The Economics of Child Abuse
A Study of California

Technical Appendix

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Introduction

The purpose of the Technical Appendix is to provide a more detailed discussion on the methodologies, assumptions, and sources used to complete the cost estimate for the economic burden of child maltreatment in California.

The Analysis

To determine our final methodology, we performed a broad literature review of reports written on the economic cost of child maltreatment or similar social issues and closely analyzed their methodologies and data sources. Reports covered a wide range of topics—child maltreatment, incarceration, education, and substance abuse—and spanned multiple geographies. We compared the different approaches and underlying studies used to support each analysis and determined the method for our analysis.

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Overarching Assumptions

We considered the following assumptions while performing this analysis:

Method

There are generally two methods used for economic burden estimates: a prevalence-based approach or an incidence-based approach.[12] A prevalence-based method provides an estimate of the direct and indirect costs incurred in a given period resulting from all current and prior cases of child maltreatment, regardless of the onset of child maltreatment. In contrast, an incidence-based method estimates the total lifetime costs resulting from new cases of child maltreatment that occur within a given time period.

While both methods are relevant, an incidence-based approach is more useful in our context because the economic burden resulting from a single child with substantiated maltreatment could be compared with the cost of preventing maltreatment for a single child. In addition, the incidence-based approach was the most commonly used approach applied in the other cost estimation reports we reviewed.

Substantiated Victims

Each state defines the types of child maltreatment in its statutes and policies. Child welfare system (CWS) agencies determine the appropriate response for the alleged maltreatment based on those statutes and policies. In most states, the majority of reports receive an investigation, which results in a determination about the alleged child maltreatment. The two most prevalent determinations are:

Substantiated: An investigation determination that concludes the allegation of maltreatment or risk of maltreatment was supported or founded by state law or policy.

Unsubstantiated: An investigation determination that concludes there was not sufficient evidence under state law to conclude or suspect that the child was maltreated or at risk of being maltreated.

For our total cost estimate, we considered only substantiated victims (children whose maltreatment has been substantiated), but performed a sensitivity analysis to demonstrate the total cost—considering reported, substantiated, and estimated total victims of maltreatment.

In addition, we recognize overlap may exist between fatalities (children who have died as a result of maltreatment in 2017) and substantiated victims (children that have had a substantiated report of maltreatment in 2017).

To eliminate the risk of double-counting, we have subtracted the number of fatalities from the number of substantiated victims in the calculations for each cost category below. We use the term "survivors" to represent the number of substantiated victims less the number fatalities. In 2017, California had 71,289 substantiated victims of maltreatment, and 133 verified child deaths relating to maltreatment. Our cost estimates for surviving victims represent 71,156 survivors of maltreatment in 2017.

Year Of Analysis

Our estimate is based in 2017, the most current year of available data for substantiated cases of child maltreatment found at the California Child Welfare Indicators Project.[3]

This data source provides the total number of children in California with reports of maltreatment, and the total number of children with substantiated cases of maltreatment. It is important to note that we leverage unique counts of children for this analysis – not unique counts of cases, as it is possible that one child may have multiple CPS cases opened in a given year.

One-Year Scope

We estimate the societal cost for all children who were maltreated in 2017. The estimate is based off a unique count of children who were maltreated in one year. We acknowledge that many victims are maltreated multiple times throughout their childhood. Thus, a portion of victims in 2017 were also victimized in 2016.

For this reason, the scope of this analysis is limited to one year. If one were to estimate the economic impact of children maltreated over multiple years, the first step would be to arrive at a unduplicated count of victims over the time period examined.

Discount Rate

We employ the discount rate whenever future dollar figures are adjusted to present value, to account for the time value of money.

The choice of an appropriate social discount rate for cost–benefit analysis of public investment projects has been subject to debate in economics literature for many years and ranges from three to seven percent for developed countries.[4] We considered multiple approaches: marginal social rate of time preference, social opportunity cost of capital, weighted average or optimal growth model, and shadow price of capital. There is no one-size-fits-all approach to selecting the social discount rate.[5] We have selected three percent, because this is the social discount rate applied in the Center for Disease Control and Prevention's (CDC) cost estimation report and a best practice for the Social Return on Investment (SROI) analysis as cited by experts and published in recommended guidelines.

Geographic Adjustment

Where possible, we adjusted per-category cost estimates derived from national studies to reflect differences in California's income and cost of living. The adjusting value is specified in the Cost Estimation Detail section. The only cost category that could not be adjusted for geography is the Criminal Justice category. Because this category includes costs across multiple systems (e.g., police, courts, the justice system, juvenile detention, and jails) we could not identify an appropriate adjusting factor for the state of California.

