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Assessing Child Health and Health Care in the U.S. Virgin Islands Using the National Survey of Children's Health

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Abstract

Objectives To characterize the health and health care experiences of children in the U.S. Virgin Islands (USVI), assess differences by household poverty status, and provide comparisons to the general U.S. child population.

Methods Data are from the 2011–2012 National Survey of Children's Health, which included 2342 USVI children, aged 0–17 years. Parent-reported measures of health status and health conditions, behavioral characteristics, and health care access and utilization were assessed. Weighted prevalence estimates were calculated and compared by household poverty status using Chi square tests.

Results Overall, 31.3% of USVI children lived in households below 100% of the federal poverty level (FPL). Children in these low-income households were more likely to have public insurance (33.0% vs. 8.4%) and unmet health needs (11.6% vs. 6.3%) as compared to those in households with incomes ≥ 100% FPL (all $p < 0.01$). They were also less likely to have a medical home (22.5% vs. 42.2%), including a usual source of sick care ($p < 0.01$). Compared with U.S. children in general, USVI children had lower rates of preventive medical visits, preventive dental visits, and care received in a medical home.

Conclusions USVI children experience challenges in accessing and utilizing health care services, particularly those in low-income households, and fare worse than U.S. children on many of these measures. These findings will serve as a baseline comparison for an upcoming survey of maternal and child health to be conducted in eight U.S. territories including the USVI.

Keywords United States Virgin Islands · Child health · Poverty · Health services accessibility

Significance

What is already known on this subject? USVI children and families face significant socioeconomic challenges that impact their physical and mental health, with one-third of USVI children living in households below the federal poverty level. Little is known about their health status and health care experiences and how these vary by poverty.

What this study adds? This is the only study to describe USVI children's health by assessing critical MCH indicators using data from the 2011–2012 National Survey of Children's Health, which was the only time USVI was sampled. This study serves as a baseline for future data collection efforts to identify the priority health needs of USVI children.

Introduction

The U.S. Virgin Islands (USVI) is an unincorporated territory of the United States with a population of approximately 107,000 individuals (Central Intelligence Agency 2018). Children < 18 years represent nearly 20% of the total USVI population, including a disproportionate number living in poverty; in 2013, 43% of USVI children ≤ 5 years and 31% of children 6–17 lived in families with incomes below the federal poverty level (FPL)

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(Community Foundation of the Virgin Islands 2016). USVI families face significant socioeconomic hardships (e.g., unemployment, lack of health insurance, single-parent families) and at higher rates than the general U.S. population (Community Foundation of the Virgin Islands 2016; U.S. Department of Commerce 2018). This likely affects their ability to promote and protect their children's health. The increasing prevalence of public health emergencies, including infectious diseases and natural disasters (e.g., Zika, Hurricanes Irma and Maria), may further impact the health care needs and health outcomes of USVI children, particularly those in low-income families (Artiga et al. 2018; Ikejezie et al. 2017).

Little is known about the health and health care experiences of USVI children. The few health-related data sources for the USVI are limited in scope and primarily focused on health insurance coverage, disability, and vaccinations (Population Reference Bureau 2002; Centers for Disease Control and Prevention, National Immunization Survey; Community Foundation of the Virgin Islands 2016). As one of eight U.S. jurisdictions, the USVI submits annual reports and 5-year needs assessments to the Health Resources and Services Administration's Maternal and Child Health Bureau (HRSA MCHB) on the health and well-being of their MCH populations. However, their ability to provide up-to-date information about accomplishments and future needs has been limited by their infrastructure and data capacity. In 2011–2012, HRSA MCHB fielded the National Survey of Children's Health (NSCH) and, for the only time, sampled USVI children. The USVI used these data to report on selected Title V MCH Services Block Grant performance and outcome measures, however, these data have not been used to describe the overall profile of USVI children's health or health care. Such a profile, particularly in the face of emerging threats, may identify vulnerable groups of children and inform interventions and policy decisions. The 2011–2012 NSCH allows for the estimation of a wide range of measures pertaining to USVI child health that are unavailable elsewhere. Results from this study will serve as a baseline comparison for an upcoming MCH jurisdictional survey to be fielded in the USVI in 2019. The jurisdictional survey will provide up-to-date estimates of similar measures to ascertain the current status of children's health and health care in the wake of public health challenges in the USVI.

