



The economic burden of child maltreatment in the United States, 2015

Cora Peterson*, Curtis Florence, Joanne Klevens

National Center for Injury Prevention and Control, Centers for Disease Control and Prevention (CDC), Atlanta, GA, USA

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ABSTRACT

Child maltreatment incurs a high lifetime cost per victim and creates a substantial US population economic burden. This study aimed to use the most recent data and recommended methods to update previous (2008) estimates of 1) the per-victim lifetime cost, and 2) the annual US population economic burden of child maltreatment. Three ways to update the previous estimates were identified: 1) apply value per statistical life methodology to value child maltreatment mortality, 2) apply monetized quality-adjusted life years methodology to value child maltreatment morbidity, and 3) apply updated estimates of the exposed population. As with the previous estimates, the updated estimates used the societal cost perspective and lifetime horizon, but also accounted for victim and community intangible costs. Updated methods increased the estimated nonfatal child maltreatment per-victim lifetime cost from \$210,012 (2010 USD) to \$830,928 (2015 USD) and increased the fatal per-victim cost from \$1.3 to \$16.6 million. The estimated US population economic burden of child maltreatment based on 2015 *substantiated* incident cases (482,000 nonfatal and 1670 fatal victims) was \$428 billion, representing lifetime costs incurred annually. Using estimated incidence of *investigated* annual incident cases (2,368,000 nonfatal and 1670 fatal victims), the estimated economic burden was \$2 trillion. Accounting for victim and community intangible costs increased the estimated cost of child maltreatment considerably compared to previous estimates. The economic burden of child maltreatment is substantial and might off-set the cost of evidence-based interventions that reduce child maltreatment incidence.

1. Introduction

Child maltreatment includes neglect, physical abuse, psychological maltreatment, and sexual abuse (Leeb, Paulozzi, Melanson, Simon, & Arias, 2008). In 2015, 1670 children died nationwide due to maltreatment and another 683,000 suffered maltreatment that was substantiated by authorities (US Department of Health & Human Services, 2017). Survey data suggests child maltreatment is far more prevalent, affecting an estimated 25% of children and youth age 0–17 years old (Finkelhor, Turner, Shattuck, & Hamby, 2015).

Fang, Brown, Florence, and Mercy (2012) reported in this journal the estimated lifetime per-victim cost of nonfatal and fatal child maltreatment and the associated US population economic burden based on 2008 incidence data (Fang et al., 2012). That study estimated the lifetime per victim cost of nonfatal and fatal child maltreatment to be \$210,000 and \$1.3 million, respectively, and the annual US economic burden to be \$124 billion (all 2010 USD). Since that study, new data and the recent promotion of alternative

Abbreviations: QALY, quality of life years; USDHHS, US Department of Health and Human Services; VSL, value per statistical life

* Corresponding author at: Mailstop F-62, 4770 Buford Highway, CDC National Center for Injury Prevention and Control, Atlanta, GA, 30341, United States.

E-mail address: vsm2@cdc.gov (C. Peterson).

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methodologies for valuing morbidity and mortality have created an opportunity to update those estimates. This study aimed to use the most recent data and recommended methods to update previous estimates of 1) the per-victim lifetime cost, and 2) the annual US population economic burden of child maltreatment.

In this study we applied three updates to the previous study's methods and data: 1) value per statistical life (VSL) methodology replaced the previous study's human capital valuation of child maltreatment mortality, 2) monetized quality-adjusted life years (QALY) methodology replaced the previous study's human capital valuation of child maltreatment morbidity, and 3) updated estimates of the exposed population based on the most recent administrative data.

1.1. Cost methodology updates

The two cost methodology updates (VSL and monetized QALYs) were made in consideration of recent US Department of Health and Human Services (USDHHS) guidance on methods for economic evaluation for regulatory impact analysis ([Office of the Assistant Secretary for Planning & Evaluation, 2016](#)). That guidance recommended the use of VSL to value mortality and monetized QALYs to value morbidity where appropriate data exists to do so. VSL and monetized QALYs can replace the human capital valuation method used to value mortality and morbidity in many previous cost of illness studies, including the previous child maltreatment cost study ([Fang et al., 2012](#)). Both methods for valuing morbidity and mortality—VSL/monetized QALYs and the human capital method—use a societal cost perspective; that is, both methods aim to include all measureable costs attributable to a given health condition, not only those that incur to a particular payer (e.g., health system, employer).

