

CHAIR

Ronnie Musgrove, JD
Jackson, MS

MEMBERS

Kathleen Belanger, PhD, MSW
Nacogdoches, TX

William Benson
Silver Spring, MD

Ty Borders, PhD, MS, MA
Lexington, KY

Kathleen Dalton, PhD
Chapel Hill, NC

Carolyn Emanuel-McClain, MPH
Clearwater, SC

Kelley Evans
Red Lodge, MT

Barbara Fabre
White Earth, MN

Constance Greer
St. Paul, MN

Octavio Martinez, Jr., MD, MPH, MBA, FAPA
Austin, TX

Carolyn Montoya, PhD, CPNP
Albuquerque, NM

Maria Sallie Poepsel, PhD, MSN, CRNA, APRN
Columbia, MO

Chester Robinson, DPA
Jackson, MS

Mary Kate Rolf, MBA, FACHE
Syracuse, NY

John Sheehan, MBA, CPA
Chesterfield, MO

Mary Sheridan, RN, MBA
Boise, ID

Benjamin Taylor, PhD, DFAAPA, PA-C
Martinez, GA

Donald Warne, MD, MPH
Fargo, ND

Peggy Wheeler, MPH
Sacramento, CA

EXECUTIVE SECRETARY

Paul Moore, DPh
Rockville, MD



National Advisory Committee on Rural Health and Human Services

Exploring the Rural Context for Adverse Childhood Experiences (ACEs)

Policy Brief and Recommendations

August 2018

EDITORIAL NOTE

During its April 2018 meeting in and near Saratoga Springs, New York, the National Advisory Committee on Rural Health and Human Services (hereinafter referred to as “the Committee”) examined the rural landscape of adverse childhood experiences (ACEs). In its explorations, the Committee considered the role that health and human services play in mitigating and preventing ACEs and their related outcomes. Over the two-and-a-half day meeting, the Committee heard about national and state-level perspectives on ACE-related research and prevention. The following day, the subcommittee tasked with this topic visited a rural community in Schoharie County. There, the members toured the Schoharie County Head Start located in Cobleskill and heard from early childhood experts and advocates, head start educators, home visiting specialists, school-based providers, and an array of cross-systems professionals including local law enforcement and community, social, and human service staff (see **Appendix A**).

ACKNOWLEDGEMENTS

The Committee would like to acknowledge those whose participation helped make the April 2018 meeting in and near Saratoga Springs and this policy brief possible.

The Committee expresses its gratitude to each of the presenters for their contributions to the meeting and for their subject matter knowledge and expertise. These individuals are Dr. Elizabeth Crouch (South Carolina Rural Health Research Center); Dr. Michael Compton (New York State Office of Mental Health); Priti Irani (New York State Department of Health); Dr. Rahil Briggs (HealthySteps); and Dr. Heather Larkin (SUNY Albany).

The Committee expresses particular appreciation to Siri Young (Schoharie County Child Development Council) for her assistance with the meeting planning process, for leading the tour of the Schoharie County Head Start, and for being a passionate community advocate, educator, and leader.

The Committee would also like to thank each of the community panelists who shared their insights and experiences during the site visit meeting in Cobleskill. These individuals are Dawn Bialkowski (Gilboa-Conesville Central School); Chief Richard Bialkowski (Cobleskill Police Department); Susan Cimino-Cary (Schoharie Hypnosis and Reiki); Dr. Miguelina Germán (Montefiore Medical Center); Richelle Gregory (Clinton County Mental Health and Addiction Services); Dr. Susan Emerson, Jane Hamilton and Gayle Wheeler (Bassett Healthcare Network); Linda Hill and Karen Simmons (Schoharie County Department of Health); Dr. Carol Morris (SUNY Cobleskill); Sarah Nies and Bonnie Post (Schoharie County Office of Community Services); Amy Pricolo-Brown (Child At Risk Response Team of Schoharie County); Marcia Rice (New York State Office of Mental Health); Lisa Scott and Eileen Thrush (Schoharie County Child Development Council); Angela Smith (Catholic Charities of Delaware, Otsego, and Schoharie Counties); Kathy Wright (Parsons Child and Family Center at Malta); and Dr. Katie Zuber (Rockefeller Institute of Government).

Lastly, the Committee extends its gratitude and appreciation to Alfred Delena for coordinating the activities of this meeting, the Committee’s findings, and this policy brief.

RECOMMENDATIONS

1. The Committee recommends the Secretary develop and implement a comprehensive prevention strategy that identifies priority outreach/awareness, programming, research and policy areas to address toxic stress, trauma and the health consequences of ACEs for rural, tribal and other at-risk populations.
2. The Committee recommends the Secretary support research that evaluates long-term economic costs resulting from ACEs and benefits gained from federal investments in ACE-related prevention programming.
3. The Committee recommends the Health Resources and Services Administration’s Maternal and Child Health Bureau establish and include a predefined variable for “Rural-Urban Status” in the National Survey on Children’s Health to allow for standardized analyses of ACE prevalence.
4. The Committee recommends the Secretary seek additional funding for telehealth-supported school-based health centers in rural areas as a way of increasing access to integrated primary and behavioral health care services.

INTRODUCTION

Over the past decade, the Committee has examined a number of rural issues that touch upon the [social determinants of health](#).ⁱ Through its reports and policy briefs to the Secretary, the Committee has consistently documented the unique health barriers experienced by individuals residing in rural areas.ⁱⁱ Some of these barriers include inadequate access to primary and behavioral health care, rural hospital closures, health professional workforce shortages, lack of transportation services, food insecurity, housing instability, and diminished economic opportunities. Compounded by the already limited rural infrastructure, each of these determinants contributes to existing rural health disparities, which in turn, affect life expectancy, morbidity, and mortality. The Committee’s past work has focused on understanding how conditions and outcomes such as [homelessness](#), [childhood poverty](#), [intimate partner violence](#), [opioid misuse](#) and [suicide](#) can be mitigated or more effectively addressed through health and human service programs under the purview of the U.S. Department of Health and Human Services (HHS). In this policy brief, the Committee takes up **adverse childhood experiences** or **ACEs**, another layer and set of conditions that may exacerbate rural health disparities and outcomes. ACEs refer to any form of chronic stress or trauma (e.g., abuse, neglect, and household dysfunction) that, when experienced during childhood and adolescence, can have both short- and long-term impacts on an individual’s development, health and overall well-being.

ⁱ As defined by the [World Health Organization](#), the social determinants of health are “the circumstances in which people grow, live, work and age, and the systems put in place to deal with illness. The conditions in which people live and die are, in turn, shaped by political, social, and economic forces.”

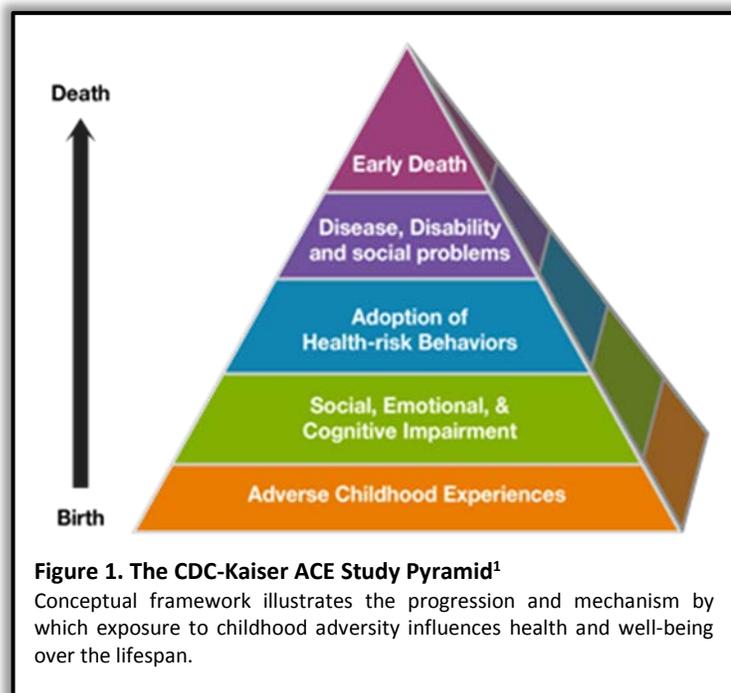
ⁱⁱ To read the Committee’s previous work on rural health and human service topics, please visit: [hrsa.gov/advisory-committees/rural-health/index.html](https://www.hrsa.gov/advisory-committees/rural-health/index.html).