Our study objectives were to characterize USVI children's health and health care experiences using a broad set of parent-reported measures of health status, health conditions, behaviors, and health care access and utilization and to assess differences by household poverty status. We hypothesized that USVI children living in poverty would fare worse than those above the poverty line. We also sought to put the USVI estimates in context by providing comparisons to the general U.S. child population. Given the generally higher rates of socioeconomic challenges faced by children and families in the USVI, we expected USVI children to have poorer health and less health care access/use compared with their U.S. counterparts.

Methods

Study Design

We conducted secondary data analyses using the 2011–2012 NSCH, a cross-sectional, nationally representative survey of non-institutionalized children aged 0–17 years, including the USVI. HRSA MCHB provided direction and funding for the survey, and the CDC's National Center for Health Statistics conducted the random-digit-dial (RDD) phone survey. The sample design included both landline telephone and cell-phone samples to address possible coverage bias. However, for the USVI, only a landline RDD sample was fielded because a cell-phone sample frame was unavailable. Survey respondents were parents or guardians familiar with their child's health. For homes with multiple children, one child was randomly selected as the subject of the interview.

Data collection occurred from February 2011 to June 2012 and produced a total sample of 98,019 children (2342 children in the USVI). The interview completion rate (proportion of households with children that completed the survey) was 68.4% for the USVI and 54.1% for the rest of the U.S. Additional information regarding the survey methodology can be found elsewhere (Bramlett et al. 2017). Institutional Review Board (IRB) approval for the original data collection was obtained from the CDC. The current study was exempt from IRB review because it utilized existing, publicly available data.

Measures

We examined several parent-reported measures of children's health status, health conditions, health behaviors, and health care access and utilization. Unless otherwise stated, estimates pertain to children ages 0–17 years; we applied specific age ranges to certain measures, consistent with previous literature. Specific survey item wording and response options can be found elsewhere (Centers for Disease Control and Prevention 2017).

Sociodemographic Characteristics

Sociodemographic characteristics included child age, sex, race/ethnicity (classified as non-Hispanic white, black or multiracial/other or Hispanic white, black, or multiracial/

other to reflect the ethnic and racial diversity of the USVI), household education, household generation status, family structure, household income relative to the FPL, and household member receipt of Women, Infants, and Children (WIC) benefits. The 2011 U.S. Department of Health and Human Services federal poverty guidelines for the 48 contiguous states and D.C. were used to assign poverty status, including the USVI sample since poverty guidelines are not defined for U.S. jurisdictions (U.S. Department of Health and Human Services 2011).

Missing data for household poverty status (9.3% of observations) were multiply imputed using regression methods, to adjust for observed differences between non-respondents and respondents and to preserve all observed values while reflecting the uncertainty introduced when replacing missing values. Income and household size were imputed five times. This approach was preferable over listwise deletion of observations with missing data, which would have led to biased estimates because income nonresponse was related to several variables. Additional information regarding imputation methods can be found elsewhere (Bramlett et al. 2017).

Health Status and Health Conditions

Health status measures included children's general health, oral health, special health care needs (SHCN), qualifying categories for SHCN, and body mass index (BMI). Four mutually exclusive SHCN qualifying categories were based on responses to the Children with Special Health Care Needs Screener: prescription medications only, elevated service need/use only, both medications and services, and functional limitations (Bramlett et al. 2009). Classification of BMI was restricted to children aged 10–17 years due to expected underestimation of parent-reported height for children < 10 years (Blumberg et al. 2012).

