

Investigating tetanus, diphtheria, acellular pertussis vaccination during pregnancy and risk of congenital anomalies

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Supplementary Material

Secular Trend Plots Supplementary Methods

The rates of events were calculated and plotted between January 2011 and March 2020 as the number of events of a specific congenital anomaly body system per 1,000 Kaiser Permanente Southern California (KPSC) live-born infants. The infants and their congenital anomaly events were aggregated by birth year and month. Only one event per infant was counted. The red line represents the 6-month moving average. The gray horizontal lines represent the mean, mean + 2 standard deviations, and mean + 3 standard deviations. The vertical gray lines represent the time of the International Classification of Diseases (ICD)-10 transition (OCT2015), the first birth date of infants in the historical cohort (JAN2012), the last birth date of infants in the historical cohort (OCT2015), the first birth date of infants in the exposed cohort (FEB2018), and the last birth date of infants in the exposed cohort (MAY2019). These secular trends were based on automated data (ICD-9 and ICD-10 codes) and have not been chart-reviewed.

Supplementary Tables

International Classification of Diseases (ICD)-9 and -10 diagnosis codes and descriptions associated with congenital anomalies with elevated adjusted relative risks.

Due to the transition from ICD-9 to ICD-10 codes, there may be different descriptions for the same diagnosis. For example, in Table S1, the codes 743.65 and Q10.5 describe the same congenital anomaly.

Table S1. Congenital Anomalies Of Eye

ICD diagnosis code and description	Exposed (N=16,350)	Unexposed (N=16,088)
	Number of events N=1,142 (%)	Number of events N=973 (%)
ICD-9 codes		
743.10, MICROPHTHALMOS, UNSPECIFIED	0 (0.00)	1 (0.10)
743.30, CONGENITAL CATARACT, UNSPECIFIED	0 (0.00)	4 (0.41)
743.31, CONGENITAL CAPSULAR AND SUBCAPSULAR CATARACT	0 (0.00)	2 (0.21)
743.43, OTHER CORNEAL OPACITIES, CONGENITAL	0 (0.00)	1 (0.10)
743.46, OTHER SPECIFIED CONGENITAL ANOMALIES OF IRIS AND CILIARY BODY	0 (0.00)	3 (0.31)
743.51, VITREOUS ANOMALIES	0 (0.00)	1 (0.10)
743.61, CONGENITAL PTOSIS	0 (0.00)	8 (0.82)
743.62, CONGENITAL DEFORMITIES OF EYELIDS	0 (0.00)	11 (1.13)
743.63, OTHER SPECIFIED CONGENITAL ANOMALIES OF EYELID	0 (0.00)	24 (2.47)
743.65, SPECIFIED CONGENITAL ANOMALIES OF LACRIMAL PASSAGES	0 (0.00)	888 (91.26)
743.8, OTHER SPECIFIED ANOMALIES OF EYE	0 (0.00)	2 (0.21)
743.9, UNSPECIFIED ANOMALY OF EYE	0 (0.00)	18 (1.85)
ICD-10 codes		
Q10.0, CONGENITAL PTOSIS	13 (1.14)	0 (0.00)
Q10.2, CONGENITAL ENTROPION	3 (0.26)	0 (0.00)
Q10.3, OTHER CONGENITAL MALFORMATIONS OF EYELID	45 (3.94)	2 (0.21)
Q10.5, CONGENITAL STENOSIS AND STRICTURE OF LACRIMAL DUCT	1,066 (93.35)	11 (1.13)
Q10.6, OTHER CONGENITAL MALFORMATIONS OF LACRIMAL APPARATUS	1 (0.09)	0 (0.00)
Q11.2, MICROPHTHALMOS	1 (0.09)	0 (0.00)
Q12.0, CONGENITAL CATARACT	3 (0.26)	0 (0.00)
Q13.0, COLOBOMA OF IRIS	2 (0.18)	0 (0.00)
Q13.5, BLUE SCLERA	1 (0.09)	0 (0.00)
Q14.1, CONGENITAL MALFORMATION OF RETINA	1 (0.09)	0 (0.00)
Q14.8, OTHER CONGENITAL MALFORMATIONS OF POSTERIOR SEGMENT OF EYE	2 (0.18)	0 (0.00)
Q15.0, CONGENITAL GLAUCOMA	3 (0.26)	0 (0.00)

ICD diagnosis code and description	Exposed	Unexposed
	(N=16,350)	(N=16,088)
	Number of events	Number of events
	N=1,142 (%)	N=973 (%)
Q15.8, OTHER SPECIFIED CONGENITAL MALFORMATIONS OF EYE	1 (0.09)	0 (0.00)
Q15.9, CONGENITAL MALFORMATION OF EYE, UNSPECIFIED	7 (0.61)	1 (0.10)

Table S2. Congenital Anomalies Of Ear, Face, And Neck

ICD diagnosis code and description	Exposed (N=16,350)	Unexposed (N=16,088)
	Number of events N=266 (%)	Number of events N=131 (%)
ICD-9 Codes		
744.1, ACCESSORY AURICLE	0 (0.00)	55 (41.98)
744.22, MACROTIA	0 (0.00)	2 (1.53)
744.23, MICROTIA	0 (0.00)	4 (3.05)
744.29, OTHER SPECIFIED ANOMALIES OF EAR	0 (0.00)	10 (7.63)
744.3, UNSPECIFIED ANOMALY OF EAR	0 (0.00)	23 (17.56)
744.42, BRANCHIAL CLEFT CYST	0 (0.00)	1 (0.76)
744.46, PREAURICULAR SINUS OR FISTULA	0 (0.00)	17 (12.98)
744.47, PREAURICULAR CYST	0 (0.00)	5 (3.82)
744.49, OTHER BRANCHIAL CLEFT CYST OR FISTULA; PREAURICULAR SINUS	0 (0.00)	3 (2.29)
744.83, MACROSTOMIA	0 (0.00)	1 (0.76)
744.84, MICROSTOMIA	0 (0.00)	1 (0.76)
744.89, OTHER SPECIFIED CONGENITAL ANOMALIES OF FACE AND NECK	0 (0.00)	3 (2.29)
744.9, UNSPECIFIED CONGENITAL ANOMALIES OF FACE AND NECK	0 (0.00)	8 (6.11)
ICD-10 Codes		
Q16.1, CONGENITAL ABSENCE, ATRESIA AND STRICTURE OF AUDITORY CANAL (EXTERNAL)	4 (1.50)	0 (0.00)
Q17.0, ACCESSORY AURICLE	78 (29.32)	0 (0.00)
Q17.2, MICROTIA	5 (1.88)	0 (0.00)
Q17.3, OTHER MISSHAPEN EAR	26 (9.77)	0 (0.00)
Q17.4, MISPLACED EAR	2 (0.75)	0 (0.00)
Q17.8, OTHER SPECIFIED CONGENITAL MALFORMATIONS OF EAR	30 (11.28)	0 (0.00)
Q17.9, CONGENITAL MALFORMATION OF EAR, UNSPECIFIED	75 (28.20)	0 (0.00)
Q18.0, SINUS, FISTULA AND CYST OF BRANCHIAL CLEFT	3 (1.13)	0 (0.00)
Q18.1, PREAURICULAR SINUS AND CYST	40 (15.04)	0 (0.00)
Q18.3, WEBBING OF NECK	1 (0.38)	0 (0.00)
Q18.8, OTHER SPECIFIED CONGENITAL MALFORMATIONS OF FACE AND NECK	5 (1.88)	0 (0.00)
Q18.9, CONGENITAL MALFORMATION OF FACE AND NECK, UNSPECIFIED	3 (1.13)	0 (0.00)

Table S3. Congenital Anomalies Of Respiratory System

ICD diagnosis code and description	Exposed (N=16,350)	Unexposed (N=16,088)
	Number of events N=225 (%)	Number of events N=166 (%)
ICD-9 Codes		
748.0, CHOANAL ATRESIA	0 (0.00)	2 (1.20)
748.1, OTHER ANOMALIES OF NOSE	0 (0.00)	7 (4.22)
748.3, OTHER ANOMALIES OF LARYNX, TRACHEA, AND BRONCHUS	0 (0.00)	146 (87.95)
748.5, AGENESIS, HYPOPLASIA, AND DYSPLASIA OF LUNG	0 (0.00)	6 (3.61)
748.60, ANOMALY OF LUNG, UNSPECIFIED	0 (0.00)	1 (0.60)
ICD-10 Codes		
Q30.0, CHOANAL ATRESIA	4 (1.78)	0 (0.00)
Q31.5, CONGENITAL LARYNGOMALACIA	196 (87.11)	5 (3.01)
Q31.9, CONGENITAL MALFORMATION OF LARYNX, UNSPECIFIED	1 (0.44)	0 (0.00)
Q32.0, CONGENITAL TRACHEOMALACIA	6 (2.67)	0 (0.00)
Q32.1, OTHER CONGENITAL MALFORMATIONS OF TRACHEA	1 (0.44)	0 (0.00)
Q32.2, CONGENITAL BRONCHOMALACIA	1 (0.44)	0 (0.00)
Q33.0, CONGENITAL CYSTIC LUNG	2 (0.89)	0 (0.00)
Q33.6, CONGENITAL HYPOPLASIA AND DYSPLASIA OF LUNG	13 (5.78)	0 (0.00)
Q33.9, CONGENITAL MALFORMATION OF LUNG, UNSPECIFIED	4 (1.78)	0 (0.00)
Q34.9, CONGENITAL MALFORMATION OF RESPIRATORY SYSTEM, UNSPECIFIED	1 (0.44)	0 (0.00)

