

SUPPLEMENTAL MATERIAL

Table S1. Characteristics of individuals with congenital heart defects, total, by age, and racial and ethnic group.

Characteristics	Age Group [†]											
	1-18 years					p-value [§]	19-64 years					p-value [§]
	Total N=18951	nHW n=9657 (51.0%)	nHB n=4896 (25.8%)	Hispanic n=3708 (19.6%)	Other [‡] n=690 (3.6%)		Total N=12591	nHW n=8516 (67.6%)	nHB n=2095 (16.6%)	Hispanic n=1657 (13.2%)	Other [‡] n=323 (2.6%)	
N (%)	n (%) [*]	n (%) [*]	n (%) [*]	n (%) [*]	N (%)	n (%) [*]	n (%) [*]	n (%) [*]	n (%) [*]			
Site												
Georgia	4480 (23.6)	1956 (20.2)	1833 (37.4)	470 (12.7)	221 (32.0)	<0.001	1590 (12.6)	898 (10.5)	582 (27.7)	52 (3.1)	58 (18.0)	<0.001
North Carolina	7311 (38.6)	4498 (46.6)	1707 (34.9)	852 (23.0)	254 (36.8)		4519 (35.9)	3535 (41.5)	747 (35.7)	129 (7.8)	108 (33.4)	
New York	5967 (31.5)	2161 (22.4)	1344 (27.4)	2247 (60.6)	215 (31.2)		4273 (33.9)	2086 (24.5)	747 (35.7)	1287 (77.7)	153 (47.4)	
Utah	1193 (6.3)	1042 (10.8)	12 (0.3)	139 (3.7)	0 (0.0)		2209 (17.6)	1997 (23.5)	19 (0.9)	189 (11.4)	<10 --	
Sex												
Female	8916 (47.1)	4348 (45.0)	2436 (49.7)	1779 (48.0)	353 (51.2)	<0.001	6460 (51.3)	3947 (46.4)	1282 (61.2)	1055 (63.7)	176 (54.5)	<0.001
Male	10035 (52.9)	5309 (55.0)	2460 (50.3)	1929 (52.0)	337 (48.8)		6131 (48.7)	4569 (53.6)	813 (38.8)	602 (36.3)	147 (45.5)	
CHD Anatomic Severity												
Severe	4942 (26.1)	2536 (26.2)	1305 (26.7)	910 (24.5)	191 (27.7)	<0.001	2873 (22.8)	1952 (22.9)	524 (25.0)	320 (19.3)	77 (23.8)	<0.001
Shunt	6518 (34.4)	2827 (29.3)	1860 (38.0)	1545 (41.7)	286 (41.4)		2549 (20.2)	1336 (15.7)	592 (28.3)	531 (32.0)	90 (27.9)	
Valve	5527 (29.2)	3359 (34.8)	1167 (23.8)	879 (23.7)	122 (17.7)		6532 (51.9)	4786 (56.2)	885 (42.2)	722 (43.6)	139 (43.0)	
Shunt and Valve	1964 (10.3)	935 (9.7)	564 (11.5)	374 (10.1)	91 (13.2)		637 (5.1)	442 (5.2)	94 (4.5)	84 (5.1)	17 (5.3)	
Health Insurance												
Any public	10825 (57.1)	3731 (38.6)	3623 (74.0)	3096 (83.5)	375 (54.4)	<0.001	5246 (41.7)	2426 (28.5)	1364 (65.1)	1303 (78.6)	153 (47.4)	<0.001
Private	6416 (33.9)	4853 (50.2)	912 (18.6)	430 (11.6)	221 (32.0)		6145 (48.8)	5210 (61.2)	528 (25.2)	270 (16.3)	137 (42.4)	
None	88 (0.5)	43 (0.5)	30 (0.6)	15 (0.4)	0 (0.0)		222 (1.8)	105 (1.2)	57 (2.7)	52 (3.2)	<10 --	
Unknown	1622 (8.5)	1030 (10.7)	331 (6.8)	167 (4.5)	94 (13.6)		978 (7.8)	775 (9.1)	146 (7.0)	32 (1.9)	25 (7.7)	

