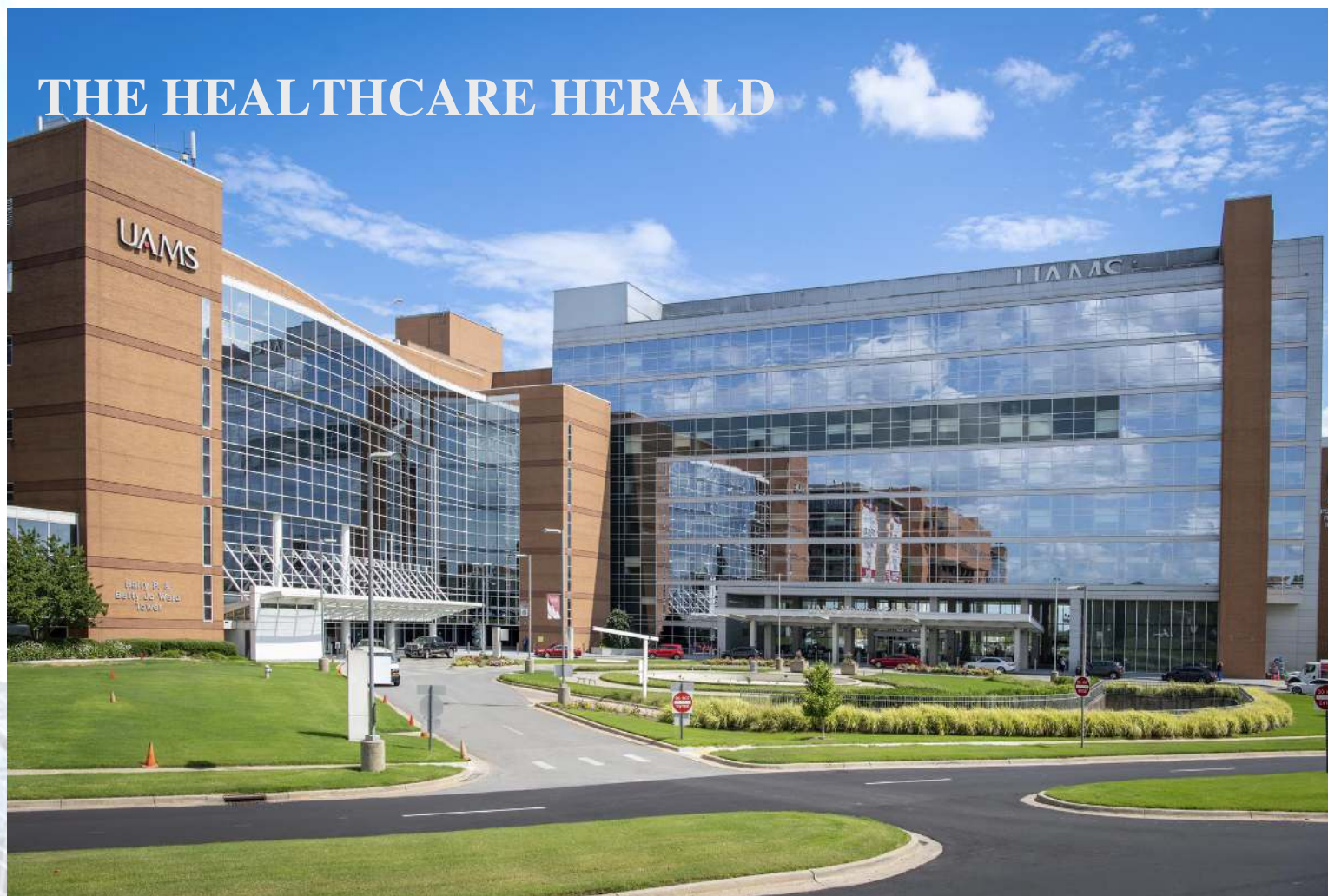


# THE HEALTHCARE HERALD

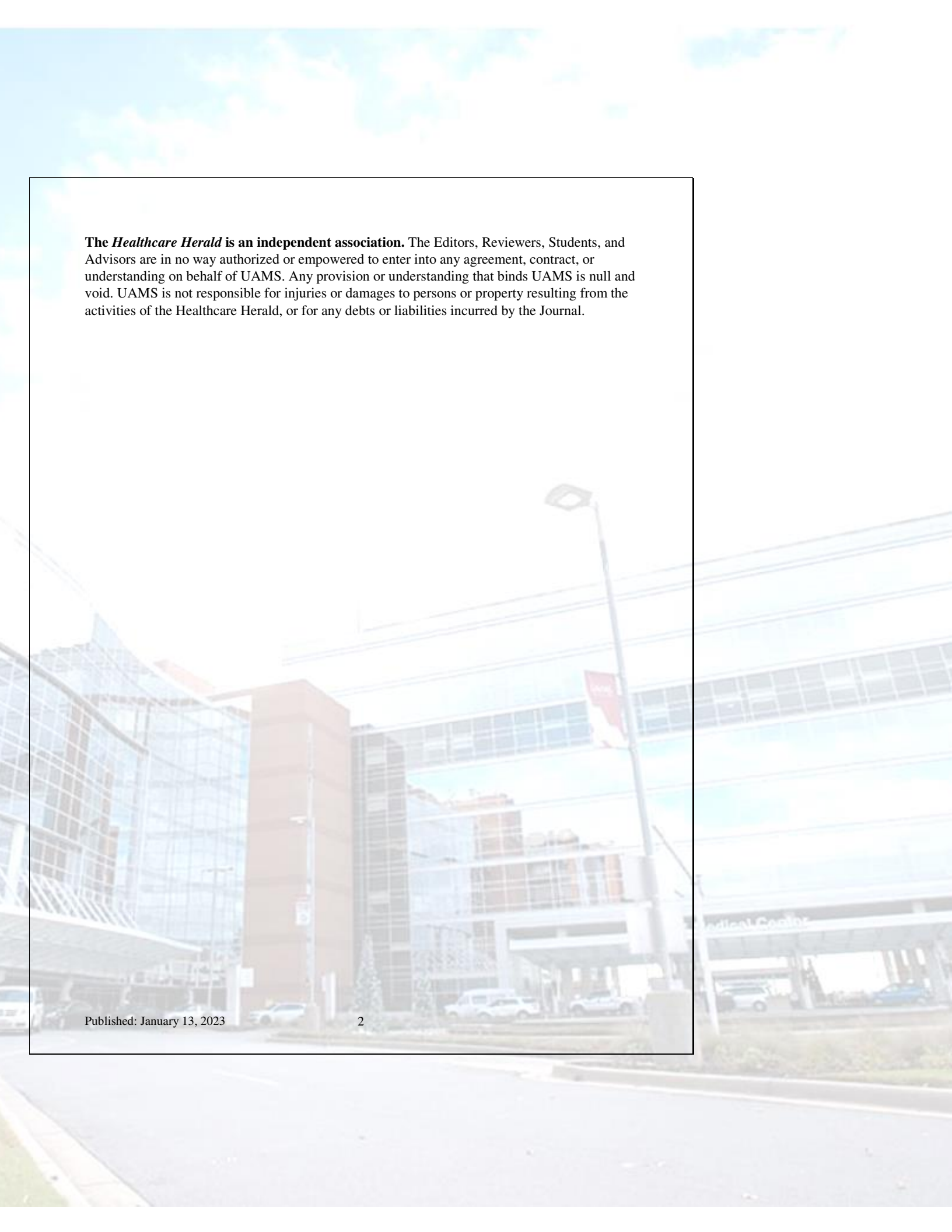


# VOLUME 1

Published: January 13, 2023

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Volume 1  
Editors: Alisha Crump, MPH & Erin Womack  
Faculty Advisors: Dr. Tremaine Williams & Dr. Kwasi Boateng

Published: January 13, 2023

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## A FOREWORD FROM THE EDITORS

### Welcome to the inaugural issue of the University of Arkansas for Medical Sciences Healthcare Herald!

*The Healthcare Herald* is a student-led, peer-reviewed journal that reinforces the initiative to create a platform where students can learn about and advocate the importance of healthcare delivery, both historical and current, to underrepresented populations in Arkansas!

*The Healthcare Herald* creates a place where students can explore issues pertinent both to the University of Arkansas for Medical Sciences and its mission of advancing patient care in our state. Through the development of this journal, we aim to increase the number of individuals from underrepresented groups engaged in healthcare, mitigating healthcare workforce shortages experienced across the nation. In addition, we aim to increase the scope and breadth of research conducted on minority and rural populations in Arkansas who are disproportionately impacted by health disparities. Finally, we hope to ensure greater diversity and representativeness within our healthcare system at large. The students who publish in this journal have remained faithful to the betterment of the field and are striving toward excellence in healthcare for all in Arkansas. This journal is supported by our editors, advisors, and advisory committee with the goal of creating a superb publication for our readers throughout the state, region, and nation.

The inaugural issue includes an academic manuscript, commentary piece, and abstract submission. They exemplify the values of the journal and set the stage for subsequent issues. Additionally, the research presented here exemplifies the educational emphasis we strive to build upon.

Using the journal inauguration as an occasion, we would like to thank many people who created the opportunity for the journal to be made happen. The list includes all current UAMS Healthcare Herald Steering Committee Members and many others. In particular, our greatest thanks are to faculty advisors Dr. Tremaine Williams and Dr. Kwasi Boateng, who put a lot of their time into this endeavor.

*"The return from your work must be the satisfaction which that work brings you and the world's need of that work. With this, life is heaven, or as near heaven as you can get" ~W.E.B. Dubois*



A handwritten signature in black ink, appearing to read 'Alisha Crump'.

Alisha Crump, MPH  
Editor-in-Chief  
She/Her/Hers



A handwritten signature in black ink, appearing to read 'Erin Womack'.

Erin Womack  
Associate Editor-in-Chief  
She/Her/Hers

## ABOUT THE HEALTHCARE HERALD

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The primary audience for The University of Arkansas for Medical Sciences Healthcare Herald are individuals within the state of Arkansas and around the nation who are students of, entering into, or already serving in the realm of healthcare and healthcare improvement. This publication's aim is to reach both students and professionals within the broader healthcare community who develop and maintain programs in healthcare education, delivery, and improvement. These individuals will include regulatory professionals, researchers, practitioners, administrators, students, and any interested general public.

