

Supplementary Table 1. List of ICD-9/10-CM codes used to define birth defects within the first year of life.

Birth Defect Category	ICD-9 Description	ICD-9 codes	ICD-10 codes	ICD-10 Description	Notes
Spina bifida	Spina bifida with hydrocephalus	741.0x	Q05.0-Q05.4	Spina bifida with hydrocephalus	
			Q05.9	Spina bifida, unspecified	
			Q07.03	Arnold-Chiari syndrome with spina bifida and hydrocephalus	
	Spina bifida without hydrocephalus	741.9x	Q05.5-Q05.8	Spina bifida without hydrocephalus	
			Q05.9	Spina bifida, unspecified	
			Q07.01	Arnold-Chiari syndrome with spina bifida	
Encephalocele, cranial meningocele, encephalomyelocele	Encephalocele	742.0	Q01.0-Q01.9	Encephalocele	
Microcephalus	Microcephalus	742.1	Q02	Microcephaly	
Holoprosencephaly*	Reduction deformities of brain	742.2	Q04.2	Holoprosencephaly	
Anophthalmia, microphthalmia	Clinical anophthalmos, unspecified	743.00	Q11.1	Other anophthalmos	
	Cryptophthalmos	743.06	Q11.2	Microphthalmos	
	Microphthalmos, unspecified	743.10	Q11.2	Microphthalmos	
	Simple microphthalmos	743.11	Q11.2	Microphthalmos	
	Microphthalmos associated with other anomalies of eye and adnexa	743.12	Q11.2	Microphthalmos	
Cataracts and other lens defects	Congenital cataract, unspecified	743.30	Q12.0	Congenital cataract	
	Capsular and subcapsular cataract	743.31	Q12.0	Congenital cataract	

	Cortical and zonular cataract	743.32	Q12.0	Congenital cataract	
	Nuclear cataract	743.33	Q12.0	Congenital cataract	
	Total and subtotal cataract, congenital	743.34	Q12.0	Congenital cataract	
	Congenital aphakia	743.35	Q12.3	Congenital aphakia	
	Anomalies of lens shape	743.36	Q12.2	Coloboma of lens	
			Q12.4	Spherophakia	
			Q12.8	Other congenital lens malformations	
	Buphthalmos	743.2x	Q15.0	Congenital glaucoma	
Anotia, microtia	Absence of external ear	744.01	Q16.0	Congenital absence of (ear) auricle	
	Microtia	744.23	Q17.2	Microtia	
Other cardiac defects: septal defects, heterotaxy, partial anomalous pulmonary venous return	Septal heart defects: Ventricular septal defect, Other bulbus cordis anomalies and anomalies of cardiac septal closure, unspecified defect of septal closure	745.4	Q21.0	Ventricular septal defect	
			Q20.6	Isomerism of atrial appendages	
			Q21.4	Aortopulmonary septal defect	
			Q21.8	Other congenital malformations of cardiac septa	
	745.9	Q21.9	Congenital malformation of cardiac septum, unspecified		
	Partial anomalous pulmonary venous return	747.42	Q26.3	Partial anomalous pulmonary venous connection	
			Q26.4	Anomalous pulmonary venous connection, unspecified	
	Situs inversus (Laterality defects—heterotaxy)	759.3	Q89.3	Situs inversus	
Severe cardiac defects: single ventricle, tricuspid atresia, ebstein anomaly, hypoplastic left heart, hypoplastic right	Common truncus	745.0	Q20.0	Common truncus	* Because the specific ICD-10 code for interruption of aortic arch, Q25.21, was not introduced until October
	Transposition of great vessels	745.1x	Q20.1	Double outlet right ventricle	
			Q20.3	Discordant ventriculoarterial connection	
			Q20.5	Discordant atrioventricular connection	

