

Economic Costs of Adverse Childhood Experiences in Alaska

The Price of Not Intervening Before Trauma Occurs



This document and other information related to Adverse Childhood Experiences in Alaska can be accessed at <http://dhss.alaska.gov/abada/ace-ak/Pages/default.aspx>



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Child Adversity and State Fiscal Health

In Alaska, Adverse Childhood Experiences (ACEs) have been a frequently discussed subject in the fields of behavioral health and child development over the past 5-10 years. This paper will take the discussion in a different direction in light of the recent survey of Alaskan adults - asking them about their own experiences with adverse childhood experiences or ACEs. Links to numerous poor health, economic and social outcomes have been found for adults who experienced ACEs.ⁱ Subsequent to the dozens of ACE studies from all over the U.S and around the world since the original data first became available, research in the fields of neuroscience and epigenetics have sharpened the picture of the mechanisms that lead from child trauma to negative outcomes, often years later.

As the funding of state government changes from a tax base linked almost entirely to resource extractionⁱⁱ to one which is derived from broad-based taxes on citizens, the economic health of Alaska will be tied more than ever to its workforce. Since the building of the pipeline, Alaska has invested heavily in its people through social and health programs offered by the state. There is evidence that these investments have paid dividends which have been largely unrecognized due to the current budgeting and tax processes. In the past, the majority of successful government spending was not tied to increased state revenue because the tax base was reliant primarily on one or two industries. This is changing.

What follows is a unique way to look at the issues of child maltreatment and other adverse childhood experiences. Policymakers see the costs when a child is taken into custody but rarely connect the expenses incurred thirty years later. This discussion will explore those economic impacts to which a concentrated effort to reduce child trauma might lead, using the Alaska 2013 Behavioral Risk Factor Surveillance Systemⁱⁱⁱ (BRFSS) survey data. A model will be explored where a change in the ACE scores of Alaskan adults will be overlaid with outcome data to see if there would be a reduction in the number of adults who experience certain chronic health conditions. Added to that will be an analysis of costs that are currently associated with these chronic health issues and how these expenditures might have looked with a change in ACE scores.

The main focus of this analysis will be on the long term costs of ACEs – specifically the costs Alaska pays for adults who experienced ACEs. **It is important to remember that costs associated with child trauma, however, begin in childhood.** A recent report from the Centers for Disease Control and Prevention estimating lifetime costs of child maltreatment, an especially high level of adverse childhood experience, are seen below.

Key findings:^{iv}

The estimated average lifetime cost per victim of nonfatal child maltreatment includes:

\$32,648 in childhood health care costs

+ **\$7,728 in child welfare costs**

+ **\$7,999 in special education costs**

\$48,375 Total Childhood Costs of Maltreatment

What Are The Recent Child Abuse Numbers in Alaska?

First-Time Child Abuse Victims in Alaska^v
Average Annual Number 2009 - 2013
1705

Applying the **\$48,375** cost estimate for childhood expenses to the average number of Alaskan children who had a substantiated report of harm over the past several years (1,705) the financial liability anticipated is large each year. It can be estimated that Alaska takes on the burden of approximately \$82 million in current and projected costs each year on average.

Why Are Adverse Childhood Experiences So Important to Alaska?

The Intersection of Economics and Childhood Development

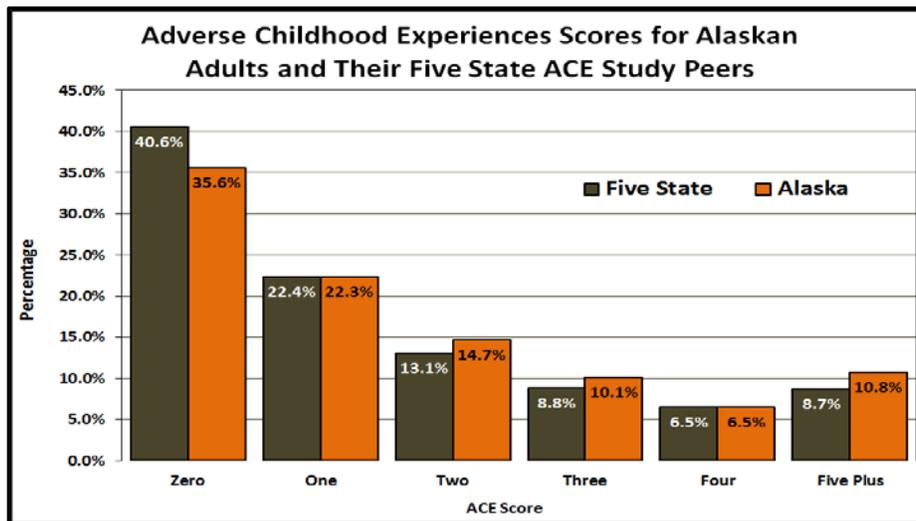
The fields of economics and business have discovered that child development has a profound impact on the economic health of a community. Groups and individuals like the Rand Corporation,^{vi} The Federal Reserve Bank,^{vii} the Upjohn Institute,^{viii} and Nobel Laureate (Economics 2000) James Heckman,^{ix} from the University of Chicago have explored the importance of the earliest years of an individual's life to his or her later economic success. The idea that **"skills beget skills"** in child development leads to the very real cost benefit analysis that clearly demonstrates the need to get the early years of children's lives right. Alaskan professionals can and do repair damage caused to the developing brains of young children through their exposure to trauma - but it is costly.

In Alaska's state government there is, of course, considerable work being done with children who have been traumatized. The Office of Children's Services and the Divisions of Behavioral Health, Public Health and Juvenile Justice as well as the Department of Education and Early Development primarily do the work of helping to repair the damage caused by trauma. **Yet, is Alaska optimizing its chances to reduce social and economic costs when it comes to child maltreatment?**

The Alaskan ACE Study – What the Numbers Show

Alaska surveyed more than 4,000 adults in the 2013 Behavioral Risk Factor Surveillance System (BRFSS) to determine the extent of their ACEs experienced prior to age 18. The results, shown below in **Figure 1**, were compared to a sample of five states^x which had been combined by the Centers for Disease Control and Prevention using a questionnaire identical to Alaska’s study. The results of these states’ statistically significant assessment of 23,000 residents represent one of the largest population bases of ACE questions asked of Americans (more than 20 million residents live in the five states sampled).

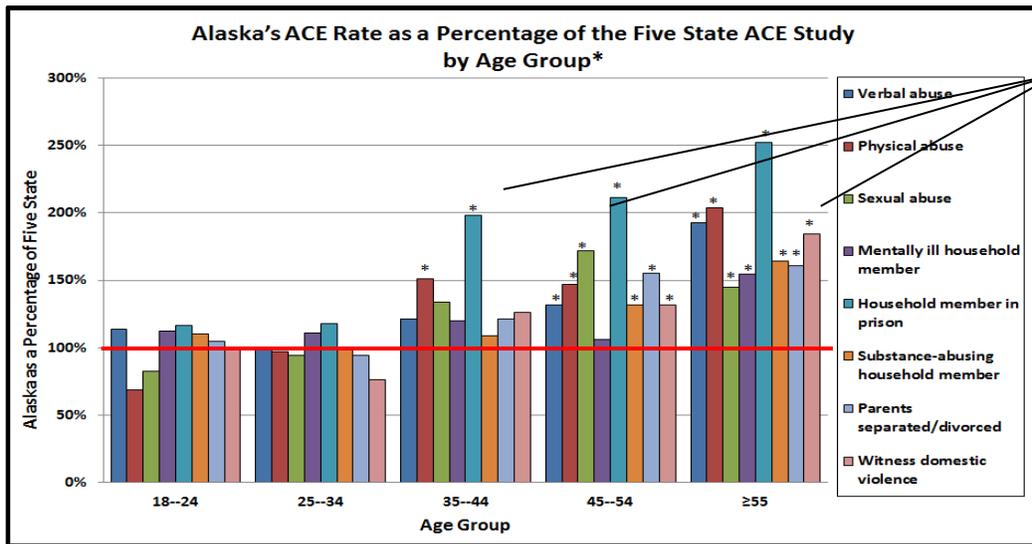
Figure 1^{xi}



Alaska clearly has higher rates of ACEs than the average of the five states surveyed. As Alaska’s Health and Social Services staff explored the data more fully, they uncovered an interesting finding. When comparing Alaska’s ACE prevalence to the five states (Washington, Louisiana, Tennessee, Arkansas, and New Mexico) by age groups, it appears that the higher ACE scores in Alaska are held in the older generations. Below, **Figure 2** compares Alaska’s rate for each ACE as a percentage of the five states’ rate. For example if Alaska had exactly the same rate for an adverse experience it would register as 100% (red horizontal line).

