

Moderator: Jennifer Burges

April 26, 2018

12:00 pm CT

Coordinator: I would now like to turn the call over to your host, Shawnda Schroeder. You may begin.

Shawnda Schroeder: Thank you. Good morning, good afternoon. My name is Shawnda Schroeder. I am the Principal Investigator of the Rural Health Research Gateway also referred to as Gateway. Today the Rural Health Research Gateway will be hosting a webinar entitled Diminishing Access to Rural Maternity Care and Associated Changes in Birth Location and Outcomes.

For those of you who aren't familiar with the Rural Health Research Gateway, Gateway is a website that provides easy and timely access to research and findings of the Federal Office of Rural Health Policy-funded Rural Health Research Centers. We include information dating back to 1997.

Really our goal is to help move new research findings of those Rural Health Research Centers to various end users quickly and efficiently. Our website can be used to find abstracts of current and completed projects, publications that resulted from those projects, and information about the research centers themselves and contact information for our individual researchers like the one sharing information with us today.

Following today's presentation, the webinar will be posted on the Rural Health Research Gateway website. You can find Gateway at ruralhealthresearch.org. The link is also included on the left-hand bar of your screen right now.

You can join our Gateway alerts and you would receive periodic e-mail updates when we have a new publication or when we have a new free webinar or when you have an archive available from today's webinar. You can follow us on Twitter; you can like us on Facebook and get Facebook notifications about rural research.

Now as mentioned we have muted all the lines today, but I encourage you to use the Q&A chat box at the bottom of your screen to type any questions that you might have for Dr. Henning-Smith.

At the end of the presentation today, the HRSA operator will open for questions, and if we don't get through all of those that are in the chat box, I will share them with Dr. Henning-Smith afterward and put them in the archive e-mail that we will send-out.

Thank you again for joining us and I would now like to introduce our presenter, Dr. Carrie Henning-Smith. She is the deputy director of the University of Minnesota's Rural Health Research Center and an assistant professor in the Division of Health Policy and Management at the University of Minnesota School of Public Health.

Dr. Henning-Smith has led multiple research projects at the Rural Health Research Center with a wide range of topics including social determinants of health, access to and quality of care, and aging and long-term care.

She was chosen as the 2017 Rural Health Fellow by the National Rural Health Association and serves as a current editorial board member for the Journal of Rural Health. So thank you for joining us today and I will turn it over to you.

Carrie Henning-Smith: Thank you Shawnda, I'm delighted to be here and hello and welcome to all of the participants on the call. I think that we'll have an interesting and hopefully very engaging hour together. As Shawnda said my name is Carrie Henning-Smith. I'm an assistant professor in the Division of Health Policy and Management at the University of Minnesota School of Public Health.

I'm also the deputy director of the University of Minnesota Rural Health Research Center, and here at the University of Minnesota Rural Health Research Center we have been examining issues related to quality and access of rural maternity care for the past several years. I am excited to share some of our most recent findings with you today.

First I would like to acknowledge my coauthors and collaborators here at the University of Minnesota Rural Health Research Center, and I would also like to acknowledge our funder, the federal Office of Rural Health Policy at HRSA, with great appreciation for their support for this work.

Here's a brief overview of the webinar for today. We'll start with a little background on rural maternity care access. I will then describe some of our recent work on diminishing access to maternity care in rural areas. Finally, I'll talk about our most recent work describing changes in birth location and outcomes following obstetric unit closures in rural counties.

There are more than 18 million reproductive age women, and we're defining that as women between the ages of 18 and 44 living in rural U.S. counties. Access to obstetric care in rural communities is critical to ensuring good maternal and child health outcomes.

Prior research shows that greater travel distances for obstetric services are associated with higher rates of newborn morbidity and mortality. In 2002 43% of rural counties in the U.S. had no hospital-based obstetric services despite the fact that over 98% of births occur in hospitals.

Additionally, the number of rural hospitals providing obstetric care has been steadily decreasing. Published reports and media coverage both indicate that these obstetric care access problems are related to recent hospital and obstetric unit closures in rural areas, but the national scope of these access problems had not been quantified recently until we started doing this work here.

