

# The Economic Costs of ACEs and Toxic Stress

Adverse Childhood Experiences (ACEs) such as child abuse, neglect, and household challenges (like family member incarceration or intimate partner violence) are very common, affecting 62% of California adults by age 18 years. Approximately 16% of Californians report experiencing four or more ACEs.<sup>27</sup> ACEs are associated in a dose-response fashion with numerous poor health and social outcomes over the life course, including at least nine of the 10 leading causes of death nationally.<sup>2,16,17,29,30,85</sup>

The consequences of ACEs also create significant costs for systems and for individuals and families. For health, this includes costs to healthcare systems, like increased utilization of services for health conditions that could be prevented or mitigated, and the costs to society and individuals, who lose productive, healthy years of life.<sup>13,63,64</sup> They also include costs from lost economic productivity, school failure and noncompletion, learning and developmental problems requiring interventions like special education, involvement in criminal justice, child welfare, and public support service systems.<sup>16,555,611-616</sup>

## ESTIMATES OF HEALTH COST IMPACTS

Studies estimating economic costs of health conditions often look at healthy years of life lost due to ill health and premature death across populations. A commonly used measure is disability-adjusted life years (DALYs), which is the sum of years of life lost due to premature death and to disability for people living with the

### DISABILITY-ADJUSTED LIFE YEARS

The sum of years of life lost due to premature death and to disability for people living with a health condition or its consequences.

### ACE-ATTRIBUTABLE FRACTION

Excess risk of disease due to ACEs exposure specifically is called the ACE-attributable fraction for that disease or condition.

health condition or its consequences. Sometimes analysts use studies of the value people place on reducing their risk of dying to assign a monetary value to a DALY. Another way costs are calculated for health risks like ACEs starts with estimating the proportion of common diseases or health conditions that are thought to be caused by, or attributable to, exposure to the risk factor (in this case, ACEs). This excess risk of disease due to ACEs exposure specifically is called the ACE-attributable fraction for that disease or condition. Because many factors contribute to diseases and health conditions, ACE-attributable fractions are used to estimate costs due to the proportion of that condition thought to arise from exposure to ACEs specifically.

**In North America and Europe, the health consequences attributable to ACEs in 2017 resulted in an estimated annual cost of \$1.3 trillion.**

In a 2019 systematic review and meta-analysis of studies comparing risk data in individuals with ACEs to those without, Bellis and colleagues calculated the relative risk for 10 major causes of ill health and risk factors for poor health outcomes associated

with ACEs leading to toxic stress, including cancer, diabetes, cardiovascular disease, respiratory disease, anxiety, depression, harmful alcohol use, illicit drug use, smoking, and obesity (known as ACE-Associated Health Conditions, AAHCs). The fraction of these AAHCs attributable to ACEs ranged from 7.5% to 41.1%. Significantly, in North America, 30% of cases of anxiety and 40% of cases of depression were attributable to ACEs. Costs were calculated based on the DALYs using the human capital method, which assigns a monetary value to reduced productivity due to ill health and premature death. Costs due to cardiovascular disease attributable to ACEs were substantially higher than for the other causes of ill health included in the study. Costs went up with total number of ACEs experienced; 77-82% of costs resulted in those who had experienced two or more ACEs. For North America and Europe, the health consequences attributable to ACEs in 2017 resulted in an estimated yearly loss of 37.5 million DALYs, at a cost of \$1.3 trillion, representing 3.6% of gross domestic product (GDP) for North America and 2.7% for Europe.<sup>64</sup>

A study by Miller and colleagues focusing on 2013 data for California estimated personal healthcare spending (using patient health system encounters), health burden measured in DALYs, and costs based on monetized DALYs. The annual (2013) healthcare burden and the resulting monetary costs of the ACE-attributable fraction of eight AAHCs (asthma, arthritis, chronic obstructive pulmonary disorder [COPD], depression, cardiovascular disease, smoking, heavy drinking, and obesity)

totaled \$112.5 billion, with \$10.5 billion in personal healthcare spending and \$102 billion in years of productive life lost due to early death and disability. This includes an estimated loss of 434,313 DALYs, or healthy years of life, for that year. Specifically, on average, each adult with a history of ACEs cost an additional \$589 in annual healthcare expenses, and 0.0224 DALYs valued at \$5,769. Costs rose with the number of ACEs experienced. However, since there are more adults with fewer than four ACEs, while healthcare costs for people with four or more ACEs were more than double the costs for those with just one ACE (\$818 versus \$407 per person per year), most (64%) of the health costs resulted from adults exposed to fewer ACEs. For example, adults exposed to one ACE accounted for 24% of the total health costs (Table 5).<sup>63,617</sup>

