

Per Ostmo:

Now it is my pleasure to introduce our presenter. Kristie Thompson, a research fellow at the North Carolina Rural Health Research Program since 2013, works with the director managing overall operations, dissemination, reporting, and communications in addition to her research contributions. Kristie's expertise is broadly based in health policy as a research fellow, project manager, grant maker, and journal editor. Previously, Kristie worked with the North Carolina Institute of Medicine, where she served as a project director, as assistant vice president of the institute, and as the managing editor of the North Carolina Medical Journal. Kristie has also worked with the North Carolina Health and Wellness Trust Fund, where she served as a research and policy officer and as a research associate with the Cecil G. Sheps Center for Health Services Research. Now, today, Kristie will share the 2023 Rural Population Health Chartbook and walk us through how to interpret all the data within. So thank you, Kristie, and I'll leave it to you.

Kristie Thompso...:

Hey everyone, thank you so much for having me. I'm excited to represent my colleagues at the North Carolina Rural Health Research Program today, and I'm also excited to be sharing information about our new rural population health chartbook.

So, what I'm here to do today, a few goals, are to explain the contents of the chartbook and to show you how to read the charts and make them relevant to your state. I'm also going to challenge you to think a little bit about what kind of person you are.

So first, I want to acknowledge that there are already a lot of population health chartbooks out there on the streets. The ones I have listed here are national chartbooks. So if you're starting your journey looking for data to describe need in a proposal or thinking about how to allocate funds, you might start with some of these sources. These are great sources. We used the County Health Rankings & Roadmaps as one of our sources in the chartbook. The only thing with these sources is they don't stratify for rural and urban. However, there's a ton of chartbooks that do, and this is a list of them. Which one you use might depend on whether you're looking at national level data, regional, individual, state data, or county data. These are all other great resources that you can use as you're trying to describe rural data in your state or rural population health in your state.

So what makes our chartbook special or different? We like to think that our chartbook is special because it focuses on county-level data. Our goal was to show variation within the states. Not one rural community is like every other rural community, so we wanted to capture these differences. We emphasize the distribution of the county rates for each indicator in each state instead of focusing solely on the averages. We also compare each state's county rates to all the US county rates. So you have an idea of where you are in that ranking. We show how population health indicators can vary across the country by region and by state. We obviously compare rural and urban. And the chartbook is designed for single-page compilations, so you can extract pages from the PDF

and build your own smaller chartbook just for your state, if that's what you'd like to do.

Some other key uses for this chartbook: We've organized a ton of data and tried to distill it into snapshot pages so that you can focus on pressing issues, see what things might appear most urgent to you when you look at the charts; identify disparities between rural and urban, between sex, race, and ethnicity; position your state among other states, see how you rank compared to other states in the United States, too many times saying states; and to look for regional patterns using the maps.

These are our data sources. We looked at the County Health Rankings & Roadmaps, CMS Provider of Services, Census Bureau, American Community Survey, Housing and Transportation Affordability Index, CDC Wonder's Compressed Mortality File, and the USDA's Rural Atlas. Each of these has county-level data, which was important for everything that we put together here.

We defined rural as non-metro counties. We looked at 33 indicators across five health domains: access to care, health risks and outcomes, mortality, social determinants of health, socioeconomic factors. We looked at each of these indicators for all US counties, 3,142 counties, 1,962 of those are rural. So when you do the math, that's over 103,000 data points. That's a lot of data.

So what's a great way to condense and display a large amount of data without obscuring the details? I'll give you a hint. Research has shown that there are two kinds of people in the world, and the evidence is pretty clear. Most of them hate box plots, but guess which group I work with? Yep, the group that likes box plots. We use a ridiculous amount of box plots in this chartbook. If you've seen it already, which I'm guessing if you're on this webinar, you have, you might have counted that there's 78 pages with a minimum of 33 box plots per page. That could be horrifying to some, but we think it's a good thing. And here's why.

The box plots allow us to show the distribution that I mentioned earlier to expand beyond the average. The average alone might hide the counties that are doing really poorly or exceptionally well. You can also use these to show the spread of the data. How far are the rates from the center of distribution? How far are they from normal? We can also look at the skewness of the data. Is it centered in a normal distribution or do you have clusters of rates at the high end, at the low end? What is the shape of this data? We can also use the box plots to compare distributions of multiple sets of data. So we can use it to compare states against states, indicators against indicators. It's really helpful if you've got 45 to 50 states to compare or 33 indicators to compare. And lastly, and not lastly, but also, it allows us to look at unusual observations. We can see outliers, things that are abnormally far from the middle of the data. And in this case, this is important, we want to know if one of our county rates is way out of range.

