Operator: Ten, nine, eight, seven, six.

Carrie Au-Yeung: Hi everyone. Thank you for joining us for today's presentation by SHADAC's Robert Hest and Colin Planalp, who will discuss state level opioid data available on SHADAC's State Health Compare and show how this data can be used to examine the United States opioid epidemic at the state level. My name is Carrie Au-Yeung. I'm a research fellow here at SHADAC. And I'll be moderating today's event.

First, a few technical details before we begin. Broadcast audio is available for today's webinar through your computer speakers. However, you can also listen today by telephone, by dialing 866-454-4207 and using passcode 975622. All phones will be muted for the duration of the event, due to the large number of attendees on the call.

However, you can submit questions for the question and answer portion of the event by using the chat feature at any time, or by sending us a tweet to @SHADAC. If you're having trouble accessing the online component of today's event, please call the ReadyTalk helpline at (800) 843-9166. If you're able to log into ReadyTalk, but are still having technical problems, you can also ask for help using the chat feature at any time.

Slides for today's event are available online at www.SHADAC.org/2018OpioidDataWebinar. And that URL is also in the chat box to the left. Finally, today's event is being recorded and we will notify all attendees by email when that recording is available. And now I'd like to hand the call over to SHADAC Director Lynn Blewett, who will say a few words before we begin.

Lynn Blewett: Thank you Carrie. Welcome to today's webinar on the opioid overdose crisis and our State Health Compare website where you can access the data we will be discussing today. I'm Lynn Blewett, Director of SHADAC, and a faculty member here at the University of Minnesota in the School of Public Health. As many of you may know, SHADAC is a health policy research center located at the University of Minnesota. Our experts and policy analysts work with federal and state data to inform health policy. We specialize in health insurance access, cost, use, and quality with a particular focus on the use of data to inform policy decisions to improve health of state and local populations.

I want to thank the Robert Wood Johnson Foundation for their continued support of our work and for funding of our new and improved data web tool, the State Health Compare. We encourage you to explore the data that's available and we will be discussing data on the opioid crisis in today's webinar. The opioid crisis is an important issue and one that's received increasing attention in recent years.

The US Centers for Disease Control and Prevention estimates that more than 60,000 people died of drug overdoses in 2016 and about two-thirds of those were caused by opioids. That makes opioid overdose deaths the most common, more common than motor vehicle accidents in the US. And the growth in overdose deaths seems to be accelerating. Preliminary data from the CDC suggests that death from drug overdoses have increased, growing to more than 72,000 in 2017.

As that commitment to connect state and federal policy makers with actionable health data, SHADAC added opioid overdose deaths to our State Health Compare website in 2017 and earlier this month we updated those data. Our goal today is to provide a data centered overview of the crisis at the national state level and connect people with data they need to better understand the issue in their state.

I encourage you to go check out the opioid and other data on State Health Compare after our webinar, and to ask questions during our Q&A session today. Thanks again to the Robert Wood Johnson Foundation for supporting our work. And now I'll pass the call back to Carrie Au-Yeung, who will introduce today's speaker.

Carrie Au-Yeung: Thank you Lynn. Our first speaker today, Robert Hest, is a research fellow here at SHADAC, where he manages SHADAC's State Health Compare, a web tool that Lynn mentioned, which allows analysts and policymakers to view state level data on a wide range of healthcare topics through a culture of health lens. Mr. Hest also works on SHADAC's Minnesota Long Term Care Projection Model or MN LTM, which projects future long-term care utilization and spending among older adults in Minnesota.

In addition, Mr. Hest helps track 1332 state innovation waivers for state-based reinsurance programs. Before joining the SHADAC staff as a research fellow in October 2017, Mr. Hest worked at SHADAC as a graduate research assistant. He earned his Master of Public Policy from the Humphrey School of Public Affairs with an emphasis in policy analysis and he received his Bachelor of Arts from Carlton College in Political Science. Our second speaker is SHADAC research fellow, Colin Planalp.

Mr. Planalp has more than seven years of experience in the healthcare sector, having worked in the fields of health communications and health policy. His work at SHADAC has included writing papers on employer sponsored health insurance and the evolving issue of health insurance churn, research state choices in benefit design from Medicaid expansion populations and state Medicaid initiatives to integrate behavioral and physical health, and providing technical assistance to states and US territories for the Center for Medicare and Medicaid Innovation and State Innovation Models, or SIM programs.

Before joining SHADAC, Mr. Planalp worked at the University of Missouri's Academic Medical Center in Columbia, Missouri, where he worked closely with researchers, healthcare providers and professionals, and hospital and clinical administrators. Mr. Planalp holds a Master's Degree in Public Affairs from the University of Missouri's Truman School of Public Affairs, and a Bachelor's Degree from the Missouri School of Journalism.

