

### Presentation 3 – Han Kang

**A Review of Medical Records for 206  
Children with Birth Defects Reported  
by Gulf War Era Veteran Parents**

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Background

The National Health Survey of Gulf War Era Veterans and Their Families,  
Phase I & II, 1995-1996\*

Unit Component	Male	Female	Total
Active	4,800	1,200	6,000
Reserve	4,000	1,000	5,000
National Guard	3,200	800	4,000
Total	12,000	3,000	15,000

\* Kang et al, JOEM 2000; 421:491-501

**SURVEY DESIGN**

- Questionnaires through the mail
- Supplemental telephone interviews
- Physical examinations on a sample of veterans
- Validation through civilian, military and VA medical records

**QUESTIONNAIRE INSTRUMENTS**

- Limitations of activities
- Use of medical services (hospitalization, clinic visit)
- Chronic medical conditions (31 items)
- Prevalence of symptoms (48 items)
- Exposures in the Gulf theater (24 items)
- Prophylactics, vaccines (9 items)
- Reproductive health and pregnancy outcomes
  - live birth
  - birth defects
  - infant death
  - still birth
  - miscarriage
- Life events (14 items)
- Smoking & drinking histories
- PTSD checklist (PCL), 17 items

**Percent Distribution of Selected Characteristics of Those Who Responded vs. Those Who Have Not Responded**

Characteristics	Phase I	Phase II	Non Respondents
	Respondents (N=15,817)	Respondents (N=5,100)	Respondents (N=9,083)
<b>Sex</b>			
Male	79.3	81.8	80.3
Female	20.7	18.2	19.7
<b>Age (Mean Age In 1991) Years</b>	31.6	29.2	27.7
<b>Race</b>			
White	76.0	69.2	57.4
Black	16.4	24.2	32.8
Other	7.6	6.6	9.8
<b>Marital Status</b>			
Married	55.2	50.3	42.4
Single	39.4	44.7	53.5
Other	5.4	5.0	4.1
<b>Rank</b>			
Enlisted	82.6	88.0	92.4
Officer	15.8	11.0	7.0
Warrant	1.5	1.0	0.6

**Percent Distribution of Selected Characteristics of Those Who Responded vs. Those Who Have Not Responded (cont'd)**

Characteristics	Phase I	Phase II	Non Respondents
	Respondents (N=15,817)	Respondents (N=5,100)	Respondents (N=9,083)
<b>Branch</b>			
Air Force	12.9	12.8	8.6
Army	63.8	61.7	65.7
Marine	10.6	12.3	11.7
Navy	12.7	13.2	14.0
<b>Unit Component</b>			
Active	38.1	40.3	43.2
National Guard	27.8	26.7	24.7
Reserve	34.1	33.0	32.1
<b>Current Active Duty</b>			
Yes	20.3	16.2	.....
No	79.7	83.8	.....

**Percent Distribution of Selected Characteristics of Those Who Responded vs. Those Who Have Not Responded by Gulf War Service Status**

Characteristics	Gulf Veterans		Non-Gulf Veterans	
	Respondents (N=11,441)	Non-R † (N=3,559)	Respondents (N=8,474)	Non-R † (N=6,524)
<b>Sex</b>				
Male	81.4	80.0	75.1	80.5
Female	18.6	20.0	24.9	19.5
<b>Age (Mean Age In 1991) Years</b>	30.4	27.4	31.7	27.9
<b>Race</b>				
White	73.7	55.7	75.1	58.7
Black	19.0	34.1	17.4	31.8
Other	7.3	10.2	7.5	9.5
<b>Marital Status ‡</b>				
Married	52.5	42.9	55.8	42.1
Single	42.2	52.9	33.9	53.9
Other	5.3	4.2	5.3	4.0
<b>Rank</b>				
Enlisted	86.3	93.3	81.0	91.8
Officer	12.4	6.1	17.4	7.6
Warrant	1.3	0.6	1.5	0.6