We have five different types of charts in the chartbook. The first one is the state summary box plot. This one helps us identify the most pressing issues in our state. It'll be the first one that I explained today. Second, we have the rural and urban disparity bar charts. We also call it the lollipop chart. I think you can probably see why. It helps us compare state, rural, and urban averages so that we can see how much disparity there might be between those two values. We also have indicator box plots by region and by state. So this has an indicator with all the states across the x-axis. And it lets us look at North Carolina compared to South Carolina compared to California, or region by region. We have bar charts that allow us to compare sex, race, and ethnicity across census divisions. And we have an... Ooh, too much. We have a national map or national maps that help us look for regional patterns.

So how do we use these charts? I'm going to use my home state of North Carolina to help show you how we can use the charts. I'm going to use it to help answer each one of these questions. The first question, what are the most pressing issues in my state? Does North Carolina have rural-urban health disparities? How does North Carolina compare to the rest of the country? Is North Carolina part of a regional issue? And are there differences based on sex, race, and ethnicity in my census division?

The state summary box plots, the first thing you see here, this is page one of 33 box plots on a page. So before we launch into that, I'd like to do a quick review of how we've constructed this and why. I think it's helpful to think of the state summary box plots in layers. So first layer, layer one, organizes county data on a national level, and layer two organizes the county data on a state level.

So layer one, we'll think of layer one as the base layer for all of the state summary charts. And I'm going to try to use... Do you see my cursor? So what we've done in layer one for each indicator, we've collected rates for all the counties. I've got the little chart here with the rates on all the counties, and they're organized from lowest to highest on this chart. And then we've sorted the rates, or we've divided them into equal groups. Oops, too far. Okay, four equal groups. So you can see the first group is quartile one, second group is quartile two, quartile three, and quartile four. We're setting up a national distribution using percentiles to rank all of the scores from lowest to highest. Each group has about 785 county values for each indicator. So if this were obesity, these would be the lowest, 785 county obesity rates in the United States.

So following that, we add the second layer, which is the box and whisker plot. So the blue box and the whiskers, these capture all over the data. We're going to say this is North Carolina. So these would capture all of North Carolina rural data for obesity. So after we've organized all the county data points in the nation on this layer one, which I showed you before, this table in the back, we draw a blue box plot around all the North Carolina rural values to organize that data. So it takes the data from the minimum to the maximum, organizes it there.

We're going to talk more about that on the next slide, but I want to remind you, as we're going on, that each of these is a quartile and it has 25% of the data. So zero to 25% of US values, 25 to 50% of US values. The y-axis on our state summary charts are national percentiles. I'll remind you that again when we get to the actual chart. And important also to recognize is that the 50th percentile is the middle value of all of the values. So this half of the US county rates will be below the 50th percentile and half will be above the 50th percentile.

Okay, now we're going to look at the data inside the blue box plot. Now, that's our state data right here, plopped on top of the national data back behind. So we're pretending North Carolina has 20 rural counties, 20 rural dots we've captured with a box plot. We have half of the... Excuse me, I'm sorry. Looking at this, we also have a middle value in the state box plot. That's the median, the 50th percentile for the North Carolina rural county values. So we'll know that at the median, half of our values are below the median and half are above. Just like the national 50th percentile, half of the values in the country are below and half are above. For the state, this is our halfway mark, or not halfway, our middle way. We also have the blue box drawn around the second quartile and the third quartile. And this represents 50% of all of the data values for North Carolina rural counties. The rest of the 50% of the data is in the quartile one, 25% of our lowest county values, and quartile four, which will have our highest county values.

So box plots, the other thing to know when you're looking at the box spots, and you'll see this in our charts, they're not always the same shape. It depends on how the data is distributed. You might have 10 values that are all the same all at this area here. So then you would have a more scrunched up area there. Or you might have them all spread far, like this is. We have a little bit of spread there, but more clustering here, which makes the shape of our box plot.

Okay, interpreting the box plot on the national scale. So if we're looking at obesity rates, we know that higher is worse. So we're wanting to look to see what is the most pressing part of this problem on our box plot, and looking at the highest rates, they're up here. What we're going to do is, we're looking at, the highest rates are above the 75th percentile. The lowest rates are below the 25th percentile. 50 is right in the middle, where half of the rates are below, half are above. So that makes sense that these would be the top 25% and these would be the low 25%. So we see we have quite a few county values up here. Even if these dots weren't here, you'd be able to see that the median is pretty close to the 75th percentile. So we know that close to half of our values are up in this higher range for our county, whereas the other half of the values are below this point. And we have only one value down here that's in the lowest 25% of the country.