### MISSION

The mission of the Healthcare Herald is to enhance students' and practitioners' medical journeys through the publication of articles, research, and personal narratives that impact lives and strengthen one's commitment to equality in healthcare.

### SCOPE

The scope of The Healthcare Herald is purposefully eclectic and serves as a medium for both academic and creative expression connecting those who have been touched by medical experiences, whether that be healthcare providers, administrators, educators, or patients. This publication includes, but is not restricted to, high-quality academic manuscripts, conference-quality poster presentations, research project summaries, and artistic pieces, among other formats. Submissions are accepted in a progressive manner and reviewed on a rolling basis. To ensure your submission adheres to the guidelines of The Healthcare Herald, please see the submission process Overview, Guidelines, and Review Process, below.

- **Commentary:** Individuals with a specific medical experience that they would like to share.
- **Original Research:** Manuscripts, literature reviews, project summaries, and conference proceedings.
- **Academic Debate:** Individuals with a pressing medical issue or academic debate in which they wish to advance.

## INSTRUCTIONS FOR AUTHORS

- Eligible research article types include **original research, literature review, poems, narrative review, special commentary, letter to the editor, and meta-analysis**
- Article authors are required to submit a set of keywords to improve searchability and information retrieval.
  - Provide between 3 to 6 inclusive keywords.
  - Keywords should represent the main subject matter of the submission.
- An abstract of no more than 250 words summarizing the objectives, methods, results, conclusions, and relevance of the study or review is required
- All manuscripts should be submitted online at:  
<https://regionalcampuses.uams.edu/journal/submission-form/>

Article Type	Description	Requirements
<b>Original Research</b>	An original research paper should present a unique argument of the researcher that builds on the existing research on a topic and addresses a specific question.  <b>Eligible include types:</b> Clinical trial Intervention study Cohort study Secondary data use Case-control study Epidemiologic assessment Survey with a high response rate Cost-effectiveness analysis Decision analysis Study of screening and diagnostic tests Other observational studies	<ul style="list-style-type: none"> <li>• 3000 words</li> <li>• ≤5 tables and/or figures</li> </ul>
<b>Literature Reviews</b>	Critical assessments of the literature and data sources pertaining to clinical topics, emphasizing factors such as cause, diagnosis, prognosis, therapy, or prevention.	<ul style="list-style-type: none"> <li>• 3000 words</li> <li>• 50-75 references</li> <li>• ≤5 tables and/or figures</li> <li>• A PRISMA-style flow diagram should be included as an online supplement</li> <li>• Include a table with ratings of the quality of the studies/evidence</li> </ul>
<b>Poems</b>	Original poems related to the medical experience, whether from the point of view of a health care worker, patient, or simply an observer.	<ul style="list-style-type: none"> <li>• Less than 150 lines.</li> <li>• 1 Author</li> </ul>
<b>Narrative Review</b>	Reviews aimed at identifying and summarizing what has previously been published.	<ul style="list-style-type: none"> <li>• 2000-3500 words</li> <li>• 50-75 references</li> <li>• ≤5 tables and/or figures</li> </ul>