With that, I'll hand the controls over to Robert.

Robert Hest: Thanks everyone for joining us today. I'm excited to give you a quick demonstration of SHADAC's State Health Compare Data Dissemination web tool, highlighting the opioid related data we have available. State Health Compare is SHADAC's web tool where we have state and local estimates of more than 40 measures related to topics such as health insurance coverage, access to utilization costs and quality of care, health behaviors and outcomes in public health, and social and economic factors.

All of our measures are available as tables, maps, bar charts, trends, and state rankings, giving users the flexibility to visualize the data in multiple ways and perform different types of analyses. In addition, for most measures we provide policy relevant breakdowns by variables like age, race/ethnicity, coverage type, and education, among others. And when available, we provide margins of error in addition to point estimates, to give users the ability to compare estimates and perform statistical testing.

If you want more information about how to do significance testing using data from State Health Compare, you can check other brief on that topic linked in this slide. Finally, we also make it easy to download the data in a spreadsheet format. The estimates on State Health Compare come from 13 data sources, some of which are listed on this slide. One of the criteria we use when deciding on data sources to include was that estimates be potentially available for all states.

However, there is some suppression for some measures, either due to small sample sizes or if the data isn't available for the state for a particular year. Let's move to screen sharing and I'll walk you through how to find State Health Compare and access our data. The URL for State Health Compare is StateHealthCompare.SHADAC.org. You can also get to the sites from the SHADAC homepage here, by clicking the icon in the upper right hand corner.

Once you're on the State Health Compare landing page, you can access the estimates, by clicking "Explore the Data." You can see all the topic areas and measures that are available within each topic area. As I mentioned, many of these measures are available by further breakdowns, such as age, education, race/ethnicity, income, etc. If you select show available breakdowns you'll be able to see all the breakdowns available for each measure.

Under the health behavior section, you can see that we have two opioid measures available - opioid-related drug poisoning deaths broken down by opioid type and sales of opioid painkillers broken down by oxycodone versus hydrocodone. Let's look at our measure, Opioid-Related Drug Poisoning Deaths. This measure shows the age-adjusted rates of opioid-related drug poisoning deaths per 100,000 people broken down by opioid type.

A previous version of this measure broke down opioid deaths by heroin versus non-heroin opioids. That breakdown became less useful with the recent rise of overdose deaths from synthetic opioids such as fentanyl. So we updated it to distinguish between deaths from synthetic opioids like fentanyl and deaths from natural and semi-synthetic opioids, such as prescription opioid painkillers. As you can see when you select any measure on our site, you'll first see the most recent year of data displayed as a map.

On the top, the opioid type breakdown dropdown menu allows you to select data for heroin, natural, and semi-synthetic opioids or synthetic opioids. The slide below the map allows you to select data from previous years. Hovering over a state you can see the estimate for that state. So for example,

in Texas in 2016, there were 1.9 heroin-related opioid overdose deaths per 100,000 people. Now let's select rank to view our state rank chart. The state rank chart allows you to compare estimates among all states where data are available. The drop down menus at the top of the screen again allow you to select the opioid types, the timeframe - 2016 all the way back to 1999 - and the states you'd like to compare.

Here we're going to select all of the states. The state rank chart can be sorted alphabetically by state as it is by default, ascending from lowest value or descending from the highest value. So here we can see that the District of Columbia had the highest number of - the highest rate of opioid deaths related to heroin at 17.3 and Kansas had the lowest number at 1.2 deaths per 100,000 people. Let's go back to sorting by state.

You can also add the margins of error to the bars, which can be helpful if you want to robustly compare different state estimates. The yellow bar here represents a 95% confidence interval around the estimates. Hovering over Alabama, we can see that the state had a point estimate of 2.8 deaths with a margin of error of 0.5. This corresponds to a 95% confidence interval of 2.3 deaths to 3.3 deaths. Now let's move to the trend chart. The trend chart, as its name implies, allows you to see trends over time and it allows you to look at trends in two different ways.

First, the trend chart allows you to compare trends among multiple states. So for example, by comparing the United States, Alabama, Alaska and Arizona, we can compare the national trend in heroin related overdose deaths to trends in these specific states. The trend chart can simultaneously display trends in up to seven states. Alternatively, you can compare trends among the three opioid types, for one state, by selecting trend lines, show opioid type. Here we see the national trends in overdose deaths related to heroin, natural, and semi-synthetic opioids and synthetic opioids.

At the bottom of this and every other measure page, you'll find detailed source information, measure notes, and measure definitions that give you important context for each measure and its breakdown. In addition to maps, state ranks, and trends, each measure can be displayed as a customizable bar chart or as a table. Additionally, we do give you the option to download the data for any of our measures on State Health Compare in a spreadsheet format. This can be helpful if you want to do significance testing or create additional graphs or data visualization using our estimates.