BACKGROUND

Understanding the Link between Childhood Trauma and Adult Well-Being

In their landmark research study published in 1998, principal investigators Dr. Vincent Felitti and Dr. Robert Anda analyzed medical evaluations and self-reported survey data collected from over 17,000 Kaiser health-plan members.¹ Following their medical visits, each study participant received a questionnaire in the mail asking for a personal history of health-related behaviors and childhood adversities, or what they termed, “adverse childhood experiences” (ACEs). These ACE categories included: physical, sexual, or emotional abuse; physical or emotional neglect; and certain forms of household dysfunction, such as domestic violence; parental separation or divorce; or living with a family member who was substance dependent, affected by mental illness, or was incarcerated.

The ACE Study, as it is referred to, revealed several concerning outcomes. First, ACEs are quite common. With a sample population of predominantly white (74.5%), college-educated (75.2%) adults,ⁱⁱⁱ 63.9% of participants reported at least one ACE category and 12.5% reported a high ACE score of four or more. Second, Felitti, Anda, and colleagues observed a dose-response relationship between the number of ACEs and poor adult health outcomes. In other words, the more ACEs an individual reported, the more likely they were to engage in negative health behaviors and be at an elevated risk for the leading causes of morbidity and mortality.¹ Compared with individuals who reported no ACE history, those with a four or more ACEs were 1.6 times as likely to have diabetes; 1.9 times as likely to have cancer; 2.2 times as likely to develop ischemic heart disease; 2.4 times as likely to suffer from a stroke; or 3.9 times as likely to have chronic obstructive pulmonary disease (COPD).¹ Furthermore, these same individuals were also as likely to be severely obese (1.6 times), be a current smoker (2.2 times), have a sexually transmitted disease (2.5 times), be depressed (4.6 times), be an alcoholic (7.4 times), have injected drugs (10.3 times), or have attempted suicide (12.2 times).¹



Based on their findings, Felitti, Anda, and colleagues developed a conceptual framework suggesting that early exposure to chronic stress has negative downstream implications on adult behavior, health and well-being (see **Figure 1**). These effects, in turn, have further ramifications for the onset of chronic disease, disability and even premature mortality.

ⁱⁱⁱ Centers for Disease Control and Prevention. “[Data and Statistics, Participant Demographics.](#)”

Addressing Health Disparities and Historical Trauma among Native Populations

American Indians and Alaska Natives (AI/AN) represent roughly 2% of the total U.S. population² with more than half living in rural or small towns.³ The AI/AN population faces some of the highest health disparities in the nation. When compared with their racial American counterparts, Native people die at higher rates from alcoholism (520% higher), tuberculosis (450% higher), chronic liver disease and cirrhosis (368% higher), diabetes (177% higher), unintentional injuries (141% higher), and suicide (60% higher).⁴ In particular, of all racial groups, Native youth (ages 15-24) have the highest suicide rate at 34.1 deaths per 100,000.⁵ Pertinent to the issue of ACEs, analyzing 2011-2012 national data, researchers found that when compared to non-Hispanic White children, AI/AN youth (ages 17 and under) are more likely to have experienced 8 of 9 ACE categories.⁶

In short, race-based discrimination and **historical trauma** or the “cumulative emotional and psychological wounding over the lifespan and across generations, emanating from massive group trauma,”⁷ may explain, in part, differences in health outcomes and higher ACEs.⁸

Thus, to effectively reduce racial health disparities, the Committee believes that interventions that address historical trauma are fundamental to the healing and health of tribal communities.^{9,10}

In the twenty years since the seminal ACE study was published, subsequent research has strengthened the association between ACEs and increased risks for negative health behaviors and chronic physical and psychological conditions in adulthood.^{11,12} A growing body of literature reaffirms the links between ACEs and consequent health-related outcomes, which includes—among others—smoking,^{13,14} illicit drug use,¹⁵ alcoholism,¹⁶ suicidal behaviors,^{17,18} cancer,^{19,20} COPD,²¹ depressive disorders,²² ischemic heart disease,²³ and general disability.²⁴ With advances in genomics, epigenetics, neuroscience, and the broader behavioral and social science disciplines, researchers have also begun to understand the crucial role that *toxic stress*^{iv} plays in affecting the foundations for healthy development.^{25,26} Toxic stress disrupts the development of essential nervous, endocrine, and immune systems.²⁷ Furthermore, when experienced for a prolonged duration, toxic stress can lead to a “wear and tear” effect on the brain and body.²⁸

Rural-Urban ACE Prevalence among Adults and Children

Despite findings from the ACE Study and additional follow-up research, the surveillance of ACEs—nationally and especially accounting for rural-urban variation—remains limited. Of the existing studies that have examined population data on ACE prevalence among adults in the U.S., only three studies have investigated geographic differences.^{29,30,31} Two of the three studies have analyzed data from multiple states using the Centers for Disease Control and Prevention’s (CDC) Behavioral Risk Factor Surveillance System (BRFSS) survey. Using BRFSS data, a 2018 study^v published in the *Journal of Environmental and Public Health* revealed that 55.4% of rural adult respondents reported exposure to at least one ACE and 14.7% experienced four or more.³⁰ These findings seem to suggest a similar pattern to that of other multi-state BRFSS analyses,^{32,33} the original ACE Study,¹ and results from a 2016 study published by researchers

^{iv} Although “stress” has received a bad reputation, not all stress is “bad”. In the presence of a stressor, the adoption of adaptive coping mechanisms is key to buffering its effects. However, the degree to which a stressor is harmful is characterized by the strength of the stressor and the absence of a supportive adult/caregiver. Thus, unlike “positive” and “tolerable” stress, toxic stress refers to the severe and prolonged activation of the stress response system **without** the supportive presence of a caring adult/caregiver who can diminish the severity of the stressor(s) impact.²⁵

^v Researchers analyzed 2011 and 2012 BRFSS data from 79,810 survey respondents from 9 states (Iowa, Minnesota, Montana, North Carolina, Oklahoma, Tennessee, Vermont, Washington, and Wisconsin).

at the Maine Rural Health Research Center (MRHRC).³¹ In this second BRFSS-based study,^{vi} MRHRC researchers found that ACEs were more likely to co-occur in rural areas and that exposure to ACEs was common among surveyed rural adults. In both of these studies, reported rural adult ACE prevalence appears to be lower³⁰ or roughly the same³¹ in comparison to urban respondents. However, among young people, ages 17 and under, an analysis of data from 2011-2012 National Survey on Children's Health (NSCH) found that 28.9% of those living in small rural areas experienced two or more ACEs compared with 21.3% of urban children.³⁴ (See **Appendix B** for a list of items asked in both the BRFSS and NSCH questionnaires.) Additional findings point out that rural children experience economic hardship significantly more than children living in urban areas do.³⁴

Although there is limited specific research on the prevalence and severity of ACEs nationally, and especially with regard to rural-urban differences, it is plausible that rural children and adults would be at an elevated risk of experiencing a higher degree of toxic stress and thus, more ACEs compared to their urban counterparts. For certain ACE categories, there are notable differences in outcomes between rural and urban populations. Among its findings, the Fourth National Incidence Study of Child Abuse and Neglect^{vii} reported that when compared with urban children, rural children were twice as likely to have experienced nearly all forms of maltreatment (i.e., abuse and neglect).³⁵ On incarceration, data analysis from the Vera Institute of Justice^{viii} revealed that despite having low crime rates, rural counties have the highest pretrial detention rates in the nation and experienced a 436% increase in pretrial incarceration from 1970 to 2013.³⁶ On intimate partner violence (IPV), the Committee's 2015 policy brief on the issue pointed out that prevalence of IPV among rural areas may be marginally higher than that of non-rural areas.³⁷ Taken together, these findings seem to suggest that perhaps ACEs and their related outcomes are more pronounced in rural areas.

Revisiting Rural Health Disparities

As the Committee has noted in its reports and policy briefs to the Secretary, rural population health is diminished when multiple, often co-occurring factors limit one's ability to thrive. The co-occurrence and coalescence of factors, such as—but not limited to—poverty, socioeconomic status, and disease, take a toll on the health of rural communities.