Health conditions included parent-reported current diagnosis by a health care provider for selected conditions. We grouped some conditions together due to small sample sizes in the USVI, and examined asthma, any developmental disorders (attention deficit hyperactivity disorder or ADHD, autism, seizures, speech/language problems, intellectual disability, hearing/vision problems, learning disability, and developmental delay), and any selected mental health conditions (anxiety, depression, and behavioral or conduct problems). Developmental disorders and mental health conditions were measured among children 3–17 years.

Health Behaviors

Health behaviors included history of breastfeeding among children 0–5 years, screen time (hours per average weekday watching television programs, playing video games, using electronic devices) among children 1–17 years, physical activity (number of days in the past week that the child exercised, played a sport, or participated in physical activity for ≥ 20 min) among children 6–17 years, and adequate sleep (number of nights in the past week that the child got enough sleep for his/her age) among children 6–17 years.

Health Care Access and Utilization

Measures included children's current health insurance status, health insurance adequacy, usual place of sick care, preventive medical care visits in the past 12 months, preventive dental care visits in the past 12 months (among children 1–17 years), unmet health care needs, having a medical home, and receipt of developmental screening (among children 10–71 months). Health insurance inadequacy was measured among children with current health insurance, and was based on the presence of three possible indicators: (a) insurance never or sometimes offers benefits or covers services that meet child's needs, (b) insurance never or sometimes allows child to see the health care provider he/she needs, or (c) money paid for the child's health care (excluding insurance premiums or costs covered by insurance) is never or sometimes reasonable.

Five components of medical homes were examined individually, including having: (a) a personal doctor/nurse, (b) usual source of sick care, (c) family-centered care (i.e., child's doctors spend enough time with the family, listen carefully to their concerns, show sensitivity to their values and customs, provide information specific to their concerns, and make them feel like partners in their child's care), (d) no problems receiving needed referrals, and (e) effective care coordination (i.e., family is satisfied with communication among child's doctors and other health care providers, satisfied with communication between doctors and school/other providers, and gets needed help coordinating care). To qualify as having a medical home, children must meet all five components.

Statistical Analysis

We conducted univariate analyses to examine sociodemographic characteristics of the USVI sample and to calculate the overall prevalence of health and health care measures in this population. We also calculated the prevalence of measures for the general U.S. child population. We conducted bivariate analyses to compare the prevalence of selected measures in the USVI by household poverty status (some measures of interest included too few observations to conduct bivariate analyses). Due to small sample sizes, we dichotomized poverty status for the bivariate analyses (< 100% FPL vs. ≥ 100% FPL). We used Chi square tests with a statistical significance of $p < 0.05$ to assess overall

associations between poverty status in the USVI and selected measures. For measures with ≥ 2 categories that had significant associations ($p < 0.05$), we conducted pairwise comparisons to identify significant differences between each pair of categories. Estimates were weighted based on the survey's sampling design to produce estimates that were representative of children 0–17 years, and were conducted using SAS 9.4 (SAS Institute, Cary, North Carolina) and SAS-callable SUDAAN 11.0 (RTI International, Research Triangle Park, North Carolina).

Results

Sociodemographic Characteristics

In 2011–2012, 2342 USVI children 0–17 years were included in the NSCH, representing an estimated 26,958 children. High proportions of USVI children were non-Hispanic black (70.7%), had a parent who completed at least a high school degree or equivalent (72.5%), lived in a third or higher generation household (52.3%), and lived with two married parents (44.7%) or with single mothers (39.1%) (Table 1). Nearly one-third (31.3%) lived in

Table 1 Sociodemographic characteristics of children aged 0–17 years in the U.S. Virgin Islands, 2011–2012

