

Letters

RESEARCH LETTER

Trends in Circumcision Among Newborn Males in the US

Neonatal male circumcision (NMC) reduces penile inflammation, urinary tract infections, and acquisition and transmission of sexually transmitted infections.¹ The World Health Organization (WHO) recommended NMC in 2007, followed by the American Academy of Pediatrics (AAP) in 2012 and the Centers for Disease Control and Prevention (CDC) in 2018.^{2,3} Previous studies have evaluated earlier trends in NMC.⁴ We examined trends in inpatient NMC procedures after the 2012 AAP recommendation.

Methods | This cross-sectional study used the 2012 to 2022 Kids' Inpatient Database (KID), a nationally representative dataset

of US pediatric hospitalizations (eFigure 1 and eMethods in Supplement 1). The analytical subpopulation included all discharges of male neonates aged 0 to 28 days except those with coagulopathies, penile anomalies, or prematurity. The outcome was NMC identified by *International Classification of Diseases (ICD)* codes (eFigure 2 and eTable in Supplement 1). The Johns Hopkins Institutional Review Board deemed this study exempt from review because it used deidentified data. We followed the **STROBE** reporting guideline.

All analyses accounted for the stratified, 1-stage, cluster survey design. Discharge weights were applied to generate national estimates. The unit of analysis was a hospital discharge. Annual inpatient NMC prevalence was calculated overall and stratified by patient and hospital characteristics. We used binomial regression to estimate prevalence difference (PD) between 2012 and 2022. Data were analyzed from February to May 2025 using Stata/MP 18 (StataCorp).

Table 1. Prevalence of Inpatient Circumcision by Neonatal Characteristics From 2012 to 2022^a

Characteristic	NMC, weighted estimates, No. (prevalence %)				2022 vs 2012 Prevalence difference, % (95% CI)
	2012 (n = 1 816 129)	2016 (n = 1 821 449)	2019 (n = 1 706 932)	2022 (n = 1 655 434)	
Overall	981 955 (54.1)	950 875 (52.2)	869 457 (50.9)	816 290 (49.3)	-4.8 (-6.9 to -2.6)
Race and ethnicity ^b					
Asian or Pacific Islander	37 236 (39.7)	37 582 (36.6)	32 367 (34.6)	31 448 (37.5)	-2.2 (-6.2 to 1.9)
Black	147 371 (64.9)	149 079 (65.5)	144 206 (65.3)	131 840 (66.1)	1.2 (-2.3 to 4.7)
Hispanic	71 139 (21.2)	72 875 (21.9)	66 313 (21.3)	70 788 (21.0)	-0.1 (-2.6 to 2.3)
Native American	6637 (44.2)	4649 (38.4)	4379 (39.2)	4198 (40.9)	-3.3 (-10.6 to 4.0)
White	572 517 (65.3)	539 014 (63.3)	484 301 (61.0)	444 707 (60.0)	-5.3 (-7.4 to -3.2)
Other ^c	54 880 (48.7)	49 855 (46.2)	52 232 (44.8)	46 898 (43.4)	-5.2 (-9.3 to -1.2)
Median zip code household income ^d					
Lowest	251 195 (49.6)	244 588 (47.9)	227 154 (48.6)	212 807 (49.1)	-0.5 (-3.5 to 2.5)
Middle to low	235 926 (53.6)	230 166 (51.9)	211 631 (51.1)	201 344 (49.1)	-4.5 (-7.0 to -1.9)
Middle to high	244 036 (55.6)	240 943 (53.8)	220 957 (51.5)	201 415 (48.5)	-7.2 (-9.9 to -4.4)
Highest	237 125 (59.4)	227 434 (56.8)	204 504 (53.6)	197 371 (51.1)	-8.3 (-11.1 to -5.5)
Insurance status ^e					
Medicare	3579 (58.7)	3826 (59.3)	2602 (63.1)	1878 (51.0)	-7.7 (-21.7 to 6.4)
Medicaid	375 397 (44.5)	366 655 (44.2)	334 559 (44.3)	306 312 (42.3)	-2.3 (-4.8 to 0.3)
Private	534 841 (64.2)	513 702 (60.7)	465 966 (57.9)	442 068 (56.3)	-8.0 (-10.1 to -5.8)
Self-pay	30 173 (42.3)	35 007 (41.8)	40 688 (42.9)	40 292 (43.5)	1.2 (-2.7 to 5.2)
No charge or other ^f	35 496 (61.0)	30 628 (58.6)	24 380 (53.6)	24 631 (53.0)	-8.0 (-12.4 to -3.6)