Source: JAMA Network

	These reviews should address a specific question or issue that is relevant to clinical or public health practice	
<b>Special Commentary</b>	These articles describe an important issue in clinical medicine, public health, health policy, or medical research in a scholarly, thorough, well-referenced, systematic, and evidence-based manner	<ul style="list-style-type: none"> <li>• Less than 4,000 words.</li> <li>• 15-50 references</li> <li>• ≤4 tables and/or figures</li> </ul>
<b>Letter to the Editor</b>	Letters discussing a recent article in this journal should be submitted within 6 weeks of the article's publication in print.	<ul style="list-style-type: none"> <li>• 400 words</li> <li>• ≤5 references (1 of which should be to the recent article)</li> <li>• ≤3 authors</li> </ul>
<b>Meta-Analyses</b>	Systematic, critical assessments of literature and data sources pertaining to clinical topics, emphasizing factors such as cause, diagnosis, prognosis, therapy, or prevention, and that includes a statistical technique for quantitatively combining the results of multiple studies that measure the same outcome into a single pooled or summary estimate.	<ul style="list-style-type: none"> <li>• 3000 words</li> <li>• 50-75 references</li> <li>• ≤5 tables and/or figures</li> <li>• Follow PRISMA Reporting Guidelines for Meta-Analyses</li> </ul>

## GRAPHICS

- Graphics should be included in the submission, either in the text or appended to the end. If appended at the end, the desired placement for the graphic within the text should be specified (e.g., "insert Figure 1 here").
- References to the graphics should be indicated in the text (e.g., "Figure 1"), along with the appropriate citation for the source.
  - If the graphic is not original, permission to reprint must be included in the submission
- To ensure a high-quality image, graphics, either electronic or printed, must be camera-ready and have a high resolution of at least 600 dpi.

## ARTISTIC WORKS

- Digital Artwork: Should be submitted in .tiff format or .png.
- Photographs of Art: No more than one picture submitted in .tiff or .jpeg file format.

## REFERENCES

It is the responsibility of the author to ensure that all material drawn from other sources is credited, either as a footnote, an endnote, or a reference. All assertions, not those of the author, should be credited to or referenced by a source. References should be cited in the text as superscript numbers placed at the end of the sentence or paragraph. The corresponding superscript number should be listed in the reference section.

- [NLM Reference Style](#) or [APA 7<sup>th</sup> Edition Reference Style](#) are required.
- References may not be used in the abstract section.

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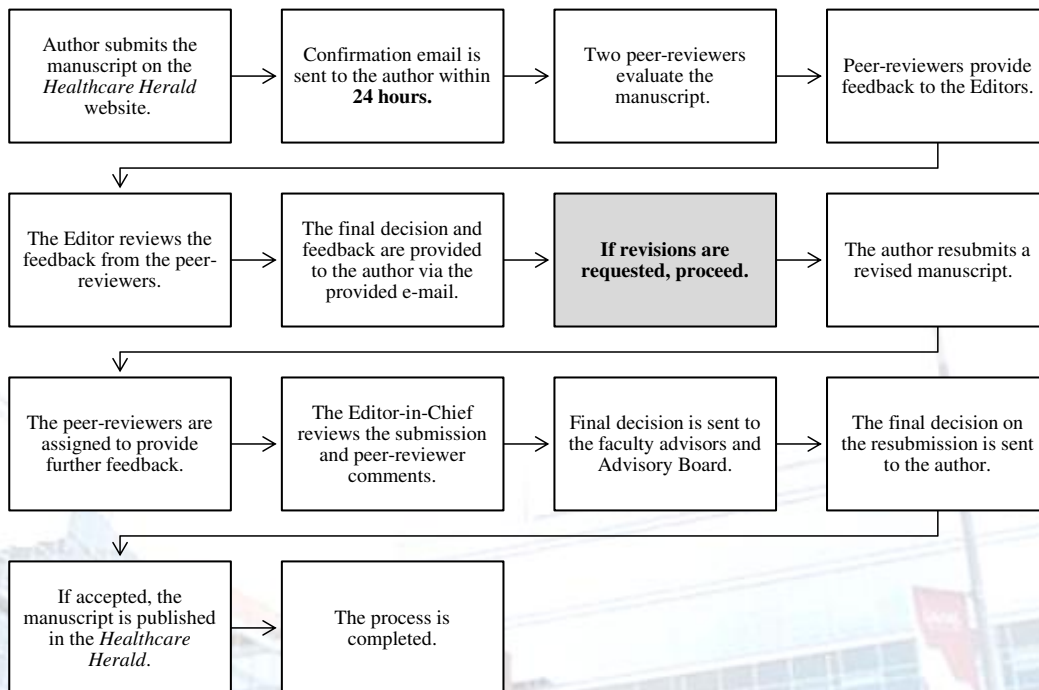
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## SUBMISSION TIMELINE





# VOLUME 1

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Published: January 13, 2023

Article/Brief Report/Observation and Commentary

## Abortion access hindered during the COVID-19 Pandemic, Arkansas, 2020

Lorraine Stigar<sup>1</sup>, Mallory Jayroe<sup>1</sup>, Kevin Ryan<sup>1</sup>

<sup>1</sup>University of Arkansas for Medical Sciences

### Abstract

As cases of COVID-19 (the disease caused by SARS-CoV-2) increased across the US, measures were taken at the local and state level to preserve personal protective equipment for our healthcare workers through the restriction of non-urgent and elective procedures. Abortion has been classified as an essential health service by the World Health Organization; however, in Arkansas, abortion care was deemed elective, and therefore, restrictions were put in place, limiting its access and increasing interstate travel to obtain this health service. The authors provide a timeline of Supreme Court decisions regarding abortion access in the US, as well as Arkansas-specific legislation and court decisions. The authors address the public health impact of defining abortion care as non-essential or elective while also providing recommendations for how to define non-essential and elective services due to the lack of an existing definition at the time of this writing. The authors recommend defining abortion care as essential due to the physiological nature of pregnancy, a lack of risk associated with abortion care, and the multi-level impact postponing can have on individuals and families.

**Keywords:** Abortion, COVID-19, Essential Care, Arkansas, Access

## Background

As cases of COVID-19 (the disease caused by SARS-CoV-2) increased across the US in early 2020, states respectively declared public health emergencies to mitigate the spread of the disease. Recognizing that the availability of personal protective equipment (PPE) necessary to protect healthcare personnel caring for COVID-19–positive patients was potentially limited, many states elected to define certain medical procedures and services as non-urgent and elective (Erickson et al., 2020). These states then restricted or banned these services for the stated purpose of preserving PPE and limiting its use to the provision of essential health services (Erickson et al., 2020). While many understand essential health services to be defined as care for patients with urgent and emergent health conditions, the authors of this paper were unable to find a clear definition of the term.