Neighborhood median income (USD)												
<\$40,000	6455 (34.1)	1872 (19.4)	2300 (47.0)	2040 (55.0)	243 (35.2)	<0.001	3548 (28.2)	1423 (16.7)	1013 (48.3)	999 (60.3)	113 (35.0)	<0.001
\$40,000-\$75,000	10007 (52.8)	5837 (60.4)	2391 (48.8)	1464 (39.5)	315 (45.7)		7024 (55.8)	5305 (62.3)	1007 (48.1)	571 (34.5)	141 (43.6)	
>\$75,000	2489 (13.1)	1948 (20.2)	205 (4.2)	204 (5.5)	132 (19.1)		2019 (16.0)	1788 (21.0)	75 (3.6)	87 (5.2)	69 (21.4)	
Neighborhood poverty status												
Low poverty neighborhood (<25% households below FPL)	12315 (65.0)	7719 (79.9)	2547 (52.0)	1613 (43.5)	436 (63.2)	<0.001	8919 (70.8)	6965 (81.8)	1040 (49.6)	715 (43.2)	199 (61.6)	<0.001
High poverty neighborhood (≥25% households below FPL)	6636 (35.0)	1938 (20.1)	2349 (48.0)	2095 (56.5)	254 (36.8)		3672 (29.2)	1551 (18.2)	1055 (50.4)	942 (56.8)	124 (38.4)	
Healthcare utilization												
≥1 Outpatient visits	17731 (93.6)	8935 (92.5)	4586 (93.7)	3583 (96.6)	627 (90.9)	<0.001	11621 (92.3)	7795 (91.5)	1946 (92.9)	1592 (96.1)	288 (89.2)	<0.001
≥1 Hospitalizations	9628 (36.6)	3156 (32.7)	1875 (38.3)	1574 (42.5)	323 (46.8)	<0.001	6595 (52.4)	4162 (48.9)	1224 (58.4)	1025 (61.9)	184 (57.0)	<0.001
≥1 Emergency department visits	5980 (31.6)	2152 (22.3)	1561 (31.9)	2103 (56.7)	164 (23.8)	<0.001	4798 (38.1)	2675 (31.4)	892 (42.6)	1123 (67.8)	108 (33.4)	<0.001
Mortality												
Yes	113 (0.6)	46 (0.5)	41 (0.8)	22 (0.6)	<10 --	ns	261 (2.1)	151 (1.8)	74 (3.5)	28 (1.7)	<10 --	<0.001

CHD = congenital heart defects; FPL = Federal Poverty Level; USD = United States dollar currency.

Cell sizes less than 10 are not displayed directly and are reported as '<10' per site-specific cell size suppression policy; cell size values of '0' are reported directly.

Statistically significant aOR values are bolded.

* Column percentages reported in cells. Cell sizes less than 10 are not displayed directly and are reported as '<10' per site-specific cell size suppression policy; cell size values of '0' are reported directly.

† For 1-18 year olds, median age was 6 years, and for 19-64 year olds, median age was 38 years.

‡ Other racial and ethnic group includes Asian, American Indian/Native American, Native Hawaiian or Other Pacific Islander, and multi-racial. Unknown race excluded from analyses.

§ Chi-square tests compare racial and ethnic groups; analyses do not include "Total" column.

|| Insurance categorization: public defined as Medicaid or Medicare; private defined as private, other government, or other insurance; none defined as self-pay/uninsured; and unknown defined as unavailable, unknown, or no insurance indicated.

Table S2. Associations between race and ethnicity and healthcare utilization and mortality, stratified by age and neighborhood poverty status among individuals with congenital heart defects.