So when you look on the next couple of charts where we have all of these, we won't have the dots, we'll just have the box plot. So what you'll be looking for is, what part of my box plot is above the 75th percentile or below the 25th percentile? And I'll talk about how to tell which one, which direction to look as

we get to the charts. Any questions so far? This is a good place to pause because I've stumbled through some of these box plot explanations.

Per Ostmo: Yeah, Kristie, we do have a couple of questions we can tackle for now. So first, there was this slide at the beginning that showed the dates for the data collected, and I believe it was 2011 and 2017. So this chartbook is really collecting pre-COVID era data. Is there a plan or possibility to update the chartbook with post-COVID data? And what kind of work would that entail?

Kristie Thompso...: Sure. This is a multi-year project that involves quite a bit of work, but we'd love to do it again. I'm not sure... We don't have funding to do that anytime soon, and it would probably take several years to truly get a collection of data to call it post-COVID. But yeah, I think that would be a really interesting thing to do, is to look at pre and post COVID.

Per Ostmo: So the next question, the most recent data for children is showing that the availability of health care for children is simply disappearing in rural areas. How does the chartbook address the needs of children in this report?

Kristie Thompso...: That's a good question. The chartbook addressing the needs of children. We have deep child poverty. We have infant mortality and low birth weight, access to care indicators affect children, teen pregnancy. Those are all the specific indicators I'm thinking of off the top of my head that are for children or could impact children. I don't know, aside from adding other indicators that are child specific, I think these give us an idea of where a kid might be starting if they're born a low birth weight baby, in addition to having something to say about the health of the mother going through a pregnancy and all the factors that go into population health and outcome of a birth.

Trying to find the best answer for this. This isn't a child health specific chartbook. I think it probably does have something to offer for child health. The challenge with providing more data on that is small population size and data suppression, which if you're working with some of these indicators in rural health, you already are aware of that challenge. And I'll talk more about it in other slides. So I guess a long-winded answer of that is, there are some indicators in here that point toward challenges that children face in rural populations. Is it comprehensive? We don't have anything on education or specific on ages other than teen pregnancy. So does that cover it?

Per Ostmo: Yeah, I think that's good. We can move on for now. We'll tackle some more Q&A later.

Kristie Thompso...: Sure. Okay. Any questions about box plots? Hopefully everybody kind of understands. As we move forward, we're going to be looking for the most pressing issues above the 75th percentile and or below the 25th percentile. Okay, the first chart is the state summary box plot. It's a collection of box plots, and we're looking for the most pressing issues in North Carolina. So this is the

box plot. The first thing I'm going to do is try to orient you where your eyes go as soon as this slide pops up. There's so much going on. The first thing is that we have 33 indicators. They're all across the x-axis, and they're organized based on health domains, access, health outcomes and risks, mortality, social determinants of health, and socioeconomic factors.

But reminder, the y-axis is the national percentile. So each of these gray lines on the state summary box plots is a percentile line. As you look across at your box plot, if we look at dentist supply, which is the first one, we can see zero, that's the minimum, and our maximum is up here close to a hundred. This is for the ratio of dentist to population in North Carolina rural counties.

We have a median on each of the box plots. So we know that half of our rural county values are below the median and half are above. So we can see on this chart a minimum, a maximum, a median, and then each of our quartiles. This is quartile one, 25% of the data; quartile two, 25% of the data; quartile three, 25%; and then the last 25% is up here in the fourth quartile. So looking at this chart, that's how every one of the indicators is organized.

The next thing to know about this chart is that it's important to know the difference between the colors. The green box plots, higher is better, higher is healthier. The blue box plots, lower is healthier. So when we were talking about looking at above the 75th percentile and below the 25th percentile, green box plots are going to be worse if they're below the 25th percentile. And blue box plots, the values are worse if they're above. So if you look at mortality, higher mortality is bad. If you're looking at access, higher access is good. I'm sorry. So that's what to know about this chart.

I've highlighted the indicators. The blue up here, these are the pressing issues, and I'll tell you why after I pointed all of these. And then down here are the green ones, which are health higher is better. So we've highlighted the low for green, the high for blue. First is employer-sponsored insurance. When we look at employer-sponsored insurance, we like to have a higher percent of the population covered by commercial or employer-sponsored insurance. This chart shows us that for rural counties in North Carolina, we have three quartiles that are below the 25th percentile. So that's three quarters of our county values below the 25th percentile. So that means 75% of the counties in the United States are higher, have better rates of employer-sponsored insurance than North Carolina.