According to USDA's Economic Research Service (ERS), in 2016, the poverty rate for Americans living in nonmetropolitan (rural) areas was higher than the national rate and that of those living in metropolitan (urban) centers (16.9%, 14%, and 13.6%, respectively).³⁸ Across age categories, the overall poverty rate among children^{ix} (those under 18 years) was the highest at 23.5% when compared with urban children, rural and urban working adults, and rural and urban seniors.³⁸ Additionally, of the 353 counties identified as those in persistent poverty across the country, 301 (85.3%) were rural.³⁸

With reductions in the availability of resources, poverty has been shown to increase the number of hardships and affect one's ability to provide and meet basic needs. Moreover, the experience of growing

^{vi} Analysis of BRFSS ACE survey data was obtained from 103,203 respondents from Maine, Minnesota, Montana, Nebraska, Nevada, Vermont, and Washington in 2011; Connecticut, Iowa, and North Carolina in 2012; and Iowa and Utah in 2013.

^{vii} The [National Incidence Study](#) is a congressionally mandated, periodic research effort by HHS's Administration for Children and Families to assess the incidence of child abuse and neglect in the U.S.

^{viii} The [Vera Institute of Justice](#) is an independent nonprofit national research and policy organization funded by the Ford Foundation.

^{ix} Children under 5 years of age living in rural areas had an even higher poverty rate (26.8%) than that of rural children under 18 years.³⁸

up poor disrupts vital brain regions that result in difficulties with emotion regulation, executive function capacities (e.g., working memory, inhibitory control), and learning.³⁹ Poverty is also associated with elevated psychological parental distress, maternal depression, insecure attachment between child and parent/caregiver, and “chaotic” home and community conditions (e.g., violence).⁴⁰ Furthermore, poverty and low income levels contribute to a greater likelihood of health burdens. For instance, data from the CDC demonstrates chronic disease differences are amplified and more pronounced in rural impoverished communities, compared with median and more affluent areas.⁴¹

Beyond poverty and socioeconomic status, geographic differences seem to account for greater disparities in life expectancy, mortality, and chronic disease. Although national rates of infant death have been steadily decreasing,⁴⁶ as has rates based on levels of urbanization,⁴⁷ the rural-urban gap remains. In 2014, the infant mortality rate was 20% higher among rural counties (6.55 deaths per 1,000 births) than large urban counties (5.44 deaths per 1,000 births).⁴⁸ In addition to infant mortality, according to data from the CDC, death from pregnancy-related complications among rural women (ages 15-44) in 2015 was 64% higher than that of women living in large urban areas.⁴⁹ Moreover, there are growing divides in rural-urban mortality and life expectancy trends, as referenced in the Committee’s 2015 policy brief on the issue.⁵⁰ While national mortality rates have been on the decline, the rural mortality rate has decreased relatively slower than the urban rate. Furthermore, from 2005-2009, a 13% difference in mortality rates was observed between the two populations with nearly a two-and-half-year discrepancy in life expectancy (76.9 years [rural] compared to 79.1 years [large metro areas]).^{50,51} These outcomes are unsurprising given that the prevalence of chronic disease conditions (e.g., COPD,⁵² obesity,⁵³ and diabetes and coronary heart disease⁵⁴) are higher among rural communities.

On ACEs and the Opioid Epidemic

In light of the nation’s opioid epidemic, the continued rise of the rural opioid overdose death rate,⁴² and having examined the issue previously, **the Committee urges ongoing conversations and efforts to take into consideration the role toxics stress and trauma experienced early in childhood have on later opioid-related outcomes.** Although there is limited research on the scope of the issue, results from several studies do suggest that exposure to certain adverse experiences (e.g., child abuse and neglect) is linked to an increased likelihood of misusing opioids in adulthood.^{43,44} Moreover, in its 2017 policy brief, the Campaign for Trauma-Informed Policy and Practice (CTIPP) acknowledges that in order to effectively combat the opioid epidemic, strategies “must recognize the role that trauma and ACEs play in addiction” as “few strategy discussions,” to date, have done so.⁴⁵

In addition to the opioid epidemic being declared a [national public health emergency](#), HHS initiated a comprehensive federal [Strategy](#) to prioritize all opioid-related efforts. In 2017, the federal government administered over [\\$800 million](#) in funding to support services for opioid-related treatment, prevention, and recovery.

FEDERAL EFFORTS

HHS Programs

The Committee acknowledges the increasing recognition and implementation of ACE-related programming in early childhood, education, and health and human service sectors. Within HHS, ACE research and prevention can be found across multiple agencies, divisions, institutes, and centers. The [CDC](#), the [National Institutes of Health](#), and the [Agency for Healthcare Research and Quality](#) conduct medical and public health research, study health quality and safety, and monitor the nation’s health status. The

Centers for Medicare & Medicaid Services (CMS) provides essential health insurance coverage to eligible individuals, many of whom may be impacted by the effects of ACEs. CMS also manages the [Children's Health Insurance Program \(CHIP\)](#), which, in combination with [Medicaid](#), cover nearly half (47%) of all rural children.⁵⁵ The [Indian Health Service \(IHS\)](#) also provides crucial health services to federally recognized Tribal Nations. Importantly, the Health Resources and Services Administration (HRSA), the Administration for Children and Families (ACF), and the Substance Abuse and Mental Health Services Administration (SAMHSA) oversee a range of programs that either specifically or indirectly address ACEs and their related outcomes. The work of these three agencies is expanded upon below.

HRSA Programs

With the goal of increasing access to quality health care services for geographically, economically or medically underserved populations nationwide, [HRSA's Bureaus and Offices](#) support funding, training, technical assistance, and research initiatives to address a variety of issues that affect maternal and child health, primary care, workforce development, and rural health. Pertinent to the prevention of ACEs for rural communities are the following HRSA agencies and programs.

The [Maternal and Child Health Bureau \(MCHB\)](#) oversees the management of the Title V Maternal and Child Health Services Block Grant Program, the Maternal, Infant, and Early Childhood Home Visiting (MIECHV) Program, and the Healthy Start program. Home visiting^x has been shown to be an effective, evidence-based practice, and is ideally positioned to provide prevention, intervention, and treatment of ACEs. While there is no program requirement or performance measure^{xi} for MIECHV grantees to screen for ACEs or to report data on ACE screening, some grantees do use the ACE questionnaire as part of their home visiting programs.^{xii} The [Bureau of Primary Health Care](#) and the [Bureau of Health Workforce](#), respectively, manage the Health Centers Program and National Health Service Corps and NURSE Corps programs. Both of these program can play a role in the prevention or intervention of ACEs. Lastly, through its [Community-Based Division](#) and the [Office for the Advancement of Telehealth](#), the [Federal Office of Rural Health Policy](#) administers funding to rural communities through the Rural Health Care Services, Outreach, Network, and Quality Improvement Grant programs and the Telehealth Network Grant Program. These programs can be leveraged by rural communities in ways that enhance access to or improve the coordination of services related to ACEs.

ACF Programs

Within HHS, [ACF](#) is tasked with promoting the economic and social well-being of children, youth, and families by providing resources to enhance access to human services. ACF's multiple offices provide programs that benefit rural areas on issues ranging from prevention and treatment of child abuse and family violence to supporting early childhood development and education.

Initially enacted in 1974 and recently reauthorized in 2010, the [Child Abuse Prevention and Treatment Act \(CAPTA\)](#) programs have supported systems for child welfare and child protection services, as well as

^x **Home visiting** is an umbrella term that refers to an evidence-based early childhood program whereby trained professionals identify and provide specific support and services that meet the needs of parents/caregivers/families. Such needs can address a variety of issues, including teaching and modeling effective parenting skills; providing health education on topics that include breastfeeding, nutrition, and injury prevention; administering screenings to detect delays in essential developmental milestones and diagnosing developmental disabilities; and linking families with community resources.

^{xi} By statute, MIECHV grantees are required to collect and report on a [number of performance measures and systems outcomes](#) that include depression screening, child maltreatment investigations, and screening for intimate partner violence.

^{xii} Internal communication with MIECHV representative; not published online.

prevention services for children who have been abused or neglected. The [Children’s Bureau](#) offers additional child welfare, adoption, foster care, guardianship assistance, and tribal-specific service programs. While CB’s scope focuses on child abuse and welfare broadly, the [Family & Youth Services Bureau](#) programs address runaway and homeless youth, family violence prevention, and adolescent pregnancy prevention. Additionally, through its [Office of Early Childhood Development](#), ACF oversees crucial child care and early learning programs such as the Child Care and Development Fund and Head Start/Early Head Start. Moreover, the [Office of Community Services](#) support families, communities and tribal populations in reducing the impacts of certain adverse experiences and the social determinants of health through the [Social Services Block Grant](#) and [Community Services Block Grant](#) programs. Lastly, along with administering the Temporary Assistance for Needy Families (TANF) and tribal TANF programs, the [Office of Family Assistance](#) also manages the funding for the Healthy Marriage and Relationship Education Demonstration Grants, the New Pathways for Fathers and Families Demonstration Grants, and the Responsible Fatherhood Opportunities for Reentry and Mobility Grants.