heart, common truncus, transposition of great vessels, atrioventricular septal defects, tetralogy of fallot, aortic atresia/stenosis, coarctation, total anomalous pulmonary venous return, anomalous coronary artery	Tetralogy of Fallot	745.2	Q21.3	Tetralogy of Fallot	2016, for infants born in FY2016, the ICD-10 definition for coarctation of the aorta includes Q25.2x (atresia of aorta) and Q25.4 (other congenital malformations of aorta). For infants born starting in October 2016, only Q25.21 is retained from these codes.
	Single ventricle (common ventricle)	745.3	Q20.4	Double inlet ventricle (common ventricle)	
	Atrioventricular septal defects	745.6x	Q21.2	Atrioventricular septal defect	
	Cor biloculare	745.7	Q20.8	Other congenital malformations of cardiac chambers and connections	
	Pulmonary valve anomaly, unspecified	746.00	Q22.3	Other congenital malformations of pulmonary valve	
	Pulmonary valve atresia, congenital	746.01	Q22.0	Pulmonary valve atresia	
	Tricuspid atresia and stenosis	746.1	Q22.4	Tricuspid atresia and stenosis	
	Ebstein's anomaly	746.2	Q22.5	Ebstein's anomaly	
	Aortic valve atresia/stenosis	746.3	Q23.0	Congenital stenosis of aortic valve	
	Hypoplastic left heart syndrome	746.7	Q23.4	Hypoplastic left heart syndrome	
	Coronary artery anomaly	746.85	Q24.5	Malformation of coronary vessels	
	Coarctation of aorta	747.1x	Q25.1	Coarctation of aorta	
			Q25.2x	Atresia of aorta	
			Q25.4	Other congenital malformations of aorta	
	Atresia and stenosis of aorta	747.22	Q25.29	Other atresia of aorta	
Q25.3			Supravalvular aortic stenosis		
Total anomalous pulmonary venous connection	747.41	Q26.2	Total anomalous pulmonary venous connection		
N/A	N/A	Q22.6	Hypoplastic right heart syndrome		
Choanal atresia/stenosis	Choanal atresia	748.0	Q30.0	Choanal atresia	
Cleft lip and/or palate	Cleft palate	749.0x	Q35.x	Cleft palate	
	Cleft lip	749.1x	Q36.x	Cleft lip	
	Cleft palate with cleft lip	749.2x	Q37.x	Cleft palate with cleft lip	

Biliary atresia	Biliary atresia	751.61	Q44.2	Atresia of bile ducts
			Q44.3	Congenital stenosis and stricture of bile ducts
Esophageal atresia ± tracheoesophageal fistula	Tracheoesophageal fistula, esophageal atresia and stenosis	750.3	Q39.0	Atresia of esophagus without fistula
			Q39.1	Atresia of esophagus with tracheo-esophageal fistula
			Q39.2	Congenital tracheo-esophageal fistula without atresia
			Q39.3	Congenital stenosis and stricture of esophagus
			Q39.4	Esophageal web
Intestinal atresia/stenosis	Atresia and stenosis of small intestine	751.1	Q41.x	Congenital absence, atresia and stenosis of small intestine
	Atresia and stenosis of large intestine, rectum, and anal canal	751.2	Q42.x	Congenital absence, atresia and stenosis of large intestine
Pyloric stenosis	Congenital hypertrophic pyloric stenosis	750.5	Q40.0	Congenital hypertrophic pyloric stenosis
Exstrophy, bladder	Exstrophy of urinary bladder	753.5	Q64.10	Exstrophy of urinary bladder, unspecified
			Q64.19	Other exstrophy of urinary bladder
Hypospadias—second or third degree	Hypospadias	752.61	Q54.0	Hypospadias, balanic
			Q54.1	Hypospadias, penile
			Q54.2	Hypospadias, penoscrotal
			Q54.3	Hypospadias, perineal
			Q54.8	Other hypospadias
			Q54.9	Hypospadias, unspecified
Renal agenesis/hypoplasia	Renal agenesis and dysgenesis	753.0	Q60.0	Renal agenesis, unilateral
			Q60.1	Renal agenesis, bilateral

