B-28A. Did the doctor say you had a condition that made it difficult to conceive?

1 = YES
2 = NO → SKIP TO B BOX.

B-29A. What did the doctor say the main condition was--did the doctor give it a medical name?

ENTER CONDITION OR PROBLEM NAME (LIMIT OF 40 CHARACTERS)

<table>
<thead>
<tr>
<th>B BOX</th>
<th>IF FERTILITY PROBLEM OCCURRED WITH MORE THAN ONE PARTNER (B-21=YES), CONTINUE. OTHERWISE, SKIP TO SECTION C.</th>
</tr>
</thead>
</table>

Earlier you told me there was another wife or partner with whom you tried for a year or more to conceive a child but were unable to do so.

B-24B. In what year did you first have this difficulty with your other wife or partner?

ENTER LAST 2 DIGITS OF YEAR. (EDIT :.)

B-25B. Did your [wife/partner] see a doctor to discuss difficulties in conceiving children?

1 = YES
2 = NO → SKIP TO B-27B.

B-26B. Did the doctor say your [wife/partner] had a condition that made it difficult to conceive?

1 = YES
2 = NO

B-27B. Did you see a doctor about this difficulty with your [wife/partner]?

1 = YES
2 = NO → SKIP TO SECTION C.

B-28B. Did the doctor say you had a condition that made it difficult to conceive?

1 = YES
2 = NO → SKIP TO SECTION C.
B-29B. What did the doctor say the main condition was--did the doctor give it a medical name?

ENTER CONDITION NAME (LIMIT OF 40 CHARACTERS).
APPENDIX B

Birth Defects Coding Guidelines
GENERAL CODING GUIDELINES

1. In coding these responses, we used the International Classification of Diseases, Ninth Revision (ICD-9) tabular and alphabetical indices.

2. Many of the verbatim responses clearly indicated congenital conditions and they were given congenital anomaly codes. Many responses, however, indicated a condition that could be acquired. Some of these conditions are:
   - Anemia
   - Hydrocephalus
   - Seizures
   - Pneumonia

We have assumed that these conditions, if given in response to the birth defect question, are congenital or perinatal conditions and have given them the appropriate codes.

3. Other responses were not always as easy to code. We tried to distinguish true structural anomalies from illnesses or disorders. Certain words, for example, helped us distinguish an anomaly:

<table>
<thead>
<tr>
<th>Code as Anomaly</th>
<th>Code as Illness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deformity</td>
<td>Disorder</td>
</tr>
<tr>
<td>Malformation</td>
<td>Problem</td>
</tr>
<tr>
<td>Undeveloped</td>
<td>Disease</td>
</tr>
<tr>
<td>Anomaly</td>
<td>Malfunction/dysfunction</td>
</tr>
<tr>
<td>Defect</td>
<td></td>
</tr>
</tbody>
</table>

   hole not in right spot
   - hole comes out under penis

These synonyms were used to decide what code was applicable if the conception was not well described.

4. Following these general coding guidelines is an alphabetical index of disease categories or organ systems containing various conditions and their proper codes. Many of these conditions represent actual responses given by the veterans as recorded by the interviewers. We have grouped identical or similar verbatims under the same code (i.e., all respiratory problems are coded as 770.8). Also within this index, the medical words, along with their common terminology, are documented; for example—hypospadias or

5. In some instances, an asterisk (*) may precede a condition in the index. In this case, the code that was given is a contradiction to the ICD-9 index e.g., “cyst of eye.”

The ICD-9 index directs the coder to 743.0 for “cyst of eye.” This code is a congenital absence of the eye. The condition is very serious and rare. We have, therefore, assumed that this response probably reflects a cyst of the eyelid and not of the eyeball itself, and we assigned the code 373.3.
6. At times, we had to code two distinct conditions given in a single response. In such cases, we coded the first condition, unless the second was clearly more serious. For example—
a. Heart murmur/asthma
   Eye problems/prematurity
   In these examples, both conditions are of equal severity; therefore, we coded the first condition.
b. Breathing problems/cerebral palsy
   In this instance, we coded the second condition, "cerebral palsy," since it is considered more serious than the first condition.