There is a substantial literature on methods to estimate the cost of mortality and morbidity ([Office of the Assistant Secretary for Planning & Evaluation, 2016](#)). In brief, VSL mortality valuation and QALY morbidity valuation can be ultimately based on a person's willingness to pay for a defined change in mortality or morbidity risk, while the human capital method is based on the value of lost work and other productive activities—typically assessed at an observed earnings rate—due to mortality or morbidity. A major criticism of the human capital method is that intangible costs, such as the pain, suffering, and grief experienced by a community when a person dies, are not captured ([Corso, Fang, & Mercy, 2011](#)). VSL and QALY methods attempt to capture these intangible costs and typically include mortality and morbidity valuations that are many times greater than corresponding human capital valuations.

Owing to available data, a VSL mortality value is typically applied as a single standard value in cost of illness studies to estimate the cost of one lost life (e.g., \$9.6 million as 2014 USD in the recent USDHHS guidance) ([Office of the Assistant Secretary for Planning & Evaluation, 2016](#)). A QALY is a measure of the state of health, where 1 QALY is equal to 1 year of life in perfect health ([National Institute for Health & Care Excellence, 2017](#)); health conditions with greater impairment are therefore associated with lower number of QALYs. A monetized QALY morbidity value (or, monetized QALY) can be calculated using the number of years of life lived (usually assessed using population survival probabilities; or, a life table), a VSL value, and a condition-specific QALY measure. In other words, monetized QALYs represent the cost of reduced quality of life valued at a selected VSL rate. The VSL mortality value selected for a given study therefore has a substantial effect on the study's corresponding monetary QALY valuation.

1.1.1. Child maltreatment-specific value per statistical life

VSL is higher for children than for adults, and the VSL value proposed in the recent USDHHS guidance is based on average mortality at 40 years old ([Hammit & Haninger, 2010](#); [Office of the Assistant Secretary for Planning & Evaluation, 2016](#)). VSL also varies based on the characteristics of a given disease, although given the limited number of original studies that have measured VSL, it is relatively uncommon to be able to use a condition-specific VSL in a cost of illness study. However, for child maltreatment there exists a condition-specific VSL estimate based on an original analysis ([Corso et al., 2011](#)). In that previous study, a random sample of adults ($n = 199$) in Georgia was questioned in 2008 on their willingness to pay for a 50% annual reduction in the risk of a child being killed by a parent or caregiver (or, a reduction from 2 per 100,000 to 1 per 100,000 population). Based on mean estimated willingness to pay (\$148) among the respondent sample, authors reported a child maltreatment-specific VSL of \$14.8 million (2008 USD). This VSL value is consistent with previous original studies indicating that an adult's willingness to pay for a reduced mortality risk to a child is higher than for oneself; VSL for children has been estimated at \$12–15 million compared to \$6–10 million for adults (2007 USD) ([Hammit & Haninger, 2010](#)).

1.1.2. Child maltreatment-specific quality-adjusted life years

It appears just one study has reported child maltreatment preference-based health-related quality of life measures that can be used to calculate monetized QALYs from a VSL value ([Corso, Edwards, Fang, & Mercy, 2008](#)). In that study, researchers used data from the Adverse Childhood Experiences Study to assess self-reported health-related quality of life among adults who self-reported childhood maltreatment ($n = 2812$) anytime during age ≤ 18 years old compared to adults matched on demographic and economic characteristics who did not report childhood maltreatment ($n = 3356$). Respondents who reported childhood maltreatment had an average marginal disutility of 0.028 QALY per year during adulthood (age ≥ 19) compared with respondents who reported no childhood maltreatment.

2. Methods

This study updates the estimated lifetime per-victim cost and the associated population economic burden of child maltreatment reported in [Fang et al. \(2012\)](#). Updates are based on VSL and QALY valuations of mortality and morbidity that replace human capital valuations (commonly referred to as lost productivity values) applied in the previous study. The cost estimates in this study include

Table 1

Estimated value of reduced quality-adjusted life years among adults who were victims of child maltreatment.