Age Group 1-18 years																
	High poverty neighborhood (>25% households below Federal Poverty Level*)								Low poverty neighborhood (≤25% households below Federal Poverty Level*)							
	Outpatient visits**		Hospitalizations**		Emergency Department visits**		Mortality		Outpatient visits**		Hospitalizations**		Emergency Department visits**		Mortality	
	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)
Non-Hispanic White	1794 (92.6)	1.0 (referent)	648 (33.4)	1.0 (referent)	440 (22.7)	1.0 (referent)	<10 --	1.0 (referent)	7141 (92.5)	1.0 (referent)	2508 (32.5)	1.0 (referent)	1712 (22.2)	1.0 (referent)	41 (0.5)	1.0 (referent)
Non-Hispanic Black	2218 (94.4)	0.7 (0.5-0.9)	892 (38.0)	1.2 (1.0-1.3)	865 (36.8)	1.3 (1.1-1.5)	21 (0.9)	2.3 (0.8-6.5)	2368 (93.0)	0.8 (0.6-0.9)	983 (38.6)	1.2 (1.1-1.3)	696 (27.3)	1.6 (1.4-1.9)	20 (0.8)	1.2 (0.7-2.1)
Hispanic	2031 (97.0)	0.8 (0.6-1.1)	883 (42.2)	1.4 (1.2-1.6)	1336 (63.8)	1.9 (1.6-2.3)	13 (0.6)	1.6 (0.5-4.9)	1552 (96.2)	1.5 (1.1-2.0)	691 (42.8)	1.4 (1.2-1.5)	767 (47.6)	2.1 (1.8-2.4)	<10 --	0.7 (0.4-1.6)
Other‡	226 (89.0)	0.4 (0.3-0.7)	128 (50.4)	1.8 (1.3-2.3)	70 (27.6)	0.6 (0.4-0.9)	<10 --	1.0 (0.1-9.1)	401 (92.0)	0.9 (0.6-1.4)	195 (44.7)	1.6 (1.3-1.9)	94 (21.6)	1.2 (0.9-1.6)	<10 --	1.2 (0.4-3.9)
Age Group 19-64 years																
	High poverty neighborhood (>25% households below Federal Poverty Level*)								Low poverty neighborhood (≤25% households below Federal Poverty Level*)							
	Outpatient visits**		Hospitalizations**		Emergency Department visits**		Mortality		Outpatient visits**		Hospitalizations**		Emergency Department visits**		Mortality	
	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)
Non-Hispanic White	1427 (92.0)	1.0 (referent)	827 (53.3)	1.0 (referent)	474 (30.6)	1.0 (referent)	33 (2.1)	1.0 (referent)	6368 (91.4)	1.0 (referent)	3335 (47.9)	1.0 (referent)	2201 (31.6)	1.0 (referent)	118 (1.7)	1.0 (referent)
Non-Hispanic Black	989 (93.7)	1.6 (1.1-2.3)	619 (58.7)	1.0 (0.9-1.2)	460 (43.6)	1.3 (1.1-1.6)	42 (4.0)	1.4 (0.8-2.5)	957 (92.0)	1.0 (0.8-1.4)	605 (58.2)	1.2 (1.0-1.4)	432 (41.5)	1.6 (1.3-1.8)	32 (3.1)	1.2 (0.8-1.9)
Hispanic	913 (96.9)	1.8 (1.1-3.0)	566 (60.1)	1.1 (0.9-1.4)	668 (70.9)	1.5 (1.2-1.9)	14 (1.5)	0.5 (0.2-0.9)	679 (95.0)	1.2 (0.8-1.8)	459 (64.2)	1.8 (1.5-2.1)	455 (63.6)	1.9 (1.6-2.3)	14 (2.0)	0.8 (0.4-1.4)
Other‡	116 (93.6)	1.2 (0.5-2.5)	80 (64.5)	1.4 (1.0-2.1)	49 (39.5)	0.8 (0.5-1.2)	<10 --	1.1 (0.3-3.7)	172 (86.4)	0.9 (0.6-1.4)	104 (52.3)	1.1 (1.1-1.3)	59 (29.7)	0.8 (0.5-1.1)	<10 --	1.4 (0.5-3.4)

aOR = adjusted odds ratio; CI = confidence interval; CHD = congenital heart defect.

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Statistically significant aOR values are bolded.

*Assessed based on individuals' ZIP Code Tabulation Area (ZCTA) from the 2014 American Community Survey (ACS) 5-year estimates, estimated across years 2010-2014 (U.S. Census Bureau, 2014).

** Zero counts for visit types are not included; healthcare utilization visit categories are not mutually exclusive.

‡ Other racial and ethnic group includes Asian, American Indian/Native American, Native Hawaiian or Other Pacific Islander, and multi-racial. Unknown race excluded from analyses.

Table S3. Characteristics of individuals with congenital heart defects, total and by racial and ethnic group, with unknown race included.