What accounts for this leveling when compared to age cohorts in other states? Is it the flow of oil and the better jobs it created? Is it a result of immigration that has occurred since then? Can it be linked to significant spending on health and social programs? The answer probably includes all of these and others. These figures show that relative to peer groups in the five state sample, Alaska’s younger adults are more in line with ACE levels elsewhere. The ACE research shows that these changes will have considerable health, social and economic benefits moving forward.

Figure 2^{xii}



Alaska's older generations have higher rates of ACEs than their peers in the five states. The rates are similar for the younger generations.

Now is a pivotal time as Alaska confronts a budget crisis and moves to a broader based funding structure. The impact of investments provided from state coffers in preventing and mitigating the results of ACEs must not be lost as budgets are cut. ***To lose ground leads not only to increased future costs, but given the new reality, most likely decreased future revenues as well.*** Alaskans with high ACE scores make less money, are less likely to own their own homes and are more likely to be unable to work^{xiii}. ACE awareness is even more important now.

There have been great strides in the past few years increasing Alaskans' knowledge of domestic violence, with primary prevention efforts taken to scale across the state.^{xiv} Though there are agencies and groups working on the issue – **a comprehensive primary prevention effort to prevent child abuse and neglect doesn't exist in Alaska.** Could more be done to prevent ACEs?

Three Levels of Prevention^{xv}

Public Health offers a model of prevention which is pertinent for a discussion of ACE prevention and mitigation.

- In the field of Public Health, three levels of prevention are observed:
- **Primary Prevention** - aims to prevent disease or injury before it ever occurs.
 - **Secondary Prevention** - aims to reduce the impact of a disease or injury that has already occurred.
 - **Tertiary Prevention** - aims to soften the impact of an ongoing illness or injury that has lasting effects

The three tables joined below illustrate how the problem of ACEs in Alaska could be viewed. In this example, the data refer to the level of current smoking by Alaskan adults and their ACE scores.

An Example

Table 1 represents the estimated number of Alaskan adults who experience four levels of ACE scores. These figures were derived from using the 2013 Department of Labor and Workforce Developments’ population estimate and the 2013 BRFSS ACE Survey percentages as reported by Alaskan adults. If impacts were made upon ACE rates at this level in the Alaskan population - **that would be an example of primary prevention**. Prevention at that level (moving people to lower ACE scores) would save the costs associated with child maltreatment cited above and pay dividends into adulthood by reducing the number of current smokers. As this table demonstrates – Alaskans with lower ACE scores tend to be current smokers at lower rates (See explanation of Table 2 below).

Table 1		Table 2	Table 3	
ACE Scores of 2013 Adult Alaska Population		Current Smoking	Current Smoking Estimate Adult Alaska Population	
Zero	194,275	14.4%	Zero	27,901
One	121,950	18.3%	One	22,298
Two - Three	135,398	24.1%	Two - Three	32,564
Four Plus	94,134	34.5%	Four Plus	32,481
Total	545,757	21.1%	Total	115,244

The black box above (**Table 2**) displays the results from the 2013 Alaskan ACE research demonstrating the percentage, by each ACE score level, of those who are currently smoking. For example, 14.4% of Alaskan adults with zero ACEs currently smoke and 34.5% of those with four or more ACEs do. Lowering these percentages for people with high ACE scores by providing trauma informed behavioral health treatment, for example, would teach Alaskans coping skills other than using nicotine to deal with stress. That would be an instance of **secondary prevention**.

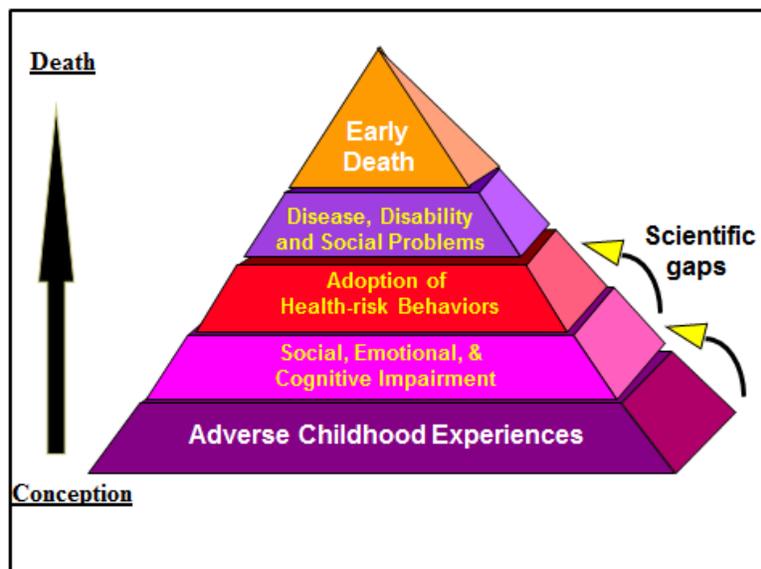
Table 3 represents the estimated current level of smokers in Alaska using the 2013 BRFSS survey results. It is derived from applying the percentages in the black box (**Table 2**) to the population based ACE estimates from **Table 1**. Working at this end of the continuum would, for example, include providing tobacco cessation programs to those Alaskans currently smoking. In terms of trauma and smoking reduction this is an example of **tertiary prevention**, as it is a way to mitigate somewhat the results of trauma (i.e. smoking). Primary, secondary and tertiary levels of prevention all have potential to improve the outcomes for Alaskans. Of course, primary prevention allows for fewer costs associated with “fixing” already damaging conditions or habits.

The Initial Paradigm

When the original ACEs studies were released, the researchers developed a graphic (**Figure 3**) to explain what they had been observing from their results. Five levels or tiers were observed throughout a person's life course if they experienced ACEs:

1. **ACEs occurred**, which led through an unknown mechanism to
2. **Social, emotional and cognitive impairments**, which led through an unknown mechanism to
3. **Adoption of high risk health behaviors**,
4. **High rates of disease, disability and social problems**, and
5. **Early death**

Figure 3^{xvi}



Subsequently, the researchers began to explore other fields of science doing complementary work. The synthesis of these fields with the ACE epidemiological work shed more light on this original paradigm.

Causation

Neurobiology & Epidemiology

Approximately eight years after the original ACE studies began to appear, the two original ACE researchers, Dr. Robert Anda and Dr. Vincent Felitti, with other scientists wrote a journal article^{xvii} making the case that the links between ACEs and other health outcomes were more than correlations. In a well-reasoned argument they proposed that ACEs cause many of the outcomes linked with them. They made their case using both the original ACE epidemiology work, and new findings in neurobiology which had for years been exploring changes in the brain as a result of traumatic experiences in childhood. In this journal article, the authors cover nine points (**Figure 4**) establishing an argument for causation.