**Percent Distribution of Selected Characteristics of Those Who Responded vs. Those Who Have Not Responded by Gulf War Service Status (cont'd)**

Characteristics	Gulf Veterans		Non-Gulf Veterans	
	Respondents (N=11,441)	Non-R † (N=3,559)	Respondents (N=8,474)	Non-R † (N=6,524)
<b>Branch</b>				
Air Force	12.5	8.4	13.4	8.7
Army	63.2	63.7	63.4	67.2
Marine	11.2	12.2	10.8	11.4
Navy	13.1	15.8	12.4	12.6
<b>Unit Component</b>				
Active	37.3	46.7	40.2	40.8
National Guard	28.3	23.3	26.5	25.7
Reserve	34.4	30.1	33.2	33.5
<b>Current Active Duty</b>				
Yes	19.2	.....	19.4	.....

† Non R= non-respondents  
‡ Marital Status at the time of deployment

National Health Survey Phase I and II  
Publications

- Kang HK, Mahan CM, Lee KY, Magee CA, Murphy FM. Illness among United States veterans of the Gulf War, a population based survey of 30,000 veterans. *J Occup Environ Med* 2000; 42:491-501.
- Kang HK, Magee C, Mahan CM, Lee KY, Murphy FM, et al. Pregnancy outcomes among US Gulf War veterans: a population based survey of 30,000 veterans. *Ann Epidemiology* 2001; 11: 504-511
- Kang HK, Mahan CM, Lee KY, Murphy FM, et al. Evidence for a deployment related Gulf War syndrome by factor analysis. *Archives Environmental Health* 2002; 57:61-68
- Kang HK, Natelson BH, Mahan CM, Lee KY and Murphy FM. Post-traumatic stress disorder and chronic fatigue syndrome-like illness among Gulf War veterans: A population based survey of 30,000 veterans. *Am J Epidemiol* 2003; 157:141-148 .
- Mahan CM, Kang HK, Dalager NA, et al. Anthrax vaccination and self-reported symptoms functional status, and medical conditions in the National Health Survey of Gulf War Era Veterans and Their Families. *Ann Epidemiol* 2003; 13:1-8
- Kang HK, Dalager NA, Ishii EK, et al. The role of sexual harassment and assault in PTSD among Gulf War veterans, manuscript submitted, under revision.

Table 1: Reported birth defects among index liveborn infants by Gulf deployment and gender of veterans

Birth Defects	Gulf (N= 2707)		Non-Gulf (N= 2266)		Adjusted OR(95%CI)
	N	(%)	N	(%)	
<b>Likely defects</b>					
Male	120	(5.4)	47	(2.8)	1.94(1.37-2.74)
Female	26	(5.5)	13	(2.3)	2.97(1.47-5.99)