Table S4. Congenital Anomalies Of Upper Gastrointestinal System

ICD diagnosis code and description	Exposed (N=16,350)	Unexposed (N=16,088)
	Number of events N=1,109 (%)	Number of events N=609 (%)
ICD-9 Codes		
750.0, TONGUE TIE	0 (0.00)	563 (92.45)
750.26, OTHER SPECIFIED ANOMALIES OF MOUTH	0 (0.00)	6 (0.99)
750.3, TRACHEOESOPHAGEAL FISTULA, ESOPHAGEAL ATRESIA AND STENOSIS	0 (0.00)	7 (1.15)
750.5, CONGENITAL HYPERTROPHIC PYLORIC STENOSIS	0 (0.00)	26 (4.27)
750.6, CONGENITAL HIATUS HERNIA	0 (0.00)	1 (0.16)
750.9, UNSPECIFIED ANOMALY OF UPPER ALIMENTARY TRACT	0 (0.00)	4 (0.66)
ICD-10 Codes		
Q38.0, CONGENITAL MALFORMATIONS OF LIPS, NOT ELSEWHERE CLASSIFIED	7 (0.63)	0 (0.00)
Q38.1, ANKYLOGLOSSIA	1,063 (95.85)	3 (0.49)
Q38.2, MACROGLOSSIA	4 (0.36)	0 (0.00)
Q38.3, OTHER CONGENITAL MALFORMATIONS OF TONGUE	3 (0.27)	0 (0.00)
Q38.4, CONGENITAL MALFORMATIONS OF SALIVARY GLANDS AND DUCTS	4 (0.36)	0 (0.00)
Q38.5, CONGENITAL MALFORMATIONS OF PALATE, NOT ELSEWHERE CLASSIFIED	4 (0.36)	0 (0.00)
Q38.6, OTHER CONGENITAL MALFORMATIONS OF MOUTH	3 (0.27)	0 (0.00)
Q39.1, ATRESIA OF ESOPHAGUS WITH TRACHEO-ESOPHAGEAL FISTULA	1 (0.09)	0 (0.00)
Q40.0, CONGENITAL HYPERTROPHIC PYLORIC STENOSIS	22 (1.98)	0 (0.00)

Table S5. Congenital Anomalies Of Genital Organs

ICD diagnosis code and description	Exposed (N=16,350)	Unexposed (N=16,088)
	Number of events N=355 (%)	Number of events N=297 (%)
ICD-9 Codes		
752.40, UNSPECIFIED ANOMALY OF CERVIX, VAGINA, AND EXTERNAL FEMALE GENITALIA	0 (0.00)	1 (0.34)
752.42, IMPERFORATE HYMEN	0 (0.00)	2 (0.67)
752.45, VAGINAL AGENESIS	0 (0.00)	1 (0.34)
752.49, OTHER ANOMALIES OF CERVIX, VAGINA, AND EXTERNAL FEMALE GENITALIA	0 (0.00)	35 (11.78)
752.51, UNDESCENDED TESTIS	0 (0.00)	103 (34.68)
752.52, RETRACTILE TESTIS	0 (0.00)	6 (2.02)
752.61, HYPOSPADIAS	0 (0.00)	73 (24.58)
752.63, CONGENITAL CHORDEE	0 (0.00)	11 (3.70)
752.64, MICROPENIS	0 (0.00)	2 (0.67)
752.65, HIDDEN PENIS	0 (0.00)	24 (8.08)
752.69, OTHER PENILE ANOMALIES	0 (0.00)	40 (13.47)
752.7, INDETERMINATE SEX AND PSEUDOHERMAPHRODITISM	0 (0.00)	1 (0.34)
752.89, OTHER SPECIFIED ANOMALIES OF GENITAL ORGANS	0 (0.00)	5 (1.68)
752.9, UNSPECIFIED ANOMALY OF GENITAL ORGANS	0 (0.00)	3 (1.01)
ICD-10 Codes		
Q52.10, DOUBLING OF VAGINA, UNSPECIFIED	1 (0.28)	0 (0.00)
Q52.4, OTHER CONGENITAL MALFORMATIONS OF VAGINA	1 (0.28)	0 (0.00)
Q52.5, FUSION OF LABIA	32 (9.01)	2 (0.67)
Q53.10, UNSPECIFIED UNDESCENDED TESTICLE, UNILATERAL	80 (22.54)	1 (0.34)
Q53.112, UNILATERAL INGUINAL TESTIS	6 (1.69)	0 (0.00)
Q53.13, UNILATERAL HIGH SCROTAL TESTIS	4 (1.13)	0 (0.00)
Q53.20, UNDESCENDED TESTICLE, UNSPECIFIED, BILATERAL	17 (4.79)	0 (0.00)
Q53.212, BILATERAL INGUINAL TESTES	4 (1.13)	0 (0.00)
Q53.9, UNDESCENDED TESTICLE, UNSPECIFIED	20 (5.63)	0 (0.00)
Q54.0, HYPOSPADIAS, BALANIC	3 (0.85)	0 (0.00)
Q54.1, HYPOSPADIAS, PENILE	4 (1.13)	0 (0.00)

ICD diagnosis code and description	Exposed	Unexposed
	(N=16,350)	(N=16,088)
	Number of events	Number of events
	N=355 (%)	N=297 (%)
Q54.2, HYPOSPADIAS, PENOSCROTAL	1 (0.28)	0 (0.00)
Q54.4, CONGENITAL CHORDEE	21 (5.92)	0 (0.00)
Q54.9, HYPOSPADIAS, UNSPECIFIED	50 (14.08)	0 (0.00)
Q55.0, ABSENCE AND APLASIA OF TESTIS	1 (0.28)	0 (0.00)
Q55.22, RETRACTILE TESTIS	11 (3.10)	0 (0.00)
Q55.29, OTHER CONGENITAL MALFORMATIONS OF TESTIS AND SCROTUM	1 (0.28)	0 (0.00)
Q55.61, CURVATURE OF PENIS (LATERAL)	7 (1.97)	0 (0.00)
Q55.62, HYPOPLASIA OF PENIS	8 (2.25)	0 (0.00)
Q55.63, CONGENITAL TORSION OF PENIS	35 (9.86)	0 (0.00)
Q55.64, HIDDEN PENIS	46 (12.96)	0 (0.00)
Q55.69, OTHER CONGENITAL MALFORMATION OF PENIS	11 (3.10)	0 (0.00)
Q55.8, OTHER SPECIFIED CONGENITAL MALFORMATIONS OF MALE GENITAL ORGANS	4 (1.13)	0 (0.00)
Q56.4, INDETERMINATE SEX, UNSPECIFIED	5 (1.41)	0 (0.00)

Table S6. Congenital Anomalies Of Renal System

ICD diagnosis code and description	Exposed (N=16,350)	Unexposed (N=16,088)
	Number of events N=128 (%)	Number of events N=95 (%)
ICD-9 Codes		
753.0, RENAL AGENESIS AND DYSGENESIS	0 (0.00)	6 (6.32)
753.11, CONGENITAL SINGLE RENAL CYST	0 (0.00)	3 (3.16)
753.12, POLYCYSTIC KIDNEY, UNSPECIFIED TYPE	0 (0.00)	2 (2.11)
753.14, POLYCYSTIC KIDNEY, AUTOSOMAL RECESSIVE	0 (0.00)	2 (2.11)
753.15, RENAL DYSPLASIA	0 (0.00)	3 (3.16)
753.19, OTHER SPECIFIED CYSTIC KIDNEY DISEASE	0 (0.00)	5 (5.26)
753.20, UNSPECIFIED OBSTRUCTIVE DEFECT OF RENAL PELVIS AND URETER	0 (0.00)	1 (1.05)
753.21, CONGENITAL OBSTRUCTION OF URETEROPELVIC JUNCTION	0 (0.00)	1 (1.05)
753.22, CONGENITAL OBSTRUCTION OF URETEROVESICAL JUNCTION	0 (0.00)	5 (5.26)
753.23, CONGENITAL URETEROCELE	0 (0.00)	1 (1.05)
753.29, OTHER OBSTRUCTIVE DEFECTS OF RENAL PELVIS AND URETER	0 (0.00)	67 (70.53)
753.3, OTHER SPECIFIED ANOMALIES OF KIDNEY	0 (0.00)	8 (8.42)
753.6, ATRESIA AND STENOSIS OF URETHRA AND BLADDER NECK	0 (0.00)	1 (1.05)
753.7, ANOMALIES OF URACHUS	0 (0.00)	2 (2.11)
753.9, UNSPECIFIED ANOMALY OF URINARY SYSTEM	0 (0.00)	6 (6.32)
ICD-10 Codes		
Q60.0, RENAL AGENESIS, UNILATERAL	4 (3.13)	0 (0.00)
Q61.00, CONGENITAL RENAL CYST, UNSPECIFIED	2 (1.56)	0 (0.00)
Q61.3, POLYCYSTIC KIDNEY, UNSPECIFIED	1 (0.78)	0 (0.00)
Q61.4, RENAL DYSPLASIA	6 (4.69)	0 (0.00)
Q61.9, CYSTIC KIDNEY DISEASE, UNSPECIFIED	1 (0.78)	0 (0.00)
Q62.0, CONGENITAL HYDRONEPHROSIS	109 (85.16)	0 (0.00)
Q62.31, CONGENITAL URETEROCELE, ORTHOTOPIC	3 (2.34)	0 (0.00)
Q62.39, OTHER OBSTRUCTIVE DEFECTS OF RENAL PELVIS AND URETER	1 (0.78)	0 (0.00)
Q62.7, CONGENITAL VESICO-URETERO-RENAL REFLUX	3 (2.34)	0 (0.00)
Q63.1, LOBULATED, FUSED AND HORSESHOE KIDNEY	2 (1.56)	0 (0.00)