To download the data, click "Download Data" up here and then either choose currently selected data or choose data to download. If we click "Choose Data to Download" we'll select the US and all states here, to select measures for those specific states. Next, we'll select a measure and breakdown we'd like to download. So in this case we'll select prescription opioid painkiller sales and opioid-related drug poisoning deaths. And finally, we'll select a timeframe of measures that we'd like to download.

So in this case for opioid painkiller sales, we'll select 2013 and 2017 and for drug poisoning deaths we'll select 2012 to 2016. By clicking "Download Data," we'll download a compressed folder with CSVs for each of these measures. With that, I'll hand it over to my colleague, Colin Planalp, who will go into more detail about what these data are and how they can be used to better understand the opioid crisis.

Colin Planalp: Thank you Robert. So here in a moment, I'm going to talk about the opioid crisis and some of these data that Robert was going over. But first, I want to start out by giving some background on opioids. They're a family of drugs that act on the opioid receptors in the pleasure centers of the brain that can both relieve pain and cause intense sensations of pleasure or euphoria. And they're also potentially addictive.

There are three types of opioids: natural opioids, which are derived directly from the opium poppy, the pods of which you can see here on the left, and examples include morphine and codeine. Semi-synthetic opioids, which are synthesized from natural opioids. These are often more potent than natural opioids. Examples are common prescription painkillers like oxycodone, also known by the brand name, OxyContin and the illegal opioid heroin. And synthetic opioids, which are similar to other opioids, but don't require opium poppies as a raw ingredient. These include some of the most potent types of opioids.

Examples include fentanyl, which is sometimes used as a prescription painkiller, but also recently has been manufactured and sold by international drug traffickers. While there are variations in the potency and chemical properties of different opioids, because they act on the same parts of the brain they have similar effects. That's why a person who is addicted to prescription painkillers may switch to heroin - it becomes cheaper and easier to obtain.

I also want to talk a little bit about the recent history of the opioid crisis. Attention to the issue has grown since 2011 when the US Centers for Disease Control and Prevention declared that death from prescription painkillers had become an epidemic. Since then, states and the federal government have taken various steps aimed at reducing deaths from prescription opioids, such as developing prescribing guidelines to educate and encourage providers to follow best practices, creating and improving prescription drug monitoring programs to track prescribing and dispensing of controlled substances including prescription opioids, and increasing enforcement on pill mills that improperly prescribe opioid painkillers.

Additionally, death rates from prescription painkillers declined, but that slack has been taken up by illegally trafficked opioids, first by fentanyl and then more recently by synthetic opioids like fentanyl. That's likely because people will switch from using prescription opioids to heroin and counterfeit pain pills. Because of growing interest in the opioid crisis recently, in 2017 SHADAC added data on opioid-associated overdose deaths to our State Health Compare website. The data on State

Health Compare come from the National Center for Health Statistics Vital Statistic System and they're based on death records that states report to the CDC.

When SHADAC first added those data in 2017, we broke out the overdose deaths by heroin-related and non-heroin opioid related. But this year we updated State Health Compare with different categories that correspond to the evolving epidemic, which in the past few years has shifted from being overwhelmingly driven by prescription painkillers, to mostly driven by heroin and synthetic opioids. So in State Health Compare, you can examine data from natural and semi-synthetic opioids which includes most prescription opioid painkillers like oxycodone, synthetic opioids like fentanyl and heroin.

It's worth noting that these categories don't perfectly correspond with the chemical types of opioids that I described earlier but instead are based on how overdoses are coded in death records. For example, heroin is chemically a semi-synthetic opioid, but it's recorded differently on death records than other semi-synthetic opioids because of its illegal status. There are a few other considerations or limitations to the State Health Compare data that I want to point out. First, the opioid categories are not mutually exclusive.

For example, if a person was found to have overdosed on both heroin and synthetic opioids together that death could be recorded as both types of opioids, so you can't add the different categories for a combined rate. Second, there are some known issues of underreporting of opioid related overdose deaths, and those generally come in two forms. One is systematic year over year underreporting of opioid-related deaths because death records instead list deaths as drug overdoses generally, but don't specify the type of drug associated.

That happens to some extent in most states, but research suggests that some states underreport opioid deaths much more than others. Another single year reporting problem is in individual states, which the CDC acknowledges in data notes, which we link too, through State Health Compare and

which often are obvious when looking at trend data. And third, for privacy reasons, the CDC suppresses death rates that are based on small numbers of deaths, 20 or fewer. That means that some death rates will be missing, particularly in states with relatively small populations and especially in earlier years of the crisis when overdoses were less common.