Kang et al, *Ann Epidemiol* 2001; 11: 504-511

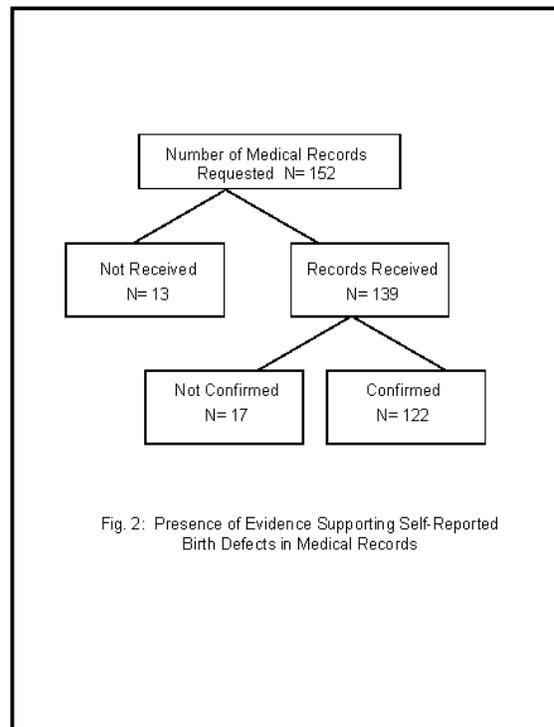
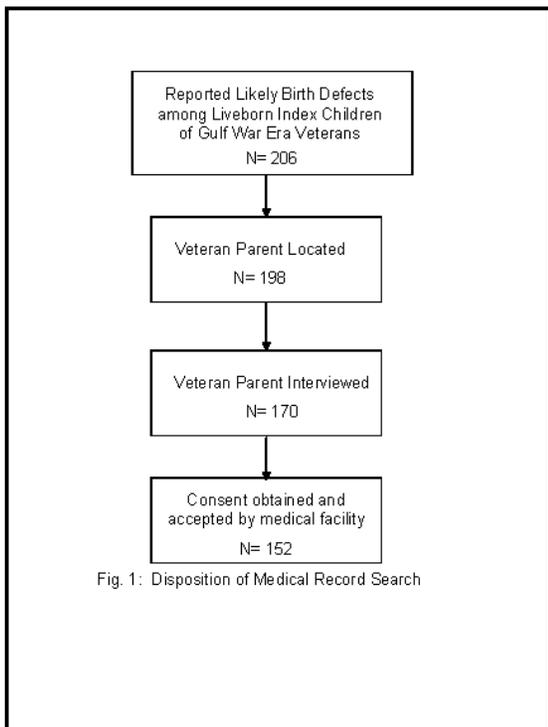


Table 2: Disposition of medical record review by parent Gulf War deployment status

Disposition	Gulf (N= 146)		Non-Gulf (N= 60)	
	N	%	N	%
Veteran Interviewed	126	86	44	73
Veteran Consented	112	(89)	40	(91)
Record Received	102	(91)	37	(93)
Male	83		25	
Female	19		12	
Self-Report Confirmed	87	(85)	35	(95)
Male	71		24	
Female	16		11	

Table 3: Confirmation rate by groups of birth defects and parental Gulf War deployment status

Group of Birth Defects	Gulf		Non-Gulf	
	# Records	# Conf	# Records	# Conf
1. Chromosomal Abnormality	5	5	0	0
2. Multiple Anomalies (Except Chromosomal & Heritable Genetic)	7	7	9	9
3. Isolated Anomaly	75	63	24	23
4. Congenital Malignancy	1	1	0	0
5. Heritable Genetic Disease	2	2	0	0
6. Undescribed Isolated Heart Abnormality	8	6	2	1
7. Other Poorly Described Defect (on-Cardiac)	4	3	2	2
Total	102	87	37	35

Table 4. Adjusted relative risk estimates for likely birth defects

Gender	Adjusted relative risk(95% confidence interval)			
	Phase I & II	Green's method <sup>a)</sup>	Direct <sup>b)</sup>	Confirmed Cases <sup>c)</sup>
Male veterans	1.98 (1.39-2.83)	2.78	1.72(1.21-2.43)	2.24(1.41-3.55)
Female veterans	2.53 (1.23-5.27)	2.71	2.26(1.12-4.56)	1.78(0.83-3.84)

<sup>a)</sup> True risk ratio =  $[P^1/P2 - (1 - Pred_1)/Pred_2]$ , where  $Pred_1$  denotes the positive predictive value within the non-Gulf veteran group, as defined by Green; Kelsey, JL et al. 1986

<sup>b)</sup> dRR = (self-report cases Gulf / # live birth Gulf) x confirmation rate Gulf + (self-report cases non-Gulf / # live birth non-Gulf) x confirmation rate non-Gulf

<sup>c)</sup> cRR = (confirmed cases Gulf / # live birth Gulf) + (Confirmed cases non-Gulf / # live birth non-Gulf)

### Summary

- Among those veterans who were located, and who consented to release their medical records, reported birth defects were documented in medical records for 85% of Gulf War veterans' children and 95% of non-Gulf veterans' children.
- The association of the reported birth defects among children and veteran's military service in the Gulf War was supported by a review of medical records.