7. Judging from some verbatims, the veteran was not sure what type of condition his child had. Responses such as "badly deformed" and "would have been a vegetable" clearly indicate severe congenital anomalies. Although we did not know what condition the child had, we could assign a code of 759.9 for "congenital anomaly, unspecified."
### ALLERGIES
1. Allergy to milk/formula – code as intestinal malabsorption | 579.8
2. Allergies, multiple allergies | 995.3
3. Allergies to drugs, pollen, etc. – code as directed in index

### BLOOD DISEASES
1. Infection with blood cells | 771.8
2. Broken blood vessels | 772.6
   - Blood blisters
3. Rh disease | 773.0
   - Needed blood transfusion (Rh factor)
4. Problem with bilirubin count in blood – see "jaundice" | 774.6
5. Anemia | 776.5
   - Low red blood count
   - Low hemoglobin
6. Low white blood count | 776.8
7. Blood disease/disorder/problem | 776.9
   - Thick blood

### DIGESTIVE SYSTEM
1. Digestive reflux | 530.1
2. Stomach disorder/problems | 537.9
3. Liver problems/ailment | 573.9
4. Tongue tied | 750.0
   - Skin attached to tongue
5. Esophageal atresia/tracheoesophageal fistula | 750.3
   - Food tube went to lungs
   - Esophagus does not join stomach
   - Did not have an esophagus
6. Pyloric stenosis | 750.5
   - Stomach muscle closed stomach
   - Restriction of stomach valve
   - Blockage of stomach opening
   - Valve of stomach bottom closed
   - Outlet from stomach too small
   - Muscle obstruction of stomach
   - Opening/stomach/intestinal enlarged muscle
   - Pyloric valve malformed
7. Other anomalies of stomach
   Stomach valve wouldn't close
   Blockage in stomach
   Hole in stomach
   Born without stomach
   Malformation
   Bubble in stomach

8. Malformed throat pipe

9. Intestinal blockage/obstruction, NOS
   Undeveloped/not formed bowels
   Abdominal obstruction

10. Imperforate anus
    Rectal opening too small
    Undersized rectum
    Rectal tract too small
    Anal obstruction

11. Other anomalies of intestines
    Redundant colon
    Intestines "stuck together"
    Enlarged intestines
    Anal web

12. Umbilical cord attached to intestines

13. Intestinal, digestive (tract) problem/disorder
    Trouble passing bowels

**EAR AND NECK**

1. Hearing Problems

2. Otitis media
   Ear infection
   Fluid in ears
   Tubes in ears
   Tube from ear to throat

3. Hearing deficiency

4. Underdeveloped ear canal
   Atresia

5. Tab or tag on ear

6. Other specified anomalies of ear
   Cauliflower ear
   Pointed ear
   Misshapen ear
   Sunken eardrum
7. Unspecified anomaly of ear
   - Deformed ear (canal)
   - Malformation of ear (canal)

8. Branchial cleft, cyst, or fistula
   - Hole in neck/next to sideburns
   - Opening in neck/hole

ENDOCRINE SYSTEM

1. Diabetes
   - Diabetes-like condition
2. Hormone imbalance
3. Calcium deficiency
4. Immune deficiency
5. Undeveloped immune system

EYE AND LACRIMAL SYSTEM

1. Vision problems
2. Eye problems (includes eye nerve problems) with
   - no mention of muscle problems (see eye muscle problems)
3. Astigmatism
4. Eye deficiency — code as blindness
5. Cyst of eye (under, over, etc.)
   - Includes dermoid cyst
6. Eyelid/eye does not open
7. Blocked tear ducts
   - Plugged up tear ducts
   - Closed up tear ducts
   - Lump in tear ducts
8. Esotropia (cross-eyed)
9. Exotropia (wall-eyed)
10. Lazy eye
    - Turned eye (in) (out)
    - Wandering eye
    - Floating eye
11. Weak eye muscles
    - (Eye) muscle problems
    - Strabismus
12. Spasm of eye
   Nystagmus
   Twitching eye
   Can’t keep straight

13. Droopy eyelids
    Sleepy eyelids
    Granulated
    Ptosis

*Contradicts ICD-9 index

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**GENITOURINARY SYSTEM – KIDNEY AND URETER**