ICD diagnosis code and description	Exposed	Unexposed
	(N=16,350)	(N=16,088)
	Number of events	Number of events
	N=128 (%)	N=95 (%)
Q63.2, ECTOPIC KIDNEY	1 (0.78)	0 (0.00)
Q63.8, OTHER SPECIFIED CONGENITAL MALFORMATIONS OF KIDNEY	3 (2.34)	0 (0.00)
Q63.9, CONGENITAL MALFORMATION OF KIDNEY, UNSPECIFIED	1 (0.78)	0 (0.00)
Q64.2, CONGENITAL POSTERIOR URETHRAL VALVES	1 (0.78)	0 (0.00)
Q64.4, MALFORMATION OF URACHUS	2 (1.56)	0 (0.00)
Q64.6, CONGENITAL DIVERTICULUM OF BLADDER	1 (0.78)	0 (0.00)
Q64.79, OTHER CONGENITAL MALFORMATIONS OF BLADDER AND URETHRA	1 (0.78)	0 (0.00)

Table S7. Congenital Anomalies Of Musculoskeletal System

ICD diagnosis code and description	Exposed (N=16,350)	Unexposed (N=16,088)
	Number of events N=266 (%)	Number of events N=171 (%)
ICD-9 Codes		
754.0, CONGENITAL MUSCULOSKELETAL DEFORMITIES OF SKULL, FACE, AND JAW	0 (0.00)	23 (13.45)
754.1, CONGENITAL MUSCULOSKELETAL DEFORMITIES OF STERNOCLEIDOMASTOID MUSCLE	0 (0.00)	8 (4.68)
754.2, CONGENITAL MUSCULOSKELETAL DEFORMITIES OF SPINE	0 (0.00)	3 (1.75)
754.30, CONGENITAL DISLOCATION OF HIP, UNILATERAL	0 (0.00)	8 (4.68)
754.31, CONGENITAL DISLOCATION OF HIP, BILATERAL	0 (0.00)	3 (1.75)
754.32, CONGENITAL SUBLUXATION OF HIP, UNILATERAL	0 (0.00)	7 (4.09)
754.33, CONGENITAL SUBLUXATION OF HIP, BILATERAL	0 (0.00)	2 (1.17)
754.41, CONGENITAL DISLOCATION OF KNEE (WITH GENU RECURVATUM)	0 (0.00)	1 (0.58)
754.43, CONGENITAL BOWING OF TIBIA AND FIBULA	0 (0.00)	1 (0.58)
754.50, TALIPES VARUS	0 (0.00)	7 (4.09)
754.51, TALIPES EQUINOVARUS	0 (0.00)	10 (5.85)
754.53, METATARSUS VARUS	0 (0.00)	12 (7.02)
754.60, TALIPES VALGUS	0 (0.00)	1 (0.58)
754.62, TALIPES CALCANEVALGUS	0 (0.00)	5 (2.92)
754.70, TALIPES, UNSPECIFIED	0 (0.00)	7 (4.09)
754.81, PECTUS EXCAVATUM	0 (0.00)	17 (9.94)
754.82, PECTUS CARINATUM	0 (0.00)	1 (0.58)
754.89, OTHER SPECIFIED NONTERATOGENIC ANOMALIES	0 (0.00)	1 (0.58)
756.0, ANOMALIES OF SKULL AND FACE BONES	0 (0.00)	24 (14.04)
756.10, ANOMALY OF SPINE, UNSPECIFIED	0 (0.00)	1 (0.58)
756.14, HEMIVERTEBRA	0 (0.00)	1 (0.58)
756.3, OTHER ANOMALIES OF RIBS AND STERNUM	0 (0.00)	3 (1.75)
756.50, CONGENITAL OSTEODYSTROPHY, UNSPECIFIED	0 (0.00)	1 (0.58)
756.6, ANOMALIES OF DIAPHRAGM	0 (0.00)	4 (2.34)
756.71, PRUNE BELLY SYNDROME	0 (0.00)	1 (0.58)
756.72, OMPHALOCELE	0 (0.00)	2 (1.17)

ICD diagnosis code and description	Exposed (N=16,350)	Unexposed (N=16,088)
	Number of events N=266 (%)	Number of events N=171 (%)
756.73, GASTROSCHISIS	0 (0.00)	8 (4.68)
756.79, OTHER CONGENITAL ANOMALIES OF ABDOMINAL WALL	0 (0.00)	5 (2.92)
756.89, OTHER SPECIFIED ANOMALIES OF MUSCLE, TENDON, FASCIA, AND CONNECTIVE TISSUE	0 (0.00)	7 (4.09)
ICD-10 Codes		
Q65.01, CONGENITAL DISLOCATION OF RIGHT HIP, UNILATERAL	1 (0.38)	0 (0.00)
Q65.02, CONGENITAL DISLOCATION OF LEFT HIP, UNILATERAL	2 (0.75)	0 (0.00)
Q65.1, CONGENITAL DISLOCATION OF HIP, BILATERAL	2 (0.75)	0 (0.00)
Q65.32, CONGENITAL PARTIAL DISLOCATION OF LEFT HIP, UNILATERAL	4 (1.50)	0 (0.00)
Q66.0, CONGENITAL TALIPES EQUINOVARUS	25 (9.40)	0 (0.00)
Q66.21, CONGENITAL METATARSUS PRIMUS VARUS	2 (0.75)	0 (0.00)
Q66.22, CONGENITAL METATARSUS ADDUCTUS	10 (3.76)	0 (0.00)
Q66.3, OTHER CONGENITAL VARUS DEFORMITIES OF FEET	2 (0.75)	0 (0.00)
Q66.4, CONGENITAL TALIPES CALCANEVALGUS	7 (2.63)	0 (0.00)
Q66.6, OTHER CONGENITAL VALGUS DEFORMITIES OF FEET	1 (0.38)	0 (0.00)
Q66.9, CONGENITAL DEFORMITY OF FEET, UNSPECIFIED	12 (4.51)	0 (0.00)
Q67.0, CONGENITAL FACIAL ASYMMETRY	5 (1.88)	0 (0.00)
Q67.2, DOLICHOCEPHALY	3 (1.13)	1 (0.58)
Q67.3, PLAGIOCEPHALY	39 (14.66)	0 (0.00)
Q67.4, OTHER CONGENITAL DEFORMITIES OF SKULL, FACE AND JAW	7 (2.63)	0 (0.00)
Q67.5, CONGENITAL DEFORMITY OF SPINE	1 (0.38)	0 (0.00)
Q67.6, PECTUS EXCAVATUM	21 (7.89)	0 (0.00)
Q67.7, PECTUS CARINATUM	3 (1.13)	0 (0.00)
Q68.0, CONGENITAL DEFORMITY OF STERNOCLEIDOMASTOID MUSCLE	29 (10.90)	1 (0.58)
Q68.1, CONGENITAL DEFORMITY OF FINGER(S) AND HAND	3 (1.13)	0 (0.00)
Q68.2, CONGENITAL DEFORMITY OF KNEE	1 (0.38)	0 (0.00)
Q68.8, OTHER SPECIFIED CONGENITAL MUSCULOSKELETAL DEFORMITIES	4 (1.50)	0 (0.00)
Q75.0, CRANIOSYNOSTOSIS	7 (2.63)	0 (0.00)
Q75.2, HYPERTELORISM	4 (1.50)	0 (0.00)

ICD diagnosis code and description	Exposed	Unexposed
	(N=16,350)	(N=16,088)
	Number of events N=266 (%)	Number of events N=171 (%)
Q75.3, MACROCEPHALY	48 (18.05)	0 (0.00)
Q75.8, OTHER SPECIFIED CONGENITAL MALFORMATIONS OF SKULL AND FACE BONES	1 (0.38)	0 (0.00)
Q76.0, SPINA BIFIDA OCCULTA	1 (0.38)	0 (0.00)
Q76.49, OTHER CONGENITAL MALFORMATIONS OF SPINE, NOT ASSOCIATED WITH SCOLIOSIS	7 (2.63)	0 (0.00)
Q76.7, CONGENITAL MALFORMATION OF STERNUM	1 (0.38)	0 (0.00)
Q79.0, CONGENITAL DIAPHRAGMATIC HERNIA	2 (0.75)	0 (0.00)
Q79.1, OTHER CONGENITAL MALFORMATIONS OF DIAPHRAGM	2 (0.75)	0 (0.00)
Q79.2, EXOMPHALOS	5 (1.88)	0 (0.00)
Q79.3, GASTROSCHISIS	6 (2.26)	0 (0.00)
Q79.59, OTHER CONGENITAL MALFORMATIONS OF ABDOMINAL WALL	9 (3.38)	0 (0.00)
Q79.8, OTHER CONGENITAL MALFORMATIONS OF MUSCULOSKELETAL SYSTEM	1 (0.38)	0 (0.00)
Q79.9, CONGENITAL MALFORMATION OF MUSCULOSKELETAL SYSTEM, UNSPECIFIED	1 (0.38)	0 (0.00)