Before talking about the states, I want to look at the opioid crisis at the US level. The first thing I want to share is a chart showing the trend since 2000 of increasing opioid overdose deaths including heroin, synthetic opioids, and natural and semi-synthetic opioids, which I'm going to call prescription opioids here for simplicity. Here you can see that in 2000, death rates were at or below one per 100,000 people for each of the three categories. But you can also see in the chart and the data levels on the left, that death rates have increased over time.

Around 2011 however, a second - I want to pause here on 2011 for a moment, to point out the waves of the opioid crisis, which become apparent when you look at the trend in overdose deaths over time. In the first wave we see here from 2000 to 2011, deaths from heroin and synthetic opioids are relatively stable. But deaths from prescription opioids increased steadily, more than tripling in a decade. It's now widely believed that the increase in deaths from prescription opioids is related to an increase in prescribing of opioid painkillers such as oxycodone and hydrocodone.

The US Substance Abuse and Mental Health Services Administration estimates that by 2016 more than 2 million people suffered from opioid use disorders and research suggests that most of those people began by abusing prescription opioids prescribed to themselves or to friends and families. In some cases those prescriptions came from illicit pill mills, but in many cases those prescriptions likely came from well-intentioned providers looking to treat their patients' pain.

There are numerous ongoing lawsuits alleging that pharmaceutical companies contributed to overprescribing of opioid painkillers by downplaying evidence of their addictiveness and inappropriately marketing the drugs. Around 2011 however, a second wave of the opioid crisis

struck. Since then, death rates from prescription opioids have slowed, while death rates from heroin and synthetic opioids have increased precipitously.

It's not entirely clear what caused the shift. There are numerous possible reasons. For example, it's possible the efforts to address the prescription opioid crisis reduced the supply of pills and drove addicted people toward heroin as a substitute. It's also possible that illicit traffickers simply recognized the new potential market and increased supplies, drawing people away from prescription opioids and toward heroin as a cheaper and easily accessible alternative. Regardless of what caused that shift, research shows a link between abusive prescription painkillers and heroin. For example, a 2013 study found that 80% of people in treatment for heroin addiction reported that they began by abusing prescription opioid painkillers.

By 2015, death rates on heroin were about the same as prescription opioids. And by 2016, death rates from synthetic opioids had outpaced heroin and prescription opioids. Here you can clearly see the two waves of the opioid crisis highlighted. This chart shows death rates from prescription opioids with a relatively steady increase from 2000 to about 2011. After a brief drop in 2012 and 2013, they appear to have resumed their growth in 2015 and 2016. Overall, by 2016, death rates from prescription opioids were 4.4 times larger than 2000, a statistically significant increase.

This chart shows death rates from heroin, which remained relatively stable until about 2011, about the same time that death rates from prescription opioids began to slow. Overall, heroin overdose deaths in 2016, were about 7.5 times the rate in 2000. Like heroin, death rates from synthetic opioids stayed relatively stable until recently, increasing sharply since 2014. But despite their late start, synthetic opioids have seen the largest rise in overdose deaths. By 2016 synthetic opioid deaths were more than 20 times the rate in 2000.

Next, I'm going to talk about the prescription opioid crisis among the states. This map shows state rates of overdose death rates from prescription opioids compared to the US rate, with different

colors indicating whether state rates are significantly different than the US, based on statistical testing. The dark teal states, like California and Texas, have rates that are significantly lower than the US rate of 4.4 deaths per 100,000 people.

The light teal states, like Arizona and Virginia, have rates that are not significantly different than the US rate. And orange states, like Wisconsin and Maine, have rates that are significantly higher than the US rate. In this map you can see high rates of prescription opioid deaths across the country. Although many of the orange and light teal states are found in the Eastern US, the Western US also has states with relatively high rates.

This chart shows two things - first, it ranks states' 2016 prescription opioid death rates from highest to lowest. Here we see that West Virginia in 2016 had the highest rate, at 18.5 deaths per 100,000, while Nebraska had the lowest measurable rate at 1.2 deaths per 100,000. Second, the color of the bar shows whether a state's death rate has changed significantly since the year 2000. The light teal indicates a state's rate has increased significantly. A dark teal indicates that it hasn't changed significantly. And a gray indicates that testing wasn't possible because the state's rate from 2000 was suppressed because there were so few deaths in 2000, 20 or fewer.

Of the 50 states and the District of Columbia, 31 have experienced significant increases from overdose deaths from prescription opioids, since 2000. Only one state, Hawaii, experienced no significant change. And no state saw significant declines. And testing was not possible for 19 states, because their 2000 rates were suppressed due to small numbers of deaths. This chart shows opioid overdose deaths from Utah, which in 2016 had the second highest rate of deaths from prescription opioids.

