National Survey of Children's Health

NSCH Weighting and Imputation Enhancements

Imputation and weighting by race and ethnicity were revised for the 2022 National Survey of Children's Health (NSCH) as part of multi-faceted efforts to improve consistency across federal surveys. Revisions address differences in race reporting options between the NSCH and the American Community Survey (ACS) which provides population estimates for NSCH weighting. To ensure comparability for trending, these enhancements have been applied retroactively to data from the NSCH from 2016 through 2021. The 2021 NSCH revised file was released in October 2023 and files from 2016 through 2020 were released in April 2024. Beginning in 2021, a weighting element for children with special health care needs (CSHCN) was removed and this additional change was applied to revised 2016-2020 files for historical comparability. This document describes the changes made to improve estimates by race and ethnicity and ensure historical comparability for CSHCN, and the impact that these enhancements had on estimates.

Steps Taken to Improve Weighting and Imputation for Race and Ethnicity

In 2022, the NSCH underwent a comprehensive review to improve estimates by race and ethnicity and alignment with ACS. Notably, the ACS allows an additional response option for race, "Some Other Race", that is only available for use in specific federal surveys and not included in the NSCH. The following steps to improve weighting and imputation were implemented. For more detail on any of these changes, please see the 2022 Methodology Report.

1. **The disaggregation of weighting categories for American Indian/Alaska Native (AI/AN), Native Hawaiian and Other Pacific Islander (NHPI), and Multiple Race populations as part of a combined race/ethnicity weighting dimension, with the following categories available nationally and at the state-level where possible (requires sample size of 30+): Hispanic, non-Hispanic (NH) White, NH Black, NH AI/AN, NH Asian, NH NHPI, NH Multiple Race.** The prior approach to weighting collapsed AI/AN, NHPI, and Multiple Race as part of an "Other" group, which limited the accuracy of population totals for these populations, and treated race and ethnicity as separate weighting elements which is inconsistent with practical use of combined mutually exclusive categories (as well as new Standards for Maintaining, Collecting, and Presenting Federal Data on Race and Ethnicity). While the prior approach provided valid estimates within a given racial or ethnic group, the population totals for these groups were not as accurate as possible in reflecting the national population by race and ethnicity. Such discrepancies could affect overall prevalence estimates for health indicators.

2. **The redistribution of the "Some Other Race" group for non-Hispanic ACS population controls.** The prior approach to weighting grouped "Some Other Race" with an "Other" category for population controls from the ACS. With the new disaggregated categories noted above, "Some other race" needed to be redistributed, but it represents a small share of non-Hispanic respondents to the ACS; these populations were redistributed by race proportional to their distribution nationally and within each state.

3. **The imputation of race among respondents reporting on the web instrument who attempted to skip this question.** It was discovered that respondents who may have attempted to skip answering the race question and were prompted to revisit were disproportionately Hispanic and selecting "Other Pacific Islander" as the last available response option. This problem was exacerbated when the "Some Other Race" response option was required to be removed from the NSCH in 2019, which resulted in a larger proportion of Hispanic respondents identifying as NHPI than shown in Census population estimates for children (9.4% versus 0.5% in 2021). To address this issue, responses to the race question that were completed only after prompting were replaced through a hot-deck imputation using ethnicity and physical proximity to identify eligible donors.[1] While less than 2% of children were affected by this change from 2019-2022, this modification substantially reduced, but did not

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[1] Because race and ethnicity are imputed jointly, a change to the reported race for the donor or recipient in the hot-deck imputation could also change the donor-recipient pair for the imputation of ethnicity. On average, there were about 10 cases per year where the imputed ethnicity of the selected child changed because of a change to the reported race for a donor or recipient.

eliminate, the discrepancy between the NSCH and Census population estimates on the proportion of Hispanic children that identified as NHPI (2.6% with the revised approach in 2021). Hispanic respondents may still have selected "Other Pacific Islander" as the last response option without attempting to skip the question. For historical comparability, responses of "Some Other Race" were imputed to specific race categories for 2016-2018.

Weighting Changes for Children with Special Health Care Needs (CSHCN)

In 2021, a weighting element for the proportion of CSHCN as determined from the screener was removed from the final topical child weight. Oversampling in a stratum of households more likely to have children under 5 reduced the proportion of CSHCN, thus the screener distribution was no longer appropriate to include as a population control. This weighting element had limited value and was removed in revised 2016-2020 files to ensure historical comparability.

Impact on Estimates in 2016-2021

Race and Ethnicity: The most direct and largest impact of the change in weighting and imputation by race and ethnicity is for weighted totals and proportions by race and ethnicity. With the revised approach to imputation, the unweighted sample sizes for combined race/ethnicity changed by fewer than 10 total cases compared to the original approach in 2021 (see table below). When considering race alone, however, there were larger shifts for NHPI (predominantly Hispanic who selected the last available category 'Other Pacific Islander' in the absence of 'Some Other Race') that were recategorized as White, the most populous group for imputation. With separate weighting categories for NH AI/AN, NH NHPI, and NH Multiple Race in the new approach, the largest relative shift in weighted sample sizes and population proportions was for NH AI/AN, which more than doubled, while NH Multiple Race decreased by 14%. When considering race alone, there were substantial relative changes in weighted population sizes and proportions exceeding 10% for AI/AN (-26%), NHPI (-67%), and Multiple Race (-31%), while White had the largest absolute change (+4.5 percentage points). At the state-level, there was a larger range of change consistent with variation in the populations impacted by these improvements. For example, the largest absolute change for race/ethnicity was a 12.4 percentage point increase in NH AI/AN in Alaska (8.1 to 20.5) and the largest relative change was a 450% increase in NH AI/AN in Oregon (0.2 to 1.1). Changes in prior years (2016-2020) were similar, with the exception of larger shifts in unweighted sample size from 2016-2018 due to imputation of 'Some Other Race', which was needed for historical comparability as the response was collected prior to 2019.