Figure 4

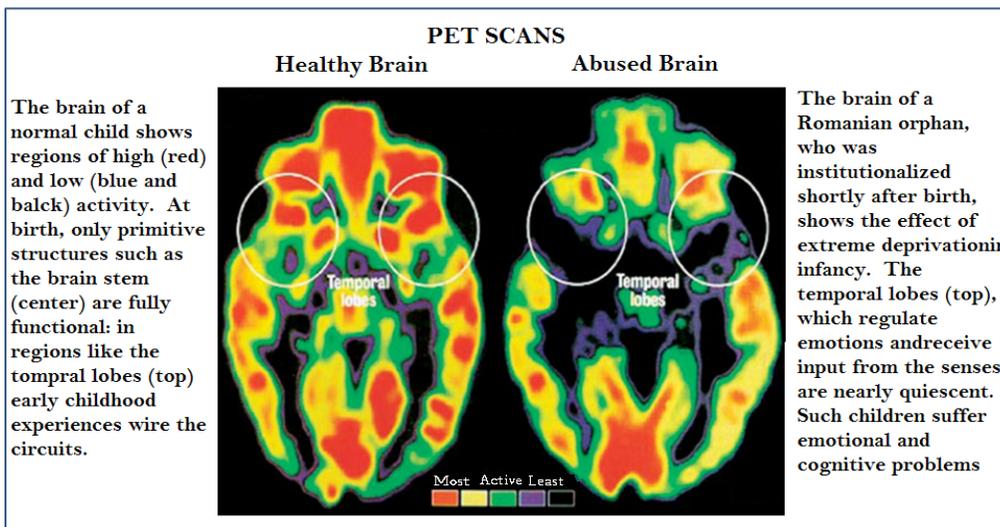
Sir Bradford Hill's - 9 criteria for establishing an argument for causation.^{xviii}

1. Demonstration of a strong association between causative agent and outcome
2. Consistency of findings across research sites and methods
3. Specificity
4. Temporal sequence
5. Biological gradient
6. Biological plausibility
7. Coherence
8. Experiential evidence
9. Analogous evidence

The understanding that ACEs lead to costly outcomes is key to achieving savings through ACE reduction efforts. The commentary, while dated (2005), if rewritten, could further expand on the neurobiological research cited and augment the case for causation, with research from the field of epigenetics.

The changes in the brain and gene expression (epigenetics)^{xix} of individuals who experience emotional and physical trauma are the underlying basis for these arguments. Scientists can show the consequences of trauma on the brain through new technologies. Research studies show that there are structural changes which occur in a person's brain and body as a result of trauma. This material provides new opportunities to alter poor outcomes as a better understanding of the mechanisms of the impacts of trauma exposure are understood. The well-known graphic comparing brain scans of a Romanian orphan who was severely neglected compared with a normally developing child is shown in **Figure 5** below and illustrates the impacts of trauma.

Figure 5^{xx}



Population Attributable Risk^{xxi}

Population attributable risk is a well-established method in epidemiology of determining the percentage of an outcome which is linked back to a precursor – in this case - ACEs. **Table 4** below represents the calculations of population attributable risks associated with a number of economic, social and health outcomes as reported by Alaskan adults. For example, if all ACEs could be eliminate then it would be expected that 40% fewer Alaskan adults would be enrolled in Medicaid or there would be 32% percent fewer smokers. This table begins to hint at the potential savings available to Alaskans with a successful ACE prevention program in place.

The items in **Table 4** are from Alaska-specific research. Additional studies in various populations explored other health links to ACEs which were not studied in Alaska suggest population attributable risks which further bolster the argument for primary ACE prevention in Alaska and in other populations. For example, the population attributable risk for adolescent suicide attempts as a result of ACEs was 80% while in adults 68% in one study^{xxii}.

Eliminating all ACEs is not a realistic goal for a policy discussion. However, the research offers some guidelines which may be especially helpful in developing a coordinated approach to effective service arrays, prevention and intervention efforts.

Table 4

Health Behavior or Outcome	PAR%*
Frequent Mental Distress	60.1%
Chronic Obstructive Pulmonary Disease, Emphysema or Chronic Bronchitis	46.1%
Health Insurance: Medicaid	40.6%
Physical Health Not Good 14+ Days	33.2%
Current Smoker	32.0%
Current or Former Asthma	30.6%
General Health	26.8%
Non-Gestational Diabetes	23.7%
Activity Limitation 14+ Days	23.7%
Heavy Alcohol Consumption	20.5%
Ever Smoker	19.3%
Told Have Arthritis	15.8%
Insufficient Sleep	15.5%
Obesity	14.3%
Separated or Divorced	13.2%
Binge Drinking Risk Factor	11.0%
No Leisure Time Physical Activity	10.2%

A Caution for Individuals & Policy Makers

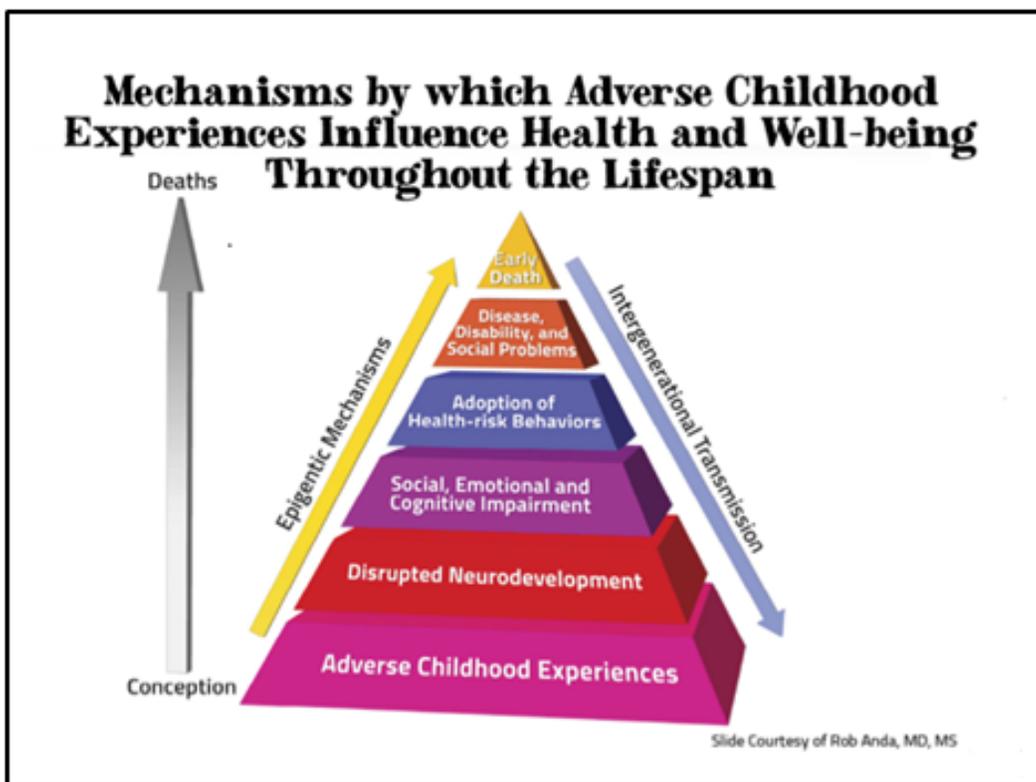
ACE research shows powerful relationships between exposure to ACEs and poor outcomes. These are important findings, but they do not predict specific outcomes for **individuals**. A person may be exposed to several ACEs and not experience the negative effects linked to ACEs. Conversely a person with no ACE exposure may develop some of the negative health outcomes associated with early trauma exposure. Because of unique biological or environmental conditions, some people are able to avoid poor outcomes (just like a person may develop lung cancer having never smoked or a person who smoked for 60 years does not develop lung cancer). Thus, ACEs research is most useful at the population level.

Policy makers must understand that while individual differences occur, these differences in outcomes should not be used to discount the overwhelming evidence and costs associated with ACEs. The strength of ACE study data is that it is **best suited** to inform how to effectively allocate resources. While individuals may vary in results - changing the ACEs for a population will pay dividends as shown below.

A New Paradigm

Recently, Dr. Rob Anda released a new ACE pyramid graphic (**Figure 6**). This representation of the ACE progression removes the “scientific gaps” seen in Figure 3 above. With the addition of research results from neurobiology and epigenetics, the mechanisms which lead from ACEs to poor health outcomes are better understood – and expanding rapidly. This graphic also brings into the discussion the idea of intergenerational transmission of ACEs. Some of the poor outcomes associated with ACEs, such as substance abuse and depression, can, if untreated, become ACEs for the next generation.

Figure 6



This new paradigm may lead in a different direction. Given what is known about the impact of trauma on developing brains and the physiological resources (**Figure 7**, below) needed to “rewire” them if damaged by toxic levels of stress, a different approach is warranted. James Heckman and others have shown that it is not just high levels of physiological resources which need to be used to fix trauma – it is also economic resources.^{xxiii} **What would a primary prevention effort do for Alaskans, both economically and socially?** Alaska expends significant resources on corrections (\$278 million in unrestricted general funds in 2016^{xxiv}), substance abuse (\$1.2 billion annually of public and private costs^{xxv}), chronic health conditions (see below) and other issues related to ACEs.

