

Engineering a Resilient Regional Healthcare System: Improving Stroke Care in Shelby County, TN
(Technical Paper)

A SCOT analysis of Home Cooking in American Culture
(STS Paper)

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Prospectus

Introduction

In the United States, someone dies from a stroke every four minutes, making strokes a leading cause of death (Virani et al., 2020). Early action is critical to increasing stroke survival rate, but only one in four patients arrives at a hospital within the optimal timeframe for critical treatments to be administered (Boyles, n.d.). Preventative intervention is equally important, involving early detection and risk factor reduction. While these aspects of stroke care are critical, there are many difficulties surrounding adequate patient access to these resources, which is attributed to the suboptimal design of current healthcare systems that are often focused on fixed facilities. Due to the fixed-facility model, bottlenecks frequently occur during high-strain scenarios, such as a pandemic. These scenarios further limit accessibility and make it more challenging to administer the best care possible. If healthcare resources were reconfigured into an optimized model for stroke care, patient outcomes could be greatly improved even when the system is under strain. Therefore, the final technical deliverables are an optimized resilient healthcare system model that focuses on improving stroke care and a technical report detailing the model and associated findings.

Even though stroke treatment occurs at a hospital, the management of stroke risk begins at home, with 91% of stroke risk coming from modifiable factors, such as obesity, hyperglycemia, and an unhealthy diet (Virani et al., 2020). Many of these factors are nutrition-related, and changes to diet, including an increase in the frequency of home cooking, are often sought after. A high frequency of home cooking, defined as six to seven times per week, has been associated with lower daily calorie, fat, and sugar consumption (Wolfson & Bleich, 2015). Additionally, there are many sociotechnical factors that affect home cooking beyond possessing

cooking skills; some determinants are time availability, close personal relationships, female gender, and cultural background (S. Mills et al., 2017). There are many emotional and social benefits beyond physical health outcomes that are gained from home cooking as well (Robinson, n.d.). It is clear that many factors, perceptions, and contexts affect people's views on, and willingness to partake in home cooking. The final STS deliverable is a research paper that will explore the sociotechnical relationships between American culture and home cooking.

Engineering a Resilient Regional Healthcare System: Improving Stroke Care in Shelby County, TN

Current healthcare delivery models focus on the utilization of fixed care facilities, which limits flexibility and precludes resilience in high-strain scenarios. Fixed facilities are those resources that are immobile, such as hospital or clinic buildings; whereas, other types of resources include telemedicine, intra-region transport, medical personnel, and community education. During times of strain, these healthcare models go through a period of degraded capability when they are unable to deliver proper healthcare to all portions of a population. This decreased accessibility to care is most burdensome to underserved communities that already face barriers to sustainable healthcare over time. A common example of one of these barriers is unreliable transportation to healthcare facilities. A 2010 study conducted in New York City among a low-income suburban community revealed that 23.5% of participants had missed or rescheduled a clinical appointment, with a reason why being the unreliability of public transportation (Silver et al., 2012). This transportation barrier to primary care is only one example of how suboptimal resource organization is detrimental to human health. This decrease

in care due to resource allocation issues is especially concerning for the care of chronic diseases, including strokes.

Strokes are greatly affected by inadequate healthcare delivery given that time is a critical factor in increasing stroke survival. It has been shown that patients have less disability three months after a stroke if they arrive at an emergency room within three hours of symptom onset (*Stroke Facts*, 2021). All aspects of the continuum of care for strokes are crucial, including preventative interventions, rapid care, and post-emergency care. Common difficulties patients face include a lack of knowledge about modifiable risk factors, poor access to primary healthcare for early stroke risk detection, and poor access to post-emergency care. These difficulties are exacerbated by the suboptimal design of current healthcare systems. The technical team of Erica Cassidy, John Quezada, and myself will reconfigure