**Updating Opioid Cost Model**

The opioid costs model assigns the CEA’s nationwide [2015 estimate](https://www.whitehouse.gov/articles/full-cost-opioid-crisis-2-5-trillion-four-years/) of the cost of the opioid crisis to states and counties. Updating the model changes both the “size of the pie”, that is the total cost of opioid abuse in the US, as well as how the pie is “sliced”, or assigning costs to states and counties.

Calculations are done in update\_estimate.R and in the “Work” sheet of CEA\_estimates.xlsx.

**Updating CEA Estimate:**

* The CEA’s $504 billion cost estimate is the summation of of fatal and non-fatal costs. Fatal costs are computed by applying an age-adjusted value of a statistical life (VSL) to the total number of people in 2015 to die of an opioid related cause. Updating fatal costs therefore involves updating the age-adjusted VSL, as well as the number of people to die of opioid related causes. Updating non-fatal costs is just applying inflation-adjusted cost per-person to the updated number of people experiencing an opioid use disorder.
* **Fatality Costs:**
  + VSL: CEA uses an age-adjusted VSL described in Aldy and Viscusi (2008). They apply the VSL of 18-24 year olds to deaths of those 0-17, and the VSL of 55-62 to fatalities in the over-62 group.
  + Updating the VSL uses methods described in a US Department of Transportation [brief](https://www.transportation.gov/office-policy/transportation-policy/revised-departmental-guidance-on-valuation-of-a-statistical-life-in-economic-analysis) (2016). Doing so relies on inflation and weekly earnings data, which I accessed from the BLS CPI and BLS median usual weekly earnings data.
  + **Number of opioid related deaths**: I was not able to reproduce the cited 33,091 deaths using the WONDER query, which leads me to believe that the data have been updated since the CEA accessed the data. I therefore independently calculate costs for 2015 and for 2017 and apply their percent increase to the original CEA fatality cost estimate.
    - The full list of multiple cause of death (MCD) I used can be found in the analysis markdown file.
    - I group the WONDER output into fatalities aged 0-24, 25-34, 35-44,45-54, and over 55. The fatality cost of opioid misuse is therefore the sum of multiplying the grouped number of fatalities by the associated VSL.
  + I find the percent change in cost between the estimate for 2015 and for 2017, and apply this change to the original CEA estimate. All in all, there was a 55% increase in my independently calculated costs, which I applied to the original CEA estimate of $431.7 billion. Finally, applying 4% inflation between December 2015 and December 2017 gives a total fatality cost of **$699.5 billion** (in 2017 dollars).
  + The CEA mentions Ruhm (2017), using the study’s finding of underreported opioid related causes on death certificates to justify a flat 25% increase in opioid deaths. I think this is ridiculous and do not apply such a multiplier. This does not actually impact the updated estimate, as I am interested the percent increase between the two time periods, which is not affected by this kind of multiplier.
* **Non-Fatality Costs**
  + The CEA uses Florence et al. (2016)’s estimate of $58 billion for the non-fatality cost of opioid misuse. Divided by the 1.9 million people with a “prescription opioid disorder” in 2015, this comes out to roughly $30,000 per person (in 2015 dollars). The CEA applies this cost to the 2.4 million with an “opioid use disorder”, which includes heroine use.
  + Assuming that the cost per person does not change, we can find the new total total non-fatality cost by multiplying the inflation adjusted cost per-person to the number of people in 2017 with an “opioid disorder” (includes heroin abuse).
  + [This](https://www.samhsa.gov/data/sites/default/files/cbhsq-reports/NSDUHFFR2017/NSDUHFFR2017.htm#sud10) report, which I believe is the updated version of what is citied in the CEA document, has the number of people experience an opioid use disorder in 2017 to be 2.1 million. This puts the total non-fatal costs at 2.1 million \* $31,506 = **$66.1 billion** (2017 dollars).
  + I also assume that the weighting used to divide this total non-fatal cost into health, criminal, and productivity costs does not change.

**Updating the Model Data**

* Hospitalization data were updated to 2016 from 2014. As with the 2014 data, state excel files had to be individually downloaded.
* Opioid death data were updated to 2017 from 2016. The same codes were used for MCD and for UCD.
* GPCI data were updated to 2019 from 2018. If 2019 data were missing I use 2018. I also use the same weighting mechanism as in 2018.
* Opioid addition data were unchanged.
* Criminal justice cost data were updated to 2015 from 2012.
* All covariates accesses from the “get\_acs” function were updated to 2017 from 2016.

**Besides updating the underlying data, no other changes were made to the model.**