Applying the Three-Delays Model to Assess the Perceived Barriers to Accessing Surgical Care in Robeson County, North Carolina

by

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Thesis submitted in partial fulfillment of
the requirements for the degree of
Master of Science in the Duke Global Health Institute
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ABSTRACT

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Abstract

Background: Robeson County, North Carolina was ranked as the least healthy county in the state, in 2020. In Robeson, accessing surgical care is a health challenge, and two known risk factors are its rural location and high proportion of racial minority groups. Applying the three-delays model, the aim of this study was to identify and assess the perceived barriers to surgical care. Methods: To obtain a diverse perspective of how access to surgical care in Robeson County is perceived, interviews were conducted with surgical patients, surgical providers, and community leaders. Duke healthcare personnel, who work in Robeson County, assisted with identifying appropriate stakeholders and surgical patients to interview initially. Additional interviewees were identified through snowball sampling, until saturation was reached. Two researchers independently examined and categorized the responses using the constant comparative method, categorizing quotes from participants in an iterative fashion to identify recurring themes. Results: A total of eleven participants were interviewed (2 nurses, 7 patients, and 2 community leaders). Themes identified included: comfort level with the health system, transportation, logistics of the health system, health system capacity, alternative medicine, community beliefs, county's historical and cultural context, financing, and suggestions from the participants. Conclusions: This preliminary study suggests that along with Robeson's rural geography and high proportion of minority groups, the county's historical and cultural context, the stigmatization of surgical diseases, and the knowledge gap in resource availability also contribute to barriers to accessing surgical care in the county.

Dedication

This thesis is dedicated to two very important people in my life: my life partner, Armoni, and our daughter, Brielle.

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Acknowledgements

First and foremost, I give recognition and all honor to God, who is the head of my life; and without Him, none of this would be possible. I would also like to acknowledge my parents, John and Lisa Eaves for instilling in me the importance of education and being an advocate for those that are often overlooked. I want to thank my life partner, Armoni, for always encouraging me throughout this process. The completion of this thesis could not have been made possible without the support of Duke University, the Graduate School, and the Global Health Institute. In particular, I would like to acknowledge Dr. Tamara Fitzgerald, Dr. Hannah Woriax, Dr. Henry Rice, and Dr. Rae Jean Proeschold-Bell for their advisement throughout the research and writing stages. Last, but certainly not least, I would like to thank all of the participants of this study for entrusting me to present, on their behalf, their stories, experiences, and suggestions pertaining to this study.

1. Introduction

Robeson County, a racially diverse and geographically rural county on the southeastern border of North Carolina, was ranked as the least healthy county in the state, in 2020.[1] Robeson is the largest county in the state by land area,[2] and is known for being home to the Lumbee tribe.[3] The Lumbee tribe is the ninth-largest tribe in the United States,[3] and in Robeson, they are the majority population group, making up over 42% of the population.[4] Black and Latino populations make up approximately 23 and 10 percent of the county's population, respectively.[4] Robeson has one hospital to service the entire county, and the physician to patient ratio is 1 to 2,441[5]. Furthermore, over 27% of the population live at or under the poverty line, and almost 16% of the population are without health insurance.[5] Consequently, accessing surgical care is a health challenge in Robeson County, and two known risk factors are the rural location and high proportion of racial minority groups.

1.1 Robeson County Health Assessment

In response to the county's growing health concerns, the Robeson County Health Department performed a health needs assessment.[1] The report found that the top leading causes of death were cancer, heart disease, and motor vehicle deaths. One of the top priority health issues was drug abuse, and contributing factors included lack of job opportunities, few mental health and rehabilitation services, scarcity of healthy food options, and insufficient safe recreation areas. The report also showed the leading factors affecting families seeking medical treatment were the inability to pay, lack of insurance, lack of health literacy, and infrequent appointment availability.[1]

Research also highlights health disparities disproportionately affecting minority populations in Robeson. Lumbee women have some of the highest rates of cardiovascular disease within the population.[6] Native American and African American women were found to have lower levels of knowledge, more inaccurate beliefs, and more barriers to cancer screening compared to white women.[7] Another report suggested an increasingly high prevalence of smokeless tobacco use, particularly within the Lumbee tribe,[8] and during the height of the COVID-19 pandemic, members of the Lumbee Tribe disproportionately faced barriers to testing and vaccine administration.[9]

1.2 Rural Surgical Care and the Three-Delays Model

In 2010, almost 30 million people in the U.S. lacked access to trauma care within one hour.[10] Gaps in access to surgical care continue to exist, and rural counties with greater percentages of minority populations and uninsured and low-education individuals disproportionately lack access to emergency surgical care.[11] Thaddeus and Maine argued that if prompt, adequate treatment is provided, the outcome of interest will usually be satisfactory; therefore, an adverse surgical outcome is mostly affected by delayed treatment.[12]

The “three-delays" model is defined as delays in: (1) seeking care, (2) reaching an appropriate facility, and (3) receiving adequate care when the facility is reached.[12] While the three-delays model was originally used to examine maternal mortality, we believe that the model is applicable to assessing barriers to other types of surgical care.

1.3 Study Objective

Research suggests that rural communities and minority populations disproportionately face barriers to surgical care,[13,14] yet few studies have identified and

assessed the barriers to accessing surgical care in Robeson County. From in-depth qualitative interviews and application of the three-delays model, we aimed to identify and assess perceived barriers to accessing surgical care in Robeson.