On April 3, 2020, the Arkansas Department of Health (ADH) issued a directive on elective procedures that stated all procedures that can be safely postponed should be rescheduled. Emergent or urgent care was considered an exception not covered by the directive. Abortion services were deemed to be elective and non-urgent, and per the directive, their provision was restricted. Other states such as Alabama, Alaska, Iowa, Louisiana, Mississippi, Ohio, Oklahoma, Tennessee, Texas, and West Virginia also restricted access to abortion care; though, of these, Arkansas was the only state that enacted a total ban on access to abortion care (Sobel et al., 2020). The American College of Obstetricians and Gynecologists (ACOG) issued a position statement during this same time stating that abortion is time sensitive, an essential component of comprehensive health care, and delaying may increase the risk of potentially making it completely inaccessible (Sobel et al., 2020). The World Health Organization (WHO) classifies abortion as essential to women’s rights and health (WHO, 2020). This report aims to describe the limits on access to abortion services that occurred in Arkansas through specific restrictions during the COVID-19 pandemic, the public health impact of defining abortion care as a non-essential and elective service, and implications should another pandemic or other public health crises occur in the future. Finally, the authors will briefly discuss the impact of state government level restrictions on the recognized federal right of access to abortion services and whether the said limitations are appropriate during a pandemic or other public health crisis.

## Abortion in Arkansas

In the 1973 *Roe v. Wade* decision, the US Supreme Court first articulated the constitutional right to access abortion without unnecessary and excessive government restrictions. In reaching this decision, the *Roe* Court described an individual’s “privacy right” that, while not expressly stated, is implied in the 14<sup>th</sup> Amendment Due Process Clause, which provides for an individual right to privacy. According to the *Roe* Court decision, the express individual rights against unreasonable and inappropriate government actions provided for in the 1<sup>st</sup>, 9<sup>th</sup>, and 14<sup>th</sup> Amendments all contribute to a general individual right to privacy not otherwise expressly stated with the body of the US Constitution. At the time, this newly articulated individual right to privacy served as the underpinning for the Court to find that this included a right for women to access abortion care, albeit a right with limitations. Since the original *Roe* decision, Arkansas, like many states, has sought to further limit that right.

In 2017, there were 4 facilities providing abortions in Arkansas, 3 of which were clinics (Witwer et al., 2019). By 2019, only medicated abortions could be provided through Planned Parenthood clinics in both Little Rock and Fayetteville. The Fayetteville location ultimately closed in July of 2019 due to financial hardships leading to reduced access to abortion services in the state. Little Rock Family Planning Services

is the only clinic providing surgical abortion in the state of Arkansas. This limitation on abortion service providers occurred primarily as a result of activities in the Arkansas General Assembly. For example, ACA (Arkansas Code Annotated) Section 20-9-302(a) (Enacted 1983; Last Amended 2019); Arkansas State Board of Health, Rules and Regulations for Abortion Facilities, Section 3 requires any facility which provides abortion care, including medical abortion, to 10 or more women in any month to obtain a state “abortion facility” license. Two other regulations include Arkansas State Board of Health, Rules and Regulations for Abortion Facilities Sections 1-12 and Arkansas State Board of Health, Rules and Regulations for Abortion Facilities Sections 12 (D)(1), (E)(13-17) (Prochoice America, 2021). These sections state that abortion facilities must comply with a uniquely imposed licensure structure that includes a variety of record-keeping, administrative, physical plant, and patient care requirements. Having a required number of rooms with specific dimensions, which are unrelated to medical necessity, is included in the physical plant requirements (Prochoice America, 2021).

In 2013, Arkansas passed a law that banned abortions after 12 weeks of pregnancy, except in cases of rape, incest, life endangerment, and fatal fetal deformity, becoming the most extreme restrictions in the nation (Welch, 2021). In March 2014, a federal court judge struck down the 2013 12-week ban as violate of the Roe Court described; right to access abortions; however, the judge did allow some portions of the 2013 Arkansas law remain intact such as the requirement that abortion providers must check for a fetal heartbeat in the presence of the woman seeking the abortion. Then in May 2015, the Eighth Circuit US Court of Appeals affirmed the lower federal court holding, and in January 2016, the US Supreme Court rejected the state’s appeal of this ruling, seemingly ending the discussion of the question.

The issue of the extent of the reach of *Roe* has been an ongoing source of debate and government action in Arkansas over the prior decade (Welch, 2021). The following is a timetable detailing sentinel events.

**2015** –“Governor Asa Hutchinson signed into law a so-called ‘telemedicine abortion’ ban that requires the physical presence of a physician when a woman takes abortion-inducing medication.”

-“Arkansas General Assembly passed SB 569, which denies any state funding to Planned Parenthood or any social service agency that refers patients to abortion providers; this includes grants for programs not related to abortion, such as disease prevention programs.”

-“Legislative session, the legislature passed a bill that mandates a forty-eight-hour waiting period for women seeking an abortion and a bill that requires doctors to give advice about a supposed abortion reversal that can be implemented during a chemical abortion.”

**2016** –“U.S. District Judge Kristine Baker of the Eastern District of Arkansas issued a preliminary injunction against the 2015 law that aimed at ending abortions by medication in Arkansas, holding that the requirements presented such an obstacle to women seeking early-stage abortions that they were unconstitutional; in July 2017, a three-judge panel of the Eighth U.S. Circuit Court of Appeals lifted the injunction against the law, and the U.S. Supreme Court, on May 29, 2018, rejected a challenge to the law.”

**2017**- “Gov. Hutchinson signed into law a bill banning the dilation and extraction procedure, a common second-trimester abortion procedure; similar laws have been put on hold in other states due to legal challenges.”

-“Gov. Hutchinson signed HB 1434, which requires doctors to ask patients if they know the sex of the fetus; if the patient acknowledges this, then the doctor is prevented from performing the abortion ‘until reasonable

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*time and effort is spent to obtain the medical records of the pregnant woman, 'ostensibly for purposes of allowing the doctor to ensure that the abortion sought is not related to the sex of the fetus.'*

*- "Act 383, which requires an immediate penalty for abortion clinics that are found to violate even minor requirements by ADH, took effect on August 1, 2017; a federal judge stated later in the month that consideration of the constitutionality of the law would receive priority status."*

**2019-** *"Governor Hutchinson signed a 'trigger' bill that would make abortion automatically illegal in Arkansas should the U.S. Supreme Court ever overturn Roe v. Wade."*

*-"Governor Hutchinson signed into law a bill restricting abortion to the first eighteen weeks of pregnancy; the following month, he signed into law a bill requiring women to wait seventy-two hours before having an abortion."*

**2020-** *March 30, 2020, ADH issued guidance letters to all health facilities, including abortion providers following Ark. Code Ann. §20-7-109--110 as a means to control the disease and limit Personal Protective Equipment (PPE).*

This included the following mandates:

*"Procedures, testing, and office visits that can be safely postponed shall be rescheduled to an appropriate future date.*

*Routine dental and eye care visits shall be postponed.*

*Emergent, urgent, and care designated as an exception below will continue.*

*Small rural hospitals under 60 beds and critical access hospitals, though strongly advised to follow this directive to maximize resources, are excluded from this directive. Exceptions to this directive should be made in the following circumstances:*

*There is a threat to the patient's life if the procedure is not performed.*

*There is a threat of permanent dysfunction of an extremity or organ system if the surgery is not done.*

*There is a risk of metastasis or progression of the staging of a disease or condition if surgery is not performed.*

*There is a risk that the patient's condition will rapidly deteriorate if surgery is not done, and there is a threat to life or an extremity or organ system or a threat of permanent dysfunction or disability." Ark. Code Ann. §20-7-109—110 – ACA enacted statutes not mandated orders from ADH*

#### **Access to Abortion Services in Arkansas during the COVID-19 Pandemic**

Following this order, on April 7, 2020, ADH ordered the only clinic providing surgical abortions in the state, Little Rock Family Planning (LRFP), to cease and desist the provision of surgical abortions unless immediately necessary to protect the life or health of the patient. In response, the clinic canceled all upcoming abortion appointments, and as a result, many women were forced to travel out of state during the height of the pandemic to obtain an abortion.

The following Monday, April 13, the American Civil Liberty Union (ACLU) of Arkansas, partnering with the law firm of O'Melveny and Myers, sued the state on behalf of the LRFP clinic. A federal judge issued a temporary restraining order allowing surgical abortion services to resume (Rutledge, Leslie, No. 20-1791). The clinic was able to perform surgical abortions for 3 days before the courts stopped them again. On April 27, 2020, ADH issued a new elective surgery directive. Per this directive, elective surgeries could resume as long as patients could obtain a negative COVID-19 test within 48 hours of their procedure (Arkansas Medical Society, 2020). During this time, there was a nationwide shortage of coronavirus test kits. On May 7, a federal judge denied an LRFP clinic request to be able to provide abortions to all patients citing the Eighth Circuit opinion. On May 18, ADH announced it was relaxing the testing requirement, and patients had 72 hours prior to elective procedures to obtain a test.

While some states employed telemedicine services to facilitate access to abortion services during the pandemic, Arkansas law enacted in 2015 prohibits the use of telemedicine for the provision of medicinal abortion, thus eliminating this option for women requesting abortions during the pandemic or otherwise (Welch, 2021).

Given that pregnancy is one of the only health conditions with beginning and end dates and in recognition that access to abortion is time sensitive, ACOG has stated that abortion is an essential healthcare service that requires timely access to care (ACOG, 2020). The statement released by ACOG notes that an inability to obtain an abortion can have longstanding and profound impacts on a person's life, health, and well-being. Therefore, timely access to abortion care services is critical for women electing to avail themselves of that option. If access to abortion is delayed, this could result in medical complications and that, in most cases, has negative impacts on social, emotional, and well-being overall (Major et al., 2009).

### **State v Federal Laws**

*Roe* determined that, "In the first trimester of pregnancy, the state may not regulate the abortion decision; only the pregnant woman and her attending physician can make that decision" (*Roe v. Wade*, 410 US 113 [1973]). The *Roe* Court held that the Due Process Clause of the 5<sup>th</sup> and 14<sup>th</sup> Amendments of the US Constitution protects an individual's fundamental right to privacy, therefore protecting the individual's choice to have an abortion. Although the 14<sup>th</sup> Amendment has been used in several cases concerning abortion care, various restrictions have been added.

In the case of *Planned Parenthood of Southeastern Pennsylvania v Casey* in 1992, several provisions were made for those seeking abortions services, "in a plurality opinion, the Supreme Court affirmed the 'essential holding' of *Roe v. Wade*, the women have a right to obtain an abortion prior to fetal viability, but rejected *Roe*'s trimester-based framework for allowing states to curb the availability of abortion in favor of a more flexible medical definition of viability." (Britannica et al., 2016). Furthermore, *Planned Parenthood of Southeastern Pennsylvania v. Casey* held that statutes restricting abortion access by requiring a woman to give informed consent, requiring minors to obtain parental consent or a judicial waiver, requiring clinics to provide specific information to the women, and a waiting period of at least 24 hours were all constitutionally permissible. However, the court did uphold and reaffirm to the individual the right to privacy articulated by the *Roe* court, and through that, the protected right of a woman's access to abortion care.



In an effort to further curb an individual’s access to abortion services, the Hyde Amendment was passed in 1976. This Amendment, “blocked federal Medicaid funding for abortion services” (Sobel et al., 2020). Although Medicaid can be used for pregnancy-related health care, Medicaid funding has been limited by preventing funding from going toward abortion care. Those who advocate for abortion care view the Hyde Amendment as a tool that interferes with health decisions that should be made between a patient and their healthcare provider and places an undue burden on marginalized communities. Planned Parenthood Action Fund states, “The Hyde Amendment is particularly harmful to people with low income, people of color, young people and immigrants - who all disproportionately rely on Medicaid for their health care coverage.” (Planned Parenthood Action Fund, 2020). While most states did not attempt a policy to restrict access to abortion care, Alabama, Alaska, Arkansas, Iowa, Louisiana, Mississippi, Ohio, Oklahoma, Tennessee, Texas, and West Virginia did, “temporary abortion bans have sprung up in several states with antiabortion governors, expanding on existing laws that already strictly limited the procedures before the pandemic.” (Shepherd, 2020). Challenges to these restrictions soon arose, resulting in locally generated executive orders and federal court decisions that restrained the implementation and execution of these restrictions. As a result, all states but one modified their original definition of abortion care as non-essential. As mentioned before, Arkansas was the only state with a ban in effect to limit access to abortion care. (Sobel et al., 2020).

## **Conclusion**

Essential healthcare services are defined as a service that is vital to the health and welfare of the population, meaning it is imperative that the service is maintained at all costs, even during a disaster. (Taylor et al., 2021). Essential services are, by definition, often time-dependent, and the absence of their provision risks impacting the ongoing health of an individual. Therefore, abortion care should be defined as essential because it meets all of these criteria. Moving forward, abortion care services need to be declared as essential, “while most providers have shifted to telehealth in an attempt to maintain care, many reproductive health conditions that have been deemed “non-essential” require in-person evaluation and treatment, and therefore patients have experienced delays in this care” (Weigel, 2020). Due to the physiologic nature of pregnancy, the risk associated with both the surgical and non-surgical abortion options, and the multi-level impact postponing or not accessing abortion can have on an individual and their families. Essential care should be defined as anything that is medically necessary, “if people must stay home and not go to medical facilities unless experiencing an emergency or serious symptom of COVID-19, abortion care must be available at home. There can and must be more options for prescribing and receiving this medication. Abortion care has always been essential and must remain so.” (McCamen, 2020). Additional recommendations would include increasing the gestational age under which an individual can access abortion care. Currently, in the state of Arkansas, surgical abortions can be obtained only up until 21 weeks of gestation. Extending this timeline would allow patients to obtain the necessary COVID-19 “pre-surgical” test results prior to their appointment with the physician. It is imperative to advocate for access to reproductive health. This includes proactive efforts in ensuring abortion services during a public health crisis while pushing back efforts to restrict abortion care services generally.