We need these data to inform policy efforts as no recent research had documented the current level and pace of hospital and obstetric unit closures. A better understanding of the extent of rural hospital unit closures in both micropolitan and non-core counties is a crucial first step to informing policy efforts in improving obstetric care access.

We also in looking at rural obstetric care need to take into account who it is that's providing the care in those hospitals, and we've done work on that at the University of Minnesota Rural Health Research Center also. This slide describes earlier work that we've done examining rural maternity care workforce.

To summarize our findings in this study and this is really a series of studies, all of which you can find on the Gateway that Shawnda mentioned earlier, but we found that hospitals with lower birth volumes here defined as fewer than 240 births a year are more likely to have family physicians and general surgeons attending deliveries, while those with a higher birth volume are more likely to have obstetricians and midwives attending deliveries.

We found that employment of physicians by the hospital itself decreases as birth volume increases, and we surveyed obstetric unit managers in rural hospitals across nine states and found a variety of workforce challenges that they're facing to staff their units, and these were often related or ascribed to their rural location and their low birth volume.

And so now I'm going to start jumping into the work on rural obstetric unit closure that we've done more recently. We know that there's been a decline in rural hospitals providing obstetric care and in rural hospitals generally, but until we started this work at the Rural Health Research Center, there was very little recent research describing this phenomenon on a national scale.

The projects that we did here examined the relationship between closure of an obstetric unit or hospital and maternity care and outcomes of childbirth in rural counties, including prenatal care, distance to delivery hospital, out-of-hospital births, and infant health outcomes.

I'm going to start by describing the rates of closure and the prevalence of closure between 2004 and 2014 and then I'll move into some of those outcomes that I mentioned.

To look at closures of rural obstetric units, we used a couple of data sources. One was the American Hospital Association annual survey. The other was an area health resource file. These helped us to identify where the obstetric units were and where hospitals were located that were providing obstetric services. We also layered-on sociodemographic data from the U.S. Census.

Using these data sources, we identified hospital obstetric service status each year between 2003 and 2014 using hospital-reported data on the number of births, provision of obstetric services, level of maternity care, and number of

obstetric beds from the AHA annual surveys and validated data on hospital provision of obstetric services using the Centers for Medicare and Medicaid service provider of services file. All of which is to say we did a lot of data checking to make sure that we were being accurate in our count of which rural counties had hospital-based obstetric services.

In order to measure the phenomenon of closure, we categorized counties into three groups. The first group was counties that had no obstetric services since the beginning of our study period, 2003-2004. The second group was counties that had continual obstetric services since 2004. That is, they had always had obstetric services in their county and that did not change during the study period.

The third group was a group of counties that had obstetric services in 2004 and those services closed at some point between 2004 and 2014. Counties that had multiple hospitals providing obstetric services but only experienced closure of obstetric services in some of those hospitals would still have been categorized as having continual obstetric services. This accounted for 59 counties over the study period so a relatively small number that had multiple hospitals.

The county in which the hospital was located was used to link information from the AHA survey with the area health resources file data. A hospital county was characterized into micropolitan, so those counties with urban cores of approximately 10,000 to 49,000 residents and rural non-core areas or those counties with urban cores smaller than 10,000 residents. We used the designation of metropolitan, micropolitan, and non-core counties from the Office of Management and Budget for all of our analyses.

The unit of analysis here is the county level. We had 1,249 hospitals across 1,984 rural counties in the U.S. in 2004. We used county-level multivariate regression to look at the predictors or the correlates of closure and the relationship between closure and maternity care and outcomes.

So here's a map that shows what we found during this study period. This is showing you the scope of rural obstetric unit loss between 2004 and 2014. Those counties shaded in black, so those very darkest counties here, lost obstetric services during the study period.

Those in dark blue, kind of a royal blue, never had services to begin with during the study period and those with a lighter blue are rural counties that had continual services between 2004 and 2014.