2. Methods

Our primary aim was to identify the current barriers to surgical care, as perceived by surgical patients, surgical providers, and community members. Our secondary aim was to assess how the perception of access to surgical care differs between surgical providers and the community as well as between racial groups. Our long term goal is to understand the perceived barriers to accessing surgical care to initiate future efforts surrounding perioperative care interventions, close the knowledge gap in resource availability, advocate for additional resources to the county, and help improve existing services.

An interview guide (see Appendix A) was developed to direct the conversation and ensure that common themes were identified. The interview guide was divided into four sections: demographics, general health access questions, pre-operative care inquires, and post-operative care inquires. Once finalized, the interview guide was vetted by our on-site coordinator, a Duke University surgeon who lives and works in Robeson County, to ensure cultural appropriateness. Interviews were allowed to deviate from the interview guide to discuss topics of importance to the interviewees, and, in some cases, new interview questions were added if a particular topic was recurring The study was deemed exempt from review by the Institutional Review Board at Duke University.

2.1 Setting and Participants

All interviews were conducted through Duke University's protected video-conferencing platform. Any resident or employee of Robeson County, 18 years of age or older was eligible for this study. To obtain a diverse perspective, we conducted interviews with patients, surgical personnel, and community members. Duke healthcare

personnel who work in Robeson County assisted us with identifying initial stakeholders and surgical patients to interview. Additional interviewees were identified through snowball sampling, in which new interviewees were identified through referrals from previous participants. We continued to interview patients until saturation was reached. Community stakeholders were contacted in person, via email, or by phone to set up an interview date and time. Clinic patients were contacted in-person during their clinic visit and asked if they would be willing to participate in the interview. Participation was voluntary, and informed consent was obtained from all participants. There was no exclusion based on sex or race.

2.2 Procedures and Analysis

One-on-one interviews were conducted by a researcher from Duke University, and audio recorded on a Duke University password-protected and encrypted Box application. Interviews were manually transcribed with the aid of Google Suite's transcription software. Two researchers independently examined and categorized the responses using the constant comparative method, which requires categorization of quotes from participants in an iterative fashion to identify recurring themes. After manually transcribing interviews, the two researchers grouped similar responses to the interview questions together. Once all responses were grouped a theme was identified and given a title. The two researchers' analyses were compared and any disputes in categorization and identification of themes were resolved by a third researcher.

3. Results

Demographics

A total of eleven participants were interviewed (2 nurses, 7 patients, 2 community members). Table 1 highlights participant demographics. Participants were between the ages of 35 and 80 years old. Of the eleven interviewees, ten (91%) of them were women, and four (36%) were members of the Lumbee tribe. Most participants reported an annual income less than $40,000, and all eleven participants (100%) had been living in Robeson County for more than ten years. More than half (n=6, 55%) of the participants identified with a racial minority group, and though all interviewees were insured, four out of the eleven participants (36%) were unemployed or disabled.

Table 1: Demographics

	Count (%)
Age	
18-35	1 (9%)
36-55	6 (55%)
56-74	2 (18%)
75+	2 (18%)
Gender	
Female	10 (91%)
Male	1 (9%)
Race	
Am. Indian	4 (36%)
Black	2 (18%)
White	5 (46%)
Lumbee? (Y/N)	
Yes	4 (36%)
No	7 (64%)
Yearly Household Income	
< $25k	4 (36%)
$25k-$40k	4 (36%)
$41k-$75k	1 (9%)
$76k-$99k	1 (9%)
> $100k	1 (9%)
Years lived in Robeson	
< 10 years	0 (0%)
11-25 years	5 (46%)
26-40 years	1 (9%)
> 40	5 (46%)
Healthcare Provider? (Y/N)	
Yes	2 (18%)
No	9 (82%)
Occupation Status	
Employed	6 (55%)
Unemployed/Disabled	4 (36%)
Retired	1 (9%)
Insured? (Y/N)	
Yes	11 (100%)
No	0 (0%)
Insurance Type	
Affordable Care Act	4 (36%)
Medicare/Medicaid	3 (28%)
Private	4 (36%)

Comparing Demographic Groups

We interviewed a total of five participants that self-identified as white. Of the five participants, three of them were patients and two were nurses. We asked all patients and community members what their single greatest challenge to accessing surgical care in Robeson County was (healthcare providers were omitted from answering this question). Of the three white patients we interviewed, none of them were able to identify any personal challenges to accessing care. One patient said, “I don't know the answer to that…I have access to a cardiologist, a cancer specialist, a primary care provider…so I don't feel that I have any challenges”. Another patient shared, “I can't say that I have any challenges”. At the end of their interview, the same patient admitted, “because of my financial situation and my race, I am privileged, but that is not true for many people who live in Robeson County”.

We also noticed a difference in perception between the nurses we interviewed and participants who were not healthcare professionals. The nurses generally had more positive things to say about the healthcare system and were often more knowledgeable about available resources. For example, out of the nine participants who were not healthcare professionals, six (67%) were not knowledgeable about transportation services offered by the county. This is compared to 100% of the nurses we interviewed who were able to identify and provide detailed information about the South East Area Transit System (SEATS) offered by the county.

3.1 Identification of Recurring Themes

From our interview data we identified the following recurring themes: *comfort level with the health system*, *transportation*, *logistics of the health system*, *health system*

capacity, *alternative medicine*, *community beliefs*, *historical and cultural context*, *financing*, and *suggestions from the participants*.