1. Kidney infection 590.9
2. Reflux of kidney 593.7
   Reflux of ureter
   Reflux of bladder
   Surgery relocation tube — bladder/kidney
3. Other nonstructural diseases of kidney 593.9
   Ailment (of) kidney
   Problem (with) kidney
   Disease (of) kidney
   Malfunction/nonfunctioning kidney
   Disorder (of) kidney
4. Obstructive defects of renal pelvis and ureter 753.2
   Hydronephrosis
   Ureteral atresia
   Tubes leading to bladder too short
5. Other anomalies of kidney 753.3
   Hole in kidney
   Two valves in kidney instead of one
   Born with three kidneys
   Accessory kidney
6. Defective kidney 753.9

---

**GENITOURINARY SYSTEM – BLADDER AND URINARY TRACT**

1. Bladder disorder 596.5
   Dysfunction
   Problem
2. Spasmodic bladder 596.8
3. Blocked urinary tract 599.6
   Obstructed
   Could not pass urine

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4. Urinary problems/difficulties  599.9

GENITOURINARY SYSTEM — MALE GENITALIA

1. Undeveloped foreskin on penis  605.0
   Penile adhesion
   Excessive foreskin over penis
   Not enough skin for circumcision

2. Other disease of genital organs  608.8
   Swollen testicles
   Enlarged testicles
   Liquid draining from testicles

3. Unspecified  608.9
   Genital problems
   Knot in testicles

4. Undescended testicles  752.5
   Testicles not in proper place
   Testicles out of place

5. Hypospadias  752.6
   (Penis) hole not in right place
   (Penis) hole dislocated
   (Penis) (urethra) hole comes out (below) (under) (middle of) penis

HEART AND CIRCULATORY SYSTEM

1. Mitral valve prolapse  424.0

2. Abnormal heart beat  427.9
   Irregular heart beat
   Arrhythmia
   Malfunction

3. Enlarged heart  429.3

4. Hole in heart  745.9

5. Hypoplastic right ventricle  746.0

6. Other anomalies of heart  746.8
   Shunt in the heart
   Blockage (of tube) of heart
   Defective heart valve
   Artery (tube) to heart bent
   Not fully developed
   Restricted blood flow in heart
7. Anomaly of aorta
   "Blue baby"
   Congenital heart disease
   Heart defect/problem

8. Heart murmur (functional)
   Echo in heart

CIRCULATORY SYSTEM

1. Peripheral vascular anomalies
   Non born blood vessels
   Small arteries
   Arterio-venous malformation, NOS
   Raised blood vessels

2. Circulatory anomalies of head or brain
   Weak capillary in brain
   Big blood vessel on head
   Arterio-venous malformation of brain
   Other specified anomalies of cerebral vessels

3. Unspecified anomalies of circulatory system
   Persistent fetal circulation

HERNIA AND HYDROCELE

1. Inguinal and groin (includes double hernia)

2. Umbilical hernia
   Ruptured belly button
   Navel rupture
   Oversized navel (had to be cut)
   Navel correction outward

3. Stomach hernia
   Penis hernia
   *Testis

4. Hernia, NOS

5. *Omphalocele
   Prune belly
   Abdominal muscle not developed
   Umbilical cord attached to intestines

6. Congenital hydrocele

*Contradicts ICD-9 index.
ABDOMINAL WALL

1. Omphalitis 771.4
   Navel would not heal
   Muscle in navel slow in closing

MUSCULOSKELETAL SYSTEM — HEAD AND SKULL

1. Specified deformities of head 754.0
   Asymmetric head
   Indentation
   Enlarged head
   Molded head

2. Specified deformities of skull 756.0
   Premature closure of sutures
   Absence of skull bones
   Craniosynostosis
   Deformity of forehead
   Cranial facial anomalies includes: anomalies of soft spot

3. Hematoma 767.0
   Hematoma of brain (includes subdural hematoma)

4. Hematoma of skull or head 767.1

5. All cutaneous hemorrhages (hematoma) — includes
   "broken blood vessels" of neck or head; blood blisters
   of head; blood lump