Abbreviation: NMC, neonatal male circumcision.

^a Analyses were weighted to produce national estimates. Binomial regression was used to estimate the prevalence difference between 2012 and 2022. Missing values were handled using the available case method.

^b Race and ethnicity data were reported to Healthcare Cost and Utilization Project Kids' Inpatient Database (KID) by participating partner organizations. These data were collected and included in this study due to established disparities in neonatal male circumcision prevalence. Race and ethnicity data were missing for 8.2% of records in 2012, 9.4% of records in 2016, 7.7% of records in 2019, and 9.0% of records in 2022.

^c Details on the other category are not available in KID.

^d Median zip code household income data were missing for 2.0% of records in 2012, 1.2% of records in 2016, 1.0% of records in 2019, and 0.7% of records in 2022.

^e Insurance status was missing in 0.3% of records in 2012 and 0.1% of records across 2016 to 2022. No charge or other indicate hospitalizations for which no standard payment source was expected or applicable.

^f No charge includes admissions under charity care, under research protocols, or for teaching purposes. Other includes nonstandard payers such as Veterans Affairs, Indian Health Service, Workers' compensation, and other government or private programs not otherwise categorized. The composition of these categories may vary by hospital and reporting practices.

Table 2. Prevalence of Inpatient Circumcision by Race and Ethnicity and Hospital Region From 2012 to 2022^a

	NMC, weighted estimates, No. (prevalence %)		2022 vs 2012 Prevalence difference, % (95% CI)
	2012 (n = 1 816 129)	2022 (n = 1 655 434)	
Northeast			
Overall	195 158 (65.3)	160 039 (59.9)	-5.4 (-9.4 to -1.5)
Asian or Pacific Islander	8294 (42.0)	7177 (46.0)	4.0 (-1.5 to 9.5)
Black	30 795 (80.3)	20 349 (75.9)	-4.4 (-10.6 to 1.8)
Hispanic	14 516 (40.3)	15 785 (38.8)	-1.6 (-5.8 to 2.7)
Native American	555 (52.6)	308 (55.9)	3.3 (-13.1 to 19.7)
White	116 872 (73.0)	81 715 (65.1)	-7.9 (-13.1 to -2.7)
Other ^b	15 053 (51.1)	16 691 (55.6)	4.5 (-1.7 to 10.7)
Midwest			
Overall	285 933 (74.0)	229 688 (68.5)	-5.5 (-7.9 to -3.0)
Asian or Pacific Islander	4192 (49.8)	5299 (46.8)	-2.9 (-9.5 to 3.6)
Black	34 678 (81.9)	28 969 (79.9)	-2.1 (-5.9 to 1.8)
Hispanic	8337 (38.4)	11 047 (36.7)	-1.7 (-7.8 to 4.4)
Native American	1830 (74.6)	1055 (59.8)	-14.8 (-26.5 to -3.1)
White	162 311 (80.7)	138 733 (74.2)	-6.5 (-8.9 to -4.1)
Other ^b	15 062 (63.3)	5758 (55.0)	-8.3 (-15.8 to -0.7)
South			
Overall	390 590 (56.9)	349 604 (52.8)	-4.1 (-7.4 to -0.9)
Asian or Pacific Islander	10 336 (46.6)	8494 (41.3)	-5.3 (-10.9 to 0.3)
Black	76 983 (60.5)	78 260 (64.5)	4.1 (-0.8 to 9.0)
Hispanic	33 331 (25.2)	29 968 (22.7)	-2.6 (-6.6 to 1.4)
Native American	2629 (56.1)	1969 (61.9)	5.9 (-5.4 to 17.2)
White	231 404 (69.1)	190 192 (63.7)	-5.4 (-8.4 to -2.4)
Other ^b	20 208 (49.4)	19 266 (44.2)	-5.2 (-12.6 to 2.2)
West			
Overall	110 274 (24.8)	76 959 (19.7)	-5.1 (-8.9 to -1.3)
Asian or Pacific Islander	14 414 (33.2)	10 477 (28.9)	-4.3 (-12.2 to 3.7)
Black	4915 (25.6)	4262 (28.0)	2.4 (-6.1 to 10.9)
Hispanic	14955 (10.2)	13 988 (10.5)	0.2 (-2.6 to 3.1)
Native American	1623 (23.9)	866 (18.2)	-5.7 (-16.0 to 4.7)
White	61 930 (34.3)	34 066 (26.2)	-8.1 (-13.0 to -3.2)
Other ^b	4557 (24.5)	5182 (21.7)	-2.8 (-8.3 to 2.6)