I wanted to show this chart because it illustrates the importance of state-level data in understanding the opioid crisis. Unlike the national trend in which deaths from heroin and synthetic opioids has surpassed prescription opioids, Utah hasn't seen that same pattern. Instead, deaths from synthetic

opioids have remained relatively stable and heroin deaths have grown a bit but not as steady as the US compared to prescription opioids. But death from prescription opioids remains higher than the US rate.

Next, we'll look at heroin death rates. This map shows heroin overdose deaths compared to the US rate of 4.9 per 100,000 people in 2016. Again, orange states have significantly higher rates than the US rate, dark teal are significantly lower and light teal are not significantly different than the US. Some link deaths from prescription opioids. This map shows that the states with the highest rates of heroin deaths are much more geographically concentrated mostly in a block east of the Mississippi River.

Because it sticks out, I also want to point out Indiana here, which is the only teal state in a big block of orange. As I mentioned earlier, some states consistently underreport deaths from opioids. And research has found that Indiana is one of these states and has one of the largest reporting gaps. So it likely should be orange as well.

This chart ranks states' 2016 heroin overdose deaths. From the District of Columbia with the highest rate at 17.3 deaths per 100,000, while Mississippi and Kansas had the lowest measurable rate at 1.2 deaths per 100,000 people. The colors also show whether states' heroin death rates have increased significantly since 2000. We see that 20 states saw significant increases, but none saw declines or remained statistically stable. Significant testing was not possible for 31 states because their rates from 2000 were suppressed due to a small number of heroin deaths.

This chart compares 2016 opioid overdose death rates from the District of Columbia, which again had the highest heroin death rate in 2016, against the US death rates. As you can see, the pattern in DC is similar to the US with deaths from synthetic opioids highest followed by heroin and then prescription opioids. But the rates in DC are significantly higher than the US. DC's death rate from synthetic opioids is more than triple the US rate. And its death rate from heroin is also more than

triple the US rate, while the death rate from prescription is not quite double the US rate. That pattern is consistent with something we see nationally that large urban areas like DC tend to have higher death rates from heroin and synthetic opioids, while rural areas tend to have higher death rates from prescription opioids.

Last, I want to look at synthetic opioid death rates across the states. This map shows states overdose death rates from synthetic opioids. You'll notice that it looks quite similar to the heroin map with most of the states that are most severely impacted being those east of the Mississippi River. That geographic overlap is consistent with the belief that illegal drug traffickers have begun dealing synthetic opioids like fentanyl alongside their traditional substances like heroin and cocaine.

Many law enforcement agencies believe that drug traffickers are, in some cases, beginning to mix synthetic opioids like fentanyl with heroin, using them to manufacture counterfeit pain pills and other drugs, to cheaply increase their potency, often with deadly consequences. Here we see that New Hampshire had the highest death rate from synthetic opioids in 2016 at 30.3 per 100,000 people, while California and Texas had the lowest measurable rates at 0.9 per 100,000 people.

Fourteen states have experience this statistically significant increases in synthetic opioid overdose death rates since the year 2000 and none have seen declines or remain statistically stable. Significance testing was not possible for the remaining 37 states, because their rates from 2000 were suppressed due to a small number of deaths, again fewer than 20. I also wanted to share West Virginia as an example for a few reasons.

First, West Virginia and surrounding states like Ohio and Kentucky were among the first to experience the prescription opioid crisis and the later shifts to heroin and synthetic opioids. So there may be some lessons to learn from their experiences. Second, West Virginia has consistently had among the highest opioid death rates in the country. For example, in 2016 West Virginia had the highest death rate from prescription opioids, as well as the second highest death rates from

both heroin and synthetic opioids. Third, although West Virginia opioid crisis has been much more severe than most other states, it's generally tracked the US trend overall. On this slide you can see that both West Virginia and the US death rates from synthetic opioids remained relatively stable until recently. Then they started growing dramatically in the years since 2013.

But West Virginia's experience with synthetic opioids has been exaggerated. In 2016 the state's death rate was more than four times the US rate. This slide shows heroin death rates, which remain relatively stable through 2010 nationally. In West Virginia deaths from heroin were so uncommon that rates were mostly suppressed until 2010 when the state saw a similar increase to the US. But heroin deaths in West Virginia increased more rapidly than in the US generally. In 2016, the state's rate was triple the US rate.

This slide shows death from prescription opioid painkillers, which unlike heroin and synthetic opioids, have increased steadily since 2000. This chart shows a couple of things - first, it shows how West Virginia was early to the opioid crisis. In 2000, the state's death rate was about the same as the US, one per 100,000 people. But by 2003, West Virginia's death rate from prescription opioids was already quadruple the US rate. Despite some peaks and valleys, West Virginia's trend is similar to the national trend, a steady increase in death rates through about 2011 when that increase slowed.