	Unweighted frequency (n)	Weighted population frequency (N)	Weighted prevalence (%)	95% CI
Age, years				
0–5	643	9084	33.7	31.4, 36.0
6–11	766	8421	31.2	29.2, 33.4
12–17	933	9453	35.1	33.0, 37.2
Sex				
Male	1212	13,682	50.8	48.4, 53.1
Female	1130	13,276	49.2	46.9, 51.6
Race/ethnicity				
Hispanic, white	55	677	2.6	1.9, 3.5
Non-Hispanic, white	115	1341	5.1	4.2, 6.3
Hispanic, black	236	2789	10.7	9.3, 12.2
Non-Hispanic, black	1625	18,477	70.7	68.5, 72.8
Hispanic, multiracial/other	119	1435	5.5	4.5, 6.7
Non-Hispanic, multiracial/other	118	1408	5.4	4.4, 6.6
Household educational attainment				
Less than high School	545	5994	27.5	25.3, 29.8
High school, GED, or vocational training	816	9769	44.8	42.3, 47.4
More than high school	517	6041	27.7	25.5, 30.0
Household generational status				
1st generation	116	1147	4.6	3.8, 5.6
2nd generation	940	10,736	43.1	40.8, 45.5
3rd generation	1104	13,011	52.3	49.9, 54.7
Family structure				
Two parent, married	1006	11,930	44.7	42.4, 47.0
Two parents, unmarried	171	1963	7.4	6.3, 8.6
Single mother	909	10,421	39.1	36.8, 41.3
Other	231	2366	8.9	7.7, 10.2
Household poverty				
< 100% FPL	625	8444	31.3	29.0, 33.8
100–199% FPL	575	6620	24.6	22.5, 26.7
200–399% FPL	633	6775	25.1	23.2, 27.2
≥ 400% FPL	509	5119	19.0	17.2, 20.9
Household member receives WIC benefits	298	4720	24.1	21.7, 26.8

GED general educational development, *FPL* federal poverty level, *WIC* women, infants and children, *CI* confidence interval

Table 2 Health status, conditions, and behaviors among children aged 0–17 years in the U.S. Virgin Islands and the U.S. in general, 2011–2012

	USVI children		U.S. children	
	Weighted prevalence (%)	95% CI	Weighted prevalence (%)	95% CI
Health status				
General health status				
Excellent or very good	81.5	79.6, 83.2	84.2	83.6, 84.7
Good	16.0	14.4, 17.8	12.7	12.2, 13.2
Fair or poor	2.5	1.9, 3.4	3.2	2.9, 3.4
Oral health status, ages 1–17 years				
Excellent or very good	70.4	68.2, 72.5	71.3	70.6, 72.0
Good	24.0	22.0, 26.1	21.1	20.5, 21.8
Fair or poor	5.6	4.7, 6.7	7.6	7.2, 8.1
Special health care needs	9.8	8.6, 11.2	19.8	19.3, 20.4
Qualifying categories for special health care needs				
Prescription medicine use only	45.5	38.6, 52.5	34.7	33.3, 36.2
Elevated service use/need only	19.2	14.0, 25.8	16.6	15.5, 17.8
Functional limitations	18.6	13.9, 24.4	24.0	22.7, 25.5
Prescription medicine and elevated service use/need	16.7	11.9, 22.8	24.6	23.3, 25.9
Body mass index, ages 10–17 years				
Underweight/healthy weight	60.5	57.3, 63.6	68.7	67.6, 69.7
Overweight/obese	39.5	36.4, 42.7	31.1	30.3, 32.4
Current health conditions				
Any developmental disorder[a], ages 3–17 years	7.1	6.0, 8.4	16.8	16.3, 17.4
Selected mental health conditions[b], ages 3–17 years	1.2	0.8, 1.9	6.3	5.9, 6.7
Asthma	7.0	5.9, 8.3	8.8	8.4, 9.2
Health behaviors				
Ever breastfed, ages 0–5 years	87.5	84.4, 90.1	79.2	78.1, 80.1
Screen time (TV or video), ages 1–17 years				
< 1 h	19.0	17.2, 20.9	21.7	21.1, 22.3
1–2 h	46.9	44.5, 49.2	56.1	55.4, 56.8
> 2 h	34.1	31.9, 36.4	22.2	21.6, 22.8
Screen time (other electronic devices), ages 1–17 years				
< 1 h	40.2	37.8, 42.6	50.5	49.7, 51.2
1–2 h	40.5	38.2, 42.9	35.3	34.6, 36.0
> 2 h	19.3	17.6, 21.2	14.2	13.7, 14.7
Physical activity ≥ 20 min, ages 6–17 years				
0 days	12.8	11.1, 14.8	9.1	8.6, 9.7
1–3 days	31.5	29.1, 34.0	25.1	24.3, 25.8
4–6 days	30.8	28.4, 33.4	37.8	37.0, 38.7
Every day	24.8	22.6, 27.3	28.0	27.2, 28.8
Adequate amount of sleep, ages 6–17 years				
0–6 nights	37.2	34.7, 39.8	41.8	41.0, 42.7
Every night	62.8	60.2, 65.3	58.2	57.3, 59.0