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Original Research

# Menu Engineering: A Diet-Based Intervention for Diabetes Prevention and Management in Rural Southeast Arkansas

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## Abstract

Type II diabetes is a leading cause of death in the US. In rural areas, particularly Southeast Arkansas, there is limited access to healthcare, healthy food options, and educational resources for healthy living; thus, the prevalence of diabetes is especially high (>25%). Sustainable public health interventions are difficult to implement in this economically disadvantaged area and must be based on existing resources and infrastructure with minimal financial investment to be successful. Such areas are often termed *food deserts* because of the lack of fresh foods and a greater reliance on prepared meals from convenience stores and restaurants. Thus, an intervention based on the concept of “menu engineering” was developed that can be deployed in existing food retailers. Menu engineering uses visual cues to influence the selection of items from a menu, potentially toward healthier options. The menu of a popular restaurant in Southeastern Arkansas was engineered to highlight existing menu items that were considered healthier. Sales orders were monitored for 1-week periods using an unmodified menu, the engineered menu, and back to the unmodified menu. Using the engineered menu led to a 6% increase in the selection of healthier options. This study shows that menu engineering is a cost-effective public health intervention for the prevention and management of type II diabetes and potentially other cardiometabolic conditions, particularly in rural areas that are socially and economically disadvantaged.

## Introduction

Diabetes mellitus is a group of chronic diseases where insulin is either insufficient, or what little is produced is not effectively used.<sup>1</sup> This inability to regulate insulin can result in hyperglycemia, and if not controlled can lead to more serious conditions including eye damage, kidney disease, high blood-pressure or stroke or death. There are three main types of diabetes: type I, type II, and gestational diabetes. Type I diabetes is thought to be caused by an abnormal autoimmune response that usually begins in adolescents and affects the pancreas' ability to produce sufficient levels of insulin. Type II diabetes is a gradual decrease in the pancreas' ability to produce insulin, or a gradual resistance towards insulin, and primarily occurs in adults. Risk factors for developing type II diabetes are related to poor lifestyle choices, including diet, lifestyle, and obesity. Gestational diabetes occurs in pregnant women who have never had diabetes. Although gestational diabetes usually resolves after birth, there is an elevated risk for developing type II diabetes later in life. Pre-diabetes is a condition of elevated blood sugar levels that are not high enough to be considered diabetes. Early interventions to improve diet and exercise are quite effective in preventing or delaying pre-diabetes advancing to diabetes. All types of diabetes usually do not present any symptoms and can only be diagnosed after blood tests. Rural communities often lack access to such health facilities or are not aware of the importance of regular checkups, meaning many cases of diabetes are often caught in later stages and has great social and economic consequence.

In the United States over 37 million adults are diabetic, about 10%, with 90-95% of cases being type 2,<sup>2</sup> and is the 8<sup>th</sup> leading cause of death nationally.<sup>3</sup> However, geographical incidence maps show an uneven distribution of diabetes between rural and urban areas. Diabetes is especially prevalent in a region that covers 15 states and spans from Louisiana to West Virginia, known as the "diabetes belt", where >12% of the population has been diagnosed with diabetes, and Arkansas is included in this region.<sup>4</sup> The prevalence of diabetes in Arkansas is higher than the national average at almost 11% of the state population, or 360,000 known cases. An additional 800,000 adults were pre-diabetic since 2018, which is 14% of the Arkansas population. Diabetes affects Arkansas disproportionately, which ranks 34<sup>th</sup> in terms of population yet is 3<sup>rd</sup> in the nation for deaths caused by diabetes.<sup>5</sup> Management of the disease in Arkansas is challenging with only 25% of diabetic patients able to keep glucose levels under control. In 2018 there were over 1,190 deaths in Arkansas that were attributed to diabetes, of which 40% of patients were unaware they had diabetes.<sup>5</sup> In the Southeastern (SE) region of Arkansas, sometimes known as the "Arkansas Delta" the prevalence of diabetes is even higher and estimated to be 25-30% of the regional population in 2013.<sup>6</sup> Developing successful public health interventions has been challenging in this rural region because of a poor socioeconomic environment and underfunded public services.

Despite this exceptionally high prevalence of diabetes in SE Arkansas, there is very little public health-related research on successful interventions in this region. A search in PubMed<sup>7</sup> using the key phrase "Arkansas Delta" found only 13 publications related to medical research, of which only 2 were related to diabetes,<sup>8,9</sup> with none within the last 5 years. To demonstrate how underserved SE Arkansas is by the research community the key phrases "Mississippi Delta", which is has a comparable demographic profile with SE Arkansas, found over 300 publications in PubMed. Due to a lack of public health studies in rural SE Arkansas a detailed demographic description and comparison will be made to provide context of the population targeted in this study.

*Rural Health Care.* There are several factors known to affect diabetes management, one of those factors is living in a rural area,<sup>10</sup> which is defined as county that has less than 50,000 people.<sup>11</sup> By this definition,

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72% of Arkansas is rural, which is one of the highest in the US.<sup>12</sup> The average percentage of uninsured adults in Arkansas is about 13%, which does not vary much between rural and urban areas.<sup>13</sup> However rural areas tend to have less medical professionals to serve the population, which affects patients' ability to seek preventative medical care and treatment for managing chronic diseases. In Arkansas there are approximately 10 physicians per 10,000 people in rural areas, compared with 30 physicians per 10,000 people in urban areas in 2019.<sup>14</sup> The majority of patients in SE Arkansas also have to drive for more than 30 minutes to reach a primary healthcare facility, including a pharmacy.<sup>15</sup>

*Socioeconomic Factors in Rural Areas.* The economies of rural areas tend to be based on agriculture and manufacturing. Mechanization in the 20<sup>th</sup> century has led to loss of employment opportunities with rural areas facing population decline, which results in a collapse of tax revenue for public services and local businesses. SE Arkansas is an extremely fertile region with a historically agriculture-based economy; however it has also experienced social and racial distress with displacement of the indigenous Quapaw people by the European Settlers to create plantations that used slavery and then sharecropping to grow cotton. Phillips county in SE Arkansas is the location of the 1919 Elaine Massacre, the worst racial massacre in US history.<sup>16</sup> The impact of these events disproportionately affects this region with ~50% of residents in SE Arkansas identifying as African-American and ~20% living in poverty (US national average ~10%)<sup>17</sup>, which child poverty rates as high as 25%.<sup>18</sup> A steep population decline of ~10%<sup>19</sup> in this region has resulted in the loss of tax revenue and funding for public services in health, education and infrastructure development. Urban areas in Arkansas saw ~5% increase in population, with growth in rapidly expanding Northwest Arkansas as high as 20%.