Figure 7^{xxvi}

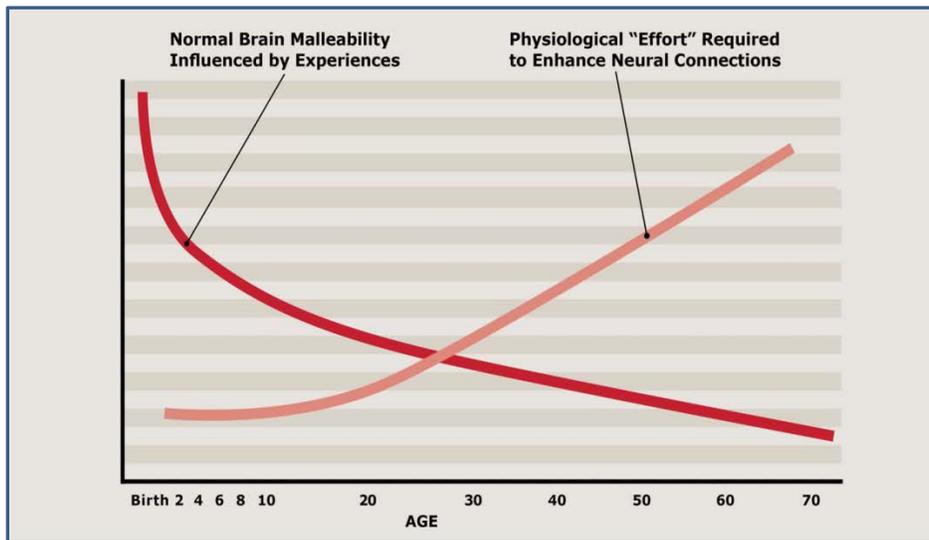


Figure 7 also gives insight into the time which is most productive to intervene if ACEs have occurred. Infants and young children require fewer physiological and economic resources to support their brains after trauma. Yet, they are the most susceptible to its effects. While intervening at any age can be effective, the younger the person is when treated after trauma the better the likelihood that the outcome will be positive with fewer resources needed.

Figure 8^{xxvii}

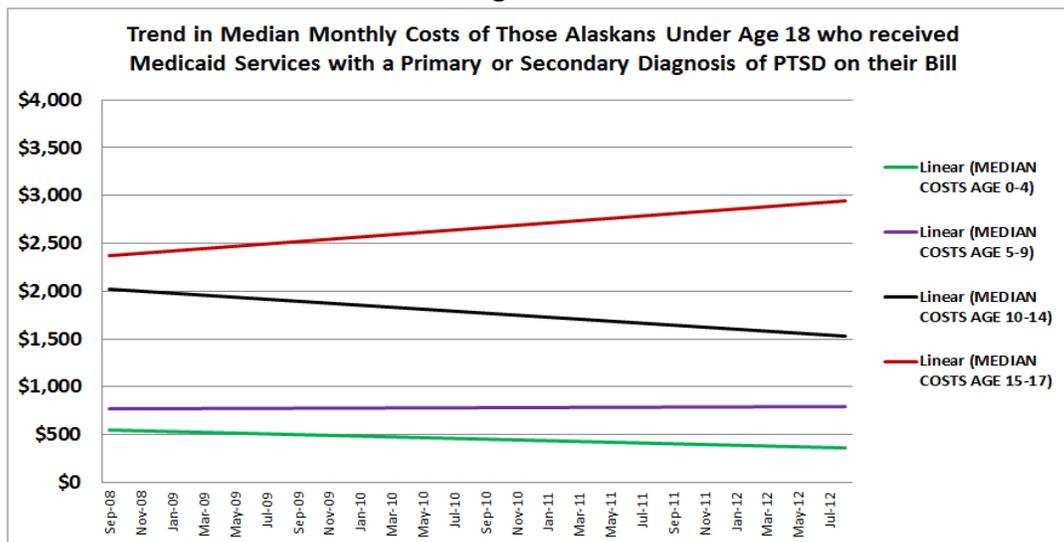


Figure 8 shows an analysis of Medicaid costs for children and youth with a PTSD diagnosis conducted by the Alaska Mental Health Board staff. It shows that treating younger children with this trauma condition is significantly cheaper than treating it later in life. Even waiting until adolescence has additional costs associated with it.

Establishing a Goal for Primary Prevention of ACEs in Alaska

Because many states (**Figure 9**) which have conducted the same ACE survey of their adult population that Alaska has, there is a rich data source from which to draw. Choosing a state or two that have a better rate of ACEs than Alaska seems a sensible place to start when developing a target for ACE prevention.

After examining the data, Vermont and Arkansas have ACE scores that are better than Alaska's. Since they have already achieved a lower level of ACE scores, it is plausible that another state can do the same.

Figure 9^{xxviii}

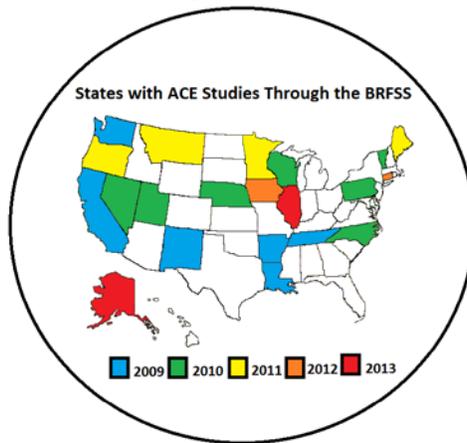
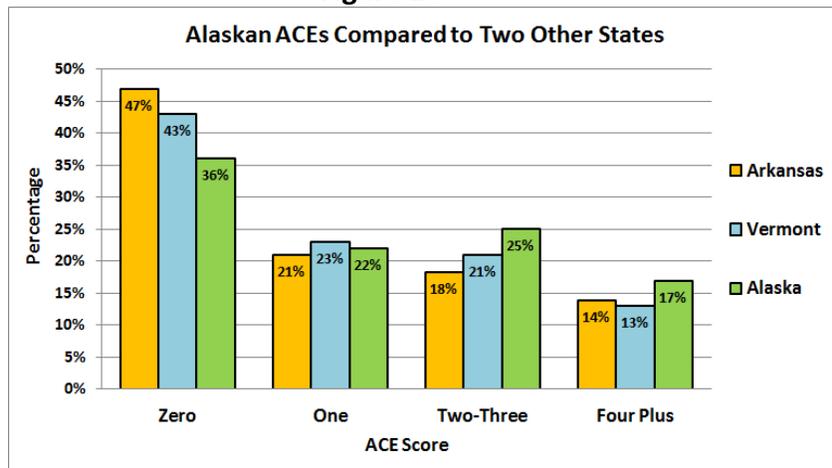


Figure 10 displays Alaska's rate of ACEs compared to Arkansas and Vermont, two states with relatively good ACE scores. The Zero ACE category is higher for the other two states. What would it take to get Alaska to the level of ACEs similar to Arkansas or Vermont?

Figure 10^{xxix xxx}



To search the possibilities for ACE reduction the staff of the Alaska Mental Health Board and Advisory Board on Alcoholism and Drug Abuse explored several scenarios with population

based reductions in ACEs. A one ACE reduction for any Alaskan who had one was first examined, but proved too ambitious. Modeling a reduction of one ACE for half of the individuals at each level of ACE score was done. For example, if half the people with one ACE dropped to no ACEs while the other half remained at one and if half the Alaskans with two ACEs dropped to one ACE and the other half stayed at two, etc. (**Table 5**).