We can move on to the uninsured rate where we see the median is just below the 75th percentile. So almost half of our rural counties are in the top 25% for least insured. Low birth weight babies, we have more than two quartiles. You see the median. Third quartile, fourth quartile, and part of the second quartile are above the 75th percentile red line. The red line isn't in your charts. I have to use it for my presentation so I can see what's going on. But you can hopefully start to see a pattern. When more of your box plot is above or below these red lines, this is how we identify the pressing issues.

The next slide, this is just a close up of the last box plot, the first two health domains: access and health outcomes and risks. I've highlighted these so you can see them a little more closely than in the last box plot. So the employer-sponsored insurance, the uninsured, and the low birth weight. We already talked about most of these, so I won't rehash it in this page. But the other thing you can see on this chart is the range of data. So I mentioned that before, but just a reminder, each one you want to check for range, minimum to maximum, because you'll have counties down here in this low range and counties up here. So just because we have half of this box plot highlighted, it doesn't mean that these counties aren't also important to consider.

Or if you're looking like you're right here, most of this is a pretty centered distribution of data with the median right near the 50th percentile, half of the data below that, half of the data above. But some counties do have values, they're in that 75th percentile. So if you don't know, looking at this, which counties those are, we have that data, we can find that data. So if you see on one of these charts something that interests you or raises questions for you and you want to know more, let us know. We're happy to help.

Okay, one more another piece of this pressing issues chart. So what I've done here is list the eight pressing issues that we find when we look at the North Carolina state summary chart. So I've highlighted infant mortality, food insecure households, deep child poverty, labor force participation rate, older adult population, and per capita income. So again, the green ones we'd like to see higher, the blue ones we'd like to see lower. We collect all of these. And then your next step would be to go to the other charts and take this list of indicators and see how they're looking in the following charts. So what I'll do for you, I'm not going to go through all of them, it would take too long, but we'll look at two pressing indicators for North Carolina and the other charts.

This next chart is the rural-urban disparity bar chart, the lollipop chart. In this chart, we're looking at how the state averages compare rural and urban. So in this chart, we're looking at averages. The blue dots are rural averages. I'm sorry, the blue dots are urban averages. The green dots are rural averages. The y-axis is the percent of uninsured. It's not the national percentile ranking in the other box plots. This is for the indicator, the percent of the population under age 65. In the United States, the average rural percent of uninsured is up here, looks like around 11 or 12%. Compared to urban, it's down at 10.

It's organized by census region first, then it goes breakdown of each census region, and the states are alphabetical across the x-axis. We can see Connecticut is right here. Rural is lower uninsured than urban. Go over in North Carolina, we see our disparity. Green dot is up here close to 15, and the blue dot is down here, maybe closer to 11 or 12%. So you can look across the region and see where do our averages compare. Oh, here's another one I wanted to show you. Some of them don't have much disparity. Like in Connecticut, urban was higher. So you just look at the dots, see the difference in the position of the dot. If blue was higher, then it's a higher rate. You can also use your straight edge to see

what states are popping up above your state. Above North Carolina, we don't see that many states with a higher rate than ours. And then you can see a lot of states with much lower rates in other census regions.

Low birth weight is my second example for the lollipop chart. I think I like to use the straight edge because it helps me focus. I've highlighted the North Carolina data here. Rural is up close to 10% in five-year average percentage of live births with low birth weight compared to urban, which is a little bit lower. You can also see that North Carolina is relatively high compared to all of the other states, but we look pretty similar to other states in our census region.

Okay, the third chart type is our indicator box plots organized by state and by region when we're looking to compare our state to other states and what the range of data looks like in our state. So I'm using uninsured again. These box plots show the range of rural data in each state. So across the x-axis... Oh, that highlighted the y-axis as soon as I said X. Across the x-axis, we have all the states where North Carolina is highlighted. The y-axis has our indicator definition. So we're looking at North Carolina, and I'm using the red lines again to frame the minimum and maximum, our range of data points for North Carolina. So we see this red line helps me see that that's around 11 ish, up to about 20 ish is our range of data points. We can see this little diamond here. That's the average for our state, very close to the median, which is a tiny tick mark just below the average in our box plot.

Using this, we can identify the minimum, the maximum, roughly the average or the median. So we can see the range of scores below our median is half of our data, and then above is the other half, and that's around 14. I mean, I'm saying the median is around 14. So half of our rural county values are below 14% uninsured and half are above. Looking here, we can look in these two lines to see what states are roughly the same as ours, what states have averages similar to ours, median similar to ours, distributions similar to ours. And color on this one has no significance, so that's also important to know. We just tried to make it look a little more attractive with color.