MUSCULOSKELETAL SYSTEM — MUSCLES

1. Rectum — no rectal muscles 569.4

2. Weak muscles in kidney 599.9

3. Muscle weakness 728.9
   Low/poor muscle tone
   Hypotonia

4. Other specified anomalies of muscles 756.8
   Spastic torticollis (congenital)
   Absence/shortened muscle or tendon
   Protruded muscle (in stomach)
   Locked muscles (in stomach)
   Tight muscles (in throat)
MUSCULOSKELETAL SYSTEM – ORTHOPEDIC DEFORMITIES

1. Dislocation of hip/out of socket/out of place hip joint
   C54.3

2. Bowlegs; includes curvature of legs
   C54.4

3. Varus deformity
   Feet (ankles) or legs turned in; foot turned in; pigeon-toed
   C54.5

4. Valgus deformity
   Feet (ankles) or legs turned out; foot turned out; flat foot
   C54.6

5. Clubfoot
   Congenital deformity of foot
   Other specified deformity of foot
   C54.7

6. Absence (congenital amputation) of any part of (upper)
   (lower) limb — includes fingers and toes — code as
   reduction deformity
   C755.2–755.4

7. Other deformities of lower limbs (includes hip and toes)
   Tibial torsion
   Twisted/crooked leg
   Feet turned, NOS
   Hip deformity (includes undeveloped hip, no hip balls)
   C755.6

8. Fracture of clavicle/collarbone
   C67.2

9. Dislocation of shoulder at birth
   Separated shoulder
   Dislocated collarbone
   C67.3

MUSCULOSKELETAL SYSTEM – SPINE

1. Pilonidal cyst
   Cleft/dimple of spine
   C685.1

2. Scoliosis
   Curvature of spine
   C54.2

3. Other deformities of spine
   Hole at (base) tailbone/rump/spine
   Opening on tailbone
   Absent vertebra
   Hemivertebra
   C56.1
**MUSCULOSKELETAL SYSTEM — THORACIC**

1. Anomalies of chest wall  
   - Breast plate slightly concave  
   - Sunken chest  
   - Chest bone caved in  
   - Concave chest  
   - Chicken breast  
   - Undeveloped chest  
   - Hole in bone of chest  

2. Anomalies of ribs and sternum  
   - Malformation (of) sternum  
   - Deformity of (ribs) (sternum)  
     (Fusion) (Ribs grew together)

**NEONATAL CONDITIONS**

1. Immaturity  
   - Specified as <7 months’ gestation

2. Prematurity, unspecified  
   - Specified as >7 months’ gestation

3. Prematurity with jaundice

4. Jaundice  
   - Yellow jaundice  
   - Problem/elevation of bilirubin count  
   - Yellow spots on body  
   - Liver problems (had to be kept under lights)

**NEOPLASMS**

1. Cyst and polyp — code under heading in index.  
   If not in index, code as “benign neoplasm”

2. Tumor — code as neoplasm, unspecified nature

3. Growth — code as neoplasm, unspecified nature  
   unless it is stated as a benign growth; then  
   code as benign neoplasm

**NERVOUS SYSTEM AND BRAIN**

1. Emotionally handicapped

2. Impairment of motor skills

3. Mentally handicapped — code as mental retardation

4. Paralysis

5. Brain dysfunction
6. Neurologic deficit
   Neurologic problem
   Impaired neurologic development

7. Pinched nerve — arm

8. Pinched nerve — neck

9. Hydrocephalus (congenital)
   Fluid on head
   Water on brain

10. Tethered spine
    Tethered cord (spine)

11. Incompletely formed optic nerve
    Undeveloped nervous system

12. Unspecified anomalies of brain, spinal cord, and nervous system
    Malformation

13. Hematoma of brain (includes subdural, cerebral)

14. Hematoma of head/skull

15. *Brain damage

16. Convulsions/seizures

17. Nervous condition
    Includes other ill-defined perinatal conditions

18. Abnormal brain waves
    *Contradicts ICD-9 index.

   RESPIRATORY SYSTEM

1. Misformed/malformed/disease of adenoids

2. Bronchial infection (not stated as due to birth)
   Code as bronchitis

3. Pulmonary edema/fluid in lungs

4. Choanal atresia
   No opening in nose for breathing
   Nasal passages too small

5. Other anomalies of nose
   Abnormal bone in nose

   *Contradicts ICD-9 index.
6. Perforation of lung
   Disorder
   Hole
   Malformation
   Spot on lung/removed upper lobe
   (Note: because of removal of upper lobe, this was given a more severe lung anomaly code)