			Q60.2	Renal agenesis, unspecified	
			Q60.3	Renal hypoplasia, unilateral	
			Q60.4	Renal hypoplasia, bilateral	
			Q60.5	Renal hypoplasia, unspecified	
			Q60.6	Potter's syndrome	
Renal dysplasia	Renal dysplasia	753.15	Q61.4	Renal dysplasia	
Congenital hydronephrosis	Obstructive defects of renal pelvis and ureter	753.2x	Q62.0	Congenital hydronephrosis	
Posterior urethral valve and/or prune belly	Atresia and stenosis of urethra and bladder neck	753.6	Q64.2	Congenital posterior urethral valves	
	Prune belly syndrome	756.71	Q79.4	Prune belly syndrome	
Gastroschisis or omphalocele	Omphalocele	756.72	Q79.2	Exomphalos	Prior to October 2009, omphalocele and gastroschisis were defined by ICD-9 code 756.79; As of October 2009, omphalocele and gastroschisis are individually defined by ICD-9 codes 756.2 and 756.3, respectively, and as of October 2015 by ICD-10 codes Q79.2 and Q79.3, respectively.
	Gastroschisis	756.73	Q79.3	Gastroschisis	
	Other congenital anomalies of abdominal wall	756.79	N/A		
Diaphragmatic hernia	Anomalies of diaphragm	756.6	Q79.0	Congenital diaphragmatic hernia	
			Q79.1	Other congenital malformations of diaphragm	
Limb reduction defects	Reduction deformities of upper limb	755.2x	Q71.x	Reduction defects of upper limb	
	Reduction deformities of lower limb	755.3x	Q72.x	Reduction defects of lower limb	

Reduction deformities, unspecified limb	755.4	Q73.x	Reduction defects of unspecified limb
Congenital cleft hand	755.58	Q71.60	Lobster-claw hand, unspecified hand
		Q71.61	Lobster-claw right hand
		Q71.62	Lobster-claw left hand
		Q71.63	Lobster-claw hand, bilateral

Supplementary Table 2. Population characteristics by exposure to atovaquone-proguanil (AP), mefloquine (MQ), or chloroquine (CQ) in pregnancy, 2003-2014.^a

	Pregnancies				Infants			
	Unexposed	AP Exposed	MQ Exposed	CQ Exposed	Unexposed	AP Exposed	MQ Exposed	CQ Exposed
<i>Total</i>	197,835	50	156	131	160,892	36	130	121
Maternal age at conception								
Median (range)	24.0 (17-54)	30.5 (19-43)	25.0 (17-41)	24.0 (18-40)	24.0 (17-54)	30.0 (19-39)	25.0 (17-41)	24.0 (18-40)
17-19 years	15,974 (8.1)	1 (2.0)	10 (6.4)	8 (6.1)	12,929 (8.0)	1 (2.8)	9 (6.9)	7 (5.8)
20-24 years	85,303 (43.1)	10 (20.0)	55 (35.3)	67 (51.2)	70,058 (43.5)	9 (25.0)	47 (36.2)	64 (52.9)
25-29 years	54,311 (27.5)	11 (22.0)	47 (30.1)	36 (27.5)	44,960 (27.9)	7 (19.4)	39 (30.0)	33 (27.3)
30-34 years	28,374 (14.3)	19 (38.0)	24 (15.4)	15 (11.5)	23,123 (14.4)	15 (41.7)	19 (14.6)	12 (9.9)
35+ years	13,873 (7.0)	9 (18.0)	20 (12.8)	5 (3.8)	9822 (6.1)	4 (11.1)	16 (12.3)	5 (4.1)
Maternal race/ethnicity								
Non-Hispanic white	94,718 (47.9)	22 (44.0)	76 (48.7)	52 (39.7)	77,537 (48.2)	17 (47.2)	67 (51.5)	48 (39.7)
Non-Hispanic black	54,052 (27.3)	7 (14.0)	43 (27.6)	44 (33.6)	43,280 (26.9)	3 (8.3)	32 (24.6)	41 (33.9)
Hispanic	27,159 (13.7)	11 (22.0)	19 (12.2)	23 (17.6)	22,026 (13.7)	10 (27.8)	16 (12.3)	22 (18.2)
Other or unknown	21,906 (11.1)	10 (20.0)	18 (11.5)	12 (9.2)	18,049 (11.2)	6 (16.7)	15 (11.5)	10 (8.3)
Maternal service branch								
Army	68,413 (34.6)	17 (34.0)	72 (46.2)	89 (67.9)	53,871 (33.5)	12 (33.3)	57 (43.9)	80 (66.1)
Navy	51,276 (26.0)	14 (28.0)	21 (13.5)	11 (8.4)	42,351 (26.3)	11 (30.6)	17 (13.1)	11 (9.1)
Air Force	58,699 (29.7)	18 (36.0)	60 (38.5)	28 (21.4)	48,523 (30.2)	13 (36.1)	53 (40.8)	27 (22.3)