Low birth weight, second example for the indicator box plots. Again, on the y-axis, we have the indicator definition and rates. X-axis, we have the states, North Carolina is highlighted. We bring in the red lines. We can see our minimum data point, our maximum data point, the average median, each of our quartiles, one, two, three, four. And this tells us the low birth weight in North Carolina rural counties range from about 6% down here, about 14% up here, looking at the average in the median that most counties are above 8%. So we see that this gray line comes across here is below both our median and our average. And we can see, looking between these two lines, the range of the other data. A lot of other states in the south look like us. We're a bit higher, but many of them look similar. The northeast, you can see, looks much different.

So now we're going to turn to the bar charts that shows sex, race, and ethnicity disparities by census division. This is an example of our bar chart that shows



differences in sex, race, and ethnicity by census division. We did this using 11 mortality indicators from the CDC Compressed Mortality File. And the reason it's by division is because of the amount of suppressed and missing data. And the reason it's for 11 mortality indicators and not 33 indicators like the rest of ours is also because of suppressed and missing data. Fortunately, division trends are often likely to be aligned with state trends. We'll move into the next slide and show you how the missing and suppressed data impacts some of the even division level comparisons.

So even at the division level, the data are sometimes unavailable or limited because of low incidence rates or missing data or potential risk of confidentiality. So this is diabetes mortality and infant mortality for New England, which is the smallest census division. And you can see that even at the division level, we have race groups that are missing data. We have ethnicity missing data in both indicators.

Per Ostmo: Kristie, can I jump in for a moment here?

Kristie Thompso...: Sure.

Per Ostmo: Can you describe a little bit more what you mean by suppressed data, and why does that exist?

Kristie Thompso...: Perfect timing. Yes, perfect timing. That's what this slide is for.

Per Ostmo: Okay.

Kristie Thompso...: So to capture the suppressed missing data, this map I thought does a good job. This map is infant mortality, and the gray counties are counties with suppressed, unstable, or missing data. And it's not just for infant mortality in one year, this is for a five-year average of infant mortality. It affects 1,282 rural counties that have suppressed or missing data for that five-year average. The reason this happens is because rural areas have smaller populations, and that means there are a smaller number of births, there are smaller number of instances of each disease or death. Each subdivision of this already small population makes the case potentially more identifiable, and they're trying to protect the identity of people who have been in whatever is happening with data confidentiality.

So for most of the data sources, counties with fewer than 10 incidences are potentially identifiable and therefore suppressed and unavailable. So we never see that data. Similarly, if there are counties with fewer than 20 incidences, they consider that data unstable. So it is also not usable. And then there's just missing data for whatever reason, somebody didn't write it down, it wasn't able to be collected, or I don't know what all the reasons there are for missing data. But those three categories are bundled together in our research and presented in our maps as gray. So when we get to the maps, you'll see a little more of this, but there are several indicators where you see significant impact of the

suppressed and missing data. It's one of the things that makes it really hard for us to learn as much as we'd like to about rural health and about the heterogeneity of rural health and the potential disparities within rural health.

However, disparities can easily be seen when there are plenty of data. The South Atlantic Census Division is where North Carolina is. So using that division, I'm showing infant mortality and suicide mortality. And with infant mortality, you can see the males have a slightly higher rate than the females. The Black population is the highest in the race categories that we have, followed by American Indian/Alaskan Natives. And then non-Hispanics have a higher rate of infant mortality. Moving over to suicide mortality, you can see the disparities are much more pronounced. The male-female disparity is pretty obvious here. White population higher than the other populations, followed by American Indian/Alaskan Native and on down. And then the non-Hispanic population much higher than the Hispanic or Latino population for suicide.

I wanted to take a moment to mention the race and ethnicity definitions and collection methods. This is a challenge in a lot of our data, not just population health data, but most of these are federal data sources and their using the Office of Management and Budget standards and definitions to collect race and ethnicity data. So these are currently under review. If you work with any of this data or you've struggled to find the data that you're looking for, they're under review and revision, and they're accepting comments through April 12th. And I encourage you, I will send out the slides later, you can use these links to make comments.

Okay, finally, we're getting to our national maps. We have rural and urban counties shown on all of these maps. We're looking for regional patterns and whether there are issues that cross borders into the neighboring state. So how to read the map? First thing to know is that the blues are rural counties with data. So this goes from light blue to dark blue, and the darker the blue, the less healthy the outcome. The legend is arranged and among the blues in quartiles. So first quartile, healthiest, second quartile, less healthy, until you get to the fourth quartile, which is the least healthy. Yellow counties are urban. We don't show any data values for the urban counties, and the gray counties have suppressed data.