But again, West Virginia's rate was higher than the US in 2016; in this case, four times higher than the US rate. That concludes my slides. Here in just a moment I'm going to hand the reins back to Carrie to moderate our question and answer session. But I also want to encourage people to visit SHADAC's State Health Compare website, where you can find all of the data that I presented today. We also have a variety of other data which Robert touched on, including state level data from the US Drug Enforcement Administration, on sales of the two most common opioid prescription painkillers, oxycodone and hydrocodone.

I also want to mention that SHADAC has produced a couple of briefs on the topic looking at both state rates of opioid-related overdose deaths and some data on national trends in opioid-related overdose deaths that look at differences across subpopulations such as age, gender, and geographies. So those will be coming out in a follow-up email to this webinar.

Carrie Au-Yeung: Great. Thank you, Colin, and also to plug those briefs further, if you've been on our web page where we have the slides for today's presentation, those briefs are linked to at the bottom of the page. And again, that URL is www.SHADAC.org/2018OpioidDataWebinar. That's our slides for today and those two briefs are linked there. But we will also include those links to those briefs in a follow up email along with the webinar recording. And now we're going to move onto our question and answer portion of today's event.

We have received a few questions already and I encourage everyone to go ahead and continue to submit any questions you might have. You can use the chat feature on the left hand side of your viewing screen or you can send questions on Twitter to us at @SHADAC. That's @SHADAC. All right. The first question is kind of a nice follow-up to the analysis you just did on West Virginia, Colin. Is there a policy analysis that identifies the factors that contribute to some states having significantly higher opioid death rates compared to other states?

For example, why do states east of the Mississippi seem to have generally higher death rates?

Colin Planalp: Yes. So that's a great question. I think that there is still a lot of research going on in this area and there aren't necessarily a lot of hard answers that are already determined. There are some factors that likely have played into that. If you go look at State Health Compare, one nice way to understand a little bit of this crisis is to look at variation and the quantity of opioids being prescribed across states. But there is a surprising amount of variation across time and the amount of opioids that are prescribed in a state, such as Mississippi, versus a state like West Virginia or Nevada, with relatively high opioid overdose deaths.

Another factor that people have, that some researchers have raised into this issue, is that there may be other economic and social factors that could be playing a part in the use and abuse of prescription opioids and the later shift to heroin and synthetic opioids. A couple of researchers from Princeton, Anne Case and Angus Deaton, a couple of years ago released their first research paper on the topic of depths of despair.

And in that study they found a surprising increase in mortality among some groups of Americans, especially I believe white, middle-aged Americans. And one idea that they posit in there is that this could be related to despair that people are facing and using opioids as a way to kind of numb that despair related to economic anxiety and economic inequality with some groups facing economic prospects that aren't as rosy as they had expected in their early lives.

Carrie Au-Yeung: Okay. Thanks. We have a question here about the limitation of opioid category being not mutually exclusive and therefore not combinable in terms of death rates. Do you have any sense for how common it is for a death to be coded with more than one opioid category?

Colin Planalp: I don't know the answer to that off the top of my head. That's something that if you want to contact us we could work with you on kind of figuring that out. I will note that there's no hard inability to be able to figure that out. SHADAC, in pulling together these data for State Health Compare, made a choice that it was more useful to look at the differences and the trends in those three types of opioids - natural and semi-synthetic also known as prescription painkillers, heroin and synthetic opioids, than it was to look at the combined death rates of all three or other opioids as well.

But like I said that's something where if you're interested SHADAC can talk with you about how you might be able to get those data and how to analyze them.

Carrie Au-Yeung: Okay. And this kind of follows along nicely with that question. Is the death data that we use based on the actual accounts per death certificate, or does it involve a probabilistic sample of death records?

Colin Planalp: So my understanding is those data that the CDC makes available through the National Center for Health Statistics which SHADAC uses for our State Health Compare website, are based on all deaths that are reported to the CDC, so that shouldn't be a probabilistic sample. I believe that maybe where this question is coming from is the reference - is because we did some statistical testing and because we have margins of error in our State Health Compare data. And what those are is more a measure of error and population size. So they're rates, not a measure of error in the number of deaths.

Carrie Au-Yeung: Okay. That makes sense. Okay. And then a question for Robert. Can you talk about how often the data of State Health Compare is updated?

Robert Hest: Yes. So we update the data on State Health Compare as new data become available. So that's - for most of our data sources that means that we update those measures once a year. The timing of those updates really just depends on when the data is made available to us. But frequently data comes out - tends to come out starting this time of year and running through the end of the year. And Colin, do you recall when the data on opioid deaths might be updated?

Colin Planalp: Yes. So I believe the CDC typically updates those data toward the end of the year, so around December. So once SHADAC has some time to access those data and prepare them for State Health Compare, it'll probably be the early part of 2019 when we'll have the 2017 data available on State Health Compare.