A Brief Note about State Block Grant Funding

Over the years, the Committee has heard from stakeholders about the limitations of state block grants with respect to rural communities. States have broad discretion over how and where block grant funding is allocated and frequently distribute it to areas of highest population, rather than the areas of greatest need. The Committee urges discussion about this inequity but also recognizes that any alteration to block grant formula allocation would require a statutory change.

SAMHSA Programs

[SAMHSA](#) is the lead agency within HHS responsible for funding program activities directed toward mental health and substance abuse issues. Through the [Community Mental Health Services Block Grant \(MHBG\)](#) and the [Substance Abuse Prevention and Treatment Block Grant \(SABG\)](#), SAMHSA administers funding that targets comprehensive, community- and prevention-based service activities and related support services. Both the MHBG and the SABG are substantial “safety

net” funding programs for some of the most vulnerable populations (e.g., rural communities) affected by mental illness and substance abuse. Along with the MHBG and the SABG, the Children’s Mental Health Initiative also supports activities that address the needs of children, youth, and young adults with serious emotional disturbance. Pertinent to targeting childhood trauma, SAMHSA’s [Safe Schools/Healthy Students Initiative](#) and [Project AWARE](#) awards grant funding to decrease youth violence, create safer schools, promote youth resilience and positive child development, and increase access to mental health services. Lastly, as part of the SAMHSA’s effort to support and elevate trauma-informed strategies, the [National Child Traumatic Stress Initiative](#) is one of several [technical assistance centers](#) that offers training, education and resources on the issue.

U.S. Departments of Justice and Education

While both the U.S Department of Justice (DOJ) and the U.S Department of Education (ED) fall beyond the jurisdiction of the Committee and the HHS Secretary, it is important to point out that each supports programs focused on the prevention of ACEs and their downstream effects. For example, DOJ administers funding to states, tribal governments, and local organizations to tackle a wide array of criminal justice related areas. Key programs that could have a role in ACE prevention for rural communities include programs administered by the [Office on Violence Against Women](#), the [Office of Juvenile Justice and Delinquency Prevention](#), and the [Office of Community Oriented Policing Services](#). Similar to DOJ, ED manages funds for several programs have the potential to reduce the impacts of adverse experiences. Sample programs that rural communities would benefit from are the [Student Support and Academic Enrichment \(SSAE\) Grants](#) program, [Project SERV](#), and the [Full-Service Community Schools Program](#).

POLICY RECOMMENDATIONS

As noted above, there are a number of federal programs and resources with the potential to address ACE-related issues. The reach and coordination of these programs can sometimes be restricted as the result of statutory parameters that inadvertently creates silos of government programs and few provide specific focus on the needs of rural communities. However, given the wide ranging and long-term effects of ACEs, *the Committee urges the Secretary to encourage all HHS Agencies and Offices to emphasize the rural dimensions of ACEs in their programs, research, and outreach, as part of building a comprehensive, collaborative effort to increase recognition of the benefits of addressing ACEs wherever they are encountered.* The Committee recognizes that several agencies such as HRSA, SAMHSA and ACF are well aware of the way in which trauma affects human health and may already include trauma-informed approaches into their program planning. Nonetheless, the Committee encourages all federal agencies and programs be made aware of the science and implications of ACEs, and receive training on trauma-informed care. This training should also recognize the unique historical and cultural backgrounds of certain subgroups, particularly for rural and tribal populations.

Defining Trauma and a Trauma-Informed Approach

In a 2014 paper, a SAMHSA expert panel presented a working concept of *trauma* and a framework to guide the implementation of a *trauma-informed* approach.⁵⁶ The panel defined **trauma** as “an **event**, series of events, or set of circumstances that is **experienced** by an individual as physically or emotionally harmful or life threatening and that has lasting adverse **effects** on the individual’s functioning and mental, physical, social, emotional, or spiritual well-being.”⁵⁶

To effectively address trauma, SAMHSA’s expert panel encouraged programs, organizations, or systems to be **trauma-informed** in the delivery of care. An entity that is “trauma-informed **realizes** the widespread impact of trauma, and understands potential paths for recovery, **recognizes** the signs and symptoms of trauma in clients, families, staff, and others, and **responds** by integrating knowledge about trauma into policies, procedures, and practices, while also seeking to actively resist **re-traumatization**.”⁵⁶

The following recommendations were informed, in part, by the Committee’s experiences and conversations during its site visit to a rural community in upstate New York. At the site visit meeting, the Committee took a tour of the Schoharie County Head Start and heard from a number of community stakeholders. (See **Appendix A** for more information about the Committee’s site visit to Cobleskill.)

Develop and Implement a National ACE Prevention Strategy

[Harvard University’s Center on the Developing Child](#) has been at the forefront of generating, translating, and disseminating research that informs practice and policy on issues related to child health and development. In 2017, the Center published a report that emphasized three critical “design principles” that practitioners and policymakers alike should consider to improve service delivery and policy.⁵⁷ These three areas were: (1) supporting responsive relationships, (2) strengthening core life skills and (3) reducing sources of stress in the lives of children and families. These design principles ties in neatly with the work of existing federal programs noted in the prior section.

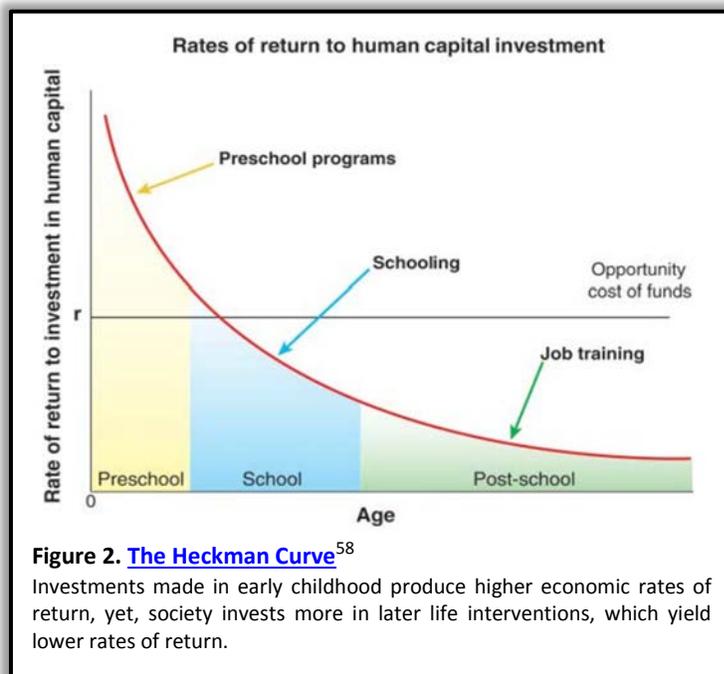
To move more fully toward integrating existing efforts into a robust initiative, the Committee recognizes the potential collaborative impact that federal human service programs, funding streams and research initiatives would have to address the health and social consequences resulting from toxic stress and trauma in an effective manner. As a step in that direction, the Committee believes that an ACE prevention

strategy—similar to that of [HHS' five-point Opioid Strategy](#), the [National Strategy on Suicide Prevention](#), and the [HRSA Strategy to Address IPV](#)—should be established with a particular focus on rural, tribal, and other at-risk populations.

Recommendation 1: The Committee recommends the Secretary develop and implement a comprehensive prevention strategy that identifies priority outreach/awareness, programming, research and policy areas to address toxic stress, trauma and the health consequences of ACEs for rural, tribal and other at-risk populations.