Measure	Value	Source
QALY decrement per year of life lived among nonfatal child maltreatment victims, by age	0.28	Corso et al. (2008)
Discount rate	3%	Sanders et al. (2016)
Lifetime discounted QALYs associated with full health	22.8	Calculated
Lifetime discounted QALYs associated with child maltreatment	21.8	Calculated
Lifetime discounted QALY decrement	1.02	Calculated
Value per statistical life	\$16,600,000	Corso et al. (2011) ^a
Value per QALY	\$743,000	Calculated ^a
Cost of reduced quality of life due to nonfatal child maltreatment (or, monetized QALY reduction)	\$760,000	Calculated

Notes. 2015 USD. QALY = quality-adjusted life year; VSL = Value per statistical life.

^a 2015 USD values are authors' calculations based on reference source data and unpublished supporting data from a recent report (Office of the Assistant Secretary for Planning & Evaluation, 2016), received through personal email communication (December 2017). See Supplemental File for data and calculations.

intangible costs due to pain, suffering, and grief attributable to child maltreatment experienced among victims and communities. We used the Corso et al. (2011) child maltreatment-specific VSL of \$14.8 million (2008 USD)—updated to present value \$16.6 million (2015 USD) using methods consistent with the USDHHS guidance—to value mortality due to child maltreatment. A lifetime QALY value reduction of \$760,000 (Table 1) due to nonfatal child maltreatment was calculated from the child maltreatment-specific VSL of \$16.6 million (2015 USD; from Corso et al. (2011), a lifetime reduction of approximately 1 QALY (discounted at 3% as is recommended) due to child maltreatment as calculated from child maltreatment-specific QALY data reported in Corso et al. (2008), and the US population life table (Arias, Heron, & Xu, 2017). The associated Supplemental File demonstrates all calculations and supporting data.

In addition to cost methodology updates, we applied updated child maltreatment incidence (or, number of new victims) estimates to assess the annual US population economic burden of child maltreatment in 2015, calculated as the per-victim cost multiplied by the annual child maltreatment incidence. The annual economic burden estimate reported in this study—like the previous study—therefore represents lifetime costs for victims incurred annually across the population due to incident child maltreatment.

Updated incidence data consisted of: 1) the estimated number of victims based on 2015 incident substantiated (i.e., allegation of maltreatment or risk of maltreatment was supported or founded by state law or policy), and 2) investigated (i.e., not substantiated) nonfatal and fatal child maltreatment cases from US administrative sources (US Department of Health & Human Services, 2017). We followed the previous study's method for estimating the proportion of investigated cases that represented first-time (or, incident) child maltreatment; that is, we multiplied the proportion of incident substantiated cases among total substantiated cases—both directly reported in administrative sources—by the total number of investigated cases (Fang et al., 2012). Substantiated child maltreatment is a conservative measure of incidence and is influenced by individual states' procedures and criteria for substantiation (Fang et al., 2012; Kohl, Jonson-Reid, & Drake, 2009; US Department of Health & Human Services, 2017). Notably, previous research has shown there is no significant difference in developmental outcomes for children with substantiated CAN versus those subject to an investigation but not substantiated (Hussey et al., 2005).

All dollar values are 2015 USD unless otherwise noted. A 3% discount rate was applied to all future outcomes (i.e., VSL, QALY value, and other elements of the lifetime cost per victim) (Sanders et al., 2016). Other cost elements from Fang et al. (2012) (e.g., medical care, special education, etc.) remain applicable (i.e., have not been replaced by more recent data) and were updated to 2015 values for this analysis using standard inflation methods (see Table 1 notes for sources and Supplemental File for supporting data). Following the example of Fang et al. (2012), we present annual population economic burden estimates based on two incidence estimates: 1) substantiated child maltreatment victims, and 2) investigated child maltreatment victims.

3. Results

The total estimated per-victim cost of nonfatal child maltreatment increased from \$210,012 (2010 USD) as reported in Fang et al. (2012) to \$830,928 (2015 USD) (Table 2). This increase is almost entirely due to using monetized QALYs (i.e., includes intangible costs due to pain, suffering, and grief attributable to child maltreatment experienced among victims and communities) in place of the human capital-based lost productivity value applied in Fang et al. (2012). This methodology change increased the estimated cost of morbidity due to nonfatal child maltreatment from \$144,360 (2010 USD) to \$760,000 (2015 USD) (Table 2). Inflation-adjusted estimates of short-and long-term health care costs, child welfare costs, criminal justice costs, and special education costs yielded modest increases in the estimated per-victim lifetime cost of non-fatal child maltreatment in this study compared to the previous study (increase of \$5276; Table 2).