Table S8. Congenital Anomalies Of Integument

ICD diagnosis code and description	Exposed (N=16,350)	Unexposed (N=16,088)
	Number of events N=949 (%)	Number of events N=477 (%)
ICD-9 Codes		
757.1, ICHTHYOSIS CONGENITA	0 (0.00)	5 (1.05)
757.2, DERMATOLYPHIC ANOMALIES	0 (0.00)	3 (0.63)
757.32, VASCULAR HAMARTOMAS	0 (0.00)	102 (21.38)
757.33, CONGENITAL PIGMENTARY ANOMALIES OF SKIN	0 (0.00)	218 (45.70)
757.39, OTHER SPECIFIED ANOMALIES OF SKIN	0 (0.00)	110 (23.06)
757.4, SPECIFIED ANOMALIES OF HAIR	0 (0.00)	2 (0.42)
757.6, SPECIFIED CONGENITAL ANOMALIES OF BREAST	0 (0.00)	29 (6.08)
757.8, OTHER SPECIFIED ANOMALIES OF THE INTEGUMENT	0 (0.00)	6 (1.26)
757.9, UNSPECIFIED CONGENITAL ANOMALY OF THE INTEGUMENT	0 (0.00)	3 (0.63)
ICD-10 Codes		
Q80.1, X-LINKED ICHTHYOSIS	1 (0.11)	0 (0.00)
Q80.2, LAMELLAR ICHTHYOSIS	1 (0.11)	0 (0.00)
Q81.9, EPIDERMOLYSIS BULLOSA, UNSPECIFIED	1 (0.11)	0 (0.00)
Q82.5, CONGENITAL NON-NEOPLASTIC NEVUS	203 (21.39)	1 (0.21)
Q82.6, CONGENITAL SACRAL DIMPLE	345 (36.35)	0 (0.00)
Q82.8, OTHER SPECIFIED CONGENITAL MALFORMATIONS OF SKIN	401 (42.26)	4 (0.84)
Q82.9, CONGENITAL MALFORMATION OF SKIN, UNSPECIFIED	1 (0.11)	0 (0.00)
Q83.3, ACCESSORY NIPPLE	28 (2.95)	1 (0.21)
Q84.0, CONGENITAL ALOPECIA	1 (0.11)	0 (0.00)
Q84.2, OTHER CONGENITAL MALFORMATIONS OF HAIR	2 (0.21)	0 (0.00)
Q84.8, OTHER SPECIFIED CONGENITAL MALFORMATIONS OF INTEGUMENT	11 (1.16)	0 (0.00)

Supplementary Figures

Secular Trends of Congenital Anomalies of Various Systems Among Kaiser Permanente Southern California (KPSC) Live-Born Infants, Irrespective of Tetanus, Diphtheria, Acellular Pertussis (Tdap) Vaccination Status During Pregnancy.