Conduct an ACE Cost-Benefit Analysis

Economist and Nobel Laureate, James Heckman has consistently promoted the idea that the best way to increase economic productivity and promote equity is to invest early in childhood^{58,59,60} (see **Figure 2**). The Committee recognizes that an understanding of economic costs resulting from ACEs and benefits gained from current federal prevention efforts are needed. The Committee acknowledges that certain



environmental drivers that result in toxic stress and trauma (e.g., childhood poverty) have tremendous economic costs to society. For example, in a 2018 study published in *Social Work Research*, researchers, McLaughlin and Rank estimate that in 2015, total childhood poverty cost the U.S. \$1.0298 trillion, representing 5.4% of America's gross domestic product.⁶¹ McLaughlin and Rank rationalize that because impoverished children are more likely to receive a substandard education, they are less likely to develop skills essential for the workplace. Thus, when compared with their non-impoverished peers, children growing up in poverty are less able to be economically productive.⁶¹ From a cost-benefit standpoint, McLaughlin and Rank conclude, "Investing in

programs that reduce childhood poverty is both smart and effective economic policy." Similarly, then, prevention of ACEs and their negative outcomes on health and well-being has ramifications for diminished economic productivity accrued from the burden of chronic disease. Therefore, the Committee contends that the rural implications of this issue deserves a more specific focus and suggests that an analyses of economic costs resulting from ACEs and of the benefits gained from current federal prevention efforts are needed.

Recommendation 2: The Committee recommends the Secretary support research that that evaluates the long-term economic costs resulting from ACEs and benefits gained from federal investments in ACE-related prevention programming.

Strengthen Data Variables to Better Understand Rural ACE Prevalence

One of the two most common ways data on ACEs is collected is through the National Survey of Children's Health (NSCH).^{xiii} (See **Appendix B** for a list of ACE-related items included in the NSCH.) Administered by HRSA's MCHB, NSCH collects state-level data on a range of items related to the health and well-being of children ages 0-17 years in the U.S. While obtaining statewide data is important, this level of collection lacks rural specificity. To help researchers and others analyze rural-urban differences in the prevalence of ACEs, the Committee recommends that, in addition to having a "state" variable in the NSCH Public Use File, a predefined composite variable for "Rural-Urban Status" should be developed. A composite variable such as this would standardize the process of investigating rural-urban differentials in ACEs and would also offer a reasonable level of specificity for meaningful research while still complying with privacy rules required for use of these data files.

Recommendation 3: The Committee recommends HRSA's MCHB establish and include a predefined variable for "Rural-Urban Status" in the NSCH to allow for standardized analyses of ACE prevalence.

Support Funding for Rural Telehealth-Supported School-Based Health Centers

In its rural health policy brief, the CDC features three essential policy options to provide greater access to mental health services for children living in rural areas.⁶² These policy options are: (1) using telehealth, (2) integrating primary care and behavioral health and, (3) administering services through the school-based health center (SBHC) model. By combining these policy options into a comprehensive approach, the Committee believes that access to and delivery of integrated services through an on-site school health center with further support from the use of telehealth is an optimal, promising practice for rural populations. Ideally, SBHCs in rural communities would be positioned to offer prevention services and intervention for ACE-related outcomes for children exposed to chronic stress and trauma. Moreover, given limited specialty services in rural areas, telehealth can be an important tool for linking SBHCs to experts in child development and mental health.

As the CDC's policy brief points out, SBHCs have been shown to yield financial benefits; annual savings from SBHCs range from \$15,028 to \$912,878 per SBHC and net savings to Medicaid, ranging from \$30 to \$969 per visit or \$46 to \$1,166 per patient.⁶² Despite these benefits, the costs of starting and maintaining an SBHC is challenging. Estimates on opening an SBHC can range from \$49,750 to \$128,250 with average operating costs during a 9-month period ranging from \$90,750 to \$152,750.⁶² Community stakeholders echoed the problem of limited startup funding available for SBHCs during the Committee's site visit.

Rural Health Spotlight:

Bassett Healthcare's School-based Healthcare Program

During its site visit to Cobleskill, the Committee heard from Jane Hamilton and Gayle Wheeler, both of whom represent [Bassett Healthcare's \(Bassett\) SBHC program](#). Staffed by licensed clinical social workers, physician assistants, nurse practitioners, physicians, nurses, dentists, a dietician, office staff, and a care coordinator, Bassett's network of 20 rural SBHC provides high-quality, comprehensive primary, mental, and dental health care to students (Pre-K–12th grade) at 15 schools in 4 counties.

With support from [HRSA's Telehealth Network Grant Program](#), Bassett's SBHC Program is increasing access to care using telehealth, connecting patients to pediatric specialty services, including psychiatry, or linking them to non-medical services such as registered dietitians.

^{xiii} Since the original ACE Study was published, [a variety of adapted and expanded ACE surveys has been developed](#).

Funding for SBHCs comes from a variety of private and public mechanisms including some support from HRSA's Community Health Center program and serviced billed through Medicaid and CHIP.⁶² The SBHC model is a promising practice for rural communities as SBHCs provide a variety of services and resources into a "one-stop-shop" for care, which may also reduce challenges regarding transportation, workforce, and mental health stigma.

Recommendation 4: The Committee recommends the Secretary seek additional funding for telehealth-supported SBHCs in rural areas as a way of increasing access to integrated primary and behavioral health care services.

POLICY CONSIDERATIONS

Along with the aforementioned policy recommendations, the Committee would like to draw attention to several policy concerns that the Secretary should also consider. These issues relate to rural workforce development, improvements in surveillance of ACE prevalence, public health education, and enhancing cross-government collaborations.

Rural Workforce Development

Rural health professional workforce recruitment and retention is a long-standing barrier to access to health care and human services. During their site visit to Schoharie County, Committee members heard from stakeholders about the need for more human service providers, particularly child welfare caseworkers, school social workers, substance abuse counselors, and mental health social workers. At the federal level, [HRSA's National Health Service Corps \(NHSC\)](#) helps address workforce shortages by supporting qualified medical, dental, and mental and behavioral health providers dedicated to working in areas with limited access to care. Accounting for nearly 10,200 clinicians, NHSC members provide cultural competent care to 10.7 million people at more than 5,000 NHSC-approved health care sites in urban, rural, and frontier areas. In exchange for providing services, NHSC offers tax-free loan repayment assistance. While the Committee appreciates that licensed clinical social workers (LCSWs) can receive loan repayment through NSHC, the Committee also recognizes and sees value in supporting the human service workforce. Therefore, the Secretary and HHS may want to consider developing human service loan repayment programs, modeled off the NHSC, to support human service professionals working in rural and underserved parts of the country.

Improved Surveillance of ACE Prevalence

As previously noted, the two most commonly used data collection tools on ACEs are the NSCH and BRFSS. While each survey collects important data, the Committee raises concerns about the limited scope of and of these national analyses on ACE prevalence, particularly with regard to rural-urban differentials. Because the BRFSS ACEs module of the survey is optional, only thirty-eight states and the District of Columbia have gathered and analyzed data ACE-related data as of 2017.^{xiv} In addition, some states that have collected ACE data in the past have not revisited the module since 2009,^{xiv} citing the costs to collect the data as problematic, which affects participation. To better study the nation's ACE prevalence, the Secretary should consider encouraging all states and the District of Columbia to collect adult population data on ACEs through the BRFSS. While the Committee acknowledges the financial costs affiliated with

^{xiv} ACEs Connection Network. State ACEs Action. "[Updated states collecting ACEs data.](#)"

administering this module and collecting data, the Committee nonetheless would like to reiterate the importance of data collection for national and geographic analyses on the issue.

Public Health Education on ACEs

Community stakeholders in Cobleskill repeatedly emphasized the important role public education and awareness plays in prevention and the need for providers, parents and families to understand ACEs and their consequences. However, ACEs may not be fully understood by the public or even health and human services providers. In 2013, an American Academy of Pediatrics (AAP) study found that 76% of respondents were not familiar with the original ACE Study and nearly 49% of the study respondents had never heard of an ACE screening tool.⁶³ The Committee believes that individuals who work with children, youth, and families across the health and human service continuum should be made aware of ACEs. The AAP has recommended that the science of early childhood adversity and toxic stress should be incorporated into the training of physicians and pediatricians.⁶⁴ Additionally, the AAP recommended that pediatricians take a more active role in educating parents, educators, policymakers, and public servants about the harmful effects toxic stress and childhood trauma have on the developing brains and bodies of young children. Therefore, the Committee encourages the Secretary to consider developing education and training programs on ACEs and toxic stress that is intended for parents, teachers, pediatricians, law enforcement, and other non-health related groups that work with children. Because of ACF's focus on children and families, the Secretary should consider encouraging ACF and its programs to collect data that includes information on rural populations at all levels of programming.