Now, I'm showing you a close up view so that we can kind of see North Carolina right here. I've circled the light blue, healthier, how we don't see the urban areas. In a lot of North Carolina, we have urban in the middle. And then the dark blue, just to get you oriented with this slide. The other thing to tell you about the maps is that you can find the data range that we've used when we use national percentiles in some of our other charts. And we don't have the numbers on those charts. You can see that the data range here, this is the minimum and this is the maximum. If you go and look at whatever indicator you're looking for, you'll find the minimum here on the map and the maximum and the breakdown for each quartile.

So looking at the uninsured population in North Carolina, this has blown up even more. I don't know if everyone knows the shape of North Carolina. This is my state. I'm looking at yellow counties here, these are our urban counties, and all of these blue counties are rural counties. So most of North Carolina counties are darker blue because we already talked about we have higher rates of uninsured in our rural counties, and you can see that they're in the third and fourth quartile. The range of data for these counties is from 10.6 to 33.7. However, none of North Carolina's rural counties get up to 33.7, but some are over 14.5 for sure.

We also see on the map some of our counties right on the borders. You see counties right next door in Virginia. And down here in South Carolina, they look similar in this indicator with the kind of rates. And out here in the tip, Western North Carolina, Northern Georgia, tip of South Carolina. So we are sharing some regional issues with these other counties in other states. This is for uninsured, which a lot of times, or right now, is affecting states independently in North Carolina. Just yesterday, the governor signed a bill to make Medicaid expansion happen. So maybe the North Carolina's uninsured rates are another thing that we can update, if we update the chartbook again.

Low birth weight, similar to the one before, we have a few counties that are looking a little bit healthier compared to the darker ones. But still most of our counties, 28, are in the darkest, least healthy, blue. 16 are in the third quartile, so that's the next tier. And then only five are in quartile two, and only one in the first quartile, which is the more healthy group. Again with the legend, here's the suppressed or missing data. This number is the national number. So if you're looking at the chartbook, you see a whole map of the US, and across that map there'll be 103 rural counties that are missing data. So you can't see 103 counties in North Carolina. None are missing from North Carolina, but across the nation you'll find 103 are missing.

Another thing to tell you about the legend for the maps is, you see this number here, this is the number of counties represented in this quartile. Remember when we were talking about the 3,142 counties being divided into four equal quartiles and there should be 785 or so in each quartile, and there would be 785 in each of these if we had these urban counties included? But the urban county data is part of the ranking, but their values are not included as colors on the map. So that's why you see these are 509 rural counties in the US as part of this quartile, 453 as part of this quartile and so on.

Okay, I have covered a lot really quickly. So the next few slides are summary slides. I'm going to go through each chart again on just one page to hit the highlights that'll help answer these questions one more time. So we start with the state summary box plots. I used red lines to show where our 75th percentile are. But behind there, across every chart, there's a gray line that goes across the 75th percentile. There's another gray line that goes across for 25th and 50th. So if you're wanting to divide and see what quartiles, what percentiles your counties are in, start with those lines to help you find that. If you're looking for

the most pressing issues, you look for green. You want to look below the 25th percentile. And for blues, you want to see what's happening above the 75th percentile.

So after you've looked at the state summary plots from the last slide, you're going to take your collection of indicators and you'll use it to see what's happening on the other charts. So which indicators have the largest disparities in your state? The biggest difference between the blue and the green dots here. Green being rural, blue being urban. How are you comparing? How does your rural state average compare to other states? These are things you can look at on the lollipop chart. Comparing the indicators with the box plots, we have them divided by census region and ranked by state according to the average rural data. So how does your state compare to other states? What does your rural data look like? Your range? I mean, is it a broad range? Does it span from end to end? Is it narrow? Is it centered or is it skewed, clustered on one end? Find your median, so you know where half of your values are below that and half are above. This one is also by rate. These are not the national percentiles. That's only in the state box plots that help you find the pressing issues.

And then we have the sex, race, and ethnicity disparities charts. Do you see disparities in your census division using these charts? If you do, you can use that to look more closely into other counties that you have, and we can help you try to find more data. Are there geographic patterns among counties in your state? When you're looking at the big map, you can squint and see the darker areas. You want to blow this up if you want to look at your individual state and see where the counties are really being affected. Do your counties share challenges with neighboring states? Are there opportunities there to work with a neighboring state that might be facing some of the same struggles?

So after all of this talk about box plots and chart, chart, charts, this is the question where you think about the kind of person you are. Hopefully, you're a person that feels a little bit better about a box plot today. And that concludes my presentation. Are there any questions?