Carrie Au-Yeung: Another question for Colin. Does the category semi-synthetic or prescription opioids include potential abuse of replacement therapy drugs such as methadone or buprenorphine and if not, why not?

Colin Planalp: Yes. So that is a great question. So there are - I want to back up a little bit here. There are three drugs that are FDA approved for the treatment of opioid use disorders, as part of medication-assisted treatment. Those include buprenorphine and methadone, which our questioner asked about, as well as naltrexone, which is a non- opioid, so a different type of medication that wouldn't be included here in overdose deaths.

So buprenorphine would be included in the category of natural and semi-synthetic opioid overdose deaths. So if someone were to die of an overdose from buprenorphine that would be included in those data on natural and semi-synthetic opioids. Methadone, we don't, on State Health Compare, include data on methadone deaths. Those are typically coded separately from other opioid deaths as their own category of methadone related deaths, even though even though methadone is a type of synthetic opioid. That's likely because it's regulated and treated differently under federal law.

And the CDC data that we use to pull together the data for State Health Compare, do include data on methadone deaths, but we made the choice not to include those for a couple of reasons on State Health Compare. First is there are so many fewer deaths from methadone than these other three types of opioids that we include on State Health Compare that we decided it wasn't quite the same and we would have run into a lot of missing data that were suppressed due to the small number of deaths.

And the other issue is methadone hasn't seen that same trend of increasing deaths over time as those other three categories for opioids. So if people are interested in talking with us about that issue, we'd be happy to work with you in explaining how to access those data and helping you to

analyze those data. But it's kind of a different trend and you would run into limitations of the small numbers of deaths related to methadone.

Carrie Au-Yeung: Another question for you, Colin. On your limitations slide, you mentioned underreporting of opioid deaths in some states, such as Indiana. Could you speak some more about that? Are there other states besides Indiana who face that situation?

Colin Planalp: Sure. So there have been a couple of studies that have found that nationally opioid deaths are likely underreported, probably by about 20% nationwide because they list drug overdose and don't specify a specific drug. And that percent of 20% is not inconsequential. If that were true for 2016 it could raise the opioid death count from about 63,000 to more than 76,000 or add about 13,000 deaths.

One of those studies looks specifically at differences across state and found that certain states are more likely than others to underreport deaths. For example, that study found that Indiana's opioid death rate was probably about double the rate that they reported, likely because Indiana hasn't historically required toxicology reports when overdoses are suspected. And there are other states that have relatively high underreporting of opioid prescribing based on that research. A couple of examples are Pennsylvania and Louisiana.

And if anyone is interested more in that topic of underreporting and the differences across state, please feel free to reach out to SHADAC and we can share citations for those studies and talk with you about those.

Carrie Au-Yeung: Thank you. Robert, it looks like we have a question for you that just came in. Is it possible to search State Health Compare's database for opioid death rates for children, persons under 21 of age, available as a breakdown?

Robert Hest: We don't have age available as a breakdown for the specific measure on State Health Compare. And I think that that's primarily because there are many states that have not - there are few opioid related deaths. And so if you break down the data by - in addition to opioid type, to break it down by age, you end up with a lot of states where we wouldn't have data available or the data would be suppressed. And so we made a choice to not do that breakdown by age. Colin, did you have something you wanted to add there?

Colin Planalp: Yes. And I would - for people interested in differences across ages, like Robert was saying, those data aren't available in State Health Compare, primarily because we would run into a lot of suppressed data at the state level. Back to the issue briefs that I mentioned a few minutes ago, that'll come out in a follow-up email to this webinar, one of the issue briefs that we did from a prior year did look at children and ages of different adults. And what we found at the national level, not the state level, is that rates for children are really quite low compared to adults.

There is some variation by type of opioid. For example, heroin overdose death rates are generally highest among young adults from about I think around 21 to 30 or so, while deaths from non-heroin and those types of prescription opioids tend to be higher among middle aged to older adults. So from that range, from about 30 to 50, have the highest death rates from prescription opioids.

Carrie Au-Yeung: Okay. We had a few questions about specific states that you highlighted in your presentation, Colin. The first one is about Utah and why is Utah so different than the national trend? Are there any other states that are unexpected outliers in terms of opioid abuse?

Colin Planalp: Yes. So that's a really good question. The first thing to mention is part of that makes Utah different than the national trend is it hasn't seen that same rise to the same extent in deaths from heroin and synthetic opioid opioids. And that likely is at least partially related to geography. Most of the states with high rates of deaths from heroin and synthetic opioids, are in the eastern half of

the country and some researchers believe that that's likely due to differences in heroin trafficking patterns across the United States.

Heroin sold in the eastern United States is typically white powder heroin that is easier to mix with fentanyl and that plays a role in the increase in synthetic opioid overdose deaths in recent years. Whereas the western US, most of the heroin traffic there is called black tar heroin and it seems that that's harder to mix with synthetic opioids. So part of that is geographic, part of that is also because Utah has a high rate of overdose deaths from prescription opioids.

