

**Estimating the number of birth defects annually in USA
attributable to opioid use in mother
Privileged and confidential Attorney work product.**

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The overall rate of congenital malformation at birth in the USA is about 3% or 3 in 100 live births. The background rate of the main congenital malformations at birth in USA has been determined. [1]

If it is assumed that there are 250,000 NAS babies born per year (and this is the base assumption: the method can be scaled on that) then the background rate of 3% may be applied to determine that there would be 7500 birth defects if there were no exposures to opioids. The CDC study referred to in my NAS report shows that there is a significant association between opioid exposure of the mother and increased risk of congenital birth defects listed in Table 1 with the Odds Ratios of the case control study. We may use Odds Ratio as a Relative Risk since the numbers are large. We may thus calculate the numbers of cases. These results are given in Table 2.

Table 1 Association between maternal opioid analgesic treatment and specific major birth defects in National Birth Defects Prevention Study of 17449 cases and 6701 controls [2]. Significance is starred * in the usual way. Odds ratios were adjusted for maternal age, race/ethnicity, education, pre-pregnancy obesity, smoking.

Birth defect	Total no	Odds Ratio (95%CI)
Anencephaly	9	1.7 (0.84-3.4)
Spina bifida**	26	2.0 (1.3-3.2)
Any included heart defect***	211	1.4 (1.1-1.7)
Atrioventricular septal defect*	9	2.4 (1.2-4.8)
Conotruncal defects*	41	1.5 (1.0-2.1)
Tetrology of Fallot*	21	1.7 (1.1-2.8)
Ventricular septal defect*	6	2.7 (1.1-6.3)
L ventricular outflow obstruction*	36	1.5 (1.0-2.2)
Hypoplastic Left heart syndrome**	17	2.4 (1.4-4.1)
R ventricular outflow obstruction*	40	1.6 (1.1-2.3)
Pulmonary valve stenosis**	34	1.7 (1.2-2.6)
Cleft palate	25	1.3 (0.84-2.4)
Hydrocephaly*	11	2.0 (1.0-3.7)
Esophageal atresia	12	1.4 (0.76-2.5)
Gastroschisis*	26	1.8 (1.1-2.9)
Anorectal atresia/ stenosis	18	1.5 (0.9-2.4)
Diaphragmatic hernia	12	1.2 (0.66-2.2)

Table 2. Numbers of birth defects for NAS babies for selected conditions based on 250,000 NAS births.

Birth defect	Background rate Per 10,000 births	Relative Risk Opioid exposure Table 1	Number of cases based on 250,000 (rounded)
All heart defects	14.7	1.4	150
Cleft palate	10.6	1.3	80
Anencephaly	2.06	1.7	36
Spina bifida	3.5	2.0	88
Gastroschisis	4.3	1.8	86

These results are per 250,000 NAS births. For any other number, the result can be scaled.

References

1. Parker SE, Mai CT, Canfield MA et al (2010) Updated national birth prevalence estimates for selected birth defects in the USA 2004-2006. Birth Defects Research Part A. 88(12) 1008-1016
2. Broussard C, Rasmussen SA, Reefhuis J et al (2011) Maternal treatment with opioid analgesics and risk for birth defects. Am.J.Obst.Gynecol. 204: 314 e1-11.