High levels of poverty in SE Arkansas are reflected in enrollment in assistance programs. Enrollment in the Supplemental Nutrition Assistance Program (SNAP) benefits program for food assistance is ~12% for Arkansas, but as high as ~30% in SE Arkansas.<sup>20</sup> Even with assistance there are still barriers to accessing food. The population decline has led to many businesses closing in SE Arkansas and reducing important amenities, including retailers selling fresh healthy food, resulting in >50% of residents living >10 miles from the nearest supermarket.<sup>21</sup> Tele-health has been touted as a solution to provide rural areas with access to primary healthcare.<sup>22</sup> Since 2016 significant efforts at the federal level to improve broadband infrastructure in rural areas has improved access such that only 83% of rural areas, including SE Arkansas, have access to the minimum 25 Mbps/3 Mbps of bandwidth.<sup>23</sup> The impact of this recent development on health outcomes is still under investigation, but there are early studies reporting improved management of gestational diabetes using telehealth in Arkansas.<sup>24</sup>

There are significant barriers to managing type II diabetes in Southeast Arkansas, which is an especially economically disadvantaged community with socioeconomic and health outcomes that are worse than the national average. A collapse in tax revenue has led to severely underfunded public services and the inability to support interventions financially. There is also evidence that there is resistance to dietary recommendations by residents in Southeast Arkansas because they do not respect the local food preferences of the area. Thus, any intervention that seeks to change behavior to promote dietary and other lifestyle changes needs to be culturally appropriate if it is to be sustainable.

## **Methods**

The intervention chosen for this study uses the concept of menu engineering, which is designing a menu to influence consumer choices. This intervention has been successfully used in a school cafeteria to

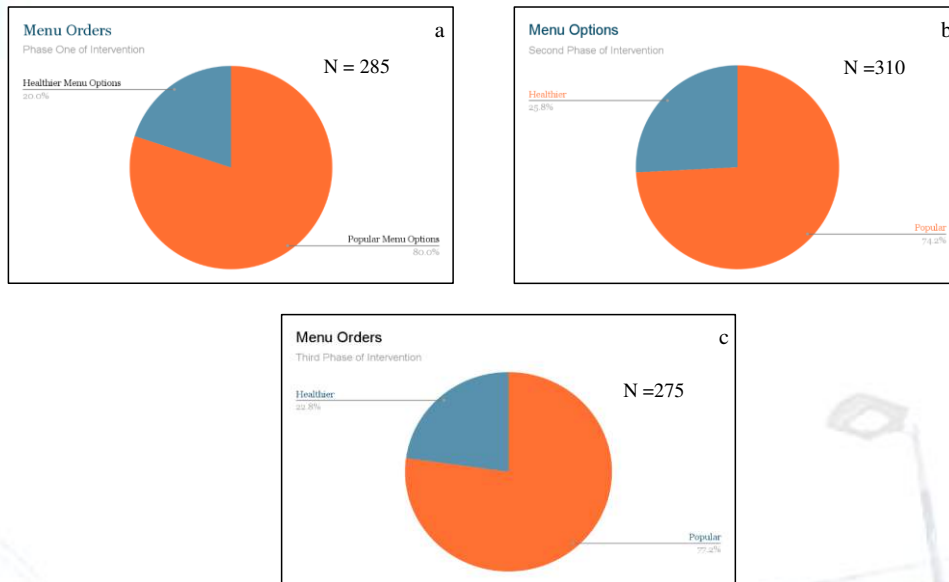
influence students to make healthier food choices by publishing the caloric value of each menu item. The present study adopts a similar strategy but maximizes its impact by targeting the general community beyond the school setting. Southeast Arkansas is a food desert in terms of the availability of fresh food, and small restaurants outweigh the prevalence of grocery stores. Thus, residents have more access to prepared foods. Menu engineering uses existing food infrastructure, needs minimal financial investment, is minimally disruptive, and thus will be more likely to be a sustainable intervention.

A local restaurant in Southeast Arkansas that serves southern comfort food common to this region was recruited to test the hypothesis that patrons will be influenced to choose healthier options if they are highlighted on the menu. Menu items that were freshly prepared and baked instead of fried were identified as “healthier options” and highlighted on the menu using colorful call-out decals. Highlighted menu options included: green beans, smoked turkey, coleslaw, and grilled chicken. All other menu items were classified as “popular menu options.” Recipes and prices were not changed to minimize business disruptions, and any alterations to the menu format were minimal. Calorie values for dishes were not readily available because of the variations of fresh ingredients and because all meals were cooked to order.

The intervention was conducted in 3 phases. In Phase 1, data were collected for an unmodified menu over a week to establish a baseline of customers’ food preferences. In Phase 2, a modified menu was served, and healthier options were highlighted on the menu and around the restaurant for a week. In Phase 3, the highlights were removed, and data were collected for an additional week. Each phase was implemented during the third week of each month for 3 consecutive months to minimize the variation in seasonal behavior. Major holidays, such as Christmas or Easter, were not part of this time frame. Customer choices were tracked through order tickets.

## **Results**

Data for the 3 phases were collected after analyzing order tickets with certain items identified as being healthier. Phase 1 tracked orders for an unmodified menu over a 1-week period, with results shown in Figure 1a. Out of 285 sales orders during that week, 20% consisted of healthier options. This established a baseline for customer food preferences in this region at this restaurant. In Phase 2, a modified menu was released with previously identified healthier options highlighted. After monitoring for a week, the selection of healthier options increased to 25.8% out of 310 sales orders, as shown in Figure 1b. To examine whether these highlights had any residual effect on customer choices, Phase 3 involved releasing an unmarked menu, similar to that used in Phase 1, and monitoring sales orders for a week. Figure 1c shows that in Phase 3, healthier options made up 22.8% of 275 sales orders, which is a decrease from Phase 2 but an increase from Phase 1.



**Figure 1.** Analysis of customer menu selections from a popular restaurant in Southeast Arkansas. Choices were classified as being either “healthier” or “popular.” **a.** Phase 1 analysis of 285 sales orders from an unmodified menu collected over a one-week period. **b.** Phase 2 analysis of 310 sales orders from a modified menu with healthier options highlighted, collected over a one-week period. **c.** Phase 3 analysis of 275 sales orders from an unmodified menu collected over a one-week period.