It's not entirely clear why Utah has a high rate of prescription opioid overdose deaths, but it's not entirely unique in the western United States. Nevada also has pretty high death rates from prescription opioids. So does Arizona, and New Mexico. So there are some geographic considerations and there are some questions that are still out there as to why prescription opioids are higher in some western states and not others.

Carrie Au-Yeung: Okay. The other question had to do with West Virginia and why the trends in West Virginia are so volatile from year to year for prescription opioids with the peaks and valleys that you had mentioned. And another question was why were there some gaps for heroin in West Virginia from year to year?

Colin Planalp: Yes. So I'll address both of those questions. First, to the peaks and valleys, those valleys are likely because of some issues in individual years with reporting of opioid overdose deaths in Virginia. And that's a topic that the notes and State Health Compare provide a link out to the CDC website where it provides additional detail on why and where those known issues of single year reporting are, in some states.

With the missing data for heroin in some years in that chart for West Virginia, that's because those years especially before 2010, have a lot of suppressed data because West Virginia has a relatively

small population compared to some states and because there are so few heroin deaths in West Virginia, before 2010.

Carrie Au-Yeung: Okay. A question for you, Robert. Would the State Health Compare database allow for comparisons of opioid death rates by state, which has expanded Medicaid coverage via the ACA versus states that did not expand?

Robert Hest: So it kind of depends on how you want to approach that. There, you know, if you want to look you can look at individual states that have expanded Medicaid and individual states that have not expanded Medicaid, and compare between those states their rates of opioid overdose deaths. On State Health Compare we don't have - we don't pool death rates in those states, broken down by Medicaid expansion status. But that's definitely something that we'd be interested in talking with you about, if you are interested in that sort of analysis.

Carrie Au-Yeung: Another question - this one specific to California. It says there didn't appear to be any statistical changes across opioid use in California. Does that suggest steady consumption across all opioid use? Any thoughts on that one, Colin?

Colin Planalp: So California, for reasons that I'm not sure anyone really knows, hasn't seen very high rates of opioid overdose deaths or very large increases over time. It's not clear whether that is because California has lower rates of consumption of opioids. That is a question that you could kind of start to think about by looking at those DEA data on oxycodone and hydrocodone sales that we include in State Health Compare. But you're right, California is kind of bucking the national trend with the opioid crisis as are a handful of other states.

Carrie Au-Yeung: Okay. A question for Robert that involves jumping back into State Health Compare. Someone said they noticed a button on State Health Compare that says "Get Image." What does that do?

Robert Hest: So on any of the pages on State Health Compare, for any of our measures - so for example, like the trend page or the State Compare Chart, you can export those as an image that you can use and use that. So if we go here to our opioid-related drug poisoning deaths default again is a map. So if you wanted to download this map as an image, to have as a static image rather than having this kind of interactive on our website, you can select what you want and then if you click this button, "Get Image," it's going to generate an image that you can download and use.

So you - to download that you just right click on it and select "Save Image As" and it will download to your computer. And you can do that for the state rank or the trend as well.

Carrie Au-Yeung: As long as we're in here, we also had a question about whether you could demonstrate how to access the database and search by other factors such as age. I guess that won't be possible for this particular variable.

Robert Hest: So yes, so we - if you - we do have age as a breakdown for a lot of the measures on State Health Compare. I'd say the best way to see which measures are broken down by age - once you're on this, our main measure page, the Explore Data page, if you check this box at the top that's "Show Available Breakdowns," that's going to show all of the breakdowns that are available for each measure. So you can see that for a lot of our measures, age is one of the listed breakdowns. And you can look at any of those measures.

For example, percent who spent the night in the hospital in the past year. You can break that down by age. We have that broken down by age and these are the age categories we would have available. And so you can look at the rates of hospitalization by age here for this measure.

Carrie Au-Yeung: All right. That's going to put us back to the presentation. Well, we're approaching the end of the hour, so I will move onto closing remarks. As mentioned earlier, we will reach out to all

attendees via email when the webinar recording for today is available. And we'll also include several issue briefs mentioned on the webinar - two from Colin and then one from Robert on statistical (vesting). To stay updated on SHADAC research, we encourage you to follow SHADAC on Twitter using the handle @SHADAC, listed at the bottom of the slide here.

You can also contact Robert or Colin directly or the SHADAC email more broadly, with follow-up questions. I want to thank Robert and Colin for taking the time to share their work with us. And thanks again to the Robert Wood Johnson Foundation for supporting this work. Finally, thank you to everyone who joined us for today's event. That concludes the webinar and I hope everyone has a great afternoon. Thank you.