7. Asphyxia/stopped breathing at birth

8. Pneumonia
   Respiratory infection at birth

9. Aspiration pneumonia/pneumonitis

10. Undeveloped lungs
    Immature lungs
    Premature lung problems
    Respiratory tract not fully developed

11.Collapsed lungs/atelectasis

12. Breathing problems/respiratory problem
    Bronchial problems
    Respiratory difficulty
    Respiratory distress
    Could not get oxygen to blood
    Cyanosis at birth

SKIN

1. Dyschromia
   Discoloration
   Spots
   Splotches

2. Other disease of skin
   Bumps
   Blisters
   Pimples

3. Unspecified diseases
   Dry skin
   Cradle cap
   Shedding of skin
   Skin problem
   Skin disease
4. Congenital anomalies
   Birthmarks
   Epidermolysis bullosa
   Urticaria pigmentosa
   Strawberry (marks) on skin

5. Edema of skin
   Fluid between skin layers

6. Rashes
   Skin eruption
   Sensitive skin

7. Changes in skin texture
   Thick skin
   Thin skin

SYNDROMES

1. Kawasaki's disease
2. Cornea delorde syndrome — should be called Cornelia de Lange's syndrome
   Prader-Willi syndrome
   Puppet Syndrome — retardation — should be called "Happy Puppet syndrome"
   Russell-Silver syndrome
3. Near miss SIDS (sudden infant death syndrome)
   Near crib death
   Near miss syndrome
APPENDIX C

Nonindependence of Child Outcomes
In this study, the data were collected in a nested data structure, with veterans at the first level and their children as the second level. In the first level, veterans were selected at random; therefore, veterans constituted independent observations. In the second (children) level, several children may come from one family; therefore, there may be a correlation among children within a family. In other words, the children may not be independent observations. Because the unit of observation may not be independent within a family, application of standard logistic regression, which assumes independent observations, may not be appropriate. In this situation (the presence of nonindependence for the children, but not for the veteran), the estimators of the standard logistic model, as used in BMD:LR or in the SAS LOGISTIC package, are still consistent, but the variance of the estimators is affected (Liang and Zeger, 1986). In other words, ignoring nonindependent observations leads to incorrect variance estimates for the regression coefficients.

We evaluated the degree of nonindependence in the children by comparing the results of the standard logistic method with the results of a modified logistic method that accounts for nonindependence.

Generally, two approaches are used to analyze data that are nonindependent. One approach is referred to as the "conditional logistic" model. The two types of conditional models are the transitional or state dependence model and the random-effects model. The transitional model uses, in its logistic form, a probability function for one outcome (response) in a family, given other outcomes in that family. Because the logistic form is defined as a conditional probability function within a family, this approach is most appropriate if the objective of the study is to evaluate the association of outcome within a family. This approach is advocated by Rosner (1984), Bonney (1986), and Connolly and Liang (in press). The random-effects model uses the conditional distribution of a response given a random effect (Anderson and Aitkin, 1985; Stiratelli et al., 1984; Zeger et al., 1987). In this model, subject-to-subject heterogeneity is explicitly modelled. Zeger et al. (1987) refer to this model as the subject-specific (SS) model. Thus, as in the transitional model, the regression coefficients have subject-specific interpretation.

The second approach is referred to as the "marginal logistic" model. In the logistic form of this model, a marginal probability function is used for each observation (Liang and Zeger, 1986; Stram et al., (in press); Zeger et al., 1987; Zeger and Liang, 1986). In contrast to the subject-specific model, Zeger et al. (1987) call this model a population-averaged (PA) model. This model is most useful for evaluating the association between the outcomes and the covariates as a population average. This model focuses on regression coefficients, while treating the nonindependence as a nuisance, and uses a "working" correlation matrix to approximate the nonindependence (Liang and Zeger, 1986). The PA model uses a generalized estimating equation (GEE) to estimate regression coefficients and intraclass correlation as a measure of nonindependence. The GEE approach extends the generalized linear model estimating equation to multivariate responses. Zeger et al. (1987) summarized the advantage of the PA model as follows:

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Not to be confused with the conditional logistic analysis advocated by Breslow and Day (1980).
the population-averaged response for a given covariate, \( X_{it} \), is directly estimable from observations without assumptions about the heterogeneity across individuals in the parameters. PA parameters are in this sense one step closer to the data than SS parameters.