Characteristics	Total N=35888	Non-Hispanic White n=18173 (50.6%)	Non- Hispanic Black n=6991 (19.5%)	Hispanic n=5365 (15.0%)	Other‡ n=1013 (2.8%)	Unknown n=4346 (12.1%)	p-value§
	N (%)	n (%)*	n (%)*	n (%)*	n (%)*	n (%)*	
Site							
Georgia	8165 (22.8)	2854 (15.7)	2415 (34.5)	522 (9.7)	279 (27.5)	2095 (48.2)	<0.001
North Carolina	12601 (35.1)	8033 (44.2)	2454 (35.1)	981 (18.3)	362 (35.7)	771 (17.7)	
New York	10778 (30.0)	4247 (23.4)	2091 (29.9)	3534 (65.9)	368 (36.3)	538 (12.4)	
Utah	4344 (12.1)	3039 (16.7)	31 (0.5)	328 (6.1)	<10 (--)	942 (21.7)	
Age† (years)							
1-10	14804 (41.2)	5815 (32.0)	3585 (51.3)	2765 (51.5)	535 (52.8)	2104 (48.4)	<0.001
11-18	7497 (20.9)	3842 (21.2)	1311 (18.7)	943 (17.6)	155 (15.3)	1246 (28.7)	
19-44	8353 (23.3)	5076 (27.9)	1333 (19.1)	1096 (20.4)	200 (19.8)	648 (14.9)	
45-64	5234 (14.6)	3440 (18.9)	762 (10.9)	561 (10.5)	123 (12.1)	348 (8.0)	
Age (years)							
1-18	22301 (62.1)	9657 (53.1)	4896 (70.0)	3708 (69.1)	690 (68.1)	3350 (77.1)	<0.001
19-64	13587 (37.9)	8516 (46.9)	2095 (30.0)	1657 (30.9)	323 (31.9)	996 (22.9)	
Sex							
Female	17432 (48.6)	8295 (45.6)	3718 (53.2)	2834 (52.8)	529 (52.2)	2056 (47.3)	<0.001
Male	18456 (51.4)	9878 (54.4)	3273 (46.8)	2531 (47.2)	484 (47.8)	2290 (52.7)	
CHD Anatomic Severity							
Severe	8693 (24.2)	4488 (24.7)	1829 (26.2)	1230 (22.9)	268 (26.5)	878 (20.2)	<0.001
Shunt	10609 (29.6)	4163 (22.9)	2452 (35.1)	2076 (38.7)	376 (37.1)	1542 (35.5)	
Valve	13664 (38.1)	8145 (44.8)	2052 (29.3)	1601 (29.8)	261 (25.8)	1605 (36.9)	
Shunt and Valve	2922 (8.1)	1377 (7.6)	658 (9.4)	458 (8.6)	108 (10.6)	321 (7.4)	

Health Insurance							
Any public	17830 (49.7)	6157 (33.9)	4987 (71.3)	4399 (82.0)	528 (52.1)	1759 (40.5)	<0.001
Private	14791 (41.2)	10063 (55.4)	1440 (20.6)	700 (13.0)	358 (35.3)	2230 (51.3)	
None	370 (1.0)	148 (0.8)	87 (1.3)	67 (1.3)	<10 (--)	60 (1.4)	
Unknown	2897 (8.1)	1805 (9.9)	477 (6.8)	199 (3.7)	119 (11.7)	297 (6.8)	
Neighborhood median income (USD)							
<\$40,000	10922 (30.4)	3295 (18.1)	3313 (47.4)	3039 (56.7)	356 (35.1)	919 (21.2)	<0.001
\$40,000-\$75,000	19471 (54.3)	11142 (61.3)	3398 (48.6)	2035 (37.9)	456 (45.0)	2440 (56.1)	
>\$75,000	5495 (15.3)	3736 (20.6)	280 (4.0)	291 (5.4)	201 (19.9)	987 (22.7)	
Neighborhood poverty status							
Low poverty neighborhood (<25% households below FPL)	24430 (68.1)	14684 (80.8)	3587 (51.3)	2328 (43.4)	635 (62.7)	3196 (73.5)	<0.001
High poverty neighborhood (≥25% households below FPL)	11458 (31.9)	3489 (19.2)	3404 (48.7)	3037 (56.6)	378 (37.3)	1150 (26.5)	
Healthcare utilization							
≥1 Outpatient visits	33381 (93.0)	16730 (92.1)	6532 (93.4)	5175 (96.5)	915 (90.3)	4029 (92.7)	<0.001
≥1 Hospitalizations	14431 (40.2)	7318 (40.3)	3099 (44.3)	2599 (48.4)	507 (50.1)	908 (20.9)	<0.001
≥1 Emergency Department visits	11313 (31.5)	4827 (26.6)	2453 (35.1)	3226 (60.1)	272 (26.9)	535 (12.3)	<0.001
Mortality							
Yes	399 (1.1)	197 (1.1)	115 (1.6)	50 (0.9)	12 (1.2)	25 (0.6)	<0.001

CHD = congenital heart defects; FPL = Federal Poverty Level; USD = United States dollar currency.