Cost Identification

We considered both direct and indirect costs to ensure that our estimate appropriately captured the full economic burden. While in reality costs exist on a spectrum of how directly they are linked to a case of maltreatment, we define direct and indirect in this report as follows:

Direct Costs

• Child Welfare
• Education
• Childhood Healthcare
• Healthcare Related to Fatalities

• Childhood Criminal Justice

Indirect Costs

• Adulthood Healthcare
• Adulthood Criminal Justice
• Lifetime Productivity

After reviewing the studies listed previously, we selected the following broad cost categories for our estimates: healthcare, education, productivity losses, criminal justice, and child welfare. We also identified that the economic impact of child fatalities is different than surviving victims, though its cost drivers (healthcare and productivity losses) are similar.

Our analysis is modeled after that used by Centers for Disease Control researchers Fang, Brown, Florence, and Mercy in their 2012 paper, "The economic burden of child abuse in the United States and implications for prevention." The study employs an incidence-based approach which identified five categories—healthcare, education, productivity, criminal justice, child welfare, and child fatalities—where research quantifies the economic cost of maltreatment and, for each category, cost-per-victim estimates from secondary data for children maltreated in the U.S. in 2008. Then, our analysis aggregates the lifetime cost of child maltreatment by multiplying the per-victim lifetime cost estimates by the number of new victims in a single year.

Studies have shown that child maltreatment may be associated with reduced life expectancy, decreased quality of life, and negative intergenerational outcomes, but we were unable to find studies that quantify the costs and therefore were unable to include them in our analysis.[6]

Average Age Of Onset

This analysis requires a fixed age from which to base costs. While maltreatment could potentially occur as early as prenatally, this report conducts relevant calculations based on a fixed age of 7, which is the weighted average age of maltreatment for first-time victims in 2016 in the state of California, the most recent year for which data is available. Therefore, we have assumed that all costs begin at age 7 and all future economic losses are discounted to this age.

Cost Estimation Detail

Overview

Each cost category uses different underlying data and studies, depending on what is available, so we have used different approaches for each category. The methodologies are all rooted in the frameworks laid out by the CDC's study.

Costs attributable to maltreatment were determined on a category-by-category basis, using the highest quality peer-reviewed studies we could find. The costs for each category were added to create a statewide annual cost estimate.

Note that, where applicable, we adjusted historical costs for inflation and discounted future costs back to the present value at the year of study, 2017. Costs were referenced to 2017 using the gross domestic product (GDP) deflator (available from https://fred.stlouisfed.org/series/GDPDEF). Future costs associated with child maltreatment accumulating over time were discounted at 3% to reflect their present value, as recommended by the U.S. Panel on Cost-Effectiveness in Health and Medicine.[7]

We also adjusted this national cost to the increased costs of the region studied, California, using a geographic inflation index appropriate for the underlying study.

Child Welfare

Methodology
To estimate child welfare costs attributable to survivors of child maltreatment, we used a study calculating the total expenditure on child welfare by local, state, and federal agencies.[8] As of 2012, national government expenditures on child welfare services were calculated to be $28.2 billion. This was adjusted using a GDP deflator to $29.4 billion in today's dollars.

The inflation-adjust cost was divided by the number of children whose maltreatment was substantiated nationally in 2012 (3.1 million children[9]) to arrive at a per-child cost in today's dollars of $9,241.

The same report found that in 2012, California spent $3.9 billion on child welfare for just over 370,000 victims of maltreatment, suggesting that California's child welfare expenses are 20 percent higher than the nation as a whole. Applying that percentage increase, we estimated the per-child cost of child welfare in California to be $11,057 in today's dollars.

To arrive at a total cost estimate, we multiplied the per-child cost by the number of child survivors of maltreatment in 2017. This returns a total cost to the child welfare system of $787 million.

Considerations
Because child welfare costs often extend beyond the year of investigation, it would be ideal to track the government expenditures related to child maltreatment on a per-child basis and determine an average. However, since this data does not exist, we chose to use a steady-state methodology. This means that since the number of investigated cases was relatively constant surrounding the year of the base study, dividing the annual budget by the number of investigated cases serves as a proxy for the lifetime costs attributable to child maltreatment.

In addition, our estimate does not differentiate between different substantiated maltreatment outcomes (i.e., substantiated and placed in foster care), so it is not sensitive to changes in the severity of cases year-over-year.