Figure S1. Congenital Anomalies of Nervous System

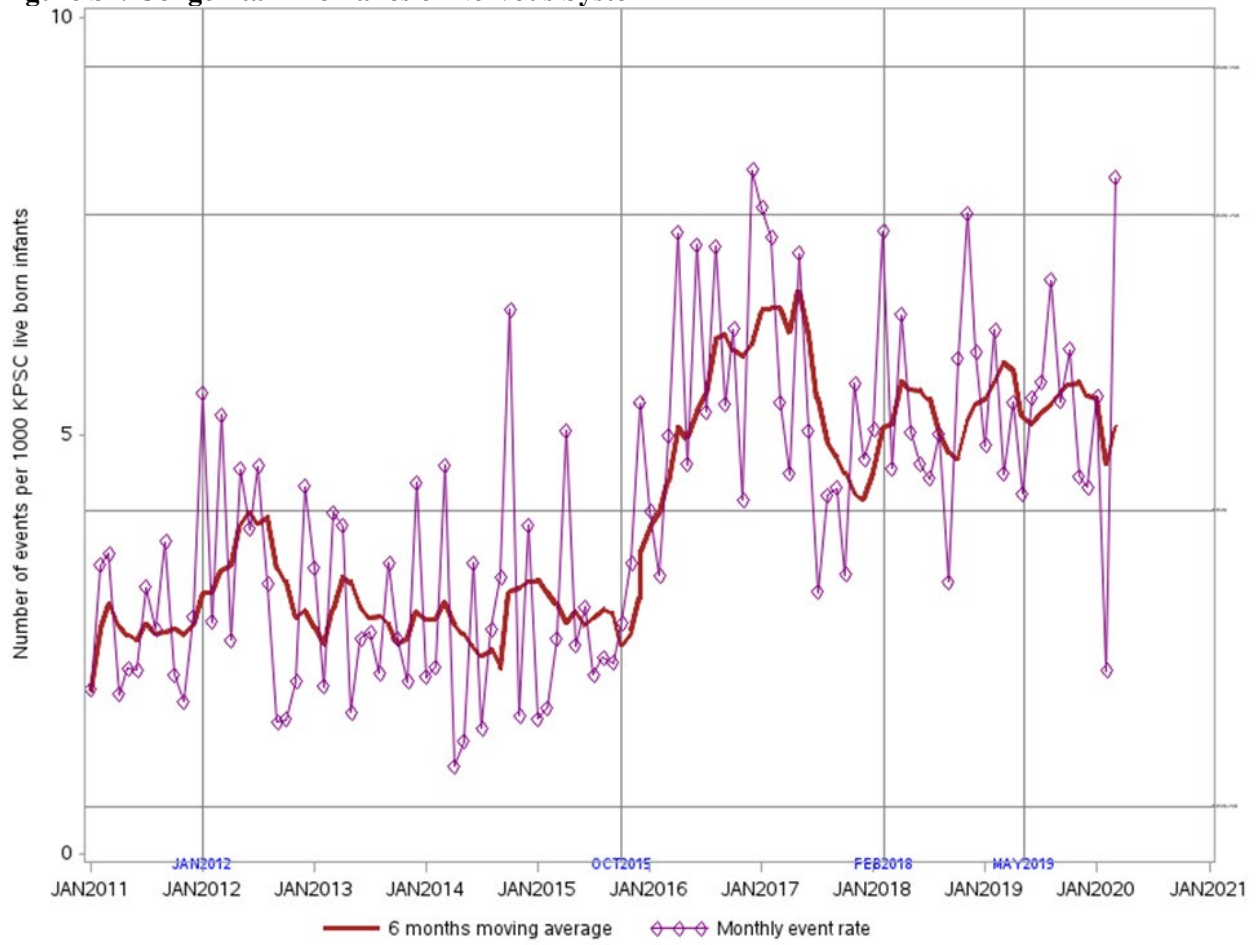


Figure S2. Congenital Anomalies of Eye

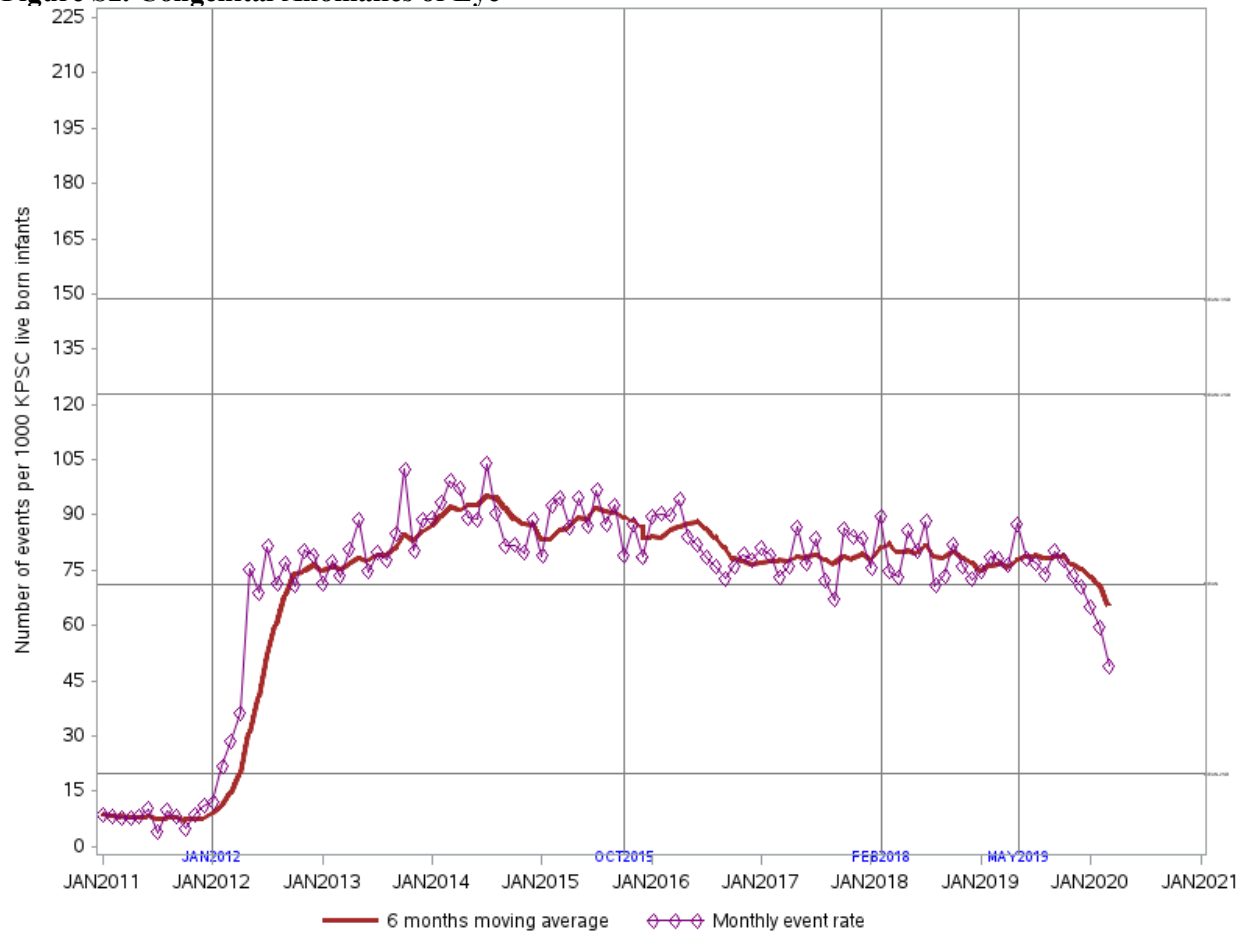


Figure S3. Congenital Anomalies of Ear, Face, and Neck

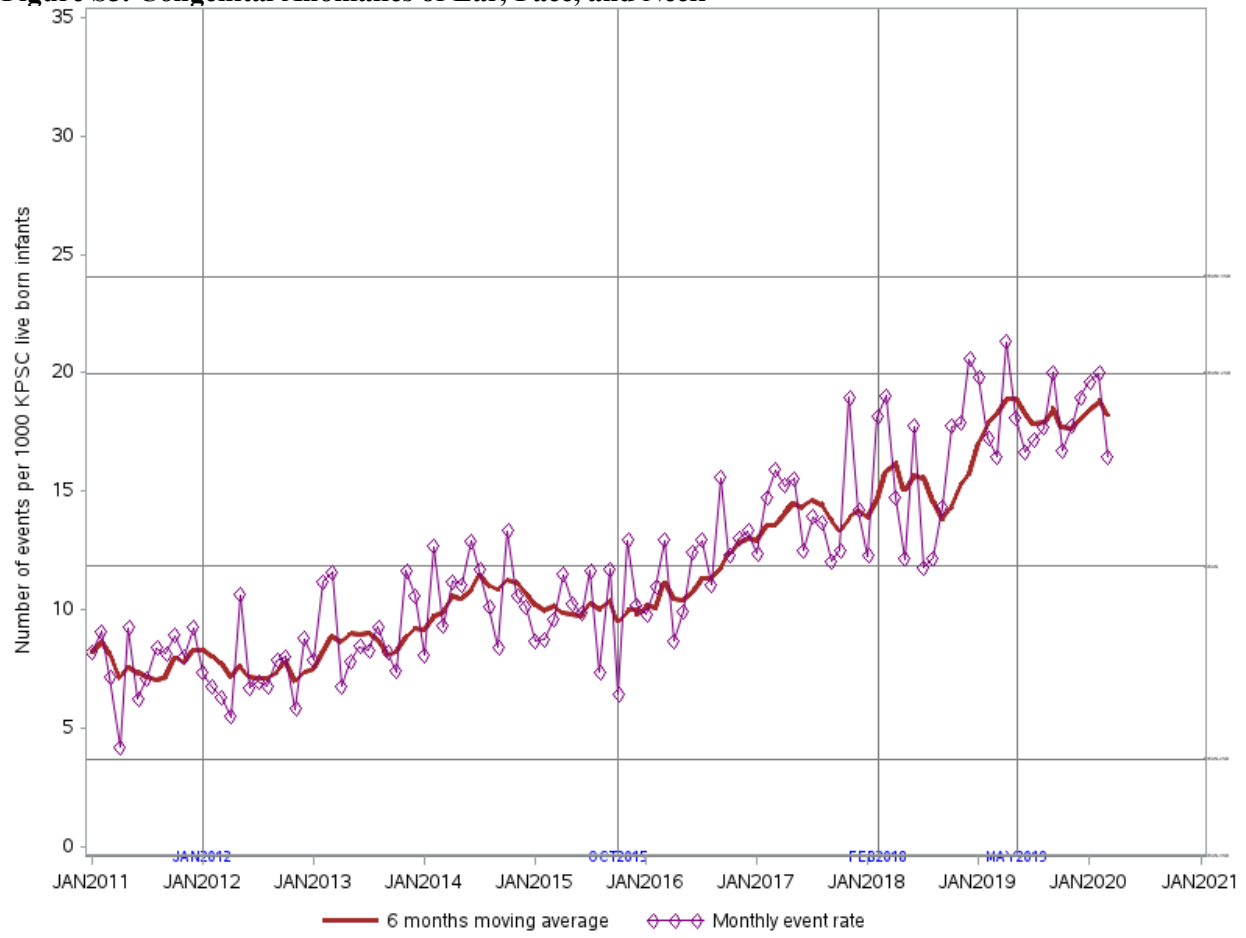


Figure S4. Congenital Anomalies of Cardiovascular System