Per Ostmo: Yes. Thank you, Kristie. We do have a few questions. One goes back to data suppression.

Kristie Thompso...: Okay.

Per Ostmo: So for those areas where data is suppressed, is there an alternative way to assess those disparities at that real granular level? Or are we just out of luck as researchers?

Kristie Thompso...: We're a little bit out of luck, I'm afraid. There might be something that people know at the local level. But at the state level, I think it's going to be hard to have that data. Well, I mean, whoever holds the data, if they have, there's indicators that they're suppressing, they may know. The CDC may know what data they're

suppressing. CMS knows what claims data they're suppressing. So somebody knows some of it. But as researchers, we do not have access to that.

Per Ostmo: Okay. Next question, this is addressed very early in the beginning that some folks may have missed, but how is rural being defined in this chartbook?

Kristie Thompso...: Rurals are being defined as non-metro counties. It's the Office of Management and Budget definition, non-metro counties.

Per Ostmo: Okay. Now, Kristie, are you able to see the Q&A box? There are a couple questions that you may want to read here.

Kristie Thompso...: Let's see. Is the first question the one you asked beginning or is it a new question?

Per Ostmo: I'll read these out for you.

Kristie Thompso...: Okay, yeah.

Per Ostmo: So first, are race data for non-Hispanic race? Or do race charts present non-mutually exclusive categories? So Hispanic in that category, but also in Black or white group categories.

Kristie Thompso...: They are not combined. This is part of the problem with how the data is collected. And this is data that's collected by CDC using the Office of Management and Budget standards and definitions. So these data are their mortality indicators, and they're sometimes... Well, they're mortality data, so they're not self-reported. They are often reported on death certificates, which can be completed by funeral directors. So it may be information from the family, it may be observation from funeral directors. So there's a lot of ways where this data can be maybe not accurate, and I think you can select Black and non-Hispanic, or Black and Hispanic, but we don't have it presented in a way where you could tell any combinations. We don't know what kind of... This is part of the problem with the way race and ethnicity data are being collected. Some of the things, I think, they're addressing in the revisions is, not everyone is just one race, not everyone is just of these two ethnicities that are presented. So it makes it hard to really see how the real differences we have as a population.

What I think it can still do even though it's not as exact as we would like it to be is, it might still highlight where there's a disparity. So it's not about that you have to know the exact science of someone's genetics to see if there's a disparity. We know across population groups that there are disparities, and if we have that kind of data, even if it's not exact, we can see where things are not equitable and try to make that better. We're not working on sickle cell in population health where we need to know more about genetics, but we're looking for ways to make things more equitable for people where it's not.

Per Ostmo: Thank you. Now, you mentioned on data suppression a little bit earlier, but what is the standard that is used to suppress the numbers for mortality? Are you using the same standard as NCHS?

Kristie Thompso...: Yes.

Per Ostmo: I want to say that's North Carolina Health Services

Kristie Thompso...: It's the same standard. Well, I don't know what the National Center for Health Statistics-

Per Ostmo: There you go.

Kristie Thompso...: This is using CDC Wonder, and they're following the link, which I'll send out later. You can read the standards that they're using. I can't remember it exactly right now, but their data suppression standard is 10 or fewer, or actually it's just less than 10. Some are 10 or fewer. So you do have to read the fine print to know whether it's 10 or fewer, or less than 10. I think CMS is 10 or fewer, and CDC is less than 10.

Per Ostmo: Looks like your co-author Mark has chimed in and says, "Need at least 20 deaths." Was that-

Kristie Thompso...: Right. That says you're going to include the unstable rates. So you have to have at least 20 for ours. So we have less than 10 is suppressed, and less than 20 counts as unstable.

Per Ostmo: Okay. Okay. Next question. Are there clusters of factors that seem to occur or patterns that you see across several states?

Kristie Thompso...: Sure. If you look at our maps, you can see a lot happening in the rural delta region. In Appalachian region, you see a lot of poverty there and you see things... In the southern states, southern states are known for having the stroke belt and higher mortality in certain heart disease and cardiovascular issues. But poverty is a big issue in the south and especially rural delta region. We have higher alcohol use. You see those cluster along the northern border of the United States near Canada. So definitely, if you're looking at the nation as a whole and you're looking for these dark blue clusters, sometimes it's a little misleading because in the west, the counties get a little larger and so you'll see a big blue block and it's a large counties, but overall you can definitely see clusters of dark blue and patterns that are in more than one state.