USVI U.S. Virgin Islands, *CI* confidence interval

[a]ADHD, autism, seizures, speech or language problems, intellectual disability, hearing problem, vision problem, learning disability, developmental delay

[b]Anxiety, depression, behavioral/conduct problem

households < 100% FPL and 24.1% lived in households that received WIC benefits.

Health Status and Health Conditions

A majority of parents reported their child was in excellent or very good general health and oral health (81.5% and 70.4%, respectively, Table 2). Nearly 10% of USVI children had a SHCN, with the greatest proportion of these qualifying because of prescription medicine use. During the same time period, nearly one-fifth (19.8%) of all children in the general U.S. population had a SHCN. The prevalence of overweight/obesity was 39.5% among USVI children 10–17 years and 31.1% among their counterparts in the U.S. overall. Among USVI children 3–17 years, 7.1% had at least one developmental disorder and 1.2% had at least one mental health condition. Seven percent of all USVI children had asthma. The prevalence of these health conditions in the general U.S. population was 16.8%, 6.3% and 8.8%, respectively.

Health Behaviors

Among USVI children 0–5 years, nearly 90% were ever breastfed (Table 2). The majority of USVI children 1–17 years met the expert recommendations of no more than 2 h of screen time per day (National Heart Lung and Blood Institute 2011; Strasburger 2011), with 65.9% watching TV or playing video games ≤ 2 h per day and 80.7% using other electronic devices ≤ 2 h per day. Higher proportions of children in the general U.S. population met the screen time recommendations. Among children 6–17 years, 24.8% of USVI children participated in ≥ 20 min of physical activity per day and 62.8% slept an adequate amount every night, compared with 28.0% and 58.2% of U.S. children, respectively.

Health Care Access and Utilization

About 22.6% of USVI children had no health insurance, and 36.4% of insured children had inadequate insurance for their needs (Table 3). In comparison, only 5.6% of U.S. children in the general population were uninsured. Approximately 18% of USVI children had no usual source for sick care as compared with 8.6% of U.S. children. Most USVI children visited a health care provider for preventive care in the past

Table 3 Health care access and utilization among children aged 0–17 years in the U.S. Virgin Islands and the U.S. in general, 2011–2012

	USVI children		U.S. children	
	Weighted prevalence (%)	95% CI	Weighted prevalence (%)	95% CI
Health insurance status				
Public	16.0	14.3, 18.0	37.1	36.4, 37.8
Private	61.4	59.0, 63.7	57.4	56.6, 58.1
Not insured	22.6	20.7, 24.6	5.6	5.2, 6.0
Current insurance not adequate for child's needs	36.4	33.9, 38.9	23.5	22.9, 24.1
Usual place for sick care				
None	18.3	16.6, 20.2	8.6	8.2, 9.1
Doctor's office	62.0	59.7, 64.3	71.4	70.7, 72.1
Hospital outpatient	2.4	1.8, 3.3	2.3	2.1, 2.5
Clinic, health center, or other	17.3	15.5, 19.2	17.7	17.1, 18.3
Any preventive medical care visit in past 12 months	76.0	74.0, 78.0	84.4	83.8, 84.9
Any preventive dental care visit in past 12 months, ages 1–17 years	54.4	52.0, 56.7	77.2	76.5, 77.8
Unmet health needs, delayed or not received	7.9	6.8, 9.3	6.7	6.3, 7.1
Medical home	36.1	33.8, 38.4	54.4	53.7, 55.1
At least one personal doctor or nurse	83.8	82.0, 85.4	90.3	89.8, 90.8
Usual source for sick care	81.7	79.9, 83.4	91.4	90.9, 91.8
Family-centered care	43.4	40.9, 45.8	66.6	65.9, 67.3
No problems getting referrals when needed	77.8	71.8, 82.9	79.2	77.7, 80.7
Care coordination	59.0	54.8, 63.1	66.1	65.0, 67.1
Developmental screening, ages 10–71 months	26.0	21.9, 30.6	30.8	29.5, 32.1