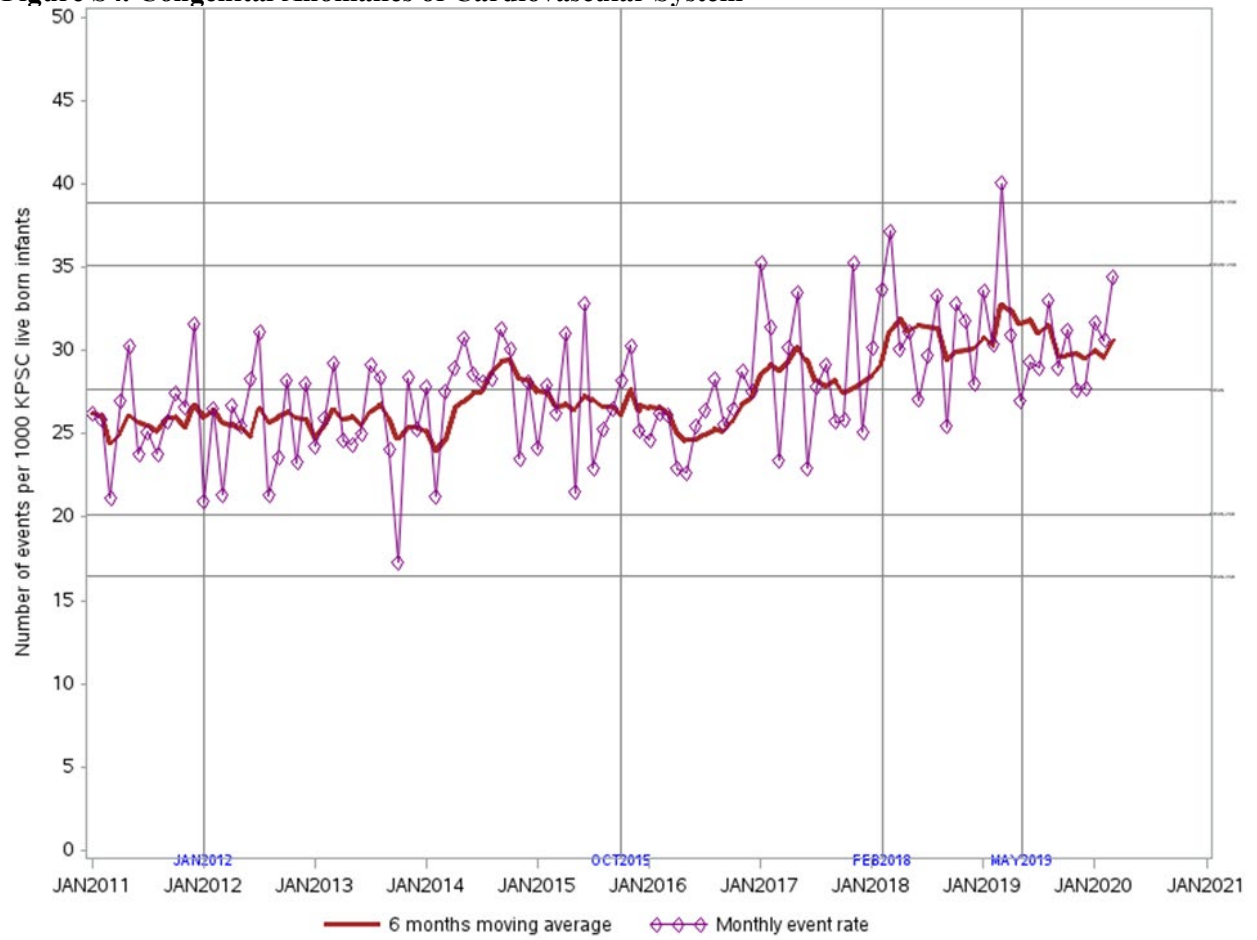


Figure S5. Congenital Anomalies of Respiratory System

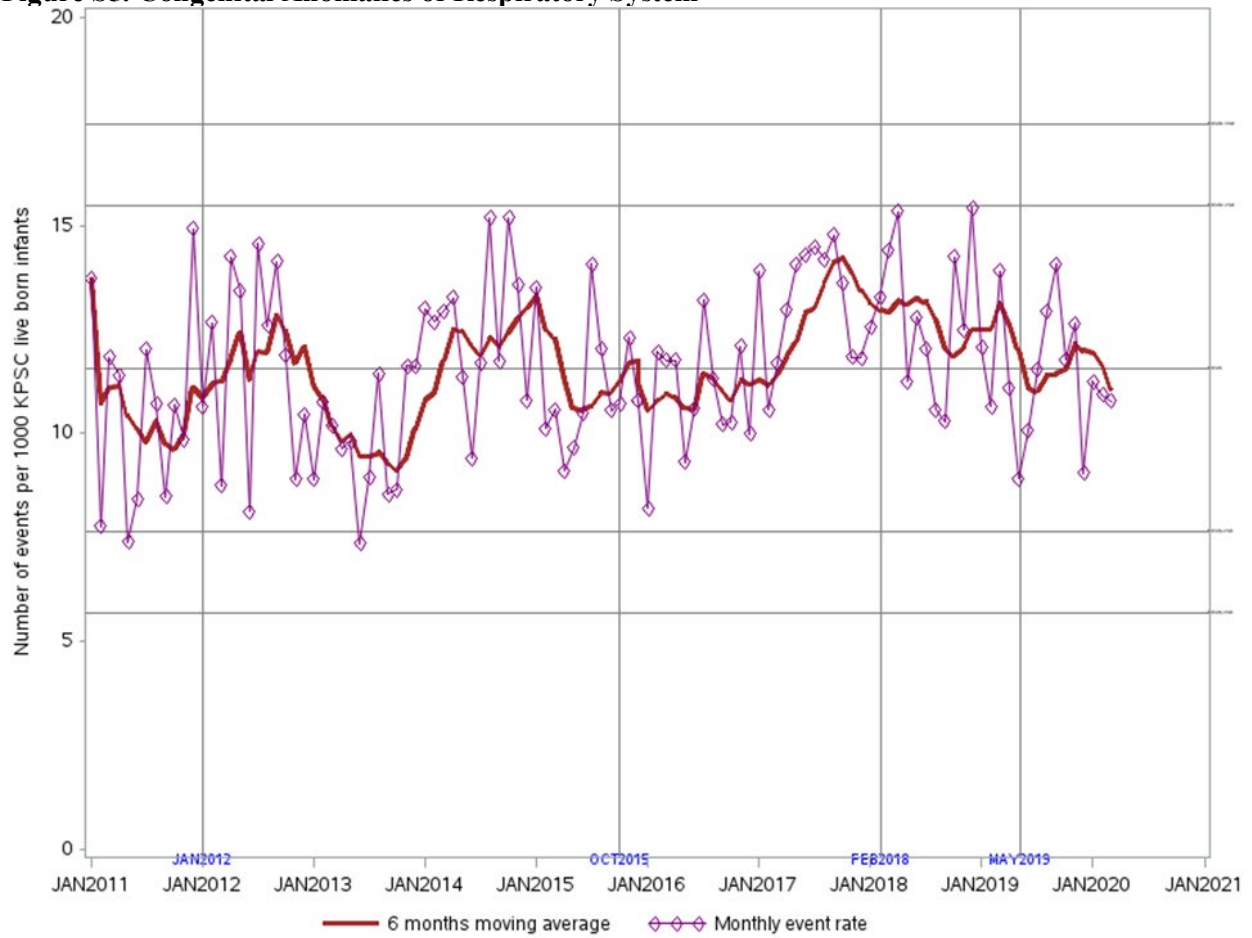


Figure S6. Clefts

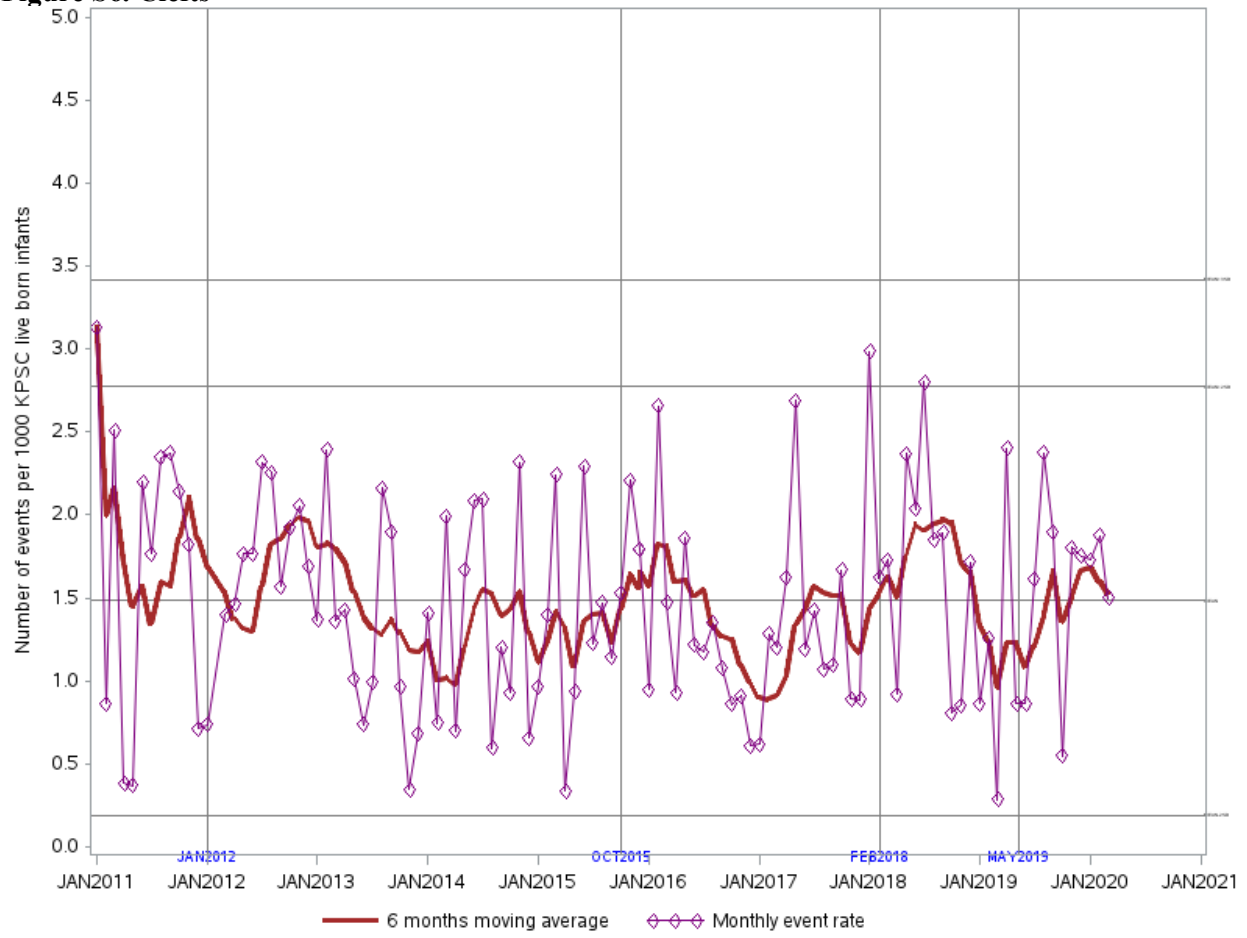


Figure S7. Congenital Anomalies of Upper Gastrointestinal System