Per Ostmo: Okay. And there was a comment here. So from CDC Wonder, you can separate non-Hispanic white from white regardless of Hispanic status, but what is unclear is how this analysis in this chartbook classified race and Hispanic origin.

Kristie Thompso...: So I have to be honest, I don't remember, and I wasn't the one that did that analysis, but I can find out and share that with you to share the group later.

Per Ostmo: Okay.

Kristie Thompso...: It's been a while since I've been digging around in CDC Wonder, so I can't offer much of an answer.

Per Ostmo: Okay. And the next question is a bit of a mouthful, but clearly a lot of work went into this chartbook. So would you discuss first a consideration to present older data? Now, I recognize that analysis and review time is needed, but some of the data is quite out of date. So did you consider doing primary analysis from data sources rather than pulling from other published sources in order to get more timely data? And potentially, maybe a primary data source would even take longer, I'm not quite sure.

Kristie Thompso...: Yeah. We are not equipped to collect our own data. I mean, when I hear primary analysis like collecting, maybe I'm interpreting this wrong, but I'm not even sure how we would do that for 33 health indicators for all counties in the US. So we have to depend on secondary data. It is older data. And when we started this project, it wasn't as old. Some of it looks older because the sample sizes are so small, we used a range of data from say, 2012 to 2016, so that we have enough numbers to have a rate in those small communities. So that's part of the reason you see those lower numbers. And part of it is, it just took us a long time to get this done, and now the data are a little older. Then you've had COVID, which has a big thing that now we want to see, "Okay, what's happening with all these indicators after COVID?" So there are lots of reasons to think about maybe doing another one of these in the future.

Per Ostmo: Okay. Let's see. It looks like your colleague Mark has chimed in and said, "White includes both Hispanic and non-Hispanic. That is, the race graphs, the green bars consider race only. Likewise, Hispanic or Latino in the yellow bars includes all races." So that was your colleague Mark chiming in.

Kristie Thompso...: Okay. Yes. Okay. So maybe I misunderstood that question. Thank you, Mark.

Per Ostmo: Okay, so we are almost wrapped up. Kristie, could you move to the second to last slide here for a moment?

Kristie Thompso...: Yep. Let me get there for you.

Per Ostmo: So I just want to remind everybody in attendance that if you are signed up to receive Gateway's research alert emails, you'll be notified, likely this Friday, when the recording, transcript and slide decks are available to view. If you're not a subscriber, you can find that information on the Gateway website.

I also just want to comment and pose a question here. I think the best thing about this chartbook is, it's very good for identifying health needs in all 50 states, but once you identify a health need, you're left with the question of, so what? What do I do now? So if you find out that your state has health issues with low birth weight, there are resources you can go to. You can learn about maternal health and infant health on the Rural Health Research Gateway. You can go to the Rural Health Information Hub or RHI Hub to learn more about those issues. Or you can reach out to the authors of this chartbook at the North Carolina Rural Health Research Program. I always want to make sure to answer those so-what questions, where do we go now? Those resources are available to you and they include Gateway, RHI Hub, and North Carolina Rural Health Research Program.

So Kristie, do you have anything to add? What do you do next after you learn about these health disparities?

Kristie Thompso...: Well, I think you hit the nail on the head. If you see something that looks interesting to you or you have more questions, we are here, we're happy to answer more questions individually offline, and we can help point you to other resources if you're not sure where to go next. But as a first step, you want to look and see what are the things that are pinging at the top of that state summary chart.

Per Ostmo: Okay. And we have, excuse me, time for one last question here. Someone said, "I'm seeing that many of these data are cited as County Health Rankings. I have felt conflicted about how to cite these data in my work since they all come from a primary data source. Can you share some of your perspective on why you choose to cite county health rankings rather than the direct source?"

Kristie Thompso...: Oh, that's a good question. And maybe Mark has a better answer for that. I mean, we downloaded the data from the County Health Rankings, not directly from the sources that they use. So we cited them. I think when we downloaded data from CDC Wonder, we cited CDC. So we cited the source where we extracted the data.

Per Ostmo: Okay. And can our audience members use these charts in presentations and publications without written permission?

Kristie Thompso...: Absolutely. All we ask is that you maybe mentioned that it came from us, but we are happy for you to use these charts.

Per Ostmo: Excellent. Okay, so we're coming up at the end of the hour. I want to thank you, Kristie, for presenting today. This chartbook is amazing and very comprehensive. So I hope that all these state offices of rural health find this useful. And I want to thank all of our audience members for joining us today, and I hope to see everyone at future Gateway webinars. So, thank you all very much and have a good afternoon.



Kristie Thompso...: Thank you.