Table 5

ACE Score	2013 Adult Alaska Population	%	ACE Score Target Reduction	%
Zero	194,275	35.6%	255,250	46.8%
One	121,950	22.3%	101,002	18.5%
Two	80,053	14.7%	67,699	12.4%
Three	55,345	10.1%	45,382	8.3%
Four	35,419	6.5%	30,554	5.6%
Five	25,689	4.7%	20,428	3.7%
Six	15,166	2.8%	14,324	2.6%
Seven	13,482	2.5%	8,930	1.6%
Eight	4,378	0.8%	2,189	0.4%
	545,757	100.0%	545,757	100.0%

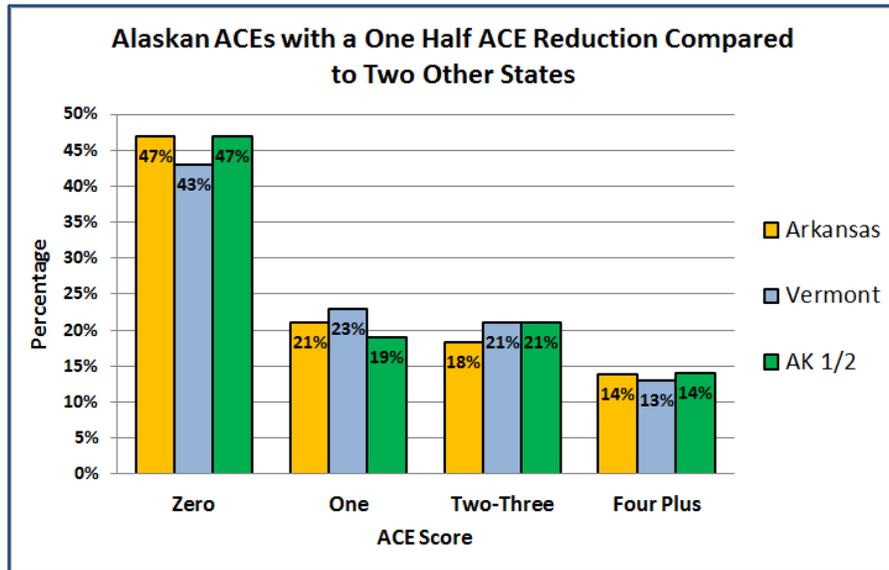
Table Six simplifies Table Five into a more manageable format and groups the higher ACE scores together. This allows for a simpler format and is in line with how most ACE data are presented across the many studies.

Table 6

ACE Scores of 2013 Adult Alaska Population		ACE Scores of 2013 Adult Alaska Population with Reduction	
Zero	194,275	Zero	255,250
One	121,950	One	101,002
Two - Three	135,398	Two - Three	113,081
Four Plus	94,134	Four Plus	76,425
Total	545,757	Total	545,757

The results of that analysis generated **Figure 11** below, which would move Alaska into the realm of the other two states.

Figure 11



The changes necessary to achieve the level of the other two states are ambitious, but Alaska has some momentum in this area already. When comparing Alaska’s ACE scores to a five state average, Alaska’s younger generations compare more favorably, whether this is due to immigration, better services, or an improved economy based on oil wealth. Compared to their peers in other states Alaskan elders had much rougher childhoods.

Current Costs and Potential Savings

In **Table 7** below, categories of five costly health conditions and adult use of Medicaid are outlined in terms of their estimated annual costs to Alaska. These costs are incurred by both the public and private sectors. For each one of these categories, a population attributable risk was calculated using the 2013 BRFSS data as they related to adverse childhood experiences. Those rates are shown and in the final column those rates are applied to the estimated annual costs to determine the expenditures associated for those categories linked with ACEs, In simple terms, if all ACEs were eliminated nearly \$800 million dollars of annual costs would be eliminated from Alaska’s expense column for these six health measures.

Table 7*

Population Attributable Risk for ACEs			
Health Behavior or Outcome	Estimated Annual Costs*	Percentage of Population Attributable Risk**	Estimated Annual Costs Linked to ACEs***
Adult Medicaid (Age 20+)	\$ 860,000,000	40.6%	\$ 349,160,000
Current Smoker	\$ 579,000,000	32.0%	\$ 185,280,000
Non-Gestational Diabetes	\$ 450,000,000	23.7%	\$ 106,650,000
Binge Drinking	\$ 545,000,000	11.0%	\$ 59,950,000
Arthritis	\$ 274,000,000	15.8%	\$ 43,292,000
Obesity	\$ 219,000,000	14.3%	\$ 31,317,000
Total	\$ 2,927,000,000		\$ 775,649,000

Again, completely eliminating ACEs is an unrealistic goal. But what might a primary prevention effort with realistic goals be able to accomplish in Alaska? A change in rates of ACEs in Alaskan adults which moves the state to similar rates achieved in Arkansas and Vermont will be explored below.

* For the source of each health behavior or outcomes costs see the individual analysis of the individual items below.

** These population attributable risks were calculated for this report by the Alaska Department of Health and Social Services, Division of Public Health, Section of Chronic Disease Prevention and Health Promotion from the Alaska ACE data captured in the 2013 BRFSS

*** These cost were calculated by multiplying the two adjacent columns

Creating an ACEs Ledger

In order to answer the questions about how a reduction in ACEs in the past might have impacted Alaska today, an ACE Ledger was developed (**Table 8**). The **first column** describes several health outcomes linked to ACEs for which there is Alaska-specific annual costs data available. Additionally Alaskan adults were asked about these conditions in the 2013 BRFSS and their answers can be cross-tabbed with their ACEs scores.

The **second column** will show an estimated number of Alaskans who experience each condition based on the 2013 BRFSS and 2013 Census estimate of Alaskan adults. The **third column** will be filled out using cost estimates for Alaska of these specific health issues as calculated by various academic and government agencies.

The **fourth column** will be calculated by dividing column three by column two to estimate an annual per person cost of each health issue. The **fifth column** will be based on overlaying the reduction of one ACE for one half of the Alaskan adult population on top of the 2013 BRFSS results. This number will be the estimated number of fewer Alaskan who would be experiencing each health measure if ACE scores had been lower. Finally, an estimated saving will be calculated by multiplying columns 4 and 5 in **column six**.

This ledger below will be completed to demonstrate estimated cost savings with a realistic reduction in ACE scores.

Table 8

One	Two	Three	Four	Five	Six
Issue	Number of Alaskans	Total Costs	Average Annual Costs	Target Reduction	Estimated Savings
Medicaid	0	\$0	\$0	0	\$0
Current Smoking	0	\$0	\$0	0	\$0
Diabetes	0	\$0	\$0	0	\$0
Binge Drinking	0	\$0	\$0	0	\$0
Arthritis	0	\$0	\$0	0	\$0
Obesity	0	\$0	\$0	0	\$0

Alaskan Adults Who Use Medicaid

According to the Alaska Department of Health and Social Services \$860 million was spent on Alaskan adults aged 20 or older in 2012 in the Medicaid program.^{xxxii} These costs were spread over approximately 53,800 Alaskans. When dividing those two figures, an annual per person cost of nearly \$16,000 is calculated. Because of the nature of the 2013 BRFSS survey (which does not survey people who are institutionalized and which is conducted in a way that makes surveying people in home and community based services more difficult), the survey results only estimated the adults using Medicaid at approximately 34,500. The following estimates will be based on these lower figures to keep them in the conservative range.

Tables 9, 10, and 11, below display the results of the 2013 BRFSS survey in combination with the 2013 Census estimates for Alaska. **Table 9** is the current estimated ACE levels for adults and the goal estimate of ACEs with successful primary prevention. **Table 10** is the percentage of the Alaskans who reported using Medicaid by ACE score. **Table 11** is calculated by multiplying Table 9 and Table 10's current estimates by goal estimates respectively.

ACE Score	Table 9		Table 10	Table 11	
	Current Estimate	Goal Estimate	Adult Medicaid	Current Estimate	Goal Estimate
Zero	194,275	255,250	3.8%	7,382	9,700
One	121,950	101,002	5.9%	7,195	5,959
Two-Three	135,398	113,081	8.0%	10,832	9,046
Four Plus	94,134	76,425	9.7%	9,131	7,413
Total	545,757	545,758		34,540	32,118

The resulting estimated reduction in the number of Alaskans who use Medicaid is 2,422 people if ACE scores were lower. This represents approximately a 7% reduction. Putting these calculations into the ACE Ledger below, the annual savings which Alaska could realize if it had levels of ACE scores like Vermont or Arkansas would be approximately \$39 million.