National Changes in Race and Ethnicity Variables between Original and Revised Approaches, 2021

	Frequency				Weighted Population Size				Weighted Proportion (%)			
	Original	Revised	Absolute Difference	Relative Difference	Original	Revised	Absolute Difference	Relative Difference	Original	Revised	Absolute Difference	Relative Difference
Race/Ethnicity												
NH White	33,565	33,574	9	0%	36,372,695	36,369,077	-3,618	0%	50.1	50.1	0.0	0%
NH Black	3,291	3,293	2	0%	9,653,237	9,629,821	-23,416	0%	13.3	13.3	0.0	0%
Hispanic	6,916	6,925	9	0%	18,711,535	18,946,867	235,332	1%	25.8	26.1	0.3	1%
NH AI/AN	316	310	-6	-2%	270,516	554,602	284,086	105%	0.4	0.8	0.4	105%
NH Asian	2,886	2,886	0	0%	3,299,557	3,410,770	111,213	3%	4.5	4.7	0.2	3%
NH NHPI	165	158	-7	-4%	145,346	133,893	-11,453	-8%	0.2	0.2	0.0	-8%
NH Multiple Race	3,753	3,746	-7	0%	4,204,273	3,608,998	-595,275	-14%	5.8	5.0	-0.8	-14%
Race												
White	38,926	39,008	82	0%	48,401,002	51,686,268	3,285,266	7%	66.6	71.1	4.5	7%
Black	3,572	3,583	11	0%	10,133,635	10,367,050	233,415	2%	13.9	14.3	0.3	2%
AI/AN	505	485	-20	-4%	1,590,482	1,178,896	-411,586	-26%	2.2	1.6	-0.6	-26%
Asian	3,014	3,015	1	0%	3,522,247	3,874,021	351,774	10%	4.8	5.3	0.5	10%
NHPI	394	299	-95	-24%	1,900,966	626,037	-1,274,929	-67%	2.6	0.9	-1.8	-67%
Multiple Race	4,481	4,502	21	0%	7,108,826	4,921,756	-2,187,070	-31%	9.8	6.8	-3.0	-31%
Alone or in Combination												
Any AI/AN	1,539	1,531	-8	-1%	3,422,675	2,264,688	-1,157,987	-34%	4.7	3.1	-1.6	-34%
Any NHPI	893	804	-89	-10%	2,511,839	1,059,604	-1,452,235	-58%	3.5	1.5	-2.0	-58%
Any Asian	5,072	5,080	8	0%	6,142,261	5,830,162	-312,099	-5%	8.5	8.0	-0.4	-5%

Children with Special Health Care Needs (CSHCN): The most direct impact of the change in weighting for CSHCN was in the prevalence of CSHCN. National estimates changed by less than 1 percentage point or 4% (see table below). At the state-level, the average absolute difference was 1.4 percentage points across all states and years, 2016-2020. However, changes were somewhat larger in years with smaller sample sizes (2017-2019) and three states (DC, KY, MI) had changes in individual years that exceeded 5 percentage points and/or the magnitude of sampling error. Using two-year estimates, changes were smaller and less than 4 percentage points except for two states (DC, MT) within the smaller sample size years (2017-2019).

National Changes in CSHCN Prevalence between Original and Revised Approaches, 2016-2020

Year	Original Estimate	Revised Estimate	Absolute Difference	Relative Difference
2016	19.4	19.0	-0.4	-2%
2017	18.2	18.5	0.3	2%
2018	18.8	18.2	-0.6	-3%
2019	19.0	18.3	-0.8	-4%
2020	19.7	19.3	-0.4	-2%

Title V National Performance and Outcome Measures using Two-Year Estimates (excluding CSHCN Prevalence):
Prevalence estimates for health indicators may also change depending on the extent to which the indicator varied by race/ethnicity and contained a large proportion affected by the weighting and imputation changes. Given that NH AI/AN, NH NHPI, and NH Multiple Race populations are relatively small nationally (<10% in total), overall national estimates for Title V National Performance and Outcome Measures changed by less than 1 percentage point or 3% with the revised approach for all two-year estimates 2016-2021. At the state-level, overall estimates of Title V Measures changed by less than 1 percentage point on average. However, some measures with smaller sample sizes changed by more than 5 percentage points in 6 six states that generally have a larger AI/AN population (AK, AZ, IL, NM, ND, MT) When examined by demographic characteristics for 2019-2020 and 2020-2021, the largest changes exceeding 5 percentage points were by race and ethnicity for NH AI/AN and NH NHPI but were less than the magnitude of sampling error in all cases. At the state-level, stratified estimates changed by a larger degree across multiple characteristics; however, only about 1% all of estimates had changes that exceeded 5 percentage points and these changes were almost always less than the magnitude of sampling error.

Practical Recommendations and Conclusions

➢ Comparisons over time should only be made with data sets using the same approach. All historical files will be re-released to enable consistent trending with the revised approach.

➢ With the exception of race and ethnicity and CSHCN, changes in prevalence estimates with the revised approach are generally small but have larger magnitude and variability at the state-level.

➢ Two-year state-level estimates are encouraged to buffer changes and improve precision.

➢ Despite these efforts, Hispanic respondents continue to overreport NHPI race in the NSCH. Therefore, producing NHPI estimates that include the Hispanic population is not recommended.