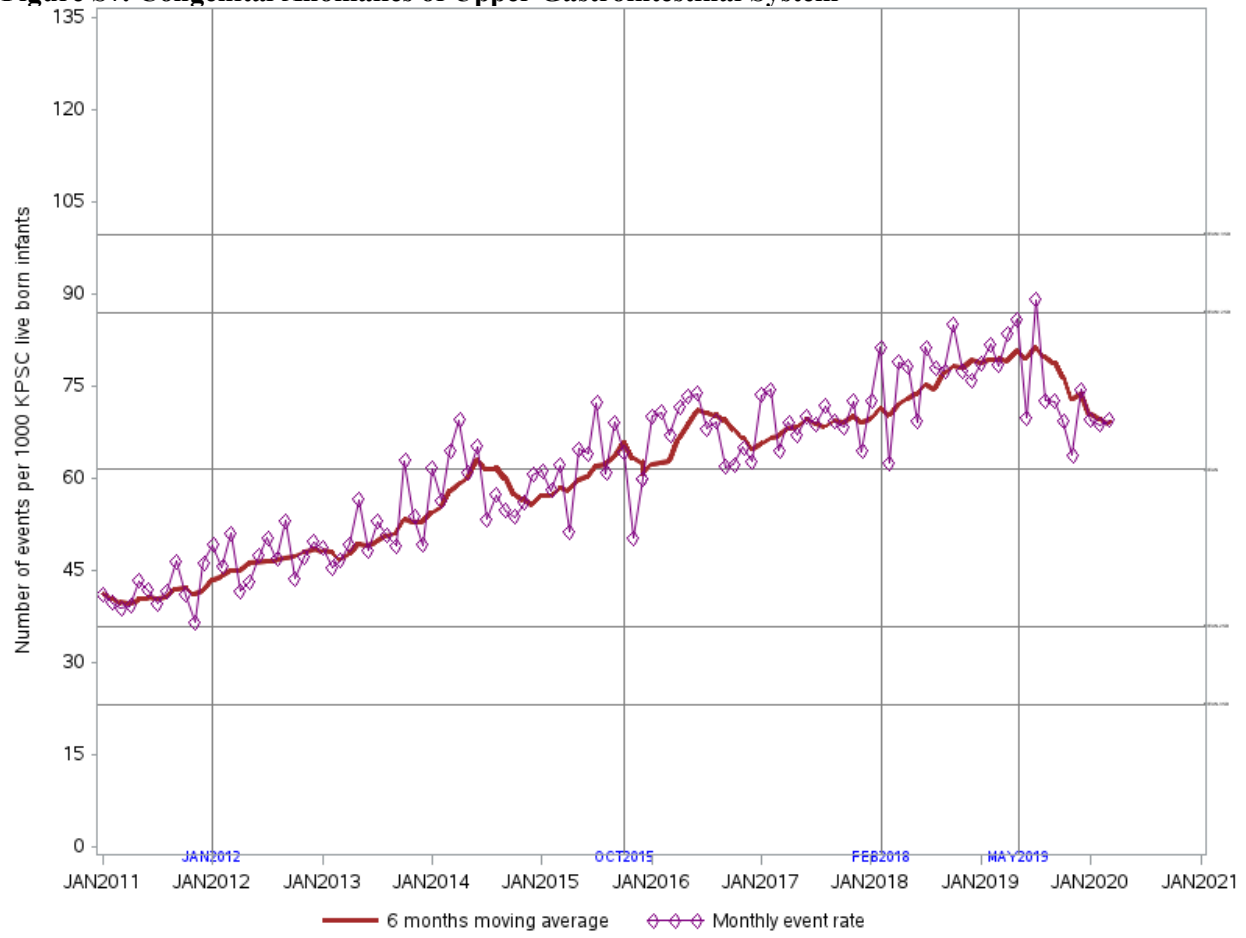


Figure S8. Congenital Anomalies of Lower Gastrointestinal System

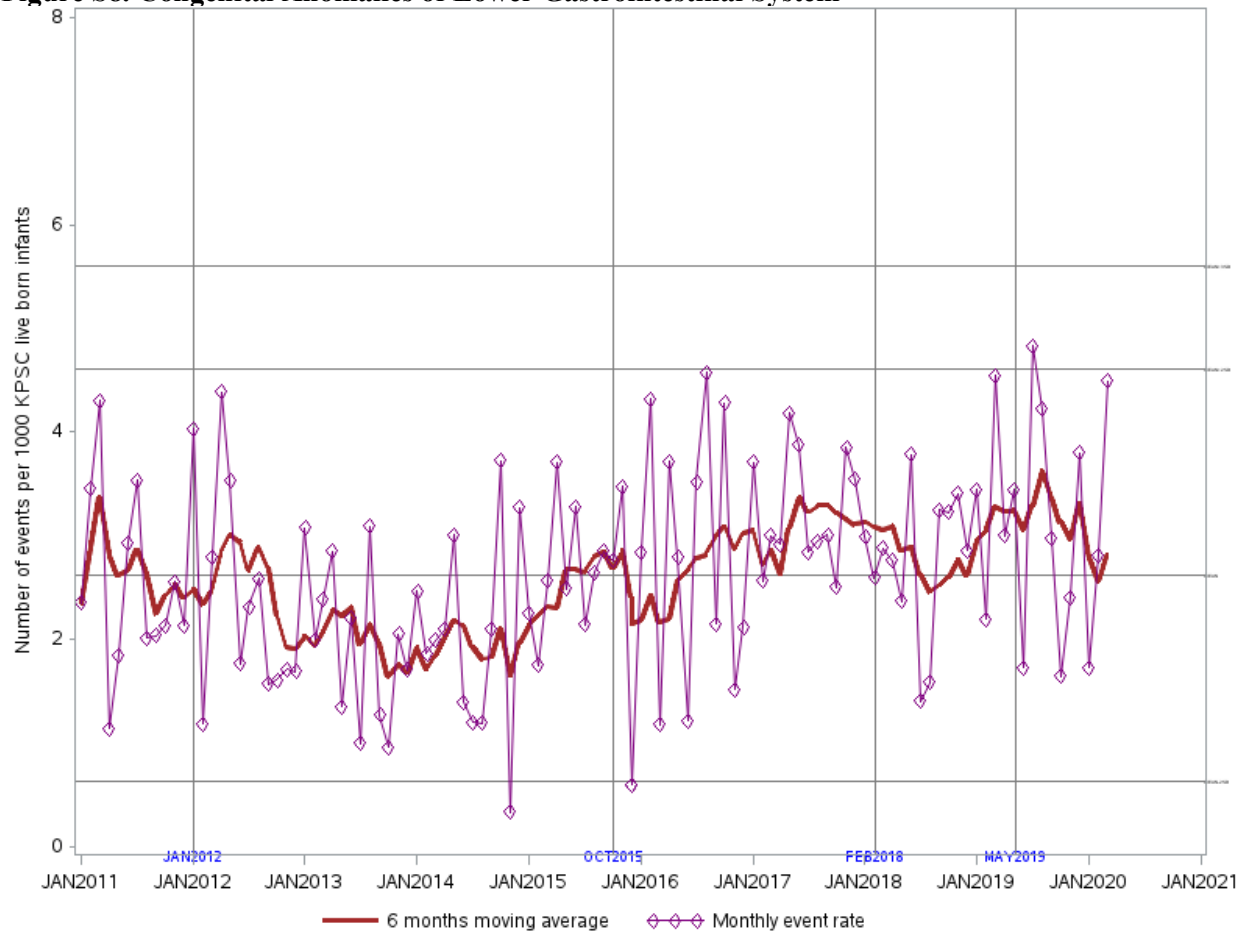


Figure S9. Congenital Anomalies of Genital System

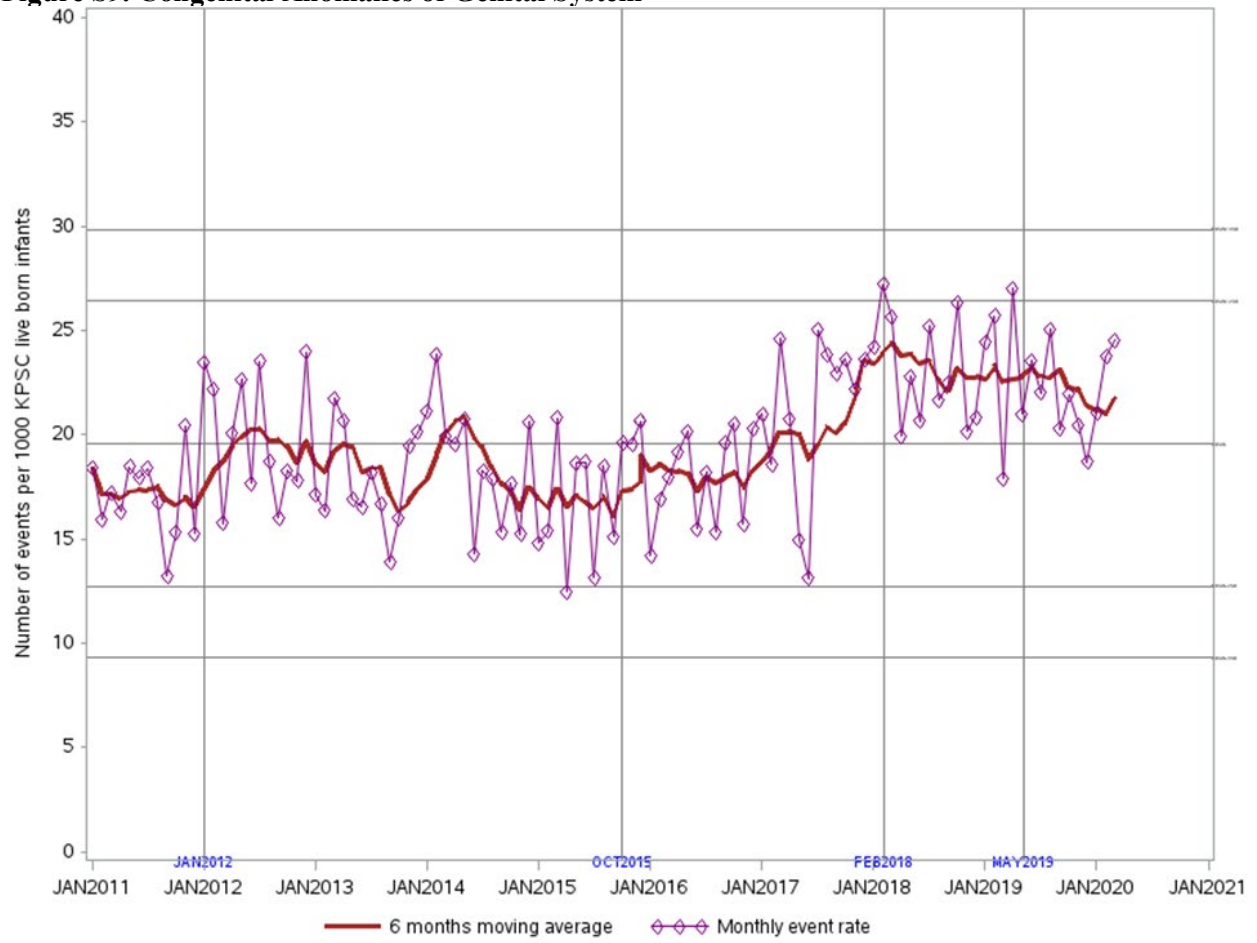


Figure S10. Congenital Anomalies of Renal System

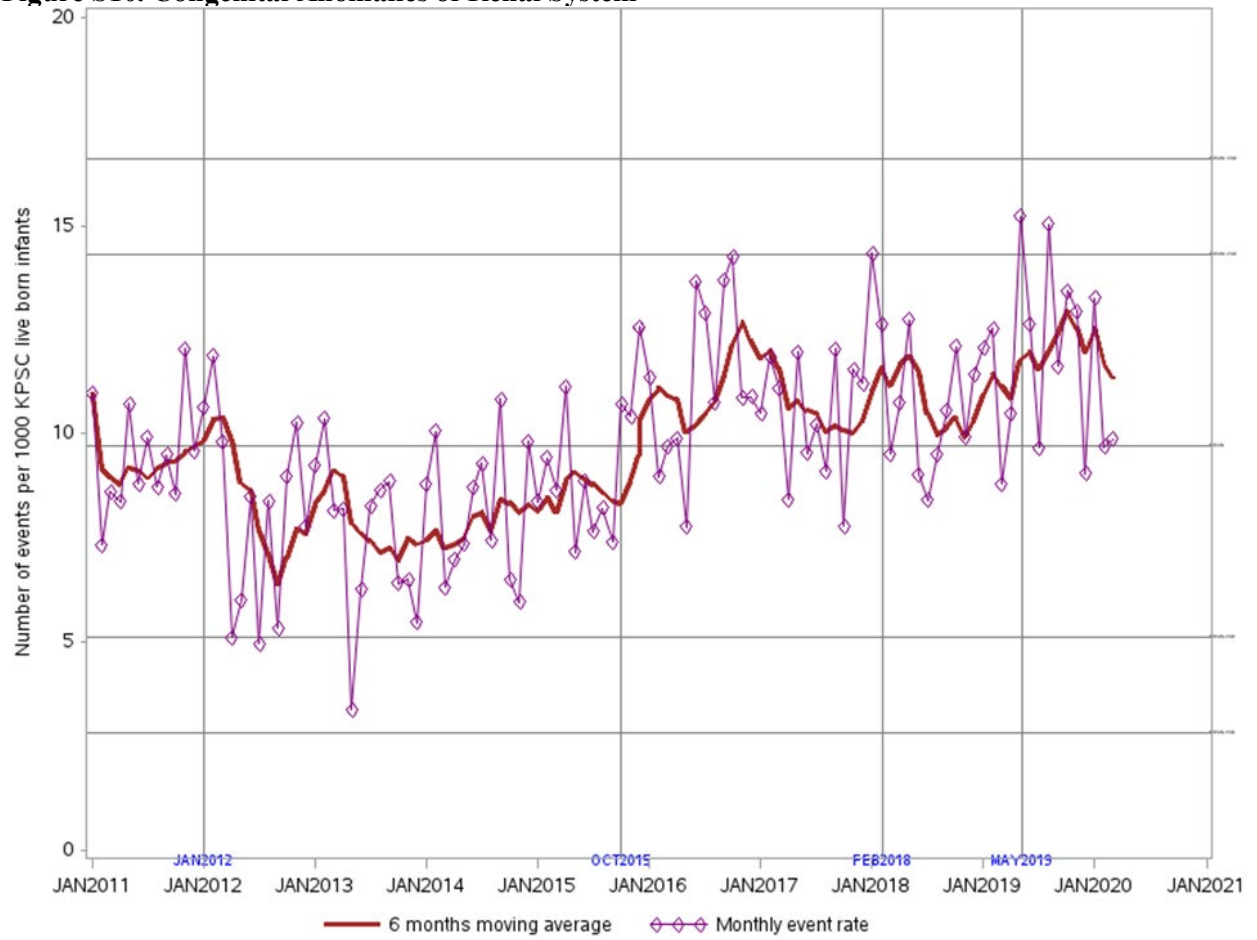