Table 12

Issue	Number of Alaskans	Total Costs	Average Annual Costs	Target Reduction	Estimated Savings
Medicaid	53,800	\$860,000,000	\$15,985	2,422	\$38,715,670

Alaskan Adults who Currently Smoke

According to the State of Alaska publication Alaska Tobacco Facts 2012,^{xxxii} \$576 million was spent on Alaskans as a result of tobacco use. A choice was made to use the current smoking figure in this calculation because the 2013 BRFSS data show that not only are people with higher ACE scores at greater risk for ever smoking they are also less likely to have quit if they ever started. These costs were spread over approximately 115,200 Alaskans. When dividing those two figures, an annual per person cost of approximately \$5,000 was calculated.

Tables 13, 14, and 15, below display the results of the 2013 BRFSS survey in combination with the 2013 Census estimates for Alaska. **Table 13** is the current estimated ACE levels for adults and the goal estimate of ACEs with successful primary prevention. **Table 14** is the percentage of the Alaskans who reported being current smokers by ACE score. **Table 15** is calculated by multiplying Table 13 and Table 14's current estimates by goal estimates respectively.

ACE Score	Table 13		Table 14	Table 15	
	Population		Current Smoking	Currently Smoke	
	Current Estimate	Goal Estimate			Current Estimate
Zero	194,275	255,250	14.4%	27,901	36,658
One	121,950	101,002	18.3%	22,298	18,468
Two-Three	135,398	113,081	24.1%	32,564	27,196
Four Plus	94,134	76,425	34.5%	32,481	26,371
Total	545,757	545,758		115,244	108,693

By changing the base rate of the ACEs in **Table 13** and leaving **Table 14** as it is - then **Table 15** is determined by multiplying Table 13 and Table 14. The results show a reduction of those currently smoking by 6,551 people

Adding these calculations into the ACE Ledger below (**Table 16**) the annual savings which Alaska could realize if it had levels of ACE scores like Vermont or Arkansas is approximately \$33 million.

Table 16

Issue	Number of Alaskans	Total Costs	Average Annual Costs	Target Reduction	Estimated Savings
Current Smoking	115,244	\$579,000,000	\$5,024	6,551	\$32,912,224

In order to calculate a total using the first two measures there is a need to eliminate “double counting” of costs. For example, some of the costs associated with current smokers are accounted for by people who are on Medicaid and currently smoke. By leaving the Medicaid calculation intact and removing the people who are on Medicaid from those Alaskans who currently smoke a **net potential savings of \$69,558,006** between these **two categories is calculated**, as seen in **Table 17** below.

Table 17

Issue	Total 2013 BRFS	With Reduction of ACEs	Percentage Unduplicated	Number of Alaskans Unduplicated*	Total Costs of Unduplicated Alaskans**	Average Annual Costs***	Target Reduction Unduplicated*	Estimated Savings*
Medicaid	53,800	51,378	100.0%	51,378	\$821,277,330	\$15,985	2,422	\$38,715,670
Current Smoking	115,244	108,693	93.7%	101,893	\$511,910,432	\$5,024	6,139	\$30,842,336

Unduplicated **\$69,558,006**

*93.7% of people who reported currently smoking were not using Medicaid. These starred items were reduced by multiplying by the 93.7% figure in the “Percentage Unduplicated” column.

** Total costs of unduplicated Alaskans includes the reduction in ACEs and the percentage unduplicated

*** Average annual per person costs remained the same for this analysis

Alaskan Adults Who Have Ever Been Diagnosed With Diabetes

According to an article in the journal *Diabetes Care*, *The Economic Costs of Diabetes in the U.S. 2012*,^{xxxiii} the annual cost of Alaskans with diabetes is \$450 million. Using the 2013 BRFSS an estimated 41,160 Alaskan adults had ever been diagnosed with diabetes. The average annual cost per person therefore is estimated at just under \$11,000 (\$450 Million/41,160).

Tables 18, 19, and 20, below display the results of the 2013 BRFSS survey in combination with the 2013 Census estimates for Alaska. **Table 18** is the current estimated ACE levels for adults and the goal estimate of ACEs with successful primary prevention. **Table 19** is the percentage of the Alaskans who reported being ever diagnosed with diabetes by ACE score. **Table 20** is calculated by multiplying Table 18 and Table 19's current estimates by goal estimates respectively.

ACE Score	Table 18 Population		Table 19 Diabetes	Table 20 Diabetes	
	Current Estimate	Goal Estimate		Current Estimate	Goal Estimate
Zero	194,275	255,250	5.9%	11,522	15,139
One	121,950	101,002	6.7%	8,124	6,728
Two-Three	135,398	113,081	10.1%	13,725	11,506
Four Plus	94,134	76,425	8.3%	7,789	6,441
Total	545,757	545,758		41,160	39,814

By changing the base rate of the ACEs in **Table 18** and leaving **Table 19** as it is - then **Table 20** is determined by multiplying Table 18 and Table 19. The results show a reduction of those with diabetes by 1,346 Alaskans.

The ACE Ledger below (**Table 21**) displays the annual savings which Alaska could realize if it had levels of ACE scores like Vermont or Arkansas is approximately \$14.7 million.

Table 21

Issue	Number of Alaskans	Total Costs	Average Annual Costs	Target Reduction	Estimated Savings
Diabetes	41,160	\$450,000,000	\$10,933	1,346	\$14,715,743

Again, there is a need to eliminate “multiple counting” of costs. For example, some of the costs associated with diabetes are accounted for by people who are on Medicaid and/or currently smoking. By leaving the Medicaid calculation intact and removing the people who are current smokers from those Alaskans who receive Medicaid and then again removing those people with diabetes who fall into either category a **net potential savings of \$78,938,520** between these **three categories is calculated**, as seen in **Table 22** below.

Table 22

Issue	Total 2013 BRFS	With Reduction of ACEs	Percentage Unduplicated	Number of Alaskans Unduplicated*	Total Costs of Unduplicated Alaskans**	Average Annual Costs***	Target Reduction Unduplicated*	Estimated Savings*
Medicaid	53,800	51,378	100.0%	51,378	\$821,277,330	\$15,985	2,422	\$38,715,670
Current Smoking	115,244	108,693	93.7%	101,893	\$511,910,432	\$5,024	6,139	\$30,842,336
Diabetes	41,160	39,814	63.7%	25,376	\$277,435,808	\$10,933	858	\$9,380,514

Unduplicated **\$78,938,520**

*63.7% of people who reported diabetes were not currently smoking or using Medicaid. These starred items were reduced by multiplying by the figure in the respective “Percentage Unduplicated” column.

** Total costs of unduplicated Alaskans includes the reduction in ACEs and the percentage unduplicated

*** Average annual per person costs remained the same for this analysis

Alaskan Adults who Binge Drink

In an article in The Journal of Preventative Medicine titled *State Costs of Excessive Alcohol Consumption*^{xxxiv} the annual cost of Alaskans who binge drink is \$545 million. Using the 2013 BRFSS an estimated 98,152 Alaskan adults binge drink. The average annual cost per person is estimated at just over \$5,500.

Tables 23, 24, and 25, below display the results of the 2013 BRFSS survey in combination with the 2013 Census estimates for Alaska. **Table 23** is the current estimated ACE levels for adults and the goal estimate of ACEs with successful primary prevention. **Table 24** is the percentage of the Alaskans who reported binge drinking by ACE score. **Table 25** is calculated by multiplying Table 23 and Table 24's current estimates by goal estimates respectively.

ACE Score	Table 23		Table 24	Table 25	
	Population		Binge Drinking	Binge Drinking	
	Current Estimate	Goal Estimate		Current Estimate	Goal Estimate
Zero	194,275	255,250	16.0%	31,105	40,868
One	121,950	101,002	17.1%	20,880	17,294
Two-Three	135,398	113,081	19.6%	26,507	22,138
Four Plus	94,134	76,425	20.9%	19,659	15,961
Total	545,757	545,758		98,152	96,260

By changing the base rate of the ACEs in **Table 23** and leaving **Table 24** as it is - then **Table 25** is determined by multiplying Table 23 and Table 24. The results show a reduction of those binge drinking by 1,892 Alaskans.

The ACE Ledger below (**Table 26**) displays the annual savings which Alaska could realize if it had levels of ACE scores like Vermont or Arkansas is approximately \$10.5 million.