The total estimated per-victim cost of fatal child maltreatment increased from \$1,272,900 (2010 USD) as reported in Fang et al. (2012) to \$16,615,186 (2015 USD) (Table 2). This increase is almost entirely due to using VSL (\$16,600,000; 2015 USD) in place of the human capital-based lost productivity (\$1,258,800; 2010 USD) value applied in Fang et al. (2012) (Table 2). The inflation-adjusted cost of medical care for victims of fatal child maltreatment yielded a modest increase in the estimated per-victim cost of fatal child maltreatment (increase of \$1086; Table 2).

Table 2

Updated per-victim lifetime cost and economic burden of child maltreatment estimates.

Source	Fang et al. (2012)		Update (this study)		Update source	
Estimate year	2008		2015			
Cost year USD	2010		2015			
Child maltreatment outcome	Nonfatal	Fatal	Nonfatal	Fatal	Nonfatal	Fatal
Lifetime cost per victim						
Short-term health care costs	\$32,648	\$14,100	\$35,162	\$15,186	Florence et al. (2013) ^a	Corso, Mercy, Simon, Finkelstein, and Miller (2007) ^a
Long-term health care costs	\$10,530	\$0	\$11,341	\$0	Bonomi et al. (2008) ^a	Assumed
Child welfare costs	\$7728	\$0	\$8399	\$0	DeVooght, Allen, and Geen (2008) ^a	Assumed
Criminal justice costs	\$6747	\$0	\$7333	\$0	Widom and Maxfield (2001); Reynolds et al. (2002) ^a	Assumed
Special education costs	\$7999	\$0	\$8693	\$0	Jonson-Reid, Drake, Kim, Porterfield, and Han (2004); Reynolds, Temple, Robertson, and Mann (2002) ^a	Assumed
Productivity losses	\$144,360	\$1,258,800	\$0	\$0	Not included	Not included
Value per statistical life	NA	Not included	\$0	\$16,600,000	N/A	Table 1
QALY reduction	\$0	NA	\$760,000	\$0	Table 1	N/A
Total cost	\$210,012	\$1,272,900	\$830,928	\$16,615,186	Calculated	Calculated
Economic burden						
<u>Incidence</u>						
Fatal		1740		1670		USDHHS (2017)
CPS substantiated	579,000		482,000		USDHHS (2017)	
CPS investigated	2,775,000		2,368,000		USDHHS (2017) ^b	
<u>Total cost</u>						
CPS substantiated	\$123,811,794,000		\$428,254,493,000		Calculated	
CPS investigated	\$584,998,146,000		\$1,995,384,064,000		Calculated	

Notes. N/A = not applicable. CPS Child Protective Services; QALY quality-adjusted life year; USDHHS US Department of Health and Human Services. Future costs discounted by 3%. Health care costs inflated to 2015 USD in “Update” columns using Personal Consumption Expenditures-Medical, other costs inflated using Gross Domestic Product (bea.gov/iTable, Table 2.5.4. [last revision 8/17/2017] and Table 1.1.4 [last revision 10/27/2017], respectively. See Supplemental File for calculations and supporting data.

^a Same as source original study (Fang et al., 2012). Cost differences represent only inflation from 2010 USD to 2015 USD values.

^b Following Fang et al. (2012), incident cases based on number of investigated children estimated by multiplying the ratio of first-time cases to total cases among 2015 substantiated cases.

The estimated incidence of substantiated nonfatal child maltreatment and number of investigated victims decreased from 2008 to 2015 (substantiated: from 579,000 to 482,000 victims; investigated: 2,775,000 to 2,368,000 victims) (Fang et al., 2012; US Department of Health & Human Services, 2017) (includes authors’ calculation of incident investigated cases) (Table 2). The incidence of fatal child maltreatment also decreased (from 1740 victims in 2008 to 1670 victims in 2015) (Table 2). Applying the two alternative nonfatal incidence estimates (in combination with 2015 fatalities) resulted in an estimated annual US population lifetime economic burden of \$428 billion based on the number of substantiated nonfatal victims (compared to \$124 billion [2010 USD] in the previous study) or \$2.0 trillion based on the estimated number of investigated incident nonfatal victims (compared to \$585 billion [2010 USD] in the previous study) (Table 2).

