

SPOUSAL MILITARY DEPLOYMENT DURING PREGNANCY AND ADVERSE BIRTH OUTCOMES

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US ARMED FORCES

- **1.4 million active duty men and women**
 - **55% of troops married**
 - **90,000 newborns annually**
- **Deployment**
 - **Stress and support**
 - **Mental health diagnoses**



Defense Manpower Data Center (December 2010), Soldier Family Action Plan. (2009)
Davis (2011); Mansfield (2012)

DEPLOYMENT AND PREGNANCY AMONG MILITARY SPOUSES



- **2.0 fold increased risk of stress or depression when spouse deployed**
- *Predictors of stress and depression*
 - *History of depression, isolation, prior deployment*
 - *Active-duty status of mother, >1 child at home*
- *No significant relationship between deployment and low birthweight (LBW) or small for gestational age (SGA)*

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DEPRESSION, ANXIETY, AND STRESS AND ADVERSE BIRTH OUTCOMES

- Non-military populations
- Psychosocial stress
 - LBW
 - 2x increased risk preterm delivery (PTD)
- Anxiety
 - 2-3x increased risk of PTD
 - Cesarean delivery and LBW
- Depression
 - 1.4x increased risk of PTD, LBW, SGA



METHODS

STUDY DESIGN AND POPULATION

- **Hospital Based Retrospective Cohort**
- **Births at Madigan Army Medical Center**
 - **September 2001- September 2011**
 - **Essentris inpatient electronic records**
 - **20,168 births**
 - **Exclusion:**
 - **Active-duty and reserve mothers**
 - **Dependent children**
 - **Multiple births**

EXPOSURE

- **Spouse deployment during pregnancy**
 - **Deployed v. not deployed**
 - **At time of delivery**
 - **13% of population exposed**

OUTCOMES

- **LBW, <2500g**
- **PTD, <37 weeks gestation**
- **SGA, <10th percentile for birthweight for gestational age**
- **Cesarean Delivery**

STATISTICAL ANALYSIS

■ Descriptive Analysis

■ Women with deployed v. non-deployed spouse

■ Characteristics compared

- Maternal age

Number of children

- Maternal race

Enlisted v. Officer

- Parity

Branch of Service

■ X² comparison

STATISTICAL ANALYSIS

- **Association between deployment status and SGA, PTD, LBW**
 - Logistic regression
 - Relative risk
 - 95% confidence intervals
- **Association between deployment status and Cesarean delivery**
 - Poisson regression with robust standard error estimates
 - Relative risk
 - 95% confidence interval

STATISTICAL ANALYSIS

■ Confounding

- A priori- maternal age
- Change of 10% in RR between crude and adjusted
 - No additional confounders identified

■ Effect Modification

- Maternal age (<20, 20-24, 25-29, 30-34, ≥35)
- Number of children (0, 1, ≥2)
- Spouse's branch of service (Army vs. other branches)

RESULTS

DESCRIPTIVE STATISTICS

- **14,799 women included**
- **With and without deployed spouse similar:**
 - Pregnancy history
 - Alcohol and tobacco use
 - Sex of infant
- **Spouse deployed more likely to be:**
 - Black or Asian
 - Enlisted
 - Army

DEPLOYMENT AND ADVERSE OUTCOMES

	Deployed	Not deployed	
	N=1939	N=12860	
Outcomes	%	%	Adjusted RR* (95% CI)
PTD	10.2	9.1	1.14 (0.97-1.34)
LBW	7.0	6.4	1.12 (0.92-1.36)
SGA	9.2	8.0	1.16 (0.97-1.4)
Cesarean section	24.8	25.8	0.98 (0.90-1.06)

*Adjusted for maternal age

BRANCH OF SERVICE

	Deployed N=197	Other Branches Not deployed N=1932	
Outcomes	%	%	Adjusted RR* (95% CI)
PTD	22.2	14.7	1.75 (1.19-2.57)
LBW	17.1	10.9	1.79 (1.18-2.71)
SGA	12	8.7	1.37 (0.83-2.27)
Cesarean delivery	26.7	27.6	1.07 (0.77-1.51)

*Adjusted for maternal age category

NUMBER OF CHILDREN

	2+ Children		
	Deployed	Not deployed	
	N=514	N=3055	
Outcomes	%	%	Adjusted RR* (95% CI)
PTD	11.8	10.0	1.22 (0.90-1.66)
LBW	9.2	6.4	1.49 (1.04-2.13)
SGA	9.0	6.0	1.56 (1.10-2.22)
Cesarean section	23.5	24.2	0.99 (0.83-1.17)

*Adjusted for maternal age category

MATERNAL AGE – 30-34 YEARS OLD

	Deployed	Not deployed	
	N=514	N=3055	
Outcomes	%	%	Adjusted RR* (95% CI)
PTD	13.0	9.5	1.48 (1.02-2.17)
LBW	10.7	6.5	1.81 (1.18-2.77)
SGA	10.6	7.0	1.67 (1.09-2.55)
Cesarean section	27.6	29.9	0.89 (0.74-1.10)

*Adjusted for living children and maternal age

MATERNAL AGE – ≥35 YEARS OLD

	Deployed	Not deployed	
	N=514	N=3055	
Outcomes	%	%	Adjusted RR* (95% CI)
PTD	21.5	13.4	1.79 (1.11-2.88)
LBW	9.6	9.4	1.05 (0.53-2.05)
SGA	10.3	7.0	1.57 (0.81-3.04)
Cesarean section	40.8	37.9	1.10 (0.88-1.37)

*Adjusted for living children and maternal age

DISCUSSION

CONCLUSIONS

- **Branch of service**
 - High risk pregnancies
 - Support
- **Children**
 - Increased risk of stress
 - Single motherhood
- **Maternal Age**
 - Sense of loss
 - Residual confounding



LIMITATIONS



- **Measurement of Deployment**
 - Timing and duration
 - Prior deployment
- **Selection bias**
 - Spouses who do not deliver at MAMC
- **Confounding**
 - Missing data
 - Unmeasured

NEXT STEPS

■ Practice

- Inform evidence based support programs
- Practitioners

■ Research

- Timing and number of deployments
- Role of social support
- Branch of service and treatment facility



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QUESTIONS