Because both the marginal and standard logistic models use the logistic form of the marginal probability function, the estimators of both models have the same interpretation. Proponents of the marginal logistic model contend that the logistic form of the marginal probability function has a simpler interpretation than the logistic form of the conditional logistic function. The choice of model actually depends on the objective of the study. Because the main objective of our study is to assess the association of the outcomes with Vietnam service among veterans as a group (population-averaged response), the marginal logistic model is the more appropriate method. Thus, to evaluate the degree of nonindependence, we compared the results of the marginal logistic model (Liang’s model) with the results of the standard logistic model. These comparisons quantify the lack of independence and determine whether the application of the standard logistic model is justifiable.

For these comparisons, we conducted three analyses. First, we compared the standard errors and betas of the two models, using several birth defect outcomes. The outcomes were arbitrarily selected to provide a range in the number of cases and the magnitude of the crude odds ratio (OR). For example, we selected all birth defect outcomes (1,416 cases, crude OR = 1.32), all nervous system birth defects (46 cases, crude OR = 2.37), and all circulatory system birth defects (158 cases, OR = 1.10). Results of these comparisons indicate the magnitude of the nonindependence problem. Second, we compared the ORs and the 95% confidence intervals (CIs) of the two models for all birth defect outcomes that were of weak or borderline statistical significance when we used the standard logistic model. In these comparisons, we evaluated the effect of ignoring nonindependence on the statistical significance of the OR for each outcome. Third, we compared the ORs and the 95% CIs of the two models for all pregnancy outcomes. We compared all pregnancy outcomes because we expect, within a family, a higher correlation of pregnancy outcomes than of birth defect outcomes and because pregnancy outcomes are much more common events than birth defects. For all comparisons in the three analyses, we used a model adjusted for the seven primary covariates.

For the first analysis of selected birth defects, the two models show similar standard errors and betas. The differences for the standard error range from -0.0089 to 0.0063 and for the betas, from -0.0002 to 0.0067 (Table C-1). Intraclass correlations for Liang’s model are 0.124

**Table C-1. Comparison of Standard Errors (SE) and Betas of Vietnam Service for Liang’s and Standard Logistic Models Adjusted for All Primary Covariates**

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>SE</th>
<th>Beta</th>
<th>Difference</th>
<th>SE</th>
<th>Beta</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Birth Defects (1416 cases)</td>
<td>Liuang</td>
<td>Standard</td>
<td>Difference</td>
<td>Liuang</td>
<td>Standard</td>
<td>Difference</td>
</tr>
<tr>
<td></td>
<td>0.0638</td>
<td>0.0575</td>
<td>0.0063</td>
<td>0.2599</td>
<td>0.2532</td>
<td>0.0167</td>
</tr>
<tr>
<td>Birth Defects of Circulatory System (159 cases)</td>
<td>0.1680</td>
<td>0.1654</td>
<td>0.0026</td>
<td>0.1422</td>
<td>0.1360</td>
<td>0.0162</td>
</tr>
<tr>
<td>Birth Defects of Nervous System (46 cases)</td>
<td>0.3335</td>
<td>0.3424</td>
<td>-0.0089</td>
<td>0.8403</td>
<td>0.8405</td>
<td>-0.0002</td>
</tr>
</tbody>
</table>

158
for all birth defect outcomes, 0.050 for circulatory system outcomes, and -0.001 for nervous system outcomes. For the second and third analyses of birth defect outcomes and pregnancy outcomes, the comparisons of the two models show that both models give similar ORs and arrive at the same conclusion on the basis of the confidence interval of the OR (Tables C-2 and C-3). These results are partly explained by the relatively small number of children in most families (2.1 children per veteran for those veterans with children). In summary, the results of these comparisons indicate that lack of independence for birth defects and pregnancy outcomes in our study is minimal; therefore, application of the standard logistic model is justified.