Based on discussions with peers in our field, we feel our current approach is under-estimating the true cost of maltreatment to the child welfare system. We are currently working with researchers from Chapin Hall at the University of Chicago to conduct a time study of child welfare expenses in multiple California counties, which we hope will allow us to provide a better estimate of child welfare expenses.

Education

Methodology
We used two studies to estimate the costs of education: one that tracks the incremental chance of a child receiving special education following

child maltreatment,[10] and a second estimating the incremental cost per year for a child receiving special education in California.[11] These studies estimate that the annual cost of receiving special education per year is $12,700 (as of 2010), and the likelihood of a maltreatment child needing special education is 11 percent. This annual cost is adjusted to 2017 dollars, and multiplied by the increased likelihood of a maltreated child receiving special education. Thus, we estimate that in 2017 the marginal per-year cost of special education for each survivor of child maltreatment is $1,514 per child.

We then created a timeline, which plots the per-year marginal costs per survivor over the average years a child receives special education. We assume special education begins at the median age of special education, 8,[12] and lasts until the child departs primary education at 18. We plot out per-year costs from 2018 through 2027, giving us 10 years of per-year marginal costs.

Finally, we discount future costs using a discount rate of three percent, and add up the discounted costs to arrive at a per-child marginal special education cost of $12,917 in today's dollars. We multiplied the per-child cost by the number of child survivors of maltreatment in 2017. This returns a total cost to the education system of $919 million.

Considerations

This methodology has a number of limitations that cause it to be a conservative estimate. Ideally, we would like to include all incremental education costs associated with child maltreatment. However, in the absence of such a study, we can only track the increased costs of special education associated with child maltreatment. This excludes any increased costs for maltreated children who remain in general education, as well as any increased private costs incurred such as tutoring or counseling. It also does not account for the possibility that special education costs may be higher for maltreated children than non-maltreated children, given the severity of their needs.

This approach also assumes that special education for all survivors begins at 8 years old, the median starting age for special education. However, we know that younger children (ages 0-5) are most likely to be maltreated, so it is possible the median starting age for special education among maltreated children is earlier than that of the population as a whole.

Healthcare

Methodology

To estimate childhood healthcare costs, we used a study that analyzed the mean Medicaid claims of

child maltreatment survivors as compared to a control group,[13] matched for demographic and socioeconomic factors. This study found that maltreated children tend to have $2,703 more in per-year Medicaid claims than non-maltreated children.

The national value was first adjusted to present value and then to the increased regional cost of healthcare,[14] using a ratio comparing the mean Medicaid claim in the region to the mean national Medicaid claim. This gave us an estimated increase in childhood healthcare costs per survivor in California of $4,114 per year. We then multiplied it by the number of years in the survivor's childhood life, assuming a one percent per-year childhood healthcare inflation rate. Note that while historic annual inflation rates for healthcare in the US vary from two to 10 percent[15], we opted to use a conservative one percent figure to minimize the risk of overestimating future healthcare cost increases.

We assume childhood healthcare resulting from maltreatment begins at age 6 and lasts until the child is 17. These assumptions were based on those Fang et al. used in the CDC's cost study, which states "the median child maltreatment case is a child aged 6 years, short-term health care costs include the incremental health care costs attributable to child maltreatment from age 6 to age 17."[16]

We plot out per-year costs from 2017 through 2027, giving us 11 years of per-survivor costs. Finally, we discount future costs using a discount rate of three percent, and add up the discounted costs to arrive at a per-survivor childhood healthcare cost of $41,106 in today's dollars. We multiplied the per-survivor cost by the number of child survivors of maltreatment in 2017. This returns a total cost to the healthcare system of $2.93 billion.

Similarly, to estimate adulthood healthcare costs, we used a longitudinal study that tracked the incremental healthcare costs per year incurred by adult survivors as a result of past child maltreatment[17]. This study found that adults who were maltreated in childhood have $507 greater annual healthcare costs than the rest of the population. In addition, we identified a geographic inflation index, which suggests California has eight percent higher healthcare costs than the nation as a whole.[18]

The national value was first adjusted to present value and then to the increased cost of healthcare in California.[19] This gave us an estimated increase in adult healthcare costs per survivor in California of $672 per year. We then multiplied it by the number of years in the survivor's adult life, assuming a one percent per-year adult healthcare cost inflation rate. Again, note that while historic annual inflation rates for healthcare in the U.S. vary from two to 10 percent[20], we opted to use a

conservative one percent figure to minimize the risk of overestimating future healthcare cost increases.