Abbreviation: NMC, neonatal male circumcision.

^a Analyses were weighted to produce national estimates. Binomial regression was used to estimate the prevalence difference between 2012 and 2022. Missing values were handled using the available case method.

^b Details on the other category are not available in the Kids' Inpatient Database.

Results | This study included over 1.5 million hospitalizations of male neonates (aged 0-28 days) each year, ranging from 1 816 129 hospitalizations in 2012 to 1 655 434 in 2022. From 2012 to 2022, the overall prevalence of hospitalizations with an NMC decreased significantly from 54.1% to 49.3% (PD, -4.8%; 95% CI, -6.9% to -2.6%) (Table 1). Decreases were observed across most patient and hospital subgroups. In 2012, NMC prevalence was 39.7% among Asian or Pacific Islander, 64.9% among Black, 21.2% among Hispanic, 44.2% among Native American, 65.3% among White, and 48.7% among other neonates. White neonates had a significant decline (PD, -5.3%; 95% CI, -7.4% to -3.2%), while prevalence among Black and Hispanic neonates remained stable. Neonates from the highest-income zip codes and those with private insurance had the highest NMC prevalence but experienced the largest reduction.

Significant declines in NMC prevalence were observed across all Census regions, with the Midwest maintaining the highest prevalence (68.5%) and the West the lowest (19.7%)

in 2022. Significant declines in NMC prevalence were also observed among White neonates across all regions, with the West showing the lowest prevalence (34.3% in 2012 and 26.2% in 2022) and the largest decrease (PD, -8.1%; 95% CI, -13.0% to -3.2%) (Table 2). NMC prevalence remained stable among Black and Hispanic neonates across regions.

Discussion | In this nationally representative study, NMC prevalence declined significantly from 2012 to 2022 despite recommendations by the CDC, AAP, and WHO, with the most notable decrease among White neonates. These findings align with prior trends and reflect sociodemographic changes and evolving cultural, clinical, and policy landscapes.⁴

Multiple factors may contribute to NMC decline. Although the AAP affirms that NMC benefits outweigh the risks and supports access to the procedure, it recommends leaving the decision to parents. There is also increased skepticism toward medical recommendations in the US.⁵ The continual Hispanic population growth and births,⁶ the ethnicity group with

the lowest NMC prevalence, may also contribute to overall decreases. Additionally, 17 states had ended Medicaid coverage for routine NMC by 2011, creating barriers for families with low income.

A study limitation is that KID captures only inpatient NMC using ICD codes, thus underestimating overall NMC prevalence due to low sensitivity of ICD codes or by excluding outpatient procedures and restricting the sample to neonates aged 0 to 28 days. Additionally, KID identifies discharge records rather than individual patients; thus, multiple hospitalizations for the same neonate appear as separate records. State identifiers were also lacking. However, KID provides the most comprehensive nationally representative estimates.

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