## ESTIMATES OF COST BEYOND HEALTH IMPACT

To estimate costs associated with ACEs and toxic stress in sectors beyond health burden and healthcare, we must look at studies of child abuse and neglect, which account for five of the 10 ACEs (physical, emotional, and sexual abuse, and physical and emotional neglect). For example, Fang and colleagues reported that US lifetime systems-level costs for child abuse and neglect cases substantiated by Child Protective Services (CPS) were \$4.5 billion in child welfare, \$3.9 billion in criminal justice, and \$4.6 billion in special education (based on 2008 data).<sup>611</sup> A California-specific study from Safe & Sound estimated annual (2017) state costs due to substantiated child abuse and neglect at \$919 million in education, \$787 million in welfare, and \$545 million in criminal justice, along with \$13 billion in lost economic productivity—or \$15.3 billion total for these areas. The report also estimates \$3.8 billion in healthcare costs and \$207 million in fatalities, totaling \$19.3 billion for the overall annual cost of substantiated child abuse and neglect cases in California.<sup>555</sup> And these are presumably underestimates, because they do not include cases that were not reported, investigated, and substantiated. More importantly, many ACEs do not qualify for reporting or investigation, but they nevertheless result in health problems, unfulfilled potential, and a myriad of other costs. A robust assessment of systems-level costs associated with all ACEs is challenging and has not been done.

Other studies give us an idea about some of the costs that go beyond the costs discussed above. For example, a study by Miller and colleagues on alcohol and drug use—which can be an ACE in itself (if it occurs in another family member) as well as an outcome or AAHC—estimated annual costs to the state of California at \$52.6 billion from alcohol and drug use leading to illness, injury, crime, traffic collisions, and public prevention efforts.<sup>616</sup> While the costs due to ACEs are only a portion of this (Bellis and colleagues described ACE-attributable fractions for North America

of 27.9% for harmful alcohol use and 41.1% for illicit drug use<sup>64</sup>), they are still quite high, and the Miller study shows impacts that go well beyond health-related costs.

Another study estimated the cost of childhood exposure to crime, including both direct victimization, and exposure to family and community crime. Though this study includes crimes arising from experiences not included in the original 10 ACEs (e.g., exposure to crime in the community, in addition to the traditional ACEs of child abuse and neglect, witnessing intimate partner violence, and having a family member who is incarcerated), it provides estimates of the broad and costly impact of childhood exposure to crime. Annual US costs were estimated at \$458 billion, when considering impact on lifetime prevalence of physical and mental health problems, life productivity, educational outcomes, criminal justice involvement, and substance use.<sup>68</sup>

While these studies on the costs of alcohol and drug use and the costs of crime aren't limited to the ACE-attributable costs, they provide some understanding of the broad impacts beyond health-associated costs, and they reveal the limits of existing methods to evaluate the indirect, lifetime, and intergenerational costs associated with ACEs. Also, because ACEs tend to co-occur,<sup>3</sup> studying the cost of a single or only some ACEs doesn't provide an accurate estimate. Future studies

Study source/ region	Risk category	Annual cost estimates	Notes
Bellis et al., 2019 <sup>64</sup> North America and Europe	ACEs	\$1.3 trillion (lost productivity)	Cost estimates of reduced economic productivity due to ill health and early death (measured in DALYs).
Miller et al., 2020 <sup>63</sup> California	ACEs	\$102 billion (health burden) \$10.5 billion (education)	Cost estimates of health burden due to ill health and early death (based on monetized DALYs) and personal healthcare spending.
Safe & Sound, 2019 <sup>555</sup> California	Child Abuse and Neglect (5 of 10 ACEs)	\$13 billion (lost productivity) \$3.8 billion (health burden) \$919 million (education) \$787 million (welfare) \$545 million (criminal justice)	Cost estimates for support systems and individuals for child abuse and neglect cases substantiated by CPS.

**Table 5.** Summary of studies estimating annual costs for ACEs and child abuse and neglect

that include all ACEs and consider cost impacts across many domains will add to understanding of the cost impact of ACEs.

## SUMMARY

Annual health burden and healthcare costs attributed to ACEs in California have been estimated at \$112.5 billion (2013).<sup>13,63</sup> Annual cost estimates across other sectors are currently limited to studies of child abuse and neglect, with an estimate of \$15.3 billion for California (2017) for lost economic productivity, education, criminal justice, and welfare costs.<sup>555</sup>

Actual costs for ACEs and toxic stress are likely higher than what has been estimated to date. Current studies have focused primarily on health costs, and on only a fraction of relevant AAHCs. Ongoing and future studies on the costs of ACEs could include total costs associated with illness and disability from all AAHCs, lost economic productivity, school failure and noncompletion, learning and developmental problems requiring interventions like special education, involvement in criminal justice, child welfare, and public support service systems, all shown to be higher in those with significant ACEs, toxic stress, and/or AAHCs.<sup>2,16,17,34-38,555,611,613</sup>

The studies discussed do demonstrate that, in the areas considered, ACEs cost California and the US billions of dollars each year; and they indicate that even moderate reductions in ACEs would yield significant gains for people's health and well-being and significant reductions in money spent by state and federal support systems. For example, the Bellis study discussed above estimates that just a 10% reduction in ACE prevalence could equal an annual savings of one million DALYs, or \$56 billion, in North America, considering health and productivity costs alone.<sup>64</sup> Significant savings could be made when the downstream impacts of ACEs are prevented or ameliorated through early screening and more intentional treatment.