USVI U.S. Virgin Islands, *CI* confidence interval

year, including a preventive medical care visit (76.0%) and a preventive dental care visit (54.4%). U.S. children had higher rates of annual preventive medical visits (84.4%) and preventive dental visits (77.5%). About 8% of USVI children and 7% of U.S. children had unmet health needs. Only 36.1% of USVI children had a medical home, with most children having a personal doctor/nurse (83.8%) and the fewest children receiving family-centered care (43.4%). In contrast, more than half of U.S. children (54.4%) had a medical home. Twenty-six percent of USVI children 10–71 months received developmental screening, compared with 30.8% of U.S. children.

Health Status and Health Care Experiences by Household Poverty Status

Compared with USVI children living in households with incomes ≥ 100% FPL, those in low-income households (< 100% FPL) were less likely to be in excellent, very good, or good oral health (92.2% vs. 95.4%, p = 0.01) and to have a SHCN (7.5% vs. 10.9%, p = 0.02; Table 4). In addition, they were significantly more likely to have public insurance (33.0% vs. 8.4%) or no insurance (38.4% vs. 15.4%), have no usual place for sick care (31.0% vs. 12.5%), and have unmet health needs (11.6% vs. 6.3%; p < 0.01 for all). Children in low-income households were less likely to visit a health care provider in the past year than those in households with incomes ≥ 100% FPL for preventive medical care (66.0% vs. 80.6%), and preventive dental care (39.1% vs. 61.3%; p < 0.01 for both). They were also less likely to have a medical home (22.5% vs. 42.2%, p < 0.01). No statistically significant differences by household poverty status were observed for the prevalence of general health status, BMI categories, current health conditions, health behaviors, health insurance adequacy, or receipt of developmental screening.

Discussion

In this population-based study of children in the USVI from 2011 to 2012, we found that children were generally in excellent or very good health, with only a small percentage reported as having a SCHN, developmental disorders, or selected mental health conditions. While most USVI children engaged in some healthy behaviors (e.g., breastfeeding, adequate sleep, and limited screen time), few participated in physical activity on a daily basis and a substantial proportion were affected by overweight/obesity. Overall, while the majority of USVI children had health insurance, it was inadequate for about one-third of children's needs. In addition, more than 1 in 5 children were uninsured. Many USVI children sought preventive health care services in the past year, but only a small percentage had a medical home. As we hypothesized based on the well-established relationship between poverty and child health (Wise and Meyers 1988), there were also significant variations by household poverty status, with children in low-income households being more likely to be in poorer oral health, have unmet health needs, and utilize less preventive services than those in households with incomes ≥ 100% FPL.

Few population-based studies have assessed the health and health care experiences of children in U.S. territories and most have suggested that children are more disadvantaged than their counterparts in the mainland U.S. (Greer et al. 2003; Washington et al. 2013; Langellier et al. 2012; Garza et al. 2011) Counterintuitive to our study hypotheses, when compared to U.S. children in general, USVI children had lower prevalence of health conditions and a prevalence of SCHN that was nearly half. One explanation may be that USVI children are under-diagnosed given their lower rate of preventive care visits where health assessments often occur. The higher rate of SHCN among USVI children in households ≥ 100% FPL compared to those in households < 100% FPL provides further evidence that the lower prevalence of SHCN in the USVI, overall, may reflect challenges with accessing and utilizing critical health care services. Families who have children with acute or complex health needs may choose to relocate due to limited availability and access to specialty care in the USVI.