The most recent data that we had available to us ended in 2014. We know anecdotally at least that the closures have continued since that study period and so if we were to look at this again today, you would see a few more counties that were in the darkest colors.

The white counties here are metropolitan counties and were not included in our study and so this just gives you a bird's-eye view of where these closures are happening and of the scope of the closures. Now I'm going to show you a series of a few charts describing rural obstetric unit loss. Some of you may have seen these before but I think they're worth revisiting. They are striking.

They all show the same general patterns but from different angles. Here, the first figure that I'm showing you shows the decline in the total number of hospitals that provided obstetric services in rural counties from 2004 to 2014.

Since 2004, 50 rural hospitals in micropolitan counties and more than 150 rural hospitals in non-core counties stopped providing obstetric services or closed entirely. The decline in the number of hospitals that provided obstetric services in rural non-core counties was more than three times the decline in micropolitan counties.

The number of hospital providing obstetric services decreased by 7.8% in micropolitan counties and by nearly 26% in non-core counties during the study period, so all of that is saying the same thing over and over again, which is that across rural counties hospitals were closing their OB services but that we saw the decline was much more dramatic in non-core counties.

Here's the next chart, I promised you a few charts that are going to look the same but they have slightly different numbers behind them so this chart shows us the number of counties, the number of rural counties that had obstetric services during the study period.

We found that the number of micropolitan counties with a hospital-based obstetric care decreased from 530 in 2004 to 503 in 2014. This was a 5% reduction in the number of micropolitan counties that had obstetric services.

Non-core counties however experienced a 25% decrease during this same time period, from 541 non-core rural counties that had obstetric services down to 404 rural non-core counties with obstetric services in 2014. Again we know these losses are continuing and so these charts would continue to slope slightly downward.

Now here's the last of the charts that I promised you. In this one you can see that there is a substantial downward trend in the percentage of rural non-core counties within the county hospital-based obstetric services from 2004 to 2014

so this is showing you the same figures that we had on the previous slide but this is in percentages of counties.

You can see that in 2004, 82% of micropolitan counties had a hospital that was providing obstetric services. For non-core counties that was fewer than half, just 40%. In the next 10 years, between 2004 and 2014, micropolitan counties declined to 78% of those counties having hospital-based obstetric services. For non-core counties that went down to fewer than 1/3 of all non-core counties having hospital-based obstetric services.

And now I'm going to show you a series of slides with the correlates of closure. And so these aren't things that necessarily caused the closure, but we found from our modeling that these are things that were significantly associated with closure and so counties that met the various characteristics I'm going to share with you were more likely to lose their obstetric services.

In this first slide, this shows that counties with lower birthrates had higher odds of losing obstetric services. So those counties where there were fewer than 90 births annually were eight times more likely to lose their obstetric services than counties that had at least 400 babies a year born in them.

On this next slide, we're looking at differences by race and ethnicity. Here we found that counties with a higher percentage of non-Hispanic Black women were four times more likely than counties with a larger percentage of non-Hispanic White women to lose their hospital-based obstetric services.

And finally, this slide shows you correlates by workforce supply. Counties with more OB/GYN and family physicians had lower odds of losing their obstetric services, all else held equal. You can look at some of our studies

that are available on the Gateway - I'll just keep plugging the Gateway here - for more information about additional correlates of closure.

We also found that lower median incomes in counties were associated with closure for example.

And then just a very short mention that there was variability across states in what counties were losing their obstetric services. More than 2/3 of rural counties in Florida, Nevada, and South Dakota had no in-county hospital obstetric services between 2004 and 2014. Rural counties in South Carolina, Washington, and North Dakota experienced the greatest decline in rural hospital-based obstetric services.

North Dakota, Florida, and Virginia had the lowest percentage of rural counties with continual hospital-based obstetric services owing to the loss of hospital obstetric units in rural non-core areas of North Dakota and Virginia and micropolitan areas of Florida.

We have an entire policy brief that just looks at variation in obstetric service loss by state. You can look up your state. We list every single state there, so another plug for the Gateway. You can find it there. You might find that interesting.