A 2-proportion pooled 2-sided z-test was manually calculated to determine statistical significance between datasets from each phase. A comparison of Phase 1 and Phase 2 data showed that displaying callouts did increase customers’ orders of healthier food options by 5.8 %, which is statistically significant with a confidence level of 90% ( $P < 0.10$ ). Phase 3 data suggests that after the highlights were removed, customers’ orders of healthier food options decreased compared with Phase 2 but did not revert to Phase 1 levels. However, the differences between Phase 3 and Phase 1 or 2 data sets are not statistically significant ( $P > 0.10$ ).

### Discussion

The region of Southeast Arkansas is one of the most challenging areas to address public healthcare. Acute disparities in poverty, public services, and infrastructure in this rural area have led this region to experience extremely poor health outcomes compared to the rest of the US. Lifestyle choices are poor due to a lack of access to preventative and supportive healthcare and amenities such as fresh food retailers. Asking individuals to change their dietary habits is difficult if healthier options are not accessible, as they are not available in food deserts. Obesity rates are high, accompanied by a high prevalence of cardiometabolic diseases, particularly diabetes. Interventions, such as diet changes and exercise, have been difficult to implement successfully in this region because of severe underfunding in public services and a lack of developing culturally appropriate recommendations that result in changes in behavior for the better.

Menu engineering is a minimally invasive intervention that requires little financial investment and leverages existing food infrastructure and cultural preferences.

Prior to implementing the intervention, it was observed that 80% of customers' orders consisted of less healthy menu options, which were mostly fried meat items, even though there were healthier baked options displayed on the same menu. Highlighting these healthier options, without any other changes to the recipes or prices, was effective in changing customers' preferences by about 6%. It is inconclusive whether this change in preference towards healthier options remained after removing highlights from the menu, and a longer-term study would need to be conducted. However, a significant change in behavior was observed with minimal investment in time, finances, and effort, which supports the overall hypothesis.

With the success of this intervention in Southeast Arkansas with so little investment, it is recommended that public health services look at menu engineering as an intervention to improve lifestyle and dietary choices. There is potential for not only reducing the risk or improving the management of diabetes but also other chronic cardiometabolic conditions that are prevalent in this region, such as heart disease. Due to menu engineering uses existing food infrastructure, it is respectful of local cultural preferences, whatever they may be. Thus, menu engineering is an intervention that has the potential to be scaled and implemented in other rural areas with disproportionately high rates of chronic diseases, underfunded public services, and difficult-to-access healthcare services.

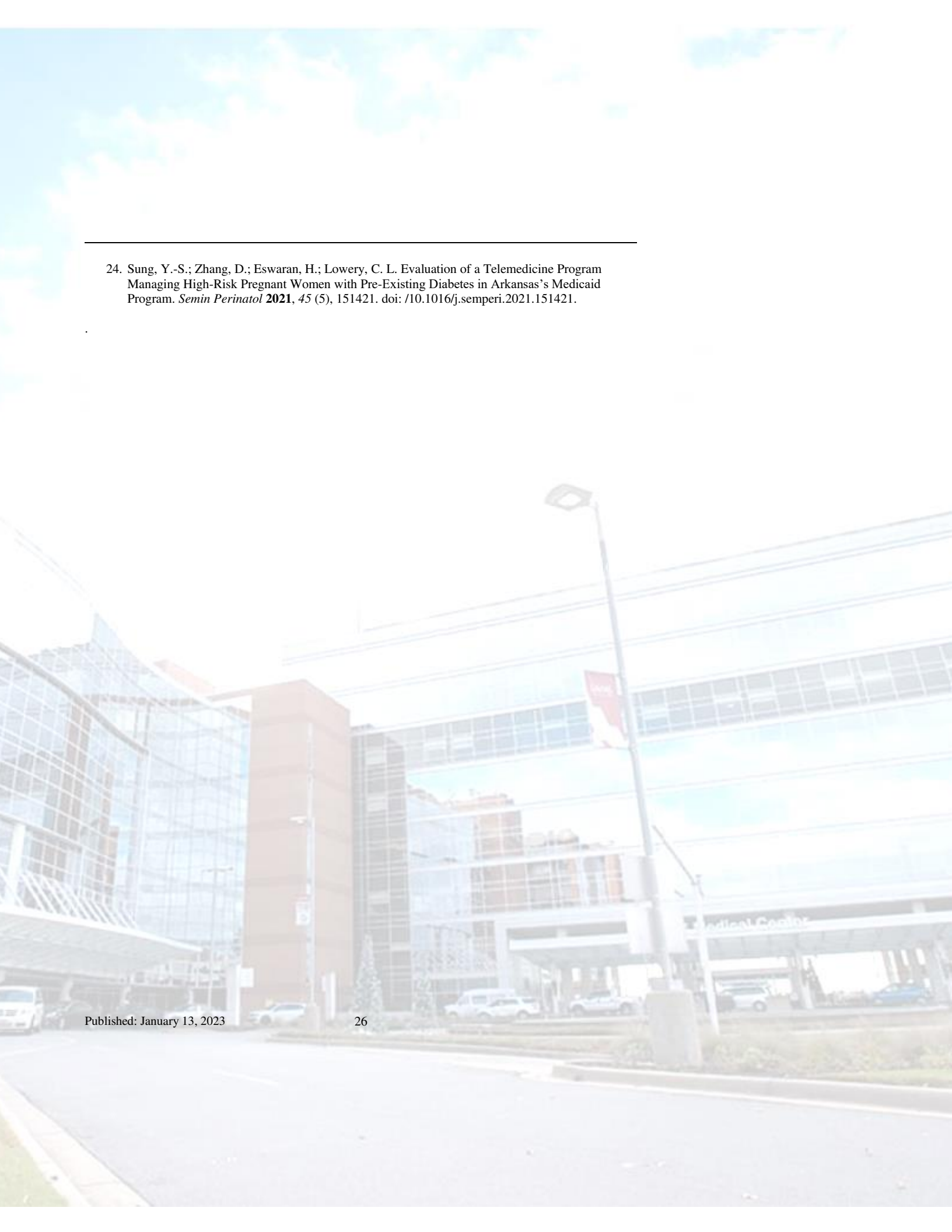
### **Conclusion**

There are several factors that increase the risk of developing type II diabetes, including lifestyle choices. This study tested an intervention that sought to improve dietary choices through modified menus highlighting healthier options in an existing restaurant in Southeast Arkansas. Menu engineering was found to significantly influence selection towards healthier options with minimal investment in time, effort, and resources. These simple modifications can be scaled to other areas of the US because it uses existing infrastructure in food retail and is culturally appropriate when influencing consumers' food choices.



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## FINAL THOUGHTS

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Thank you so much for reading our first edition of the Healthcare Herald! We are thankful for the students who submitted their work and all the great research taking place to better the health of Arkansans!

If you are interested in submitting your work, please reach out to us to get a timeline!

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THE END

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