In general, and as expected, USVI children fared worse than U.S. children in regard to health care access and utilization. The proportion of uninsured USVI children was almost four times as high as U.S. children overall. However, health insurance estimates predate the Affordable Care Act and may not reflect current patterns of coverage in the USVI or the rest of the U.S. Higher proportions of USVI children had no usual source of sick care than U.S. children in the general population. They also had lower rates of health care utilization, including annual preventive visits, and lower rates of care received in a medical home. Some of these observed differences may be due to the higher rates of poverty among USVI children as compared with U.S. children in general. They may also reflect the shortages of pediatric medical services and inadequate medical staff in the USVI that have resulted in a significant decrease in the number of patients seen annually (Maternal and Child Health Services Title V Block Grant Virgin Islands).

Recent public health emergencies, including Hurricanes Irma and Maria in 2017 and the Zika virus epidemic in 2016, have impacted the infrastructure and health care systems in the USVI (Artiga et al. 2018; Centers for Disease Control and Prevention 2017; U.S. Department of Homeland Security 2017), with likely effects on the health and well-being of USVI children. Prior to the hurricanes, the USVI had pre-existing challenges addressing access to primary health services for infants and gaps in pediatric specialty services

Table 4 Selected health and health care characteristics of children aged 0–17 years in the U.S. Virgin Islands, by household poverty status, 2011–2012

	USVI children (< 100% FPL)		USVI children (≥ 100% FPL)		P value
	Weighted prevalence (%)	95% CI	Weighted prevalence (%)	95% CI	
Health status					
General health status					0.99
Excellent, very good, or good	97.5	95.9, 98.4	97.5	96.4, 98.2	
Fair or poor	2.5	1.6, 4.1	2.5	1.8, 3.6	
Oral health status, ages 1–17 years					0.01
Excellent, very good, or good	92.2	89.7, 94.1	95.4	94.1, 96.4	
Fair or poor	7.8	5.9, 10.3	4.6	3.6, 5.9	
Special health care needs	7.5	5.5, 10.1	10.9	9.3, 12.6	0.02
Body mass index, ages 10–17 yeas					0.99
Underweight/healthy weight	60.5	54.1, 66.6	60.5	56.8, 64.1	
Overweight/obese	39.5	33.4, 45.9	39.5	35.9, 43.2	
Current health conditions					
Any developmental disorder[a], ages 3–17 years	8.3	6.1, 11.1	6.6	5.4, 8.1	0.25
Asthma	6.8	4.9, 9.5	7.1	5.9, 8.7	0.68
Health behaviors					
Ever breastfed, ages 0–5 years	87.5	81.5, 91.7	87.5	83.6, 90.6	0.99
Screen time (TV or video), ages 1–17 years					0.99
< 1 h	19.0	15.7, 22.9	19.0	16.9, 21.3	
≥ 1 h	81.0	77.1, 84.3	81.0	78.7, 83.1	
Screen time (other electronic devices), ages 1–17 years					0.65
< 1 h	41.1	36.4, 45.9	39.8	37.1, 42.6	
≥ 1 h	58.9	54.1, 63.6	60.2	57.4, 62.9	
Physical activity ≥ 20 min, ages 6–17 years					0.11
Not every day	71.9	66.6, 76.6	76.5	73.7, 79.1	
Every day	28.1	23.4, 33.4	23.5	20.9, 26.3	
Adequate amount of sleep, ages 6–17 years					0.05
0–6 nights	33.0	28.2, 38.3	39.0	36.0, 42.1	
Every night	67.0	61.7, 71.8	61.0	57.9, 64.0	
Health care access and utilization					
Health insurance status[b]					< 0.01
Public	33.0	28.8, 37.6	8.4	6.9, 10.1	
Private	28.6	24.5, 33.0	76.2	73.6, 78.7	
Not insured	38.4	34.1, 42.9	15.4	13.5, 17.5	
Current insurance not adequate for child's needs	41.1	35.5, 46.9	34.8	32.1, 37.7	0.06
No usual sources for sick care	31.0	27.0, 35.3	12.5	10.7, 14.5	< 0.01
Any preventive medical care visit in past 12 mos.	66.0	61.6, 70.1	80.6	78.3, 82.6	< 0.01
Any preventive dental care visit in past 12 mos, ages 1–17 years	39.1	34.7, 43.8	61.3	58.6, 63.9	< 0.01
Unmet health needs, delayed or not received	11.6	9.2, 14.6	6.3	5.0, 7.8	< 0.01
Medical home	22.5	18.7, 26.8	42.2	39.5, 45.1	< 0.01
Developmental screening, ages 10–71 months	25.1	17.6, 34.4	26.5	21.6, 32.0	0.79