So to review, we found that more than half of all rural counties had no hospital-based obstetric services as of 2014. Nine percent of all rural counties lost their hospital-based obstetric services between 2004 and 2014. Anecdotally, we know that losses have continued since 2014.

These losses were not random. The communities at the highest risk of losing their hospital-based obstetric services were those that were Black, low

income, more remote or smaller populations, non-core, lower birth volumes and smaller workforces.

Building on the work of rural obstetric unit loss, we investigated what the associated changes were in where babies were being born and in birth outcomes in counties that have lost obstetric services. Up until we published these findings, there was no good national evidence of any measurable changes following rural obstetric unit loss. There was some evidence out of British Columbia that these losses led to consequences for families and for babies, and there were some smaller studies across the country, but this was the first national scope study done.

The results from the study were published in JAMA on March 8th, which happens to be International Women's Day. We were able to unveil these findings as a Congressional briefing, building on the incredible interest in and momentum around this issue that has been building in recent years, so that was exciting, and I think we got the attention of policymakers, and we'll see what happens with that.

So again going back to our data sources, the data source for this study was largely based on the restricted natality detail file or birth certificate data with country identifiers for maternal residents and for the facility and location of child birth.

Again we use the American Hospital Association's annual survey to identify rural counties' availability of hospital-based obstetric services, so we really built on the work that we had done before, and we were looking at a few outcomes here. The primary outcomes were birth location and this was whether a baby was born out of the hospital and this could be a planned home

birth. This may also be a baby who is unexpectedly born on the side of a road or an unplanned home birth so this spans a lot of situations.

We also looked to see whether babies were born in a hospital without an obstetric unit, and these might be babies born in emergency rooms or in hospitals that otherwise did not have labor and delivery units and capacity to handle births.

And then finally we looked at birth outcomes, and our primary measure of birth outcome here was pre-term birth defined at less than 37 weeks' gestation.

And so again just giving you a little information on that we did with the methods, we used an interrupted time series approach to model changes and birth location and outcomes following obstetric unit loss. Measuring the annual trends prior to obstetric service loss, changes in the year immediately following closure, and changes in the annual trends that followed closure in counties that experienced service loss compared with those counties with continual services.

In other words, we looked to see in the year right after closure was there a big change or even a small change in where babies were born and in birth outcomes and then did that trend or did that change stay over time? Was that a lasting change or was it temporary and then things went back to the way that they were?

In all of our models we adjusted for county-level characteristics, maternal clinical conditions, the number of pregnancies the mother had had, and we used state (fixed effects) to adjust for differences in state context.

I'm going to show you a series of slides here, and these all come directly from the JAMA article. You may have seen that article, and if not you may be interested in looking at it to get a little more detail. I'm just giving you a quick snapshot today, but first I'm going to show you the differences in out-of-hospital births.

The rate of out-of-hospital births jumped from about 1% in all rural counties to about 2% in rural counties that were not adjacent to urban areas in the year following obstetric service loss. This trend remains relatively stable in the years following service loss.

For rural counties that were adjacent to urban areas, there was a small increase in the rate of out-of-hospital births immediately following loss followed by an increasing trend over time.

In all, these findings indicate an increase in out-of-hospital births in rural counties that lost obstetric services.

While striking, these changes were not statistically significant over time. Although I will say that a change in even 1% of babies being born still represents hundreds of babies, even thousands of babies in some situations.

The next slide is looking at our second outcome and this is changes in birth and hospitals without obstetric services. Before obstetric service loss, rural counties had a near 0% rate of babies being born at hospitals without obstetric services. That is to say this almost never happened.

After service loss, there was a small jump in birth and hospitals without obstetric services in those rural counties that were adjacent or next to urban areas, which returned to close to 0% in the years following service loss.

For rural counties not adjacent to urban areas, however, there was a large jump immediately following service loss, from less than 1% to nearly 3% of all babies being born in hospitals without obstetric services. This trend decreased over time but more slowly than in rural counties that were adjacent to urban areas.

These findings are important because hospitals without obstetric services are by definition not fully-equipped to handle labor and delivery. Their staff may not have regular practice or training, and they may not have the appropriate equipment and supplies on hand to handle a birth. Finally, I'm going to show you changes in pre-term births following obstetric service loss.

In the year prior to service loss, pre-term birth rates were up about 11.6% in non-urban-adjacent and 13% in urban-adjacent rural counties. The trends in counties with continual obstetric services showed .14 percentage points and .16 percentage point annual decline over the study period in non-urban-adjacent and urban-adjacent counties respectively.

The raw data showed a .4 or nearly a half a percentage point increase in pre-term births in the year following service loss in non-urban-adjacent rural counties and a .2 percentage point increase in urban-adjacent counties, followed by a .19 percentage point average annual decreasing trend in pre-term births in both urban-adjacent and non-urban-adjacent counties.

And again we're talking about very small changes in percentage points, but those still amount to hundreds and sometimes thousands of babies depending on the study context and the time period.

So here are the key findings. I know I just went through some very in-the-weeds charts, but let me summarize what this says and why it matters.

In rural U.S. counties not adjacent to urban areas, loss of hospital-based obstetric services compared with counties with continual services was associated with increases in out-of-hospital and pre-term births and births in hospitals without obstetric units in the following year. The latter also occurred in urban-adjacent counties. These findings may inform policy and planning regarding rural obstetric services.

And so what do we do with all of these findings? We know that rural areas are losing hospital-based obstetric services, and we know that loss of hospital-based obstetric services is associated with changes in where babies are being born and in birth outcomes, and so what do we do?

Here I've outlined a few potential federal and on the next slide state-level strategies that might be helpful in considering the goal of improving value and quality in rural maternity care. First, I will focus-on the federal level.

So one lever that can be used are federal policy efforts to address workforce shortages. There are several policy levers that can be used to improve access to high-quality maternity care services for rural women delivering in low-birth-volume hospitals. On the federal level there's currently a bill working its way through Congress entitled the Improving Access to Maternity Care Act. This would task the Health Resources and Services Administration or HRSA with identifying maternity care workforce shortage areas across the country. Those areas would benefit from loan forgiveness programs through the National Health Service Corps, which may incent maternity care clinicians to practice in those areas.

Similar strategies have been used in the past to address other types of healthcare workforce shortages, and with nearly 1/2 million rural U.S. women giving birth each year or about 500,000 babies born in rural areas every year, rural maternity care deserves a similar level of attention.

This bill has made its way through the House and is currently being considered within committee in the Senate. It's a cost-neutral bill. It doesn't have a cost associated with it and it may make a difference for women and babies and clinicians in rural areas.

The other federal policy effort here is a federal policy effort to improve maternity care quality. Federal efforts to support maternity care quality improvement generally, including requirements and resources to develop, use, and report quality measures, require attention to the particular needs of rural residents.

In 2014 Senators Debbie Stabenow and Chuck (Ted) Grassley undertook bipartisan effort to introduce legislation called the Quality of Care for Moms and Babies Act that requires the U.S. Department of Health and Human Services to identify and publish a recommended core set of maternal and infant quality measures. This act is supported by both the American Congress of Obstetrics and Gynecologists ACOG and the American College of Nurse Midwives, and this act is one example of ways that we can act to focus-on and improve quality of care in rural areas that have a rural-specific focus to it. So that's at the federal level.

I think some of the more interesting policy levers are potentially at the state and local level. There are a number of things that can be done when we think about how best to support families in rural areas.

First, we can't talk about this without talking about Medicaid policy.

Medicaid pays for nearly half of all births in the country, and it pays for more than half of all births to rural residents. Medicaid is an important component of the maternity care landscape.

The variability across states and the number and type of maternity care hospitals indicates that each state has particular constraints and opportunities for addressing rural maternity care, and there are wide range of state policy levers that might address the challenges of recruitment, retention, and skills maintenance that have been highlighted by rural hospitals in our work.

One key area where states can play a role in addressing both workforce and quality in maternity care is through Medicaid policy. Medicaid, as I said, funds nearly half of all births nationally, more than half of all births in rural areas. And state Medicaid programs have a unique opportunity through coverage, benefits, reimbursement rates, payment policy, and managed care arrangements to ensure an adequate supply of providers and to reduce financial barriers to accessing evidence-based maternity services.

Medicaid could also play a leadership role in advancing transparency and availability of information on quality metrics for rural residents who are pregnant.

Efforts to improve the reporting and availability of relevant quality measures for rural maternity units could include exploring alternative ways for low-birth-volume hospitals to report and benchmark their data with peer hospitals.

Noting the changes that we have found in birth location and birth outcomes, Medicaid is an enormous player in this and needs to be at the table and considered.

When we think about the future of Medicaid, and one of the possibilities is block granting or restructuring the way that Medicaid could be delivered to states, it's important that the rural and the birth issues are considered in the conversation of what we do with the future of Medicaid.

Another policy angle here is to think about states' scope of practice laws, and I just barely touched on the work that we've done on maternity care workforce in rural areas, but you've probably picked-up on the theme throughout that the availability of workforce and workforce constraints are one important component in obstetric service availability and obstetric service loss.

So not only do the number and size of rural maternity hospitals vary across states but so does the maternity care workforce. Efforts to address healthcare workforce challenges are not limited to the federal level, as I mentioned. The state plays a lead role in determining licensing, credentialing, and scope of practice regulations for all clinicians including those in maternity care.

There's wide variability across states in the allowed scope of practice for advanced practice nurses, including certified nurse midwives, and this is a focus of recent policy attention. We have also done some work on this and the implications for rural areas in our Center.

Restrictions that don't allow clinicians to practice at the top of their license may limit access to evidence-based services, including access to midwifery care. Efforts to reduce practice barriers for certified nurse midwives and other advanced practice nurses might increase access to care and could also reduce overall costs.

And finally, we know that birth is at its core a local event. It's an individual event, it's a family event, it's a community event, and so we can talk about state policy efforts and federal policy efforts, but a lot of things that happen around the obstetric service landscape happen at a local level, and I think it's worth mentioning several potential efforts, policy interventions, and programmatic interventions that could be useful in this space.

These include subsidies to address maternity care workforce and quality concerns in small rural hospitals, subsidies for training programs for maternity care health professionals and professional schools, especially those that encourage a homegrown rural workforce or people who are really motivated to work in rural communities and understand and care about those contexts, some encouragement of family medicine rotations and residency programs that include a focus on obstetric services in rural areas. So this means getting the professional schools onboard, getting states onboard, subsidies for continuing medical education and other ongoing training and capacity-building for maternity care professionals working in smaller more remote hospitals, collaboration between clinicians, professional societies, and healthcare delivery systems on integration of care and transfer across birth settings if transfer is required, including attention to ensuring safely-planned home births in rural settings if that is what a family chooses. We know that more babies are being born out of the hospital, and we need to make sure that that's a safe and supported setting.

Finally, I think that there is room here to think about a role for telemedicine. There are probably telemedicine experts on the call who know more about this than I do, but we need to think about how to creatively leverage resources across settings and how to support the more remote rural settings that are trying to continue providing obstetric care.

We also need to think about what happens in those emergency births. If a baby is born out of the hospital potentially on the side of the road or at home and it wasn't planned, we need to think how to train law enforcements, EMTs, and others who might encounter births.

We also need to think about what we can do to support the families who are impacted. One of the nurses who we work with in this space put it really nicely that when an obstetric unit closes in a rural area, the risk is really transferred from the hospital to the family, and so what can we do to support those families? We know that rural families and rural residents who are pregnant may end up needing to travel much farther to reach the care that they need or to deliver their baby. For some folks especially people who are low-income and lack reliable access to transportation, that can really be a barrier, so are there ways that we can think about subsidies or tangible support around housing and transportation for people who need to travel to deliver a baby.

And finally, what are the insurance regulations and the costs and how do those impact the viability of rural obstetric services? Are there guidelines that are not rural-sensitive or rural-specific that make it difficult for a rural hospital to safely provide obstetric care within the parameters provided and is there any room for flexibility in those guidelines?

So finally, and just to emphasize this point, the goal for rural communities ultimately and the goal for any of the work that we do and any of the policy interventions that we discussed should be to find workable solutions to the challenge that pregnant people in rural and remote areas face, both in accessing comprehensive maternity care services and ensuring their receipt of high-quality maternity care.

This is really an issue of both access and quality. General efforts undertaken at the federal, state, or local levels ought to account for the particular circumstances of rural communities, rural clinicians, and rural families as they navigate the life and health changes that accompany pregnancy and childbirth.

Here is an incomplete but hopefully helpful list of citations around this work. So I encourage you to as Shawnda said look on the Gateway and see some of our other work in this space, look into these publications and you can always feel free to reach out to me and to my colleagues at the University of Minnesota Rural Health Research Center, and we are happy to talk with you about this work.

So thank you again for your attention, and I look forward to a good discussion now.

Shawnda Schroeder: Thank you, Carrie. We are going to have HRSA address any questions on the line and then as HRSA's letting the callers come in, if you would like to look at some of the questions in the chat box and address those as well, feel free.

Carrie Henning-Smith: Sure, I would love to. So the first question that I see here is whether we looked at potential differences in maternal mortality rates. Such an important question, and I think that I've been equal parts heartened and heartbroken to see the increased attention to maternal mortality as we know that it's increasing in the country and increasing at disproportionate rates for different groups, which is horrific and really troubling.

Unfortunately, it's a rare enough outcome that it's difficult to do work like what we did, looking at a relatively small population and a very rare outcome

and to understand that in any significant or statistically appropriate and significant way.

That said, we will be embarking on a project starting in September looking at rural-urban differences in maternal morbidity, which is closely associated with maternal mortality and that should hopefully shed a little light on that angle, but it's certainly something that needs more work and more attention, so good question, thank you for that one.

And let's see, the next question from Jessica, can I recall what the R-square result was for the regression analysis? Not off the top of my head, Jessica, but I could look that up. I'm assuming that that's referring to the JAMA paper although I covered a number of papers in my talk today and so there are R-squared results in a lot of those.

One of the other papers that looks at closures published in Health Affairs and I'm not sure which exactly we're referring to there, but I will see if I can look that up and let Shawnda know.

Let's see, we have a question here on hospital-level restrictions, i.e., hospital privileging and credentialing policies that prohibit family medicine and midwives from providing obstetric services.

I think that's a great question. We have thought about that area, but we've mostly thought about it from a state level, and we have a series of papers out that look at advanced practice clinicians, including nurses in obstetric units and midwives in obstetric units. And again we focused more on states' scope-of-practice laws.

But we have found variability by hospital in how they are addressing workforce challenges, and I think the most interesting of all of that work that we've done has been around obstetric nurses. We know that there's a need for nurses and especially well-trained, highly-qualified nurses across all areas of medicine and that need is especially felt in rural areas.

And we have a paper that's published in the Journal of Obstetric and Gynecologic Nursing that's looking at how hospitals are dealing with that challenge, and we found that hospitals with a low birth volume are sharing nurses across their units in order to have a nurse available when they have someone come in to deliver, but otherwise that nurse might be staffing the emergency room or some other part of the hospital. This obviously requires incredible competency and flexibility on the part of nurses, but it seems to be the only way that some hospitals are able to meet the workforce challenges that we have.

So I'm not sure if that helps to answer your question, but I find it to be a fascinating and really important area.

Let's see, I'm going to take a question from someone else. Oh here, Heidi gives us, it looks like a comment and not a question, but Heidi is mentioning four states in the Upper Midwest that have simulation-in-motion projects, taking training to rural EMS and hospitals and the Number 1 training request is birth.

I think that's an excellent point, and it's something that we have discussed in our work, and when I mentioned telemedicine I think one of the areas that telehealth and technology can really play an important role is through simulation modeling and training so that in low-birth-volume settings,

clinicians are given some opportunity to practice high-risk situations or even low-risk situations and maintain their skills.

And I think what's really important here is that as hospitals find that they need to close their obstetric services, and I know that's never an easy decision and there's no one culprit there, but when hospitals find themselves needing to make that decision, they need to be aware that they may still have people come in to deliver babies as we found in our study.

And so that's another reason that even if there is not an obstetric service line in a hospital, it's still important to maintain skills and training around delivering babies and dealing with pregnancy, labor, and delivery in the hospital setting.

So I'm not sure if that's helpful, and I don't know if we have other questions on the line at this point.

Coordinator: If you'd like to ask any questions over the phone lines, please press star 1 and record your name when prompted.

Shawnda Schroeder: Thank you and while we wait for the first caller to call in with any questions, I do want to just mention we had several mentions today of the Rural Health Research Gateway, and I do want to mention that this is recorded. The archives will be shared. We will send that out through a research alert so if you'd like to subscribe to our research alerts, you can find it that way. Otherwise in both the chat box in the left-hand side of your screen today, I did share where you can access everything online if you would like to do that.

Coordinator: And again as a reminder if you'd like to ask a question over the phone lines, please press star 1 and record your name when prompted.

Shawnda Schroeder: I will take that slight feed as there are no calls currently but we will wait and see if anyone does call in. I do want to mention that the Rural Health Research Center Program of which Dr. Henning-Smith mentioned is the funding source for this current research through the Federal Office of Rural Health Policy.

The Rural Health Research Center Program is currently celebrating 30 years of the program and of doing really great work in rural health and sharing this information widely with all of you, so if you're interested to see how far back this research goes or the topics that we've been thinking about and researching for 30 years, I'd encourage you to follow us on social media.

You can follow the hashtag #30YearsOfRuralResearch and see fun pictures of our researchers 30 years back, see what type of topics were of interest 30 years ago that we're still talking about today and watch for other webinars like this one where we'll be talking about work that we've done in the past that we're still doing and where we're headed in rural health research. Were there any questions on the line?

Coordinator: There were no questions over the phone lines.

Shawnda Schroeder: Well, do you have any closing comments?

Carrie Henning-Smith: Do I?

Shawnda Schroeder: Yes.

Carrie Henning-Smith: Well, I just want to thank everyone and clearly we are doing a lot of work in this space and this is ongoing work that needs kind of all hands on deck. It's a really complicated area, but in some ways it's fundamental to secure healthcare system, to our well-being of communities, to our various society.

And so I think these are things that we need to think about in a very thoughtful way and address, and I mostly want to thank those of you who live and work and practice in rural communities.

And I want to once again acknowledge and emphasize that there's no culprits here when - there's no one culprit - when rural hospitals are closing our obstetric units, and there are multiple challenging difficult pressures on rural hospitals and rural communities, and it will take all of us to think of creative and innovative solutions to support rural communities and rural families.

So if you have some of those solutions or if there are other areas that you think that we should be looking into, please don't hesitate to reach out. We'd love to hear from you. We especially love to hear from people who are doing this work in rural communities.

And once again thank you for your attention, and it's a beautiful sunny day in Minnesota and imagining that maybe it's beautiful for a lot of you too, and so I appreciate you taking the middle of your day to be on a webinar on a nice spring day.

Shawnda Schroeder: All right, well thank you so much for joining us. It's been great hearing from you and hearing about all of your work, and thank you to those of you who joined us on the call and on the webinar and the slides are currently

available on our website if you want to go pull and look at them right now and share them with all of those who couldn't join us live today.

If you have questions of me, you can reach me. My contact information is on Gateway or questions directly for Dr. Henning-Smith can go toward her. So thank you for joining us. Have a great afternoon, everyone.

Coordinator: This concludes today's conference. Thank you for your participation. You may disconnect your lines at this time.

END