Table C-2. Comparison of Odds Ratios and 95% Confidence Intervals of Birth Defect Outcomes for Standard and Liang Logistic Models Adjusted for All Primary Covariates

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Standard</th>
<th></th>
<th>Liang</th>
<th></th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
<td>OR</td>
<td>95% CI</td>
<td></td>
</tr>
<tr>
<td>All Birth Defects (1400 cases)</td>
<td>1.29</td>
<td>1.15-1.44</td>
<td>1.30</td>
<td>1.14-1.47</td>
<td>0.124</td>
</tr>
<tr>
<td>Nervous System (46 cases)</td>
<td>2.32</td>
<td>1.18-4.53</td>
<td>2.32</td>
<td>1.21-4.46</td>
<td>0.001</td>
</tr>
<tr>
<td>Ear, Face, Neck (59 cases)</td>
<td>1.60</td>
<td>0.93-2.76</td>
<td>1.62</td>
<td>0.26-10.02</td>
<td>0.136</td>
</tr>
<tr>
<td>Circulatory (159 cases)</td>
<td>1.15</td>
<td>0.83-1.58</td>
<td>1.15</td>
<td>0.83-1.60</td>
<td>0.050</td>
</tr>
<tr>
<td>Digestive System (189 cases)</td>
<td>1.21</td>
<td>0.90-1.63</td>
<td>1.23</td>
<td>0.84-1.81</td>
<td>0.067</td>
</tr>
<tr>
<td>Urinary System (74 cases)</td>
<td>1.40</td>
<td>0.86-2.26</td>
<td>1.42</td>
<td>0.63-3.20</td>
<td>0.103</td>
</tr>
<tr>
<td>Musculoskeletal (735 cases)</td>
<td>1.25</td>
<td>1.07-1.46</td>
<td>1.24</td>
<td>1.05-1.48</td>
<td>0.140</td>
</tr>
<tr>
<td>Integument (58 cases)</td>
<td>2.22</td>
<td>1.24-4.00</td>
<td>2.27</td>
<td>1.20-4.27</td>
<td>0.087</td>
</tr>
</tbody>
</table>

Table C-3. Comparison of Odds Ratios and 95% Confidence Intervals of Pregnancy Outcomes for Standard and Liang Logistic Models Adjusted for All Primary Covariates

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Standard</th>
<th></th>
<th>Liang</th>
<th></th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
<td>OR</td>
<td>95% CI</td>
<td></td>
</tr>
<tr>
<td>Miscarriage</td>
<td>1.27</td>
<td>1.17-1.37</td>
<td>1.26</td>
<td>1.15-1.39</td>
<td>0.132</td>
</tr>
<tr>
<td>First trimester</td>
<td>1.31</td>
<td>1.19-1.44</td>
<td>1.30</td>
<td>1.16-1.46</td>
<td>0.139</td>
</tr>
<tr>
<td>Second trimester</td>
<td>1.08</td>
<td>0.91-1.28</td>
<td>1.10</td>
<td>0.90-1.33</td>
<td>0.069</td>
</tr>
<tr>
<td>Third trimester</td>
<td>1.29</td>
<td>0.87-2.50</td>
<td>1.30</td>
<td>0.66-2.59</td>
<td>0.012</td>
</tr>
<tr>
<td>Unknown</td>
<td>1.32</td>
<td>0.93-1.87</td>
<td>1.27</td>
<td>0.84-1.91</td>
<td>0.080</td>
</tr>
<tr>
<td>Induced Abortion</td>
<td>1.04</td>
<td>0.91-1.19</td>
<td>1.00</td>
<td>0.84-1.18</td>
<td>0.261</td>
</tr>
<tr>
<td>Tubal Pregnancy</td>
<td>0.95</td>
<td>0.73-1.24</td>
<td>0.96</td>
<td>0.72-1.28</td>
<td>0.099</td>
</tr>
<tr>
<td>All Short-Term Pregnancies</td>
<td>1.19</td>
<td>1.11-1.28</td>
<td>1.18</td>
<td>1.09-1.28</td>
<td>0.173</td>
</tr>
<tr>
<td>Stillbirth</td>
<td>0.88</td>
<td>0.68-1.13</td>
<td>0.87</td>
<td>0.66-1.15</td>
<td>0.047</td>
</tr>
</tbody>
</table>
APPENDIX D

Forms Used in the General Birth Defects Study and the Cerebrospinal Malformations Study