Table 26

Issue	Number of Alaskans	Total Costs	Average Annual Costs	Target Reduction	Estimated Savings
Binge Drinking	98,150	\$545,000,000	\$5,553	1,892	\$10,505,796

In order to calculate a total using these four measures there is a need to eliminate “multiple counting” of costs. A **net potential savings of \$85,291,152** between these **four categories** can be calculated, as seen in **Table 27** below.

Table 27

Issue	Total 2013 BRFSS	With Reduction of ACEs	Percentage Unduplicated	Number of Alaskans Unduplicated*	Total Costs of Unduplicated Alaskans**	Average Annual Costs***	Target Reduction Unduplicated*	Estimated Savings*
Medicaid	53,800	51,378	100.0%	51,378	\$821,277,330	\$15,985	2,422	\$38,715,670
Current Smoking	115,244	108,693	93.7%	101,893	\$511,910,432	\$5,024	6,139	\$30,842,336
Diabetes	41,160	39,814	63.7%	25,376	\$277,435,808	\$10,933	858	\$9,380,514
Binge Drinking	98,152	96,260	60.5%	58,219	\$323,290,107	\$5,553	1,144	\$6,352,632

Unduplicated **\$85,291,152**

*60.5% of people who reported binge drinking were not diabetic, currently smoking or using Medicaid. These starred items were reduced by multiplying by the figure in the respective “Percentage Unduplicated” column.

** Total costs of unduplicated Alaskans includes the reduction in ACES and the percentage unduplicated

*** Average annual per person costs remained the same for this analysis

Alaskan Adults Who Have Arthritis

According to **National and State Medical Expenditures and Lost Earnings Attributable to Arthritis and Other Rheumatic Conditions U.S. 2003**^{xxxv}, the annual costs of arthritis in Alaska is an estimated \$274.7 million. While the figure is clearly dated, it gives a conservative estimate of today's costs for this common malady. Using the 2013 BRFSS an estimated 132,136 Alaskan adults have arthritis. The average annual cost per person is estimated at \$2,453.

Tables 28, 29, and 30, below display the results of the 2013 BRFSS survey in combination with the 2013 Census estimates for Alaska. **Table 28** is the current estimated ACE levels for adults and the goal estimate of ACEs with successful primary prevention. **Table 29** is the percentage of the Alaskans who reported having arthritis by ACE score. **Table 30** is calculated by multiplying Table 28 and Table 29's current estimates by goal estimates respectively.

ACE Score	Table 28 Population		Table 29	Table 30 Arthritis	
	Current Estimate	Goal Estimate	Arthritis	Current Estimate	Goal Estimate
Zero	194,275	255,250	20.4%	39,610	52,041
One	121,950	101,002	22.4%	27,280	22,594
Two-Three	135,398	113,081	25.9%	35,122	29,333
Four Plus	94,134	76,425	32.0%	30,125	24,457
Total	545,757	545,758		132,136	128,425

By changing the base rate of the ACEs in **Table 28** and leaving **Table 29** as it is - then **Table 30** is determined by multiplying Table 28 and Table 29. The results show a reduction of those with arthritis by 3,711 Alaskans.

The ACE Ledger below (**Table 31**) displays the annual savings which Alaska could realize if it had levels of ACE scores like Vermont or Arkansas is approximately \$9.1 million.

Table 31

Issue	Number of Alaskans	Total Costs	Average Annual Costs	Target Reduction	Estimated Savings
Arthritis	132,136	\$274,700,000	\$2,453	3,711	\$9,101,890

In order to calculate a total using these five measures there is a need to eliminate “multiple counting” of costs. A **net potential savings of \$89,946,946** between these **five categories** can be calculated, as seen in **Table 32** below.

Table 32

Issue	Total 2013 BRFS	With Reduction of ACEs	Percentage Unduplicated	Number of Alaskans Unduplicated*	Total Costs of Unduplicated Alaskans**	Average Annual Costs***	Target Reduction Unduplicated*	Estimated Savings*
Medicaid	53,800	51,378	100.0%	51,378	\$821,277,330	\$15,985	2,422	\$38,715,670
Current Smoking	115,244	108,693	93.7%	101,893	\$511,910,432	\$5,024	6,139	\$30,842,336
Diabetes	41,160	39,814	63.7%	25,376	\$277,435,808	\$10,933	858	\$9,380,514
Binge Drinking	98,152	96,260	60.5%	58,219	\$323,290,107	\$5,553	1,144	\$6,352,632
Arthritis	132,136	128,425	51.1%	65,674	\$161,098,322	\$2,453	1,898	\$4,655,794

Unduplicated **\$89,946,946**

*51.1% of people who reported having arthritis were not binge drinking, diabetic, currently smoking or using Medicaid. These starred items were reduced by multiplying by the figure in the respective “Percentage Unduplicated” column.

** Total costs of unduplicated Alaskans includes the reduction in ACEs and the percentage unduplicated

*** Average annual per person costs remained the same for this analysis

Alaskan Adults who are Obese

The Institute for Social and Economic Research published a study in 2014 that estimated annual costs of adult obesity in Alaska were \$219 million.^{xxxvi} Using the 2013 BRFSS, an estimated 156,656 Alaskan adults are obese. The average annual cost per person is estimated at \$1,398.

Tables 33, 34, and 35, below display the results of the 2013 BRFSS survey in combination with the 2013 Census estimates for Alaska. **Table 33** is the current estimated ACE levels for adults and the goal estimate of ACEs with successful primary prevention. **Table 34** is the percentage of the Alaskans who reported being obese by ACE score. **Table 35** is calculated by multiplying Table 33 and Table 34's current estimates by goal estimates respectively.

ACE Score	Table 33 Population		Table 34 Obesity	Table 35 Obesity	
	Current Estimate	Goal Estimate		Current Estimate	Goal Estimate
Zero	194,275	255,250	24.6%	47,818	62,826
One	121,950	101,002	26.9%	32,835	27,195
Two-Three	135,398	113,081	32.9%	44,521	37,183
Four Plus	94,134	76,425	33.4%	31,482	25,559
Total	545,757	545,758		156,656	152,763

By changing the base rate of the ACEs in **Table 33** and leaving **Table 34** as it is - then **Table 35** is determined by multiplying Table 33 and Table 34. The results show a reduction of those who are obese by 3,893 Alaskans.

The ACE Ledger below (**Table 36**) displays the annual savings which Alaska could realize if it had levels of ACE scores like Vermont or Arkansas is approximately \$5.4 million.

Table 36

Issue	Number of Alaskans	Total Costs	Average Annual Costs	Target Reduction	Estimated Savings
Obesity	156,656	\$219,000,000	\$1,398	3,893	\$5,442,288

In order to calculate a total using these six measures there is a need to eliminate “multiple counting” of costs. A **net potential savings of \$91,936,300** between these **six categories** can be calculated, as seen in **Table 37** below.

Table 37

Issue	Total 2013 BRFSS	With Reduction of ACEs	Percentage Unduplicated	Number of Alaskans Unduplicated*	Total Costs of Unduplicated Alaskans**	Average Annual Costs***	Target Reduction Unduplicated*	Estimated Savings*
Medicaid	53,800	51,378	100.0%	51,378	\$821,277,330	\$15,985	2,422	\$38,715,670
Current Smoking	115,244	108,693	93.7%	101,893	\$511,910,432	\$5,024	6,139	\$30,842,336
Diabetes	41,160	39,814	63.7%	25,376	\$277,435,808	\$10,933	858	\$9,380,514
Binge Drinking	98,152	96,260	60.5%	58,219	\$323,290,107	\$5,553	1,144	\$6,352,632
Arthritis	132,136	128,425	51.1%	65,674	\$161,098,322	\$2,453	1,898	\$4,655,794
Obesity	156,656	152,763	36.6%	55,845	\$78,071,310	\$1,398	1,423	\$1,989,354

Unduplicated **\$91,936,300**

*36.6% of people who reported being obese were not arthritic, binge drinking, diabetic, currently smoking or using Medicaid. These starred items were reduced by multiplying by the figure in the respective “Percentage Unduplicated” column.