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Statistically significant aOR values are bolded.

* Column percentages reported in cells.

† Estimates for 1-10-year-olds based on three sites: five counties in metropolitan-Atlanta, GA; 11 counties in NY state; and statewide in NC; estimates for 11-18, 19-44, and 45-64-year-olds based on four sites: five counties in metropolitan-Atlanta, GA; 11 counties in NY; and statewide in NC and UT. Overall, median age was 13.0 years.

* Other racial and ethnic group includes Asian, American Indian/Native American, Native Hawaiian or Other Pacific Islander, and multi-racial.

§ Chi-square tests compare racial and ethnic groups; analyses do not include "Total" column.

|| Insurance categorization: public defined as Medicaid or Medicare; private defined as private, other government, or other insurance; none defined as self-pay/uninsured; and unknown defined as unavailable, unknown, or no insurance indicated.

Table S4. Associations between race and ethnicity and healthcare utilization and mortality, by neighborhood poverty status among individuals with congenital heart defects, with unknown race included.

High poverty neighborhood (>25% households below Federal Poverty Level*)								
	Outpatient visits**		Hospitalizations**		Emergency Department visits**		Mortality	
	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)
Non-Hispanic White	3221 (92.3)	1.0 (referent)	1475 (42.3)	1.0 (referent)	914 (26.2)	1.0 (referent)	38 (1.1)	1.0 (referent)
Non-Hispanic Black	3207 (94.2)	0.8 (0.7-1.0)	1511 (44.4)	1.1 (1.0-1.3)	1325 (38.9)	1.3 (1.2-1.5)	63 (1.9)	1.7 (1.0-2.6)
Hispanic	2944 (96.9)	1.0 (0.7-1.3)	1449 (47.7)	1.3 (1.2-1.5)	2004 (66.0)	1.8 (1.5-2.0)	27 (0.9)	0.7 (0.4-1.3)
Other‡	342 (90.5)	0.6 (0.4-0.9)	208 (55.0)	1.7 (1.3-2.1)	119 (31.0)	0.7 (0.5-0.9)	<10 --	1.0 (0.3-3.0)
Unknown	1071 (93.1)	0.8 (0.6-1.1)	226 (19.6)	0.4 (0.4-0.5)	160 (13.9)	0.4 (0.3-0.5)	<10 --	0.3 (0.1-0.9)
Low poverty neighborhood (≤25% households below Federal Poverty Level*)								
	Outpatient visits**		Hospitalizations**		Emergency Department visits**		Mortality	
	n (%)	aOR (95% CI)	n (%)	aOR† (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)
Non-Hispanic White	13509 (92.0)	1.0 (referent)	5843 (39.8)	1.0 (referent)	3913 (26.7)	1.0 (referent)	159 (1.1)	1.0 (referent)
Non-Hispanic Black	3325 (92.7)	0.8 (0.7-1.0)	1588 (44.3)	1.2 (1.1-1.3)	1128 (31.5)	1.7 (1.5-1.9)	52 (1.5)	1.2 (0.9-1.7)
Hispanic	2231 (95.8)	1.4 (1.1-1.7)	1150 (49.4)	1.5 (1.3-1.6)	1222 (52.5)	2.1 (1.9-2.3)	23 (1.0)	0.8 (0.5-1.2)
Other‡	573 (90.2)	0.8 (0.6-1.1)	299 (47.1)	1.5 (1.2-1.7)	153 (24.1)	1.1 (0.8-1.3)	<10 --	1.5 (0.7-3.0)
Unknown	2958 (92.6)	0.8 (0.7-0.9)	682 (21.3)	0.6 (0.5-0.7)	375 (11.7)	0.6 (0.5-0.7)	21 (0.7)	0.9 (0.6-1.4)

aOR = adjusted odds ratio; CI = confidence interval; CHD = congenital heart defect.

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Statistically significant aOR values are bolded.

*Assessed based on individuals' ZIP Code Tabulation Area (ZCTA) from the 2014 American Community Survey (ACS) 5-year estimates, estimated across years 2010-2014 (U.S. Census Bureau, 2014).

** Zero counts for visit types are not included; healthcare utilization visit categories are not mutually exclusive.

‡ Other racial and ethnic group includes Asian, American Indian/Native American, Native Hawaiian or Other Pacific Islander, and multi-racial.