Enhance Cross-Government Collaborations

In conjunction with federal efforts to keep students safe in schools, the Committee recognizes an opportunity to further enhance and align cross government partnerships through the [Federal Commission on School Safety \(FCSS\)](#). Initiated in March 2018 and comprised of department leadership from ED, DOJ, HHS, and the U.S. Department of Homeland Security, FCSS is tasked with “providing meaningful and actionable recommendations and best practices to keep students safe.” To the extent that it may already be happening, the Committee encourages the Secretary to work with the FCSS to consider the role of childhood trauma, ACEs and their consequences on health and well-being, especially among rural populations.

CONCLUSION

The topic of ACEs provides another layer of examination on rural health disparities and presents a focal point of analysis and attention on the Committee's previous work. As such, this brief emphasizes the importance of prevention, education, and awareness at the local, state, and federal levels of health and human service delivery. Moreover, in an effort to develop comprehensive efforts, this brief provides recommendations and considerations on areas that HHS can better address ACEs and their outcomes, especially for rural, tribal and other at risk populations.

The Committee believes that in order to effectively prevent and reduce health-related disparities and outcomes such as cancer, COPD, depression, heart disease, alcoholism, opioid misuse, and suicide, ACEs needs to be part of the broader conversation. In particular, rural health and human service leaders need to account for issues related to toxic stress and trauma. Additionally, as seen through the Schoharie ACEs Team (see **Appendix A**), community-driven and cross-sector collaborations and communications are crucial components to ACE prevention, especially in rural areas.

APPENDIX A: COBLESKILL SITE VISIT PROFILE

During their site visit to Cobleskill, members of the Committee heard from local professionals who work in the health and human service continuum, law enforcement, and early childhood education. The conversations between the Committee and community stakeholders underscored the need for attention to and spreading public awareness of ACEs.

The Schoharie County ACEs Team

Amidst the backdrop of limited infrastructure and resources, the [Schoharie County ACEs Team](#) is a community-driven, grassroots initiative whose aim is to “promote community awareness and capacity in order to help children and caregivers build resilience in response to [ACEs].” Comprised of professionals who work in multiple sectors within the county, the ACEs Team hosts free-of-charge conferences, trainings and events in the community that spotlight education on neuroscience, trauma and trauma-informed approaches, and resilience. As a co-founder and Team member, **Siri Young** provides in-person training to schools across Schoharie County. Building upon her work as the Mental Health Services Manager for the Schoharie County Head Start, also referred to as the [Schoharie County Child Development Council](#), Ms. Young is dedicated to raising awareness about ACEs and engaging with multiple stakeholders through collaborative partnerships.



The Committee acknowledges the importance of implementing a similar model in rural communities and while this is certainly beyond the purview of HHS, the Committee nonetheless would like HHS to become aware of this innovative model.

Community Stakeholder Perspectives

During the site visit meeting, the Committee gained further insights on the cross-sectoral nature of ACEs. Two such examples are highlighted below are from a chief of police and a crisis intervention program:

After joining the ACEs Team, Chief of Police for the Village of Cobleskill, Richard Bialkowski, remarked on the unique position police officers are in to help mitigate ACEs and their outcomes:

Since joining the team, [the knowledge I have gained on ACEs] has helped me become a better police officer. ... Having been in law enforcement long enough, I actually see the children from those adverse situations 20 years ago now as young adults, and many are making poor decisions, have substance abuse issues, and have frequent law enforcement involvement. ... I think it is vital that police officers receive training and that they are mandated to help screen and/or report on [the] children they encounter in their duties [that have been impacted by] ACEs to the proper agencies to ensure that intervention services can be initiated as early as possible. — Chief Richard Bialkowski

As the director of the Parsons Health Center at Malta and Home Based Crisis Intervention program, Kathy Wright has seen the value in creating cross-sector partnerships:

Our programs embed a trauma-informed practice in all aspects of service delivery. We assess the presence of ACEs in every client and provide constant [education on ACEs and resilience] to teachers, principals, school counselors, social service caseworkers, nurse case managers, and primary care physicians. ... We collaborate with primary care offices, mental health providers, schools, social services, churches, community centers, and food pantries. We also link those organizations with each other when we notice a duplication of services or shared need. — Kathy Wright

APPENDIX B: NSCH & BRFSS ACE-RELATED ITEMS

NSCH ACE Questionnaire^{xv}

To the best of your knowledge, has this child EVER experienced any of the following?

- a. Parent or guardian divorced or separated [Yes/No]
- b. Parent or guardian died [Yes/No]
- c. Parent or guardian served time in jail [Yes/No]
- d. Saw or heard parents or adults slap, hit, kick, punch one another in the home [Yes/No]
- e. Was a victim of violence or witnessed violence in his or her neighborhood [Yes/No]
- f. Lived with anyone who was mentally ill, suicidal, or severely depressed [Yes/No]
- g. Lived with anyone who had a problem with alcohol or drugs [Yes/No]
- h. Treated or judged unfairly because of his or her race or ethnic group [Yes/No]

SINCE THIS CHILD WAS BORN, how often has it been very hard to get by on your family's income—hard to cover the basics like food or housing? [Very Often, Somewhat Often, Rarely, Never]

BRFSS ACE Module^{xvi}

- (1) Did you live with anyone who was depressed, mentally ill, or suicidal?
- (2) Did you live with anyone who was a problem drinker or alcoholic?
- (3) Did you live with anyone who used illegal street drugs or who abused prescription medications?
- (4) Did you live with anyone who served time or was sentenced to serve time in a prison, jail or other correctional facility?
- (5) Were your parents separated or divorced?
- (6) How often did your parents or adults in your home ever slap, hit, kick, punch or beat each other up?
- (7) Before age 18, how often did a parent or adult in your home ever hit, beat, kick, or physically hurt you in any way? (Spanking does not count.)
- (8) How often did a parent or adult in your home ever swear at you, insult you, or put you down?
- (9) How often did anyone at least 5 years older than you or an adult, ever touch you sexually?
- (10) How often did anyone at least 5 years older than you or an adult, try to make you touch [them] sexually?
- (11) How often did anyone at least 5 years older than you or an adult, force you to have sex?

^{xv} Reprinted from [Sacks & Murphey \(2018\)](#) and [Bethell et al. \(2017\)](#).

^{xvi} Reprinted from the [CDC's BRFSS ACE Module](#).