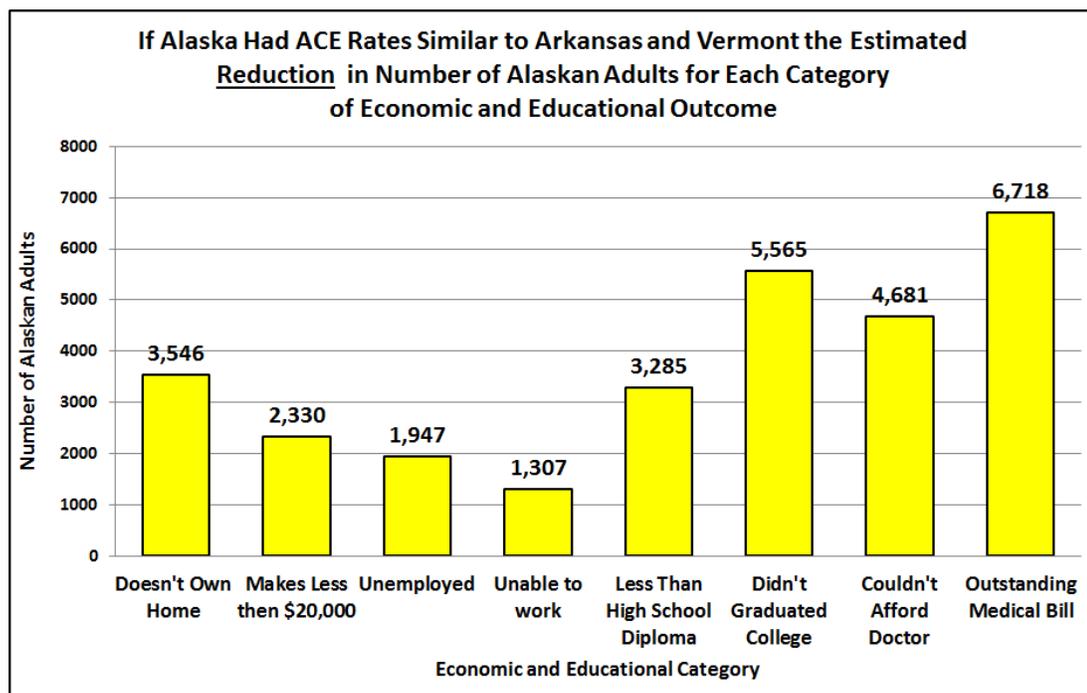
** Total costs of unduplicated Alaskans includes the reduction in ACEs and the percentage unduplicated

*** Average annual per person costs remained the same for this analysis

ACEs are Costly

Whether it is the \$82 million dollars estimated annual burden Alaskans take on each year for the costs during childhood of child abuse or the nearly \$91 million Alaskans are paying now because Alaska's adults faced more adversity than some other Americans, ACEs are costly. These data demonstrate that a modest reduction of ACEs would have a profound impact on Alaska's government and private sector costs. While the six items explored in this document are high costs items, they don't begin to capture the many other poor outcomes associated with ACEs. **Cancer, suicide, heart disease, asthma, COPD** have all been linked to ACEs^{xxxvii}. More potential areas for savings and increased economic contributions available, if ACEs are reduced, are outlined in **Figure 12** below.

Figure 12



The next steps are to explore those efforts around the state that prevent and mitigate the effects of ACEs and then take them to scale. There is solid evidence that various programs and ideas work^{xxxviii}. Whether it be through faith-based organizations, community health efforts, government programs and services, or private employers – we can avoid many of the costs of social and economic issues Alaskans pay every day. **In times such as these - saving such as these - are hard to ignore.**

End Notes

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- ⁱⁱ Knapp, G., [An Introduction to Alaska Fiscal Facts and Choices](#), UAA Institute for Social and Economic Research
- ⁱⁱⁱ Division of Public Health, [Behavioral Risk Factor Surveillance System](#) website
- ^{iv} Centers for Disease Control and Prevention, [Child Abuse and Neglect Costs the United States \\$124 Billion](#), February 1, 2012
- ^v U.S. Department of Health & Human Services, Administration for Children and Families, [Child Maltreatment 2013](#), Children's Bureau, Page 50
- ^{vi} See Rand Corporation website, [Children and Families](#) section
- ^{vii} See Federal Reserve Bank of Minneapolis website, Special Studies, [Early Childhood Development](#)
- ^{viii} See The Upjohn Institute for Employment Research, [Early Childhood](#) section
- ^{ix} See the [Heckman Equation](#) website
- ^x Centers for Disease Control and Prevention, [Adverse Childhood Experiences Reported by Adults – Five States 2009](#), 2010
- ^{xi} State of Alaska Department of Health and Social Services, [Adverse Childhood Experiences – Overcoming ACEs in Alaska](#), January 2015
- ^{xii} 2013 Alaska Behavioral Risk Factor Surveillance System, [Adverse Childhood Experiences of Alaska Adults](#), Slide 22 of Power Point, Alaska Mental Health Board & Advisory Board on Alcoholism and Drug Abuse
- ^{xiii} 2013 Alaska Behavioral Risk Factor Surveillance System, [Adverse Childhood Experiences of Alaska Adults](#), Slides 70, 74 & 76 of Power Point, Alaska Mental Health Board & Advisory Board on Alcoholism and Drug Abuse
- ^{xiv} Alaska Council on Domestic Violence and Sexual Assault, [Alaska Men Choose Respect](#)
- ^{xv} Centers for Disease Control and Prevention, [Workplace Safety and Health Topics](#)
- ^{xvi} Centers for Disease Control and Prevention, [The ACE Pyramid](#)
- ^{xvii} Anda RF, [The Enduring Effects of Abuse and Related Adverse Experiences in Childhood: A Convergence of Evidence from Neurobiology and Epidemiology](#). European Archives of Psychiatry and Clinical Neuroscience. 2006
- ^{xviii} [Med Education website](#)
- ^{xix} Genetic Science Learning Center, [Learn. Genetics](#), University of Utah, Health Science
- ^{xx} Elovathingal, T., et al, [Abnormal Brain Connectivity in Children After Early Severe Socioemotional Deprivation](#), Pediatrics, Vol. 117 No. 6, June 1, 2006
- ^{xxi} [See definition](#)
- ^{xxii} Dube, SR, et.al. [Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: findings from the Adverse Childhood Experiences Study](#), JAMA, 2001, Dec.26.
- ^{xxiii} Heckman, James, [The Heckman Equation](#)
- ^{xxiv} [Alaska Operating Budget FY2016](#)
- ^{xxv} McDowell Group, Alaska Mental Health Board and Advisory Board on Alcoholism and Drug Abuse, [Economic Costs of Alcohol and Other Drug Use in Alaska, 2012 Update](#),
- ^{xxvi} Levitt, P, [Center for the Developing Child, Harvard University](#)
- ^{xxvii} Sidmore, P, Analysis of Alaska Medicaid data for the Alaska Mental Health Board and Advisory Board on Alcoholism and Drug Abuse
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- ^{xxx} Centers for Disease Control and Prevention, [Adverse Childhood Experiences Reported by Adults – Five States 2009](#), 2010
- ^{xxxi} Alaska Department of Health and Social Services, [Long-Term Forecast of Medicaid Enrollment and Spending Supplement 2012-2032](#)
- ^{xxxii} Alaska Department of Health and Social Services, [Alaska Tobacco Facts, April 2012 Update](#)
- ^{xxxiii} , [Diabetes Care](#), [The Economic Costs of Diabetes in the U.S. 2012](#), Volume 36, April 2013, page 9
- ^{xxxiv} Centers for Disease Control and Prevention, [State costs of excessive alcohol consumption](#), and [High Costs of Excessive Drinking for the States](#)

^{xxxv} Centers for Disease Control and Prevention, [National and State Medical Expenditures and Lost Earnings Attributable to Arthritis and Other Rheumatic Conditions U.S. 2003](#)

^{xxxvi} Guettabi, M., [Current and Future Medical Costs of Childhood Obesity in Alaska](#), Institute for Social and Economic Research, University of Alaska – Anchorage

^{xxxvii} Centers for Disease Control and Prevention, [ACE Study Results](#).

^{xxxviii} U.S. Department of Health and Social Services, Administration for Children and Families, [Child Maltreatment Prevention, Past, Present and Future](#), 2011