There were 625 children < 100% FPL and 1717 children ≥ 100% FPL

USVI U.S. Virgin Islands, *FPL* federal poverty level, *CI* confidence interval

[a]ADHD, autism, seizures, speech or language problems, intellectual disability, hearing problem, vision problem, learning disability, developmental delay

[b]Pairwise comparisons were significant ($p < 0.01$) among the three categories of health insurance status

for the management of infants born to mothers with possible congenital Zika infection during pregnancy (Adebanjo et al. 2017). The structural damage to health care facilities caused by the hurricanes, pressures of the Zika outbreak on MCH systems of care, and the outmigration of health care providers (particularly mental health professionals and other specialists) have exacerbated these critical issues (Artiga et al. 2018; Austin 2018; Maternal and Child Health Services Title V Block Grant Virgin Islands 2017; U.S. Department of Homeland Security 2017).

Children are vulnerable in the aftermath of public health emergencies because of their physiological, developmental, and behavioral differences (Dziuban et al. 2017). In the USVI, the impact of the hurricanes on the health care needs and health outcomes of children remains largely unknown. Interviews with residents revealed that USVI children exhibited poor academic performance and more behavioral and emotional problems following the recent natural disasters (Artiga et al. 2018). However, more population-based data are needed to ascertain the extent of changes to children's health and health care in the USVI. Beginning in 2019, HRSA MCHB will be conducting an MCH jurisdictional survey in all eight U.S. territories, including the USVI, to collect up-to-date information on factors related to the well-being of mothers, children, and their families, to address the unique needs of the jurisdictional Title V programs. With the growing physical and mental health needs of USVI children and the rising rates of poverty and unemployment following these storms, this information is necessary for targeting efforts to improve access to and availability of health care services, particularly for the most vulnerable populations of USVI children in low-income households.

Our study provides a comprehensive snapshot of USVI children's health and health care experiences with comparisons to the general U.S. child population, however there are limitations. First, data are cross-sectional and limit our ability to make causal inferences. Measures are parent-reported and may be misclassified due to recall errors, particularly for measures occurring in the previous year (e.g., health care visits). There is also potential non-response bias in the USVI sample because, unlike the mainland U.S. sample, cellular phones were not included in the sampling frame. In addition, USVI population weights could only be controlled for age and sex. Thus, we cannot be certain of the representativeness of the USVI data.

Conclusion

This study demonstrates that USVI children and their families experience challenges in access to and utilization of health care services, particularly those in low-income households, and fare worse than U.S. children in many areas. This study also identifies priority health needs of USVI children and can be used to inform the USVI's Title V MCH Services Block Grant program activities for improving the health and well-being of their child and adolescent populations. In the face of emerging public health threats, there is an acute need for more up-to-date data on the health and well-being of MCH populations in the USVI. The NSCH provides valuable information on the health and health care experiences of the USVI child population and more current data from the MCH jurisdictional survey will allow for the assessment of critical MCH indicators, especially those that are tracked by the Title V MCH Services Block Grant.

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Compliance with Ethical Standards

Conflict of interest The authors report no conflicts of interest.

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