REFERENCES

- ¹ Felitti, Vincent J., et al. "Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The adverse childhood experiences (ACE) study." *American Journal of Preventive Medicine*, 14.4 (1998): 245-258.
- ² U.S. Census Bureau. "FFF: American Indian and Alaska Native Heritage Month: November 2017." (2017). Retrieved from <https://www.census.gov/newsroom/facts-for-features/2017/ai-an-month.html>.
- ³ Dewees, Sarah, and Benjamin Marks. "Twice invisible: Understanding rural Native America." First Nations Development Institute, Research Note, No. 2. (2017). Retrieved from <https://www.usetinc.org/wp-content/uploads/bvenuti/WWS/2017/May%202017/May%208/Twice%20Invisible%20-%20Research%20Note.pdf>.
- ⁴ Indian Health Service. "Indian Health Service trends in Indian health: 2014 edition." Report. (n.d.) U.S. Department of Health and Human Services, Indian Health Service. Retrieved from <https://www.ihs.gov/dps/publications/trends2014/>.
- ⁵ National Advisory Committee on Rural Health and Human Services. "Understanding the impact of suicide in rural America." Policy Brief. (December 2017). National Advisory Committee on Rural Health and Human Services. Retrieved from <https://www.hrsa.gov/sites/default/files/hrsa/advisory-committees/rural/publications/2017-impact-of-suicide.pdf>.
- ⁶ Kenney, Mary Kay, and Gopal K. Singh, "Adverse childhood experiences among American Indian/Alaska Native children: The 2011-2012 National Survey of Children's Health." *Scientifica* (2016): 1-14. DOI: [10.1155/2016/7424239](https://doi.org/10.1155/2016/7424239).
- ⁷ Yellow Horse Brave Heart, Maria. "The historical trauma response among Natives and its relationship with substance abuse: A Lakota illustration." *Journal of Psychoactive Drugs*, 35.1 (2003): 7-13. DOI: [10.1080/02791072.2003.10399988](https://doi.org/10.1080/02791072.2003.10399988).
- ⁸ Brockie, Teresa N., et al. "The relationship of adverse childhood experiences to PTSD, depression, poly-drug use, and suicide attempt in reservation-based Native American adolescent and young adults." *American Journal of Community Psychology*, 55.3-4 (2015): 411-421. DOI: [10.1007/s10464-015-9721-3](https://doi.org/10.1007/s10464-015-9721-3).
- ⁹ Yellow Horse Brave Heart, Maria, and Lemyra M. DeBruyn. "The American Indian holocaust: Healing historical unresolved grief." *American Indian and Alaska Native Mental Health Research*, 8.2 (1998): 56-78.
- ¹⁰ Lechner, Amanda, Michael Cavanugh, and Crystal Blyler. "Addressing trauma in American Indian and Alaska Native youth." Report. (24 August 2016). Mathematica Policy Research. Retrieved from <https://aspe.hhs.gov/pdf-report/addressing-trauma-american-indian-and-alaska-native-youth>.
- ¹¹ Hughes, Karen, et al. "The effect of multiple adverse childhood experiences on health: A systematic review and meta-analysis." *The Lancet Public Health*, 2.8 (2017): e356-e366.
- ¹² Kalmakis, Karen A., and Genevieve E. Chandler. "Health consequences of adverse childhood experiences: A systematic review." *Journal of the American Association of Nurse Practitioners*, 27 (2015): 457-465. DOI: [10.1002/2327-6924](https://doi.org/10.1002/2327-6924).
- ¹³ Ford, Earl S., et al. "Adverse childhood experiences and smoking status in five states." *Preventive Medicine*, 53.3 (2011): 188-193. DOI: [10.1016/j.ypmed.2011.06.015](https://doi.org/10.1016/j.ypmed.2011.06.015).
- ¹⁴ Edwards, Valerie J., et al. "Adverse childhood experiences and smoking persistence in adults with smoking-related symptoms and illness." *The Permanente Journal*, 11.2 (2007): 5-13.
- ¹⁵ Dube, Shanta R., et al. "Childhood abuse, neglect, and household dysfunction and the risk of illicit drug use: The Adverse Childhood Experience Study." *Pediatrics*, 111.3 (2003): 564-572. DOI: [10.1542/peds.111.3.564](https://doi.org/10.1542/peds.111.3.564).
- ¹⁶ Strine, Tara W., et al. "Associations between adverse childhood experiences, psychological distress, and adult alcohol problems." *American Journal of Health Behavior*, 36.3 (2012): 408-423. DOI: [10.5993/ajhb.36.3.11](https://doi.org/10.5993/ajhb.36.3.11).
- ¹⁷ Dube, Shanta R., et al. "Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: Findings from the Adverse Childhood Experience Study." *JAMA*, 286.24 (2001): 3089-3096.
- ¹⁸ Afifi, Tracie O., et al. "Population attributable fractions of psychiatric disorders and suicide ideation and attempts associated with adverse childhood experiences." *American Journal of Public Health*, 98.5 (2008): 946-952.
- ¹⁹ Holman, Dawn M., et al. "The association between adverse childhood experiences and risk of cancer in adulthood: A systematic review of the literature." *Pediatrics*, 138.S1 (2016). S81-S91. DOI: [10.1542/peds.2015-4268L](https://doi.org/10.1542/peds.2015-4268L).
- ²⁰ Brown, Monique J., Leroy R. Thacker, and Steven A. Cohen. "Association between adverse childhood experiences and diagnosis of cancer." *PLoS ONE*, 8.6 (2013): e65524-e65524. DOI: [10.1371/journal.pone.0065524](https://doi.org/10.1371/journal.pone.0065524).
- ²¹ Anda, Robert F., et al. "Adverse childhood experiences and chronic obstructive pulmonary disease in adults." *American Journal of Preventive Medicine*, 34.5 (2008): 396-403. DOI: [10.1016/j.amepre.2008.02.002](https://doi.org/10.1016/j.amepre.2008.02.002).
- ²² Chapman, Daniel P., et al. "Adverse childhood experiences and the risk of depressive disorders in adulthood." *Journal of Affective Disorders*, 82.2 (2004): 217-225. DOI: [10.1016/j.jad.2003.12.013](https://doi.org/10.1016/j.jad.2003.12.013).
- ²³ Dong, Maxia, et al. "Insights into casual pathways for ischemic heart disease: Adverse Childhood Experiences Study." *Circulation*, 110.23 (2004): 1761-1766. DOI: [10.1161/01.CIR.0000143074.54995.7F](https://doi.org/10.1161/01.CIR.0000143074.54995.7F).

- ²⁴ Rose, Sophia Miryam Schüssler-Fiorenza, Dawei Xie, and Margaret Stineman. "Adverse childhood experiences and disability in U.S. adults." *PM&R*, 6.8 (2014): 670-680. DOI: [10.1016/j.pmri.2014.01.013](https://doi.org/10.1016/j.pmri.2014.01.013).
- ²⁵ National Scientific Council on the Developing Child. "Excessive stress disrupts the architecture of the developing brain: Working paper 3." Updated edition. (2005/2014). Retrieved from <https://developingchild.harvard.edu/resources/wp3/>.
- ²⁶ Shonkoff, Jack P., W. Thomas Boyce, and Bruce S. McEwen. "Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion and disease prevention." *JAMA*, 301.21 (2009): 2252-2259. DOI: [10.1001/jama.2009.754](https://doi.org/10.1001/jama.2009.754).
- ²⁷ Danese, Andrea, and Bruce S. McEwen. "Adverse childhood experiences, allostasis, allostatic load, and age-related disease." *Physiology & Behavior*, 106.1 (2012): 29-39. DOI: [10.1016/j.physbeh.2011.08.019](https://doi.org/10.1016/j.physbeh.2011.08.019).
- ²⁸ McEwen, Bruce S. "Stress, adaptation, and disease: Allostasis and allostatic load." *Annals of the New York Academy of Sciences*, 840.1 (1998): 33-44.
- ²⁹ Radcliff, Elizabeth, Elizabeth Crouch, and Melissa Stropolis. "Rural-urban differences in exposure to adverse childhood experiences among South Carolina adults." *Rural & Remote Health*, 18.1 (2018). DOI: [10.22605/RRH4434](https://doi.org/10.22605/RRH4434).
- ³⁰ Chanlongbutra, Amy, Gopal K. Singh, and Curt D. Mueller. "Adverse childhood experiences, health-related quality of life, and chronic disease risks in rural areas of the United States." *Journal of Environmental and Public Health*, (2018). DOI: [10.1155/2018/7151297](https://doi.org/10.1155/2018/7151297).
- ³¹ Talbot, Jean A., Donald Szlosek, and Erika C. Ziller. "Adverse childhood experiences in rural and urban contexts." Research & Policy Brief. (April 2016). Maine Rural Health Research Center. Retrieved from <https://muskie.usm.maine.edu/Publications/rural/Adverse-Childhood-Experiences-Rural.pdf>.
- ³² Campbell, Jennifer A., Rebekah J. Walker, and Leonard E. Egede. "Associations between adverse childhood experiences, high risk behaviors, and morbidity in adulthood." *American Journal of Preventive Medicine*, 50.3 (2016): 344-352. DOI: [10.1016/j.amepre.2015.07.022](https://doi.org/10.1016/j.amepre.2015.07.022).
- ³³ Gilbert, Leah K., et al. "Childhood adversity and adult chronic disease: An update from ten states and District of Columbia, 2010." *American Journal of Preventive Medicine*, 48.3 (2015): 345-349. DOI: [10.1016/j.amepre.2014.09.006](https://doi.org/10.1016/j.amepre.2014.09.006).
- ³⁴ U.S. Department of Health and Human Services, Health Resources and Services Administration. "The health and well-being of children in rural areas: A portrait of the Nation 2011-2012." (April 2015). Health Resources and Services Administration. Retrieved from https://mchb.hrsa.gov/nsch/2011-12/rural-health/pdf/rh_2015_book.pdf.
- ³⁵ Sedlak, Andrea J., et al. "Fourth National Incidence Study of Child Abuse and Neglect (NIS-4): Report to Congress." Report. (2010). U.S. Department of Health and Human Services, Administration for Children and Families. Access at <https://www.acf.hhs.gov/opre/resource/fourth-national-incidence-study-of-child-abuse-and-neglect-nis-4-report-to>.
- ³⁶ Kang-Brown, Jacob, and Ram Subramanian. "Out of sight: The growth of jails in rural America." Report. (June 2017). Vera Institute of Justice. Access at <https://www.vera.org/publications/out-of-sight-growth-of-jails-rural-america>.
- ³⁷ National Advisory Committee on Rural Health and Human Services. "Intimate partner violence in rural America." Policy Brief. (March 2015). National Advisory Committee on Rural Health and Human Services. Retrieved from <https://www.hrsa.gov/advisorycommittees/rural/publications/partnerviolencemarch2015.pdf>.
- ³⁸ U.S. Department of Agriculture, Economic Research Service. "Rural poverty & well-being." (18 April 2018). Retrieved from <https://www.ers.usda.gov/topics/rural-economy-population/rural-poverty-well-being/>.
- ³⁹ Blair, Clancy, and C. Cybele Raver. "Poverty, stress, and brain development: New directions for prevention and intervention." *Academic Pediatrics*, 16.3S (2016): S30-S36.
- ⁴⁰ Chaudry, Ajay, and Christopher Wimer. "Poverty is not just an indicator: The relationship between income, poverty, and child well-being." *Academic Pediatrics*, 16.3S (2016): S23-S29.
- ⁴¹ Shaw, Kate M., et al. "Chronic disease disparities by county economic status and metropolitan classification, Behavioral Risk Factor Surveillance System, 2013." *Preventing Chronic Disease*, 13 (2016). DOI: [10.5888/pcd13.160088](https://doi.org/10.5888/pcd13.160088).
- ⁴² Mack, Karin A., Christopher M. Jones, and Michael F. Ballesteros. "Illicit drug use, illicit drug use disorders, and drug overdose deaths in metropolitan and nonmetropolitan areas — United States." *MMWR Surveillance Summaries*, 66.19 (2017): 1-12. DOI: [10.15585/mmwr.ss6619a1](https://doi.org/10.15585/mmwr.ss6619a1).
- ⁴³ Austin, Anna E., Meghan E. Shanahana, and Bharathi J. Zvarab. "Association of childhood abuse and prescription opioid use in early adulthood." *Addictive Behaviors*, 76 (2018): 265-269. DOI: [10.1016/j.addbeh.2017.08.03376](https://doi.org/10.1016/j.addbeh.2017.08.03376).
- ⁴⁴ Quinn, Kelly, et al. "The relationship of childhood trauma and adulthood prescription pain reliever misuse and injection drug use." *Drug and Alcohol Dependence*, 169 (2016): 190-198. DOI: [10.1016/j.drugalcdep.2016.09.021](https://doi.org/10.1016/j.drugalcdep.2016.09.021).
- ⁴⁵ Campaign for Trauma-Informed Policy and Practice. "Trauma-informed approaches need to be part of a comprehensive strategy for addressing the opioid epidemic." Policy Brief. (June 2017). Campaign for Trauma-Informed Policy and Practice. Retrieved from <http://ctipp.org/News-And-Resources/ArticleID/13/Policy-Brief-on-ACEs-and-Opioid-Addiction>.