We assume adult healthcare expenses resulting from maltreatment begin at age 18, and continue until age 64 (the last year examined in the Bonami study). We plot out per-year costs from 2028 through 2074, giving us 47 years of per-survivor costs. Finally, we discount future costs using a discount rate of three percent, and add up the discounted costs and a per-survivor adulthood healthcare cost of $12,512 in today's dollars. We multiplied the per-survivor cost by the number of survivors of maltreatment in 2017. This returns a total cost to the healthcare system of $892 million.

Finally, we add together the childhood and adulthood healthcare costs to arrive at a statewide total healthcare cost estimate of $3.8 billion.

Considerations
One limitation of this study is that the survey measures child maltreatment through self-reporting, which has a set of criteria lower than those of most child welfare jurisdictions. It also explores only physical and sexual abuse, not emotional abuse or neglect. This leads to a different rate of maltreatment than our rate of substantiated maltreatment. Additionally, the study only reports data for survivors aged 18 to 64. Thus, we chose to use age 64 as an endpoint for our healthcare cost calculations, even though the mean life expectancy for women in the U.S. is ~79 years.[21]

A related limitation in our estimate for childhood healthcare is that Florence's study examining childhood healthcare costs only analyzes costs covered by Medicaid.[22] However, the researchers in that study account for this in sensitivity analysis and find that since child maltreatment is strongly associated with low socioeconomic status, and thus Medicaid enrollment, this limitation would have a very low effect on the results.

The base studies used to estimate the incremental healthcare costs per year have a number of limitations. However, after a literature review, we decided these were the best available sources for estimating incremental healthcare costs associated with child maltreatment.

Criminal Justice

Methodology
To estimate criminal justice costs, we used two studies: one estimating the incremental chance of a juvenile or adult arrest associated with child maltreatment,[23] and another estimating the mean cost for each type of arrest.[24] This research suggests that 10.2 percent of

survivors are arrested in childhood, and 9.2 percent are arrested in adulthood. The mean all-inclusive cost of a childhood arrest is $18,950, and an adulthood arrest is $69,038 (this includes police costs, court fees, probation, and more). This cost is adjusted to 2017 dollars, and multiplied by the increased likelihood of a survivor of child maltreatment becoming arrested. Thus, we estimate that in 2017 the marginal per-year cost of childhood criminal justice for each survivor of child maltreatment is $2,696 during childhood and $8,736 during adulthood.

We assume that childhood criminal justice involvement will occur at the median age of childhood arrest, 14.[25] Assuming the onset of maltreatment is at age 7, our model puts this one-time cost to the criminal justice system at seven years in the future (i.e., 2024). We then discount the marginal cost of an arrest in that year to a present-day cost of $2,192 per survivor.

Similarly, we assume adulthood criminal justice involvement will occur at the median age of adulthood arrest, at age 23. This puts the one-time cost of adulthood criminal justice system involvement at 16 years in the future. Discounting the marginal cost of an arrest in that year to the present-day, we arrive at an estimate of $5,461 per survivor.

Finally, we multiplied the marginal per-survivor costs by the number of survivors of maltreatment in 2017. This returns a total cost of childhood criminal justice of $156 million, and a total adulthood criminal justice cost of $389 million.

Considerations
The primary limitation in estimating the cost of criminal justice associated with child maltreatment is that, because of the data available, we assume that youth who were maltreated are equally likely to be arrested for any type of crimes. The costs for felony arrests are substantially higher than those for misdemeanors, and if the increase in criminality associated with child maltreatment skews toward one type or the other, it could shift this cost in either direction.

In addition, we use the cost of one arrest as a proxy measure of the criminal justice costs. Some youth offenders are arrested multiple times, and are not included here.

Lifetime Productivity

Methodology
To estimate lifetime productivity losses, we use a longitudinal study that measures the average annual earnings of child maltreatment survivors, as compared to a control group.[26] This study found that the incremental loss in mean salary attributable to child

maltreatment was $5,000 per year per survivor. This per survivor cost was adjusted to present value and then to the increased average earnings in California.[27] This gives us a per-year estimated annual earning loss in today's dollars of $7,241 for each survivor.

We then created a timeline, which plots per-year costs per survivor over the average years an adult is in the workforce. We assume employment begins at 18, and ends at 64. We plot out per-year costs from 2028 through 2075, giving us 48 years of productivity losses per survivor. Productivity per survivor is assumed to grow at a rate of one percent each year.[28]

Finally, we discount future costs using a discount rate of three percent, and add up the discounted costs to arrive at a per-survivor productivity loss estimate of $183,301 in today's dollars. We multiplied the per-survivor cost by the number of child survivors of maltreatment in 2017. This returns a total productivity loss estimate of $13 billion.