Figure S11. Congenital Anomalies of Musculoskeletal System



Figure S12. Congenital Anomalies of Limb

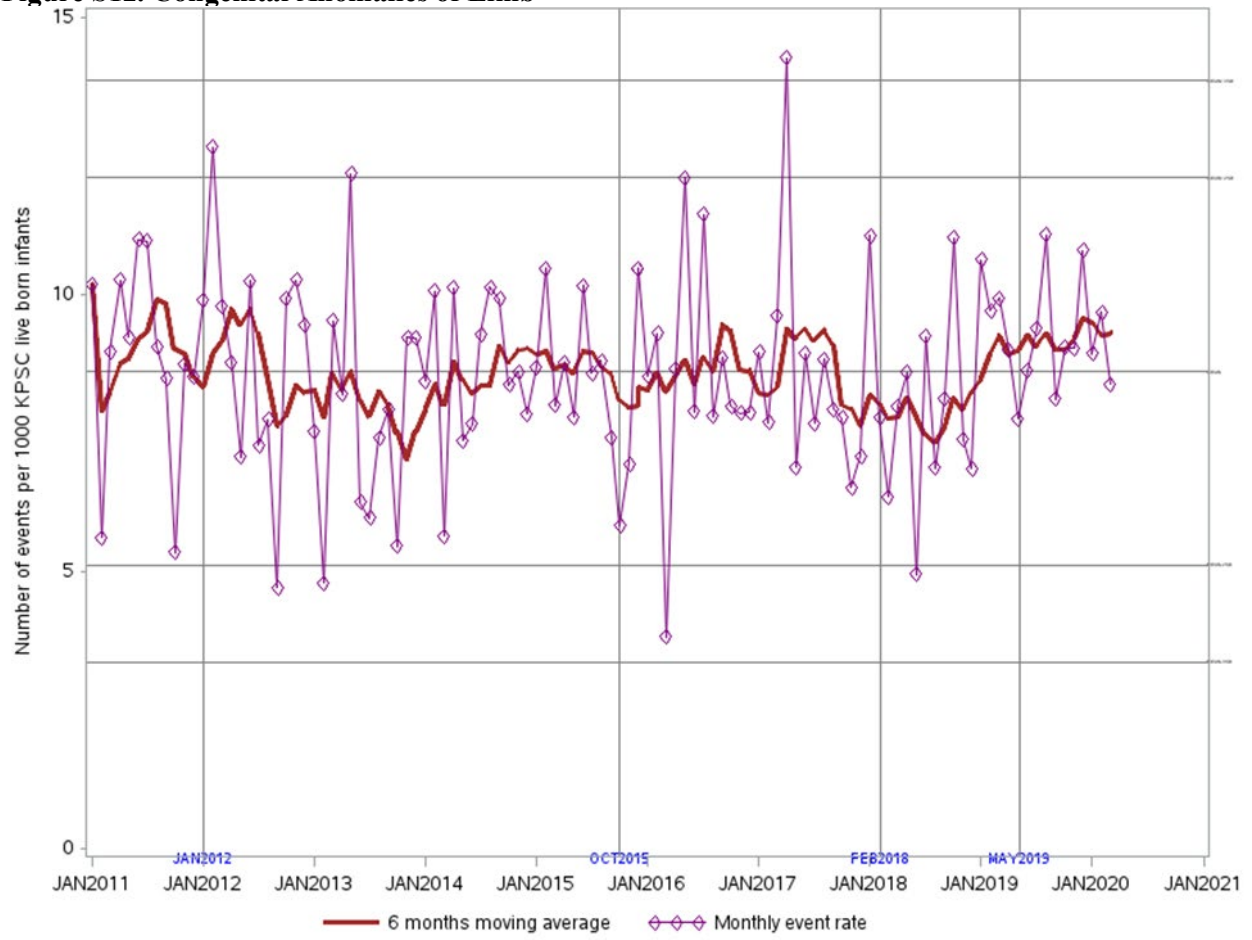


Figure S13. Congenital Anomalies of Integument

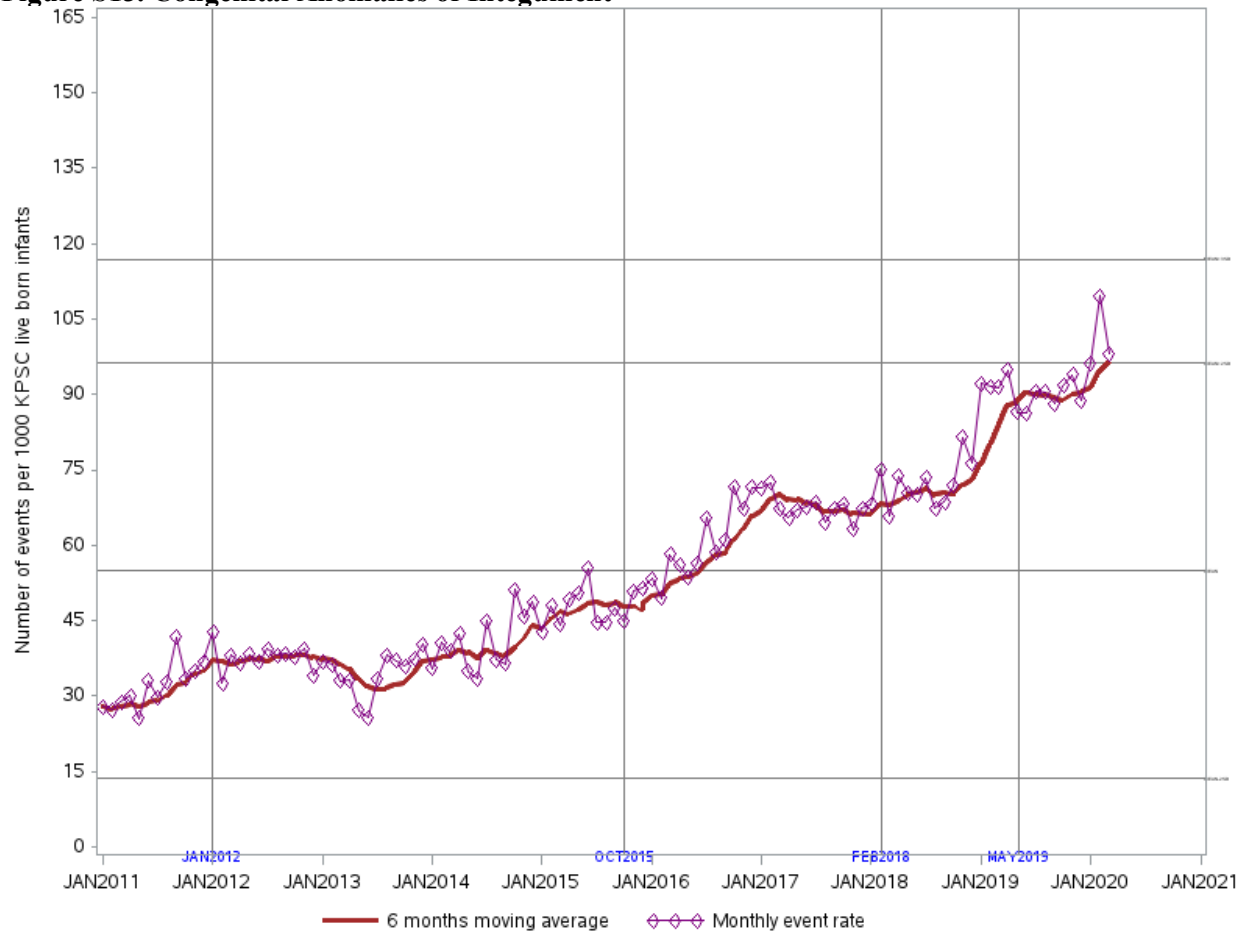


Figure S14. Other and Unspecified Congenital Anomalies