- ⁴⁶ Matthews, T. J., and Anne K. Driscoll. "Trends in infant mortality in the United States, 2005-2014." NCHS data brief, no. 279. (March 2017). National Center for Health Statistics. Retrieved from <https://www.cdc.gov/nchs/data/databriefs/db279.pdf>.
- ⁴⁷ Ely, Danielle M. "QuickStats: Infant mortality rate, by urbanization level – National Vital Statistics System, United States, 2007 and 2015." MMWR Weekly Report, 66.41 (October 2017): 1122. DOI: [10.15585/mmwr.mm6641a8](https://doi.org/10.15585/mmwr.mm6641a8).
- ⁴⁸ Ely, Danielle M., Anne K. Driscoll, and T. J. Matthews. "Infant mortality rates in rural and urban areas in the United States, 2014." NCHS data brief, no. 285. (September 2017). National Center for Health Statistics. Retrieved from <https://www.cdc.gov/nchs/products/databriefs/db285.htm>.
- ⁴⁹ McKay, Betsy, and Paul Overberg. "Rural America's childbirth crisis: The fight to save Whitney Brown." *The Wall Street Journal* (11 August 2017). Retrieved from <https://www.wsj.com/articles/rural-americas-childbirth-crisis-the-fight-to-save-whitney-brown-1502462523>.
- ⁵⁰ National Advisory Committee on Rural Health and Human Services. "Mortality and life expectancy in rural America: Connecting the health and human service safety nets to improve health outcomes over the life course." Policy Brief. (October 2015). National Advisory Committee on Rural Health and Human Services. Retrieved from <https://www.hrsa.gov/sites/default/files/hrsa/advisory-committees/rural/publications/2015-mortality.pdf>.
- ⁵¹ Singh, Gopal K., and Mohammad Siahpush. "Widening rural-urban disparities in life expectancy, U.S., 1969-2009." *American Journal of Preventive Medicine*, 46.2 (2014): e19-e29. DOI: [10.1016/j.amepre.2013.10.017](https://doi.org/10.1016/j.amepre.2013.10.017).
- ⁵² Croft, Janet B., et al. "Urban-rural county and state differences in chronic obstructive pulmonary disease – United States, 2015." MMWR Report, 67.7 (2018): 205-211. DOI: [10.15585/mmwr.mm6707a1](https://doi.org/10.15585/mmwr.mm6707a1).
- ⁵³ Lundeen, Elizabeth A., et al. "Obesity prevalence among adults living in metropolitan and nonmetropolitan counties – United States, 2016." MMWR Surveillance Summaries, 67.23 (2018): 653-658. DOI: [10.15585/mmwr.mm6723a1](https://doi.org/10.15585/mmwr.mm6723a1).
- ⁵⁴ O'Connor, A., and G. Wellenius. "Rural-urban disparities in the prevalence of diabetes and coronary heart disease." *Journal of Public Health*, 126.10 (2012): 813-820. DOI: [10.1016/j.puhe.2012.05.029](https://doi.org/10.1016/j.puhe.2012.05.029).
- ⁵⁵ O'Hare, William P. "Rural children increasingly rely on Medicaid and state Child Health Insurance Programs for health insurance." Report. (September 2014). First Focus. Retrieved from https://firstfocus.org/wp-content/uploads/2014/09/Ohare_Draft6.pdf.
- ⁵⁶ Substance Abuse and Mental Health Services Administration. "SAMHSA's concept of trauma and guidance for a trauma-informed approach." HHS Publication No. (SMA) xx-xxxx. (2014). Substance Abuse and Mental Health Services Administration. Retrieved from <https://store.samhsa.gov/shin/content/SMA14-4884/SMA14-4884.pdf>.
- ⁵⁷ Center on the Developing Child at Harvard University. "Three principles to improve outcomes for children and families." Report. (2017). Center on the Developing Child at Harvard University. Retrieved from <https://developingchild.harvard.edu/resources/three-early-childhood-development-principles-improve-child-family-outcomes/>.
- ⁵⁸ Heckman, James J. "Skill formation and the economics of investing in disadvantaged children." *Science*, 312.5782 (2006): 1900-1902. DOI: [10.1126/science.1128898](https://doi.org/10.1126/science.1128898).
- ⁵⁹ Campbell, Frances, et al. "Early childhood investments substantially boost adult health." *Science*, 343.6178 (2014):1478-1485. DOI: [10.1126/science.1248429](https://doi.org/10.1126/science.1248429).
- ⁶⁰ Heckman, James J., et al. "The rate of return to the High/Scope Perry Preschool program." *Journal of Public Economics*, 94.1-2 (2010): 114-128.
- ⁶¹ McLaughlin, Michael, and Mark R. Rank. "Estimating the economic cost of childhood poverty in the United States." *Social Work Research*, 42.2 (2018): 73-83. DOI: [10.1093/swr/svy007](https://doi.org/10.1093/swr/svy007).
- ⁶² Centers for Disease Control and Prevention. "Providing access to mental health services for children in rural areas." Rural Health Policy Brief. (n.d.) Centers for Disease Control and Prevention. Retrieved from <https://www.cdc.gov/ruralhealth/child-health/policybrief.html>.
- ⁶³ Kerker, Bonnie D., et al. "Do pediatricians ask about adverse childhood experiences in pediatric primary care?" *Academic Pediatrics*, 16.2 (2016): 154-160. DOI: [10.1016/j.acap.2015.08.002](https://doi.org/10.1016/j.acap.2015.08.002).
- ⁶⁴ Garner, Andrew S., et al. "Early childhood adversity, toxic stress, and the role of the pediatrician: Translating developmental science into lifelong health." *Pediatrics*, 129.1 (2012): e224-e231. DOI: [10.1542/peds.2011-2662](https://doi.org/10.1542/peds.2011-2662).