Considerations

The underlying study uses a human capital approach, which measures productivity with annual earnings. While this is not a perfect measure of an individual's productivity, it is one of the most commonly used proxies for productivity.

The underlying study was published in 2010, and performed by Janet Currie of Columbia University and Cathy Spatz Widom of the City University of New York. This research uses a prospective cohort design where roughly 900 maltreated children matched with members of a control group of more than 600 non-maltreated children in a midwestern county in 1967-1971. Matching was performed so that comparable non-maltreated children had a similar age, sex, ethnicity, and social class at the beginning of the study to ensure that effects found were due to maltreatment and not other factors. Data was collected from both groups in two waves of interviews, one in 1995 and the second in 2004.

We use a ratio comparing the national average earnings from this study to the average earnings in California to adjust the estimate to our geography.

Child Fatalities

Methodology

To estimate the losses related with child fatalities, we began by identifying the number of child fatalities in the region of study.[A] In California, the California

Department of Social Services (CDSS) Child Fatality unit maintains records of fatalities related to maltreatment. Each county is required to report deaths resulting from child maltreatment using the SOC 826 form within 10 days of the death. The CDSS team reconciles results with each county between January and April of the following year, after which they make statewide child death numbers public.

We identified medical costs and productivity losses using a national study of productivity and medical economic losses due to fatal acts of violence.[29] This study finds that the estimated lifetime loss in earnings due to fatal child maltreatment was $1,005,650 in 2000. This per victim cost was adjusted to the present value and then to the increased average earnings in California.[30] This gives us a per-victim productivity loss estimate of $1,540,244.

In addition, the study estimates one-time healthcare costs for victims of fatal child maltreatment to be $11,300. The national value was first adjusted to present value and then to the increased cost of healthcare in California.[31] This gave us an estimated increase in healthcare costs per victim in California of $16,328 per year.

Finally, these estimates were multiplied by the number of fatal victims of maltreatment in 2017. This gives us an estimate of $2.2 million in healthcare costs across all fatalities, and $204.8 million in productivity losses across all fatalities. Adding these together, we arrive at a total cost estimate of $207 million.

Considerations

The study established costs based on a sample size of 16,000 fatal victims of assault; however only 708 of these were aged 0-4. It is possible that a larger sample would have resulted in different cost estimates.

Note that estimates were based on the 0-4 age bracket in the study, as the majority of child deaths due to maltreatment nationally are among this age bracket.[32]

This study does not limit to one type of payer or medical institution. We regard this as a strength since it is representative of the full range of healthcare environments that the victims of maltreatment may be treated in.

In addition, the underlying study uses annual earnings to measure productivity. Although it doesn't account for the fact that some jobs are valued more highly than

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A. The source for fatal cases varies based on the geography being studied. For the State of California, a count of fatal cases of abuse is available via the California Department of Social Services' website. See: "Fatalities & Near Fatalities Reported to CDSS," California Department of Social Services, Accessed August 23, 2018.

http://www.cdss.ca.gov/inforesources/Child-Fatality-and-Near-Fatality/Data-and-Reports. For individual counties, Safe & Sound obtained data by submitting a public records request to the California Department of Social Services.

others for a similar level of output, it is one of the most commonly used measures for productivity.

Estimated Percent of Children Who Will Experience Maltreatment

Methodology

Child maltreatment can be unreported for a number of reasons. Studies use different instruments to measure child maltreatment, each with its own advantages and disadvantages. Many studies use administrative data of child maltreatment (from child welfare systems) or reports by childcare professionals. One study we reviewed is an exception.[33] Using data from a national survey of families, this study estimates the proportions of children maltreated in the past year by age range. We use the maltreatment rate for 7-year-old children, because this age is the average age of the first substantiation of maltreatment in California.[34] This study estimates that 11.5 percent of children at this age experience maltreatment.

Considerations

While the sample consisted of more than 4,500 children and youth and is nationally representative, this is a relatively small sample compared to the hundreds of thousands of children who have substantiated cases of child maltreatment within a given year.[35] In this study, one child was selected randomly for each household. Children 10 and over were interviewed directly, while caregivers were interviewed for children under 10 to identify any instances of maltreatment as well as other aspects of victimization. Thus, the data collection method may result in underestimated reports of maltreatment and victimization for young children, as caregivers may be reluctant to report maltreatment they have caused. Based on this, we believe 11.5 percent is a conservative estimate of the actual rate of child maltreatment.

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