Marine Corps	15,065	(7.6)	1	(2.0)	2	(1.3)	2	(1.5)	12,475	(7.8)	0	(0.0)	2	(1.5)	2	(1.7)
Coast Guard	4382	(2.2)	0	(0.0)	1	(0.6)	1	(0.8)	3672	(2.3)	0	(0.0)	1	(0.8)	1	(0.8)
Maternal rank																
Enlisted	170,940	(86.4)	26	(52.0)	119	(76.3)	113	(86.3)	138,803	(86.3)	20	(55.6)	97	(74.6)	104	(86.0)
Officer	26,895	(13.6)	24	(48.0)	37	(23.7)	18	(13.7)	22,089	(13.7)	16	(44.4)	33	(25.4)	17	(14.0)
Maternal education																
No high school diploma	11,229	(5.7)	0	(0.0)	12	(7.7)	2	(1.5)	8724	(5.4)	0	(0.0)	12	(9.2)	2	(1.7)
High school diploma	137,048	(69.3)	16	(32.0)	87	(55.8)	97	(74.1)	111,613	(69.4)	13	(36.1)	68	(52.3)	88	(72.7)
More than high school	46,026	(23.3)	32	(64.0)	54	(34.6)	30	(22.9)	37,737	(23.5)	22	(61.1)	48	(36.9)	29	(24.0)
Unknown	3532	(1.8)	2	(4.0)	3	(1.9)	2	(1.5)	2818	(1.8)	1	(2.8)	2	(1.5)	2	(1.7)
Maternal marital status																
Married	140,861	(71.2)	41	(82.0)	115	(73.7)	78	(59.5)	117,820	(73.2)	30	(83.3)	94	(72.3)	73	(60.3)
Unmarried or unknown	56,974	(28.8)	9	(18.0)	41	(26.3)	53	(40.5)	43,072	(26.8)	6	(16.7)	36	(27.7)	48	(39.7)
Timing of antimalarial exposure																
First trimester	N/A		47	(94.0)	132	(84.6)	97	(74.0)	N/A		33	(91.7)	107	(82.3)	87	(71.9)
Second or third trimester	N/A		3	(6.0)	24	(15.4)	34	(26.0)	N/A		3	(8.3)	23	(17.7)	34	(28.1)
Receipt of vaccination(s) not recommended in pregnancy																
No	180,945	(91.5)	40	(80.0)	135	(86.5)	124	(94.7)	146,383	(91.0)	27	(75.0)	112	(86.2)	114	(94.2)
Yes	16,890	(8.5)	10	(20.0)	21	(13.5)	7	(5.3)	14,509	(9.0)	9	(25.0)	18	(13.9)	7	(5.8)

^aData presented as N (percent %)