4. Discussion

Using updated cost methods and data, this study estimated a much higher per-victim lifetime cost of child maltreatment for victims of nonfatal (\$831,000) and fatal (\$16.6 million) child maltreatment, and a higher estimated annual US population economic burden (\$428 billion to \$2.0 trillion, depending on data source for nonfatal child maltreatment incidence) (all 2015 USD) than reported in a previous study (Fang et al., 2012) (which reported lifetime costs for nonfatal and fatal child maltreatment of \$210,012 and \$1.3 million, respectively, and an annual population economic burden of \$124 to \$585 billion [all 2010 USD]). The number of annual substantiated and investigated nonfatal victims and fatal victims decreased between the previous cost estimate (2008 incidence data) and the current estimate (2015 incidence data) but owing to methodology updates the estimated per-victim cost assessed in this study was much higher than reported in the previous study, yielding overall a higher estimated annual US population economic burden.

The increased per-victim and economic burden estimates are almost entirely due to the use of alternative methodologies (VSL and monetized QALYs) to value child maltreatment mortality and morbidity. VSL and monetized QALYs do not represent actual payments for child maltreatment along the lines of medical costs and special education costs. Instead, VSL and monetized QALY are valuations of morbidity and mortality that aim to include intangible costs such as pain and suffering experienced not only by the affected individual but the wider community. This is particularly relevant when assessing the cost of child maltreatment, which can be a high-profile and painful topic for communities.

The problem of child maltreatment offers a rather unique opportunity to apply VSL and monetized QALY estimates because previous studies reported original analyses that directly measured child maltreatment-specific VSL and QALYs (Corso et al., 2008, 2011). Applying instead the standard VSL and QALY values from the recent USDHHS guidance document (i.e., \$9.6 million VSL and \$490,000 QALY as 2014 USD)—which, as described previously, apply to mortality at average age 40 years old and are not child maltreatment-specific—would yield lower child maltreatment per-victim lifetime non-fatal (\$571,928) and fatal (\$9.6 million) costs, as well as a lower range of economic burden estimates (\$292 billion based on 2015 substantiated cases or \$1.4 trillion based on investigated cases (data not shown).

This study's estimates are limited in a number of ways. First, this analysis relied on previous estimates of health care costs, child welfare costs, criminal justice costs, and special education costs; each of these estimates has limitations as previously described (Fang et al., 2012). Applying inflation to those previous estimates to update costs to present value likely insufficiently captures cost changes during the intervening period. However, each source study for those cost estimates remains the most rigorous original analysis for each respective cost domain required to estimate comprehensively the attributable cost of child maltreatment. Second, the survey study that estimated child maltreatment-specific VSL was based on a small and narrowly defined respondent sample (Corso et al., 2011). Third, the child maltreatment QALY estimate from the selected reference study refers to quality of life experiences among adults age 19 years and above (Corso et al., 2008). Given that child maltreatment occurs at average age 6 years, the best available QALY value therefore underestimates the cost of nonfatal child maltreatment by not including quality of life reductions that occur in childhood and adolescence (Florence, Brown, Fang, & Thompson, 2013). Fourth, debate remains over appropriate methods to value mortality and morbidity in cost of illness studies. VSL and monetized QALYs are used to quantify the community-wide impact of mortality and morbidity due to child maltreatment, although should not be confused with accounting values (i.e., money paid out in response to child maltreatment or cost-savings that would occur in the event that child maltreatment were averted through prevention efforts).

Despite limitations, this study has proposed methodology and data updates to a previous rigorous estimate of the attributable cost of child maltreatment. These updates primarily aimed to account for victim and community intangible costs such as pain and suffering due to child maltreatment. This study's results suggest child maltreatment incurs a greater societal cost than previously reported. Assessing the comprehensive cost of child maltreatment is essential to contextualize the magnitude of the problem and correctly assess the value of prevention strategies. Strategies to prevent and stop child abuse and neglect and to support survivors to lessen harms are available. The Centers for Disease Control & Prevention's technical package can help communities make use of the best available evidence to prevent child abuse and neglect (Fortson, Klevens, Merrick, Gilbert, & Alexander, 2016).

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Disclaimer

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Contributor statement

Cora Peterson led the study design and interpretation of results, analyzed the data, drafted and edited the manuscript, and approved the final manuscript as submitted.

Curtis Florence led the study design and interpretation of results, edited the manuscript, and approved the final manuscript as submitted.

Joanne Klevens assisted with the study design and interpretation of results, edited the manuscript, and approved the final manuscript as submitted.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.chiabu.2018.09.018>.

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