Comfort Level with the Healthcare System

Table 2 describes participants' comfort level with the healthcare system. Participants described their comfort level with the healthcare system across six subthemes: *satisfaction with the surgical process*, *relationship with providers*, *historical and cultural context*, *sense of community*, *capacity building initiatives*, and *privacy/discretion within the health system*. Three participants (27%) expressed they have had many procedures and experiences with the Robeson County health system and have had few complications or complaints. One of the nurses we interviewed shared their patients' discomfort with the security screening process to enter the emergency room.

More than half of the participants (n= 6, 55%), expressed that they were comfortable with the healthcare system due to their relationship with providers. One patient noted that she visited the only operating health facility during the height of the COVID-19 pandemic and had a pleasant experience with the provider. Two patients expressed in their interview that they have their providers personal contact information. One nurse supported this by mentioning they have provided their cellphone number to their patients. Participants believe this gesture builds relationships between provider and patient, and ultimately, increases comfort in the health system. Two participants noted that they have had medical errors during past surgical procedures, which has decreased their perception of providers' abilities and comfort with the health system.

Two members of the Lumbee tribe expressed their discomfort with the health system because of the county's historical and cultural background. One community member stated, "Native people were not always favored by the institutions in place". As a result, in present times, "social class and racial differences make communal spaces within health facilities unwelcoming". Another community member of the Lumbee tribe shared that they live only 15 minutes from the hospital, yet they choose to seek healthcare in another county due to the historical and cultural context.

Another subtheme we found was a "sense of community". One participant shared a story of meeting the new CEO of the hospital: "I personally had a chance to meet the new leadership of the hospital. The CEO personally welcomed the community to the hospital and talked about how he wants to be a part of the community. I thought that was admirable." Under the subtheme *capacity building initiatives*, two participants shared how they were "hopeful for the future" because of increased partnerships with the University of North Carolina and the newly constructed outpatient facility in Lumberton. One participant, however, shared their discomfort with the health system because of privacy concerns within the county. "It can be off-putting" they said, as they described living in a rural area because of the "lack of privacy".

Table 2: Comfort Level with the Healthcare System

	Comfortable	Uncomfortable
Satisfaction with the surgical process	- Has had many procedures but not many issues (3, 6, 10)	- Not satisfied with the time it takes to be seen (3) - "You have to go through security to get to the ER which is scary" (11)
Relationship with providers	- Comfortable with providers (1) - Visited the only available health facility during COVID and was satisfied (3) - Has consistent providers and feels connected to them (6) - Provider gives out cell number to patients (4, 8, 10) - Know people who work in the healthcare system and can ask questions (10)	- Seeks care outside of the county health system (2) - Lack of trust between provider and patient (4) - Past medical error (5, 10)
Historical & cultural context/reputation		- Lumbee not always favored by institutions (1) - Social class and race makes communal spaces within health facilities unwelcoming (1) - 15 mins from the hospital but prefers to go out of the county (2)
Sense of community	- CEO/leadership make efforts to connect and lend itself to the community (1) - Interactions in and outside the health facility shows a sign of respect/sense of belonging (3)	
Capacity building initiatives	- UNC brings additional resources (4) - New outpatient facility in Lumberton (2)	
Privacy/discretion		- Lack of privacy in a rural community (1)

Transportation

Table 3 shows how transportation is perceived as both a resource as well as a challenge to reaching care in a timely manner. From this theme, four subthemes were assessed: *private transportation*, *alternative transportation services, telehealth services, and resources that affect transportation accessibility.* Seven participants (64%) stated they own their own vehicle or have access to a family vehicle, and three additional participants noted that they rely on a close friend or family member if they need transportation to a health facility. One participant shared that they would be hesitant to call a friend or family member if privacy or inconvenience was an issue. We discovered that rideshare services (such as Uber or Lyft) do not operate in Robeson County; however, four of the eleven interviewees did mention the availability of SEATS as a public transportation service offered by the county government. One of the nurses mentioned that the Gibson Cancer Center provides transportation services to its patients, but a few participants expressed displeasure with the lack of available public transportation services and the inefficiency of SEATS, noting that it is a time-consuming process.

Four participants noted that during the COVID-19 shutdowns there was an increased availability of telehealth interactions, and that this is still available today. One of the nurses elaborated further on the increasing number of mobile health options: “There is even a booth for health education and mobile services at the mall and other non-health related places”. The downside, they shared, is that “Mobile health is limited to the two major cities, and not readily available in the more remote areas of the county”. For a rural county, participants agreed that Robeson has well-maintained roads and is

close to a major interstate. However, almost half of the participants noted resource challenges that include rising gas prices, lack of finances to pay for rides, long travel distances for certain procedures that cannot be performed in the county, and not having electricity or Wi-Fi for telehealth options.

Table 3: Transportation

	Reliable (Positive Statements)	**Challenges (Negative statements)**
Private transportation	- Owns vehicle (1, 3, 4, 5, 6, 7, 11) - Relies on friend/family (1, 7, 8)	- Privacy or inconvenience (1) - Absence of Rideshare [Uber] (1)
Alternative transportation	- SEATS (South East Area Transit System), offered by the county government (2, 9, 10, 11) - The Gibson Cancer Center provides transportation services (11)	- Lack of public transportation options (4) - Inefficient transportation services, time consuming process (3, 10)
Telehealth	- During COVID there were more telehealth interactions (1, 2, 3, 10) - Mobile health is available. There are booths for health education and mobile services at the mall and other non-health related places (11)	- Viewed zoom as lack of contact during COVID (4, 8) - Mobile health is limited to the two major cities and not in the outskirts of the county (11)
Resources Affecting Transportation Accessibility	- Though a rural county, Robeson county has nice roads (11)	- Rising gas prices (11) - Money for transport is spent on drugs and alcohol (11) - No electricity or Wi-Fi (10) - Transportation challenges limit patients from getting to their preferred facility (10) - There are times when it is necessary to travel to Duke for procedures, but that becomes an issue because of the challenge of traveling that far (9)

Logistics of the Healthcare System

Table 4 describes participants' satisfaction with the logistics of the healthcare system, and includes three subthemes: *scheduling appointments, care coordination,* and *post-operative care*. Of the nine participants that were not healthcare providers, five of them (56%) expressed that they were satisfied with the system for scheduling appointments. We found that to account for the trend of missed appointments by patients, scheduling services often overbook appointments. This practice often causes dissatisfaction among providers and patients. One of the nurses expressed that "Appointment availability is limited, so patients go where they can receive care earliest, traveling from one facility to another, which often delays care".

We defined *care coordination* as the system extending from when a person is referred to receive surgical care to the process for follow-up after surgical care. One community member shared a story about a friend who was dissatisfied with care coordination because they had to keep up with three different entities (i.e., scheduling, providers, pharmacy). Another participant noted that "One cannot see a surgeon unless they are referred by a primary care provider (PCP), but in Robeson, there are not enough PCPs, causing a delay in care". One of the nurses also spoke about the "inability for the healthcare system to work together", revealing that providers are often not on the same page with the dissemination of information to patients (e.g., guidelines for cancer screening).

Most participants expressed their satisfaction with post-operative care. Eight interviewees indicated that after an operation, the doctor prescribes medicines and explains how to take them, followed by the nurse, who reiterates the information for

comprehension. Only one individual expressed dissatisfaction with post-operative care stating after an appointment, no follow up was provided, and as a result, a medical complication arose. One nurse provided additional context, “Most people in the county are on a 3rd-5th grade reading level and may not be able to understand written discharge papers. The literacy rate in the county is low. Some patients will show signs of being illiterate or just share that with me. When we identify that a patient cannot read or write we try to find an alternative way for communication. Sometimes I have to draw pictures for a patient to understand me. When there is a language barrier, most times patients will have someone else with them to help translate. Unfortunately, when we have blind patients we don't always have braille as an option that is immediately available. Sometimes I will have to color code medicines and draw pictures and figures to ensure patients take the right medications on the right day, at the right time.”

Table 4: Logistics of the Healthcare System

	Satisfied (positive statements)	Unsatisfied (negative statements)
Scheduling appointments	- Satisfied with scheduling of appointments (3, 4, 5, 6, 7) - Receives text reminders about appointments (7)	- Scheduling personnel are not well trained (1) - Health facilities overbook appointments to make sure everything stays full (2) - Confusion about appointments (11) - Appointment availability is limited so patients go where they can receive care earliest, traveling from one facility to another which delays care (11)
Care coordination	- Never had an issue receiving care once at the health facility (5)	- You cannot see a surgeon unless you are referred by a PCP but there are not enough PCPs causing a delay in care (11) - Patient had to know/keep up with 3-4 different entities (pharmacy, providers, etc. not coordinated or centralized) (1) - It is harder to implement multi-step programs in a rural environment (1) - The inability for the healthcare system to work together/doctors providing the same information to patients (for example about mammograms and PSA/rectal exams) (11)
Post-operative care	- Satisfied with the system to receive medication (1) - There is a system in place to receive medication in a box and someone physically comes to work with you (1) - Doctor prescribes medications and explains them and nurse reinforces the instructions (3, 5, 6, 7, 8, 9, 10, 11) - Providers have a plan for follow up and communicated everything (1, 4)	- No follow up given after appointment which led to a complication (5) - Most people in the county are on a 3rd-5th grade reading level and may not be able to understand written discharge papers (10)

Health System Capacity

Table 5 explores the current capacity of the health system, as perceived by our participants, and five subthemes arose: *availability of surgical specialists*, *commitment of providers*, *surgical support services*, *medical equipment*, and *wait times*.

According to participants, there is a need for more general surgeons and specialists, and the county is without a neurosurgeon. One patient lamented, “the county does not have the necessary heart doctor for my husband”. Another recounted a situation when no pathologist was on call during the time of surgery. A third patient described a time they were sent home because the doctor did not have the necessary staff to perform a biopsy.

According to one community member, the provider to population ratio of Robeson County is “always among the lowest in the state”. Another community member stressed there is a need for “actively recruiting providers who grow up in the county”. One patient expressed, “I feel disconnected because I never know when I'll have a new doctor. I’ve had four different doctors in the few times I have gone to the cardiology clinic”. Many participants used the term “homegrown” to describe providers who were raised in Robeson. One nurse shared, “In recent years we have had an increase in ‘homegrown’ doctors especially those in surgery and other specialties, but historically there have not been enough, and the doctor retention rate in the county has always been low.”

Surgical support was another recurring subtheme. Robeson County has two Urgent Care centers that help support the influx of surgical patients in the ER. One patient described a time when they experienced task shifting among surgical personnel.

Most participants, however, feel that surgical support services are lacking and need improvement. Two participants shared that preventative care is lacking in the county, and that there is an inadequate number of primary care practices, which affects the entire health system. Another patient also shared that there is a lack of pre-operative counseling services.

Out of the nine patients and community members we interviewed, almost half of them (n= 4, 44%) shared that medical equipment was never an issue when needing surgery. Two participants, however, one patient and one nurse did advise that there have been instances when the available equipment was unable to accommodate obese patients. In these cases, patients were often referred to other counties for surgical procedures. Three participants said that there are “always long wait times.” One patient said they are “not satisfied with the time it takes to be seen.” The same patient recounted a time at the cancer facility when they waited for over an hour before being told that the doctor would not be able to see them that day. On a separate occasion, the same patient shared a story about a time where they “arrived at the hospital at 4pm but did not get a hospital room until 2am.”

Table 5: Health System Capacity

	Efficient (Positive statements)	**Needs Improvement (negative statements)**
Availability of specialists	- "I see multiple specialists and have access to the specialists I need" (5) - Not aware of challenges for having surgery because of lack of healthcare personnel (7)	- A need for plastic surgeons (1) - No neurosurgeon (10) - Need more general surgeons, subspecialists, urologists, neurologists, gastroenterologists (11) - "The county does not have a heart doctor for my husband" (3) - No pathologist on call (4) - Patient sent home because the doctor did not have the necessary staff to perform a biopsy (5)
Commitment of providers	- Most providers who work within the health system are happy (10)	- Providers do not commit long-term/high turnover rate (1, 2, 9) - A need for recruiting providers who grow up in the county (1) - Lack of "homegrown" doctors lead to low retention rate (2) - Provider-to-population ratio is the lowest in the state (2) - "I often have a new doctor" (5)
Surgical support services	- Very close with their primary care provider so in emergency situations they can rely on her (5) - "Primary provider was unavailable but I called my PA and she was able to see me within a day" (task shifting) (4) - Urgent care is a substitute for primary care within the county (7)	- Preventative care is lacking (2, 10) - Large Medicaid population with not enough providers - urgent care get overrun (2, 11) - Inadequate # of PCPs (2) - Lack pre-operative services (4)
Medical Equipment	- Equipment not an issue (1, 4, 5, 7)	- Unable to accommodate obese patients (3,10)
Wait times		- Always long wait times (2, 4, 6) - Waited for over an hour then was told the doctor would not be able to see her that day (3) - Arrived at the hospital at 4pm, did not get a hospital room until 2am (3) - Not satisfied with wait times (3)

Alternative Medicine

Table 6 highlights the practice of alternative medicine. Five participants (45%) were either unaware of alternative medicines practices or felt that the number of people who do seek alternative medical practices was not significant. The other six individuals believed that alternative medicine was still a practice commonly sought out by members of the Lumbee tribe, as well as Black and Latino populations. One participant, who is a member of the Lumbee tribe stated, “People go to informal providers because of tradition”. Both nurses we interviewed explained the prevalence of “spiritual healers, who talk fire out of one’s body.” One nurse noted there are even extreme circumstances where “farmers go to animal/agricultural stores to get penicillin and other medical treatment meant for livestock, with hopes to self-medicate.”

Table 6: Alternative Medicine

Common practice	- “Yes people go to informal providers because of tradition but not so much because of accessibility, transportation, or money.” (1) - People use different herbs, teas, vitamins and things that have been passed down between generations (2) - “Spiritual healers”- able to talk fire out of one’s body (10, 11) - Very common practice among Latino, African-American, and Native American populations- root doctors (African-American) and fire talkers (Lumbee) (11) - Examples of farmers who go to animal/agricultural stores to get penicillin and other medical treatment meant for livestock with hopes to self-medicate (11) - Many of the Lumbee people try to treat symptoms at home first before going to a formal health facility (10)
Uncommon practice or unaware	- Not aware of such practices (6, 9) - “I do not know of people who only seek out alternative practices” (2) - This is a practice that has faded away in recent years (7) - “Some people consult ‘root doctors’ but I do not think it is a large group (4)

Community Beliefs

Table 7 describes how community beliefs play a role in the healthcare system; subthemes included: *stigma/fear of being ostracized, role of the religious community,* and *common beliefs/misconceptions.* Seven participants (64%) described stigma and fear of being ostracized as barriers to seeking care. One participant noted that there is stigma surrounding seeking care often. Two additional participants expressed that stigma is associated with high rates of diabetes, high blood pressure, and mental health. “The Church” also plays a role in how the community views illness. One participant shared, “So many people are taught and believe in ‘Give it to God’, so when it comes to mental health and addiction people feel very ashamed to seek professional help because it is perceived as a spiritual failure.” Participants also noted that misconceptions are often perpetuated by the community. One nurse shared, “Many people are on an ‘illness model’ as opposed to a ‘wellness model’. They believe if they initiate care, there will be complications”. In Robeson County, it is common to only seek care in “life or death” situations because many people believe “once you go into the ER you don't come out”.

Table 7: Community Beliefs

Stigma/fear of being ostracized	- “Stigma and fear of being ostracized” (1,10, 11) - “I know people who are ostracized” (3) - Stigma surrounding seeking care often (9) - High rate of diabetes and that can be stigmatized (2, 7) - High blood pressure is stigmatized (7)
Role of religious community	- Faith-based stigma: “I’m not going to claim my diabetes” or “I’m going to pray away my illness”- people believe if their faith was stronger they would not need to access care (11) - Mental health, fear of being ostracized, church plays a role (2)
Common beliefs/misconceptions	- There is a fear of seeking care for one thing a being flagged for something else (another health complication or drug use) (11) - Historical reputation of poor quality of care (2) - Negative view of the county (“a good doctor wouldn't practice here”) (4) - Many people are on an “illness model” as opposed to a “wellness model” - they believe if they initiate care there will be complications (11) - “If nobody in my family has had breast cancer, then I won’t get breast cancer” (10) - People believe once you go into the ER you don't come out (11) - “You only go to a doctor if you’re about to die” (2)

Historical and Cultural Context

Table 8 highlights the historical and cultural context of the county health system. Themes of racism, sexism, and cultural differences often arose within interview dialogue. Most participants expressed that increasing the number of providers that look like them and come from similar backgrounds would increase the connection and trust between providers and patients. One nurse shared an example of a Native American provider who recently started working in the county, but had a certain level of trust with their patients because of that shared cultural and racial background.

Four participants spoke about how systemic racism plays a role in the county's health system. One member of the Lumbee tribe shared, "I think that we live in an area where historically we were not always favored by the institutions in place." They went on to say, "Robeson county has a history and issue with social class and race. This makes communal spaces sometimes unwelcoming, and to avoid that, even in life or death situations, people will elect not to go to a facility. This may be considered a psychological/mental barrier, but it is a barrier nonetheless". One of the few participants who migrated to the county, added, "I think that an experience or perception in one area can overlap. I think this is the case between our judicial system and the health system. I was told the hospital wasn't integrated until 1968, so I could imagine that discrimination is still present".

Table 8: Historical and Cultural Context

Representation	- “I think people tend to look for a provider that looks like them” (2) - For preventative care, the race of the provider is important (2) - There's an example of a Native American doctor who came in with a certain level of trust (11) - There is a growing Latino population however there are no Latino surgeons in the county (11) - “As a female, I prefer a female doctor” (3) - “Cross-cultural communication is a big problem” (1)
Systemic Racism and Sexism	- “Experience or perception in one area can overlap- this is the case with the judicial system and health system” (4) - History of White power (4) - Historical experiences are passed down through generations (2, 4) - The hospital was not integrated until 1968 (4) - There is friction between Black and White people in the county (10) - Few Lumbee people would get the COVID vaccine – due to lack of trust (4) Biases against females and people of color providing medical services (1) - Only “homegrown” providers can understand certain cultural nuances (2) - “As a black person sometimes I feel as though we’re not acknowledged or shown the same respect and care” (9) - “I have witnessed a Native American patient refuse to acknowledge a Native American provider as a doctor” for example a patient might refer to a doctor as “Mr. X” as opposed to “Dr. X” (10)
Race, gender, or cultural differences is not an issue	- Unaware of racist actions towards certain people and cultures (5, 7, 8) - No preference for race or gender unless it is a personal procedure (7)

Financing

Table 9 illustrates how financing is a barrier to accessing surgical care. Although all participants were insured, more than half of them (n= 6, 55%), felt that financial limitations were a challenge when accessing surgical care. One nurse noted that patients are often unsure if their insurance will be accepted at certain facilities. Another

participant highlighted there is a “significant number of patients who do not qualify for Medicaid/Medicare but cannot afford private insurance”, and the rate of those individuals is growing.

Table 9: Financing

Insurance	- Insurance coverage was a challenge before disability (7, 9) - Patients are unsure if their insurance will be accepted (11) - People of color space out when they have children to account for when Medicaid benefits are about to run out. This is culturally accepted (11) - Trouble working with representatives of the insurance company (9) - Significant number of patients who do not qualify for Medicaid but cannot afford private insurance (2) - Lack of insurance and personal finance is the main issue for accessing care (8, 10)

Suggested Actions

Table 10 provides suggestions from participants on how to mitigate barriers and improve access to surgical care for all. Responses were grouped into five subthemes: *health infrastructure, trust/comfort in the health system, existing human resource capacity, the role of the religious community,* and *the role of the education system.* Some suggestions to improve health infrastructure included creating one-stop clinics in institutions like schools, and increasing the presence of mobile clinics in more remote areas of the county. Participants also suggested expanding health facilities’ hours of operation to accommodate working individuals and decrease wait times. One nurse stressed the importance of increased preventative care services within the county, and three patients emphasized that increasing transportation services within the county would be their number one suggestion for improving access to surgical care.

Another subtheme was *trust/comfort in the health system*. One community member noted, “I think organizations and institutions within the county need to start the

conversation to eliminate some of this tension between different cultures and races. It is not wise to think that we can all live so independently and segregated and then come together in a health system and work together with a certain level of trust". Another community member suggested public awareness campaigns to educate the community about the hospital's initiatives to improve health.

Participants also made suggestions to expand existing human resource capacity. One nurse said, "Currently there are very strict practice rules for nurses in North Carolina. I think we need to open opportunities for nurse practitioners to be self-employed and expand businesses here. The amount of money it costs to recruit a physician to rural America is more than double compared to the amount of money it takes to recruit and train a nurse."

One community member believed the key to improving care in Robeson County was to improve the relationship between the religious community and the health system. They stated, "I think pop-up clinics in and outside of churches could be very beneficial. It would help show church community members that the Church supports prevention and healthcare, which I think is a major gap/need to be filled in the county". They went on to say, "Having the Church admit that [mental health and other diseases] is a real, physical problem and not only a spiritual problem could be a major step in the right direction to improve awareness, education, and cultural perception of mental health and addition".

One nurse noted that literacy rates in the county are low and that improvements to literacy rates and health education within the education system would go a long way in mitigating barriers to care in.

Table 10: Suggested Actions

Health infrastructure	- Create one-stop clinics (2) - Mobile clinics for more remote areas in the county (11) - Decrease wait times and explain long wait times when applicable (3) - Expand urgent care hours of operation (3) - Having available appointment times outside of normal business hours (6) - Increase preventative care services (10) - Increase transportation services (3, 4, 6)
Trust/comfort in health system	- Larger organizations and institutions should take initiative in starting the conversation around racism and cultural differences (1) - Increase trust between patient and provider/health system (4, 9) - Public awareness campaigns to let the community know what the hospital is doing to improve healthcare. (2)
Existing human resource capacity	- Expand opportunities for nurse practitioners (11) - Doctors to be more committed to the patients (5)
Religious community	- Church needs to admit that mental health is a real, medical problem (2) - Pop up clinics in and outside of churches to show community members that churches support healthcare (2)
Education System	- Improve literacy rates and health education (11)

4. Discussion

In the U.S., 30 million people lack access to trauma care within one hour,[10] and gaps in access to emergency surgical services are disproportionately affecting minority and rural populations.[11] Robeson County is a racially diverse, rural county; and in Robeson, racial minorities make up approximately three-fourths of the county's population. This makes conducting research identifying barriers to surgical care all the more important.

We identified the county's historical and cultural context, the lack of available resources, the knowledge gap in presently available resources as overarching themes that contribute to barriers to surgical care in Robeson County. There is documented history of segregation and discrimination in the U.S., especially in the South, which includes Robeson County. Some participants believed that the history of racism and discrimination may still linger within the county's health system. These unwelcoming experiences and historical mistrust of the system, can cause residents of the county to seek healthcare in another counties or forgo seeking care altogether. Participants also indicated distrust in the formal health system, tradition, cultural and religious beliefs, and finances all may play a role in motivations for seeking alternative care, which is consistent with a previous study that explored Lumbee mothers' perceptions of parenting premature infants. The study found that mothers were influenced by multigenerational advice, traditional and non-traditional medicine, pride in Lumbee heritage, spirituality and the role of the Church.[16]

We identified the following lack of resources: primary care providers to refer patients for surgical care, limited provisions for obese patients, and inadequate number

of surgical providers and specialists to perform certain procedures. Another challenge is when telehealth is an alternative option, individuals living in more remote areas and/or individuals who are at or below the poverty line might face challenges because of lack of electricity or Wi-Fi. Likewise, paying for surgical care, for these individuals, can be a barrier because of minimal insurance coverage benefits or being uninsured altogether. This is evident when we consider that 27% of the population lives at or under the poverty line and 16% are without insurance.[5] Participants of the study also revealed a knowledge gap in transportation programs. We found that transportation services are available but not everyone who needs them is aware of them and they are very time consuming, which could limit use for patients who cannot take time from work and caregiving responsibilities.

Application of The Three-Delays Model

The three-delays model proposes that adverse surgical outcomes are due to three delays: (1) seeking, (2) reaching, and (3) receiving care.[12] Figure 1 shows the three-delays model applied to the context of this study to further assess the identified barriers. From the themes we identified we found that comfort level with the health system, alternative medicine, community beliefs, the county's historical and cultural context, and financing contributed to delays to seeking surgical care, transportation influenced delays to reaching care, and logistics of the healthcare system and health system capacity contributed to delays to receiving care. Figure 1illustrates, in detail, the barriers to surgical care that we identified from our interviews with participants, and how each barrier to surgical care that was uncovered in this study contributes to one of the three delays.

Figure 1: The Three Delays Model

The three-delays model also proposes, if prompt, adequate treatment is provided, adverse outcomes can be avoided.[12] Though our study found that most barriers to care fall within the *delays to seeking care* category, addressing each of these delays to surgical care is equally important. From the data, participants shared action items to help avoid delays to surgical care. To avoid delays to seeking surgical care participants suggested improving health education through partnerships with the school system and faith-based groups to promote health education, and emphasizing the importance of seeking care. Participants also suggested repairing and further building the relationship between the community and the health system through public awareness campaigns and having an increased health presence at community events. To avoid delays in reaching surgical care participants suggested building the health system's capacity through the development of perioperative resource guides to bring awareness to transportation services and newly constructed health facilities, encouraging private-public partnerships to bring more transportation services to the county and provide free Wi-Fi/electricity to surgical patients when telehealth is an option. Participants also suggested expanding mobile health to more remote areas of the county and highly populated public spaces. To avoid delays to receiving surgical care

participants suggested increasing surgical capacity by expanding hours of operation at current health facilities, building additional surgical facilities, incentivizing providers who grow up in the county to remain in the county for work, increasing surgical staff, and improving services to accommodate obese patients.

Addressing each of the three delays will help close the knowledge gap in resource availability, reducing the stigmatization of surgical diseases, get patients to the appropriate health facility in a timely manner, receive adequate surgical care, and change people's perception of the county health system's ability to care for its citizens.

4.1 Study Limitations

The primary limitation of this study is that the small sample size does not yield generalizable data. We did not interview any surgeons, members of the county government, leaders of the Lumbee, health system leadership, nor clergy members. Another limitation is that we interviewed patients of a breast surgeon, which contributed to a high number of female participants and only interviewed one male participant. Also, since the majority of our participants (7 out of 11) have had surgery then we have potentially introduced a bias for participants who managed to navigate any barriers to successfully access surgery. Furthermore, the comprehension/understanding of interview questions could have been a barrier for some of the participants we interviewed, and it is possible that participants could have been reluctant to share their true feelings and experiences as a result of the historical and cultural context of the county.

4.2 Future Work

Identifying the perceived barriers to surgical care and using the three-delays model to assess those barriers provides a foundation for future research to be conducted on the barriers to surgical care in Robeson County. As a result of identifying the influence of religion and spirituality within the Robeson County health system, a study engaging with faith-based groups led by a Duke University medical student has recently begun. Existing research supports the importance of engaging with faith-based groups to improve health outcomes. For example, a study with the goal to develop, deliver, and evaluate a cardiovascular disease program for Lumbee women in Robeson County, concluded that churches in the community can be used as resources in developing and implementing health promotion programs in Christian populations.[6]

In the near future we also hope to initiate a mobile perioperative clinic and develop health education programs in Robeson County to continuing closing the knowledge gap in resource availability and advocate for additional resources to the county.

5. Conclusion

Using a three-delay framework, this pilot qualitative study has highlighted several barriers to obtaining surgical care in Robeson County. Delays to seeking care include: past medical errors, racial minorities not feeling welcomed in historically racists/discriminatory institutions, seeking out alternative medicine and other forms of informal healthcare, the stigmatization of diseases and receiving care often, fear of being flagged for other medical reasons or fear of adverse surgical outcomes, inability to afford out-of-pocket costs. Delays to reaching care were influenced by: absence of alternative modes of transportation (i.e. ride share services), time consuming process with current public transportation, limited mobile health options, long distances to the appropriate medical facility, and when telehealth is an option patients are sometimes met with the barrier of no Wi-Fi or electricity. In general, once patients reached the hospital it was felt that resources were available. However, the following delays to receiving care were present: long wait times, limited hours of operation, ineffective referral process, inadequate medical equipment and staff in some cases, and uncertainty around insurance coverage at some health facilities. These data suggest that the following action items: improving health education, building the county health system's capacity, and increasing surgical capacity could be explored as ways to improve access to surgical care.

Appendix A

Interview Guide

Demographics

1. Basic information:
    a. Name
    b. Email address (for follow up purposes):
    c. Age
    d. Race
    e. Gender: male, female, non-binary
    f. Income: less than 25k, 25-40k, 41-75k, 75-99k, 100k+
2. Do you live or have you have lived in Robeson County? How long?
3. Are you Lumbee? Tell me about your relationship with the tribe.
4. What is your occupation/occupation status?
5. Do you have health insurance? Who is your provider?
6. How long have you worked in Robeson County health system? (provider only)

General Health Access:

7. On average, approximately how many miles do you (your patients) live from the nearest hospital or health clinic? Is this the preferred healthcare facility? Why?
8. Does the health system provide transportation services to patients, if needed? Tell me about those services and whether or not you find them helpful.
9. Do you think people have a fear of being ostracized?
10. Are there any health conditions that are associated with stigma?
11. What type of things prevent people in Robeson County from seeking the care they need?
12. What type of things prevent people in Robeson County from reaching the care they need?
13. What type of things prevent people in Robeson County from receiving the care they need?
14. Do you feel that that Robeson county has enough surgeons in the different specialties? What specialties do you think are lacking and why do you say that?
15. Do you feel that the hospitals / clinics have the necessary equipment needed? Do you have examples of equipment that has not been available when needed?
16. Do you feel that your patients trust the health system in Robeson County? Why are why not? Can you tell me story to explain why you say that?
17. Do you think that you (your patients) are connected to the health system? Why?
18. Do you think that people in Robeson county turn to alternative medicine/informal providers for surgical care because they are more accessible, trusted, or inexpensive? If so, can you give an example?
19. If you are aware of informal providers how many are there in the community? Do they have a relationship with the healthcare system? Explain further.
20. What cultural beliefs are present that may prevent someone from seeking, participating in or receiving care for surgical issues? Any examples?
21. Tell me about health education. Are there certain diseases or conditions for which people may not understand that nature and treatment of these conditions?

22. Do you believe race plays a factor in health outcomes in Robeson county? Do you see evidence of adverse surgical outcomes disproportionately affecting members of a particular race or races?
23. In your experience, are there things that prevent members of the Lumbee tribe from accessing the care they need compared to other populations? Any example?

Pre-operative:

24. On average, how long is it between the time you (your patient) might feel unwell and the time to see the appropriate doctor in clinic? What things might delay seeking the appropriate doctor earlier? Please describe that process to me.
25. Tell me about scheduling an appointment at the hospital or scheduling surgery. In your opinion is that process easy or difficult for you (most patients)? Why?
26. Tell me about transportation. What mode of transportation do you (your patients) most often use to get to their preferred healthcare facility? Do you believe transportation is an issue (for your patients)?

Post-operative:

27. When you (your patient) leave(s) the hospital, what is done to ensure there is a clear understanding of what medications to take? Tell me about that process?
28. When you (your patient) leave(s) the hospital, is there a clear plan for follow up appointments with the surgeon and wound care? Tell me about that process?
29. Does the hospital provide mobile/telehealth options (remote patient monitoring, point-of care- diagnostic, medication management, etc.) for post-surgical operations?
30. In your experience, how satisfied are you (your patients) with the surgical process and plan for follow-up? Tell me why.
31. What would you say is your (your patients') single greatest challenge to accessing surgical care in Robeson County?
32. How would you like to see access to surgical care in Robeson County improved?

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