Navy	47529	65.39	5066	65.08	779	87.14	53374	65.6
Other Military	25154	34.61	2718	34.92	115	12.86	27987	34.4
Sponsor pay grade								
Enlisted	58770	80.86	6360	81.71	700	78.3	65830	80.91
Officer	13913	19.14	1424	18.29	194	21.7	15531	19.09
Sponsor duty occupation	52689	72.49	5880	75.54	657	73.49	59226	72.79
Other occupation								
Infantry, gun crews, seamen	13052	17.96	1031	13.25	111	12.42	14194	17.45
Health care	6942	9.55	873	11.22	126	14.09	7941	9.76
Sponsor duty status								
Regular	64963	89.38	7229	92.87	819	91.61	73011	89.74
Reserve/Guard	7720	10.62	555	7.13	75	8.39	8350	10.26

Multivariable Logistic Regression Modeling Results

Variable		OR	95% CI	
Enrollment site	Naples vs other over-seas Navy site	1.36	0.90	2.06
Birth plurality	Multiple vs singleton	1.44	0.45	4.59
Infant Gender	Male vs female	1.29	0.98	1.71
<b>Maternal age</b>	<b>&gt;=35 vs &lt; 35</b>	<b>1.77</b>	<b>1.22</b>	<b>2.57</b>
<b>Sponsor race/ethnicity</b>	<b>Black, not hispanic vs White, not hispanic</b>	<b>0.56</b>	<b>0.37</b>	<b>0.86</b>
	Hispanic vs White, not hispanic	0.89	0.58	1.37
	Other/unknown vs White, not hispanic	0.82	0.54	1.26
<b>Maternal military status</b>	<b>Military sponsor vs Dependent spouse</b>	<b>1.53</b>	<b>1.13</b>	<b>2.07</b>
Sponsor service branch	Other military vs Navy	1.20	0.89	1.62
Sponsor pay grade	Officer vs enlisted	0.94	0.61	1.45
Sponsor duty occupation	Health care vs Other occupation	0.83	0.51	1.36
	Infantry, gun crews, seamen vs Other occupation	0.92	0.59	1.42
Sponsor component	Reserve/guard vs Regular	0.81	0.41	1.59