Association Between A Child's Health Status, Type Of Health Insurance And Characteristics Of Their Health Care Access And Quality

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Abstract

BACKGROUND: The healthcare system and healthcare providers are constantly navigating the increasingly complex world of the healthcare environment. Understanding how the delivery of healthcare services affects their patients is critical to becoming more proficient and competent in carrying out their Hippocratic oath. Our objective is to use the nationally representative data to estimate and compare the health status of children and its association with the type of health insurance and the characteristics of their health care access and quality.

METHODS: Cross-sectional analysis of the U.S Department of Health and Human Services, National Survey of Children's Health (NSCH) combined dataset from June 2018 to January 2020 for children age 0-17 years old. We examined 59,818 randomly selected surveys (weighted, n = 73,122,698) for the 2019-2019 combined NSCH. Multivariate logistic regression model was used to examine the associations between child functional health status and their access to health care, quality and insurance coverage. The health status of children were measured and grouped into 3 categories; excellent or very good, good and fair or poor. Measures are related to healthcare access and quality.

RESULTS: 33.6% of the children population who had excellent of very good health status were ages 6-11 and almost 50% of children with fair or poor health status are ages 12-17 years old. Children with no access to medical health care are more likely (AOR: 4.41, 95% CI: 3.13 − 6.19) to have fair or poor health status compared to those who did not. Children who have ≥2 hospital emergency visits are (AOR: 10.00, 95% CI: 6.95 − 14.38) more likely to have fair or poor health status compared to those who have none. Private health insurees are more likely (AOR: 2.84, 95% CI: 2.19 − 3.69) to have excellent or very good health status compared to those who are not insured.

CONCLUSIONS: Healthcare access and utilization of its services affects the overall functional health status of children in the US.

Background

According to the Institute of Medicine of the National Academies, children's health can be defined as "the extent to which individual children or groups of children are able or enabled to (a) develop and realize their potential, (b) satisfy their needs, and (c) develop the capacities that allow them to interact successfully with their biological, physical, and social environments. The influence of multifactorial variables on a child's health and how it affects their overall function with the healthcare system cannot be overemphasized. The Institute of Medicine (IOM) has defined access as "the timely use of personal health services to achieve the best possible health outcomes"[2].

The most common way to measure access is by comparing the health care utilization rates for different age groups, different racial and ethnic groups, and so on. If health care services are available and there is an adequate supply of services, then the opportunity to obtain health care exists, and a population may have access to services[3]. The extent to gain access to healthcare for a population of children depends on

financial, organizational and social or cultural barriers that can limit the utilization of services[4]. The extent to which the parents of a child might gain access to healthcare services will determine the child's quality of healthcare[4]. Healthcare quality is a separate construct from healthcare access and is related to the achievement of favorable outcomes associated with utilization, not to whether healthcare utilization occurs at all or to difficulties in obtaining care[5–7].

The objectives of our study was to use the combined 2018–2019 data which is the latest dataset from the National Survey of Children's Health (NSCH) which provides national-and state-level data to identify key factors that contribute to the status of a child's health, including health care access, utilization, and quality; and related family and child demographic factors[8]. There is not much known about how various factors such as; preventive medical visit[9], mental healthcare[10], hospital emergency department visits[11,12], developmental screening[13], patient-centered medical home[14,15] affects the overall functional health status of children. Additionally, the access to healthcare and quality by insurance type has not been studied using the latest data from the National Survey of Children's Health[16]. To the best of our knowledge, this will be a novel study closely examining how the factors mentioned are associated with a child's functional health status which represents a national estimate of children in the United States which is approximately 74 million people[17].

Methods

All methods were performed using relevant guidelines. The study used a cross sectional design gotten from the National Survey Children's Health (NSCH) combined data set of 2018 and 2019. The 2018 NSCH was conducted from June 2018 to January 2019. A total of 59,963 surveys were completed nationally by parents/caregivers of children ages 0-17 years for the 2018-2019 combined NSCH. NSCH questionnaires were completed online or by mail. Households received a mailing invitation asking an adult in the household who is familiar with the child's health and health care to complete a short screener questionnaire.

The survey data file contains a weight (fwc_1819) for producing national estimates from the sample data. The weighting process for the interviewed children begins with the base weight for each sample household, followed by an adjustment for screener response. Thus, the eligible children from the screener interview cases are adjusted to population controls, and a within-household subsampling factor is applied to the screener interview cases. Next, an adjustment for topical nonresponse is applied to the topical interview cases. Lastly, adjustments are used to match each state's weighted survey responses to selected characteristics of the state's population of non-institutionalized children age 0-17 years. Characteristics include those such as household size, household poverty threshold, educational attainment of the household respondent, race, ethnicity, and special health care needs status by state, as well as national age and sex distributions.

Covariates and Measurements

The outcome variable in our study was the description of the child's health status, age 0-17 years. The survey asked in general, how would you describe this child's health. There was three response categories namely; excellent or very good, good and fair or poor.

The child and family demographics covariates includes; U.S children in 3 age groups (0-5 years old, 6-11 years old and 12-17 years old) which was created from initial screening questions asked for all children in the survey, gender of the child (male, female) asked for all children in the household age 0-17 years, age and ethnicity distribution of the child population, primary language spoken in the child's home, family structure that the child lives in which refers to number and relationship between parents/adults living in the household, income level (federal poverty level, FPL, 0-99%, 100-199%, 200-399% and 400% or greater) of the household that the lives in, highest education of adult(s) in the child's household.

The type of health insurance coverage that the child has at the time of the survey includes; public (defined as Medicaid, Medical Assistance, or any kind of government assistance plan for those with low incomes or a disability), private (defined as "insurance through a current of former employer or union", "insurance purchased directly from an insurance company" or "TRICARE or other military health care" or coverage through the Affordable Care Act or other private insurance), public and private, currently uninsured.

The covariates for health care access and quality includes; how long the doctor spent with the child the last time the child was taken for a preventive check-up in the past 12 months, preventive dental visit during the past 12 months, child that received any treatment or counselling from a mental health professional, how difficult was it to get the mental health treatment or counseling that this child needed, vision screening done during the past 12 months, how many times did the child visit a hospital emergency room, child admitted to the hospital to stay for at least one night, developmental screening using a parent-completed screening tool in the past 12 months, special services for development needs to meet his or her developmental needs such as speech, occupational or behavioral therapy, medical home, personal doctor or nurse, family-centered care during the past 12 months, difficulty for the child to get referrals to see any doctors or receive any services, effective care coordination, transition to adult health care, did the child receive care in a well-functioning system, how often were the parents frustrated in their efforts to get services for their child.

Statistical Analysis

This was performed with STATA/IC Version 16.1 for Mac (Stata Corp LLC, 4905 Lakeway Dr, College Station, Texas, 77845, USA). Nominal variables were expressed as numbers and percentages. To compare nominal variables, Chi-square (χ^2) or Fischer's exact tests according to Cochran's rules and after application of a normality test (Shapiro-Wilk) were used. A two sided P value less than 0.05 was considered statistically significant. The independent associations between the outcome and predictor variables were done using the multivariate logistic regression model. Results were interpreted as adjusted odd ratios (AOR) and 95% confidence intervals (CIs).

Results

Table I shows the descriptive characteristics of children in the United States according to their health status. Approximately 34% of children (age 12–17 years, approximately 25 million) constituted the majority of children in the US, 33.6% of children (approximately 22.2 million) with excellent or very good health status were ages 6–11 years and approximately 50% of children with fair or poor health status are in the age group 12–17 years. White non-Hispanic children represented 52% of children (34 million) with excellent or very good health status while Hispanic children were the majority (34%) of children with fair or poor health status. The prevalence of excellent or very good health status were present in children whose household income is ≥ 400% FPL (33%). Fair or poor health status in children with household income < 100% FPL represented the majority (47%) of the population. Children in household where the highest level of education were more than high school represented the 71% of the whole sample population. Public health insurance was most prevalent (53%) in children with fair or poor health status, while private health insurance was most prevalent (60%) in children with excellent or very good health status.

Table I: Descriptive Characteristics of Children in the United States from the 2018–2019 National Survey of Children's Health (NSCH) According to their Health Status

Table II shows results from multivariate logistic regression. Children with preventive medical visit < 10 minutes are more likely (AOR: 1.39, 95% CI: 1.09–1.78) to have excellent or very good health status compared to those who had none while those with > 20 minutes of preventive medical visit in the past 12 months were more likely to have fair or poor health status (AOR: 2.15, 95% CI: 1.30–3.55). Children age 3–17 years who received any treatment or counseling from a mental health professional were four times more likely (AOR: 4.41, 95% CI: 3.13–6.19) to have fair or poor health status compared to those who did not. The level of difficulty to get the mental health treatment or counselling that a child needed affected their health status, those who found it very difficult (AOR: 3.84, 95% CI: 2.33–6.34) or not possible (AOR: 6.34, 95% CI: 2.66–15.09) to get this needed mental health care were more likely to have fair or poor health status compared to those who did not. Children who visited the hospital emergency room ≥ 2 times during the past 12 months were 10 times more likely (AOR: 10.00, 95% CI: 6.95–14.38) to have fair or poor health outcomes compared to those who had none.

If a child was admitted to the hospital to stay for at least one night, they were 7 times more likely (AOR:7.92, 95% CI: 5.22–12.03) to have fair or poor health status compared to those who were not admitted. Children who received coordinated, ongoing, comprehensive care within a medical home were more likely (AOR: 2.37, 95% CI: 2.07–2.72) to have excellent or very good health status compared to those who did not. The less likely parents were frustrated in their efforts to get healthcare services for their child, the more likely they were to have excellent or very good health status. Private health insurance was the most likely predictor for children to have excellent or very good health status. Children with private health insurance were twice more likely (AOR: 2.82, 95% CI: 2.19–3.69) to have excellent or very good

health status and the least likely (AOR: 0.28, 95% CI: 0.14–0.59) to have fair or poor health status compared to those who were not insured.

Figures I and II shows how the sample size of children according to their health status and how they were included in the secondary analysis and the number of missing values that were excluded from the study.

Discussion

Using nationally representative data, we found that access to healthcare utilization affects the functional health status of children ages 0–17 years in the United States and hence their quality of healthcare. The factors that affect healthcare access includes social determinants of health listed in the descriptive characteristics of the children such as; gender, race/ethnicity, household income, household educational level and health insurance coverage[18–20]. It is clear from our study that the length of time a child spends at the physician's office for preventive medical checkup influences or has an association with their functional health status[21]. This trend of time spent during a medical visit can also be seen in other fields of medicine such as; emergency medicine[22,23].

According to the Institute of Medicine (IOM), timeliness in healthcare is the system's capacity to provide care quickly after a need is recognized. It is one of the six dimensions of quality the IOM established as a priority for improvement in the health care system. Measures of timeliness include time spent waiting in doctors' offices and emergency departments (EDs) and the interval between identifying a need for specific tests and treatments and actually receiving services[24]. In our study, the more time a child spent during preventive medical visits, the more likely for them to have a fair or poor health status and vice versa. Access to mental health care services also affects the health status of children.

The World Health Organization (WHO) definition of health states that "health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity"[25]. If a child is not in a good mental state of mind the they most likely will not have an excellent or very good health status. Developmental screening along with access to its services is crucial to early identification of developmental disorders which can have a life-long influence on a child's health[13]. Our study has shown that developmental screening and access to its services has an influence on a child's overall health status.

Future research is needed to explore the associations between hospital emergency room visits and mental health care in children as the most common reasons for an ED visit in the United States are abdominal pain and mental health issues[26]. Furthermore, the type of insurance coverage seems to affect the health status of children. There are several reasons why this might be the case. It could be that public health insurance gives access and thus utilization to less medical care services than private health insurance. Consistent with previous research, the health status of a child and how they are associated with the type of health insurance overage could be due to reimbursement lower rates in Medicaid that

have been linked to reduced access to health care providers, particularly for specialty services in pediatrics, compared with private insurance[27,28].

The results of our findings creates an opportunity for improvement in the healthcare system by understanding how and why health access and quality affects children's health status and what health policies can be made and implemented to help achieve them.

Limitations

One of the limitations in our study includes the risk of response bias during the survey. Survey derived data is subject to multiple sources of bias that potentially threaten its validity. There were some missing values on the child's health status probably due to nonresponse from the parents/caregivers when completing the survey either via web or mail. Previous research have shown that the differences between responders and non-responders on demographic variables, health status and health-related behaviors have found differences in at least one variable. There was sufficiently high rate of response during the survey to ensure the generalizability of the results found within the sample. The generalizability of the study results can be done to represent the US child population but cannot be used to represent child population in other countries due to regional, geographic and other aspects of the child's environment and culture that is different from that of children in the US. Additionally, the NSCH has made several key changes in their survey starting in 2016 from prior years of the survey. Among these changes, the NSCH consolidated content from two previous surveys and is now administered via web and mail (paper) based instruments as opposed to the random digit dial approach used previously and the NSCH survey is being fielded annually.

Conclusions

This study provides the latest nationally representative estimates of the various factors that are described as health access and quality for children ages 0–17 years in the US and how they affect the health status of a child. Preventive medical visits, mental health services, hospital emergency room visits and hospital admissions, developmental screening, effective care coordination, patient-centered medical home and type of healthcare insurance coverage are just some of these factors. The gap in research that remains is understanding the mechanism of why these factors influence children's health status and the cost-benefit analysis that they have on the healthcare system if they are improved.

Abbreviations

NSCH: National Survey of Children's Health, IOM: Institute of Medicine, HRSA: United States Department of Health and Human Services, Health Resources and Services Administration , MCHB: Maternal and Child Health Bureau, AOR: Adjusted Odds Ratio, CI: Confidence Interval, ED: Emergency Department, WHO: World Health Organization

Declarations

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Tables

Table 1: Descriptive Characteristics of Children in the United States from the 2018-2019 National Survey of Children's Health (NSCH) According to their Health Status

Variables	Total Sample Weighted n = 73,122,698 Unweighted n = 59,818 n (%)	Health Status (Excellent or Very Good) Weighted n = 66,016,584 Unweighted n = 54,938 n (%)	Health Status (Good) Weighted n = 6,003,840 Unweighted n = 4,129 n (%)	Health Status (Fair or Poor) Weighted n = 1,102,275 Unweighted n = 751 n (%)	P-value
Age, years					<0.001*
0-5	23,496,080 (32.1)	21,976,102 (33.3)	1,341,313 (22.3)	178,666 (16.2)	
6-11	24,626,723 (33.7)	22,194,757 (33.6)	2,056,416 (34.3)	375,550 (34.1)	
12-17	24,999,894 (34.2)	21,845,725 (33.1)	2,606,110 (43.4)	548,059 (49.7)	
Gender					<0.001*
Male	35,730,095 (48.9)	32,454,351 (49.1)	2,742,545 (45.7)	533,199 (48.4)	
Female	37,392,603 (51.1)	33,562,233 (50.8)	3,261,295 (54.3)	569,075 (51.6)	
Race/Ethnicity					<0.001*
Hispanic	18,600,148 (25.4)	16,248,255 (25.0)	1,971,643 (33.0)	380,249 (34.0)	
White, Non-Hispanic	36,836,798 (50.4)	34,272,665 (52.0)	2,207,896 (37.0)	356,237 (32.0)	
Black, Non-Hispanic	9,746,866 (13.3)	8,315,063 (12.0)	1,169,772 (19.0)	262,032 (24.0)	
Multi-racial, Other	7,938,885 (10.9)	7,180,600 (11.0)	654,529 (11.0)	103,756 (10.0)	
Primary Household Language					<0.001*
English	62,190,360 (86.0)	56,679,650 (86.0)	4,605,080 (78.0)	905,630 (83.0)	
Other	10,434,818 (14.0)	8,935,199 (14.0)	1,312,922 (22.0)	186,696 (17.0)	
Family Structure					<0.001*
	45,258,073 (62.0)	42,008,583 (64.0)	2,801,681 (47.0)	447,809 (41.0)	

					P-value
Two parents, married	6,134,709 (8.4)	5,400,497 (8.2)	566,815 (9.4)	167,397 (15.0)	
Two parents, unmarried	15,345,418 (21.0)	13,253,606 (20)	1,747,621 (29.0)	344,191 (31.0)	
Single parent	6,384,498 (8.6)	5,353,898 (7.8)	887,723 (14.6)	141,878 (13.0)	
Other					
Household Income					<0.001*
<100% FPL	14,170,020 (19.0)	11,581,043 (18.0)	2,074,643 (35.0)	514,334 (47.0)	
100% -199% FPL	15,761,225 (22.0)	13,936,165 (21.0)	1,572,271 (26.0)	252,790 (23.0)	
200% - 399% FPL	20,460,154 (28.0)	18,847,896 (29.0)	1,395,250 (23.0)	217,009 (20.0)	
≥400% FPL	22,731,298 (31.0)	21,651,480 (33.0)	961,676 (16.0)	118,142 (11.0)	
Household Educational Level					<0.001*
Less than high school	7,002,720 (9.6)	5,652,084 (8.6)	1,118,919 (19.0)	231,718 (21.0)	
High school or GED	13,890,782 (19.0)	11,998,401 (18.0)	1,577,549 (26.0)	314,830 (29.0)	
More than high school	52,229,196 (71.4)	48,366,099 (73.4)	3,307,372 (55.0)	555,727 (50.0)	
Health Insurance Status					<0.001*
Public Only	21,737,637 (30.0)	18,333,425 (28.0)	2,822,273 (47.0)	581,939 (53.0)	
Private Only	41,916,437 (57.0)	39,656,169 (60.0)	1,996,001 (33.0)	264,267 (24.0)	
Private and Public	3,210,838 (4.4)	2,670,857 (4.0)	442,462 (7.4)	97,519 (8.8)	
Not Insured	6,257,787 (8.6)	5,356,133 (8.0)	743,103 (12.6)	158,550 (14.2)	

* Statistical significance at P <0.05, results from chi-square analysis or Fischer's exact tests depending on distribution of data

Sample weighted to represent US national estimates (weighted n = 73,122,698)

Table 2: Multiple Logistic Regression Showing Associations between Children's Functional Status and their Access to Healthcare and Quality

Variables (reference category)	Health Status (Excellent or Very Good) Adjusted OR (95% CI)	Health Status (Good) Adjusted OR (95% CI)	Health Status (Fair or Poor) Adjusted OR (95% CI)
Preventive Medical Visit			
<10 minutes	1.39 (1.09 – 1.78)*	0.75 (0.58 – 0.98)*	0.55 (0.30 – 0.98)*
10-20 minutes	1.29 (1.09 – 1.53)*	0.80 (0.67 – 0.95)*	0.68 (0.41 – 1.11)
>20 minutes			
None (ref)	0.65 (0.53 – 0.80)*	1.37 (1.10 – 1.72)*	2.15 (1.30 – 3.55)*
Preventive Dental Visit			
≥ 1 visit	1.29 (1.10 – 1.51)*	0.77 (0.65 – 0.92)*	0.80 (0.54 – 1.18)
None (ref)			
Received Mental Health Care			
Yes	0.32 (0.27 – 0.37)*	2.65 (2.24 – 3.14)*	4.41 (3.13 – 6.19)*
No (ref)			
Level of Difficulty Obtaining Mental Health Care			
Somewhat Difficult	0.67 (0.50 – 0.89)*	1.46 (1.06 – 2.02)*	1.37 (0.82 – 2.28)
Very Difficult			
Not Possible	0.38 (0.27 – 0.53)*	1.91 (1.31 – 2.76)*	3.84 (2.33 – 6.34)*
Did Not Have Difficulty (ref)	0.36 (0.20 – 0.65)*	1.42 (0.78 – 2.58)	6.34 (2.66 – 15.09)*
Vision Screening			
Yes	0.86 (0.75 – 0.99)*	1.07 (0.93 – 1.24)	1.69 (1.20 – 2.38)*
No (ref)			
Hospital Emergency Room Visit			
1 visit	0.59 (0.49 – 0.71)*	1.55 (1.28 – 1.88)*	2.37 (1.51 – 3.72)*
≥2 visit	0.22 (0.18 – 0.26)*	3.18 (2.58 – 3.91)*	10.00 (6.95 – 14.38)*
None (ref)			

Hospital Admission			
Yes	0.30 (0.23 – 0.37)*	2.2 (1.83 – 2.85)*	7.92 (5.22 – 12.03)*
No (ref)			
Developmental Screening			
Yes	1.26 (0.85 – 1.86)	0.80 (0.53 – 1.22)	0.73 (0.27 – 1.93)
No (ref)			
Developmental Needs Special Services			
Yes			
No (ref)	0.26 (0.22 – 0.30)*	3.00 (2.56 – 3.52)*	6.79 (4.92 – 9.38)*
Medical Home Care			
Yes	2.37 (2.07 – 2.72)*	0.46 (0.39 – 0.53)*	0.30 (0.22 – 0.41)*
No (ref)			
Personal Doctor/Nurse			
Yes	1.14 (0.99 – 1.32)	0.83 (0.71 – 0.96)*	1.17 (0.74 – 1.83)
No (ref)			
Family Centered Care			
Yes	2.57 (2.15 – 3.07)*	0.45 (0.37 – 0.55)*	0.25 (0.17 – 0.38)*
No (ref)			
Effective Care Coordination			
Did Not Need	3.50 (2.99 – 4.10)*	0.57 (0.44 – 0.73)*	0.28 (0.15 – 0.49)*
Received			
Did Not Receive (ref)	2.75 (2.36 – 3.19)*	0.45 (0.37 – 0.55)*	0.25 (0.17 – 0.38)*
Transition to Adult Health Care Services			
Yes			
No (ref)	0.78 (0.62 – 1.00)	1.29 (1.00 – 1.67)*	1.08 (0.58 – 2.02)
Efforts to Get Services			
Never Frustrated	7.64 (6.00 – 9.71)*	0.18 (0.14 – 0.25)*	0.06 (0.04 – 0.09)*
Sometimes Frustrated			
Usually/Always Frustrated (ref)	2.26 (1.74 – 2.93)*	0.56 (0.41 – 0.75)*	0.34 (0.23 – 0.54)*

Health Insurance Status			
Public Only	0.87 (0.67 – 1.13)	1.11 (0.84 – 1.47)	1.24 (0.63 – 2.44)
Private Only	2.84 (2.19 – 3.69)*	0.37 (0.28 – 0.49)*	0.28 (0.14 – 0.59)*
Private and Public	0.80 (0.58 – 1.10)	1.19 (0.85 – 1.69)	1.41 (0.68 – 2.91)
Not Insured (ref)			
Received Care in a Well-Functioning Health System			
Yes	2.38 (1.93 – 2.94)*	0.44 (0.35 – 0.56)*	0.34 (0.21 – 0.55)*
No (ref)			

* Statistical significance at P <0.05, results from multivariate logistic regression model.

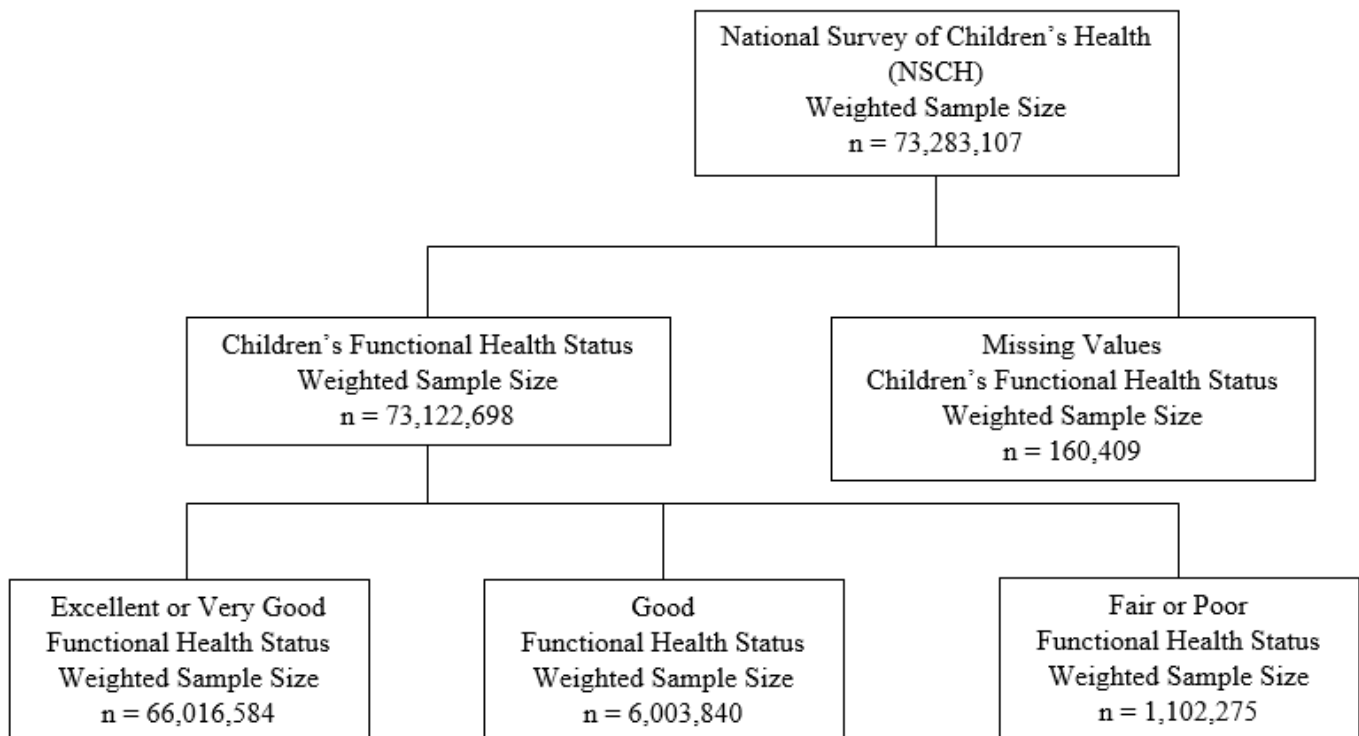Sample weighted to represent US national estimates (weighted n = 73,122,698)

Figures

Figure 1

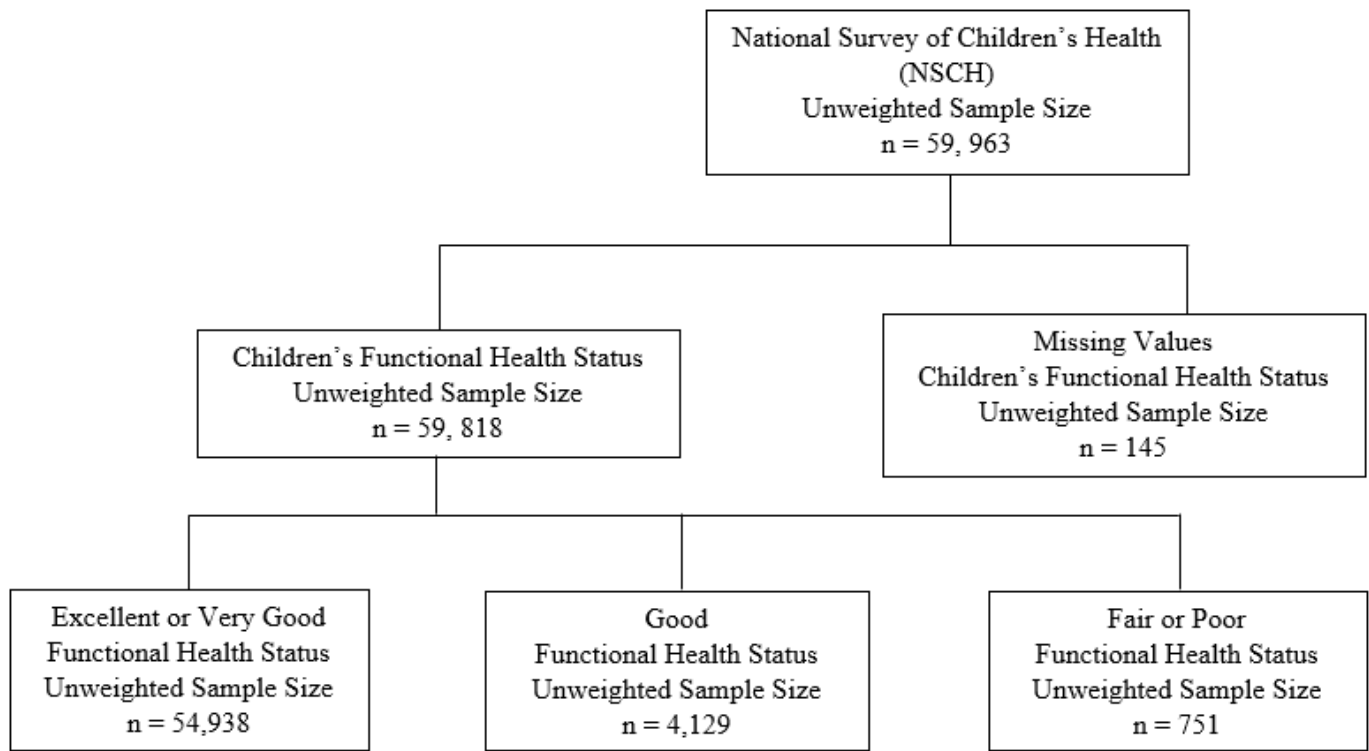Weighted Sample Size Distribution of the National Survey of Children's Health According to their Health Status

Figure 2

Unweighted Sample Size Distribution of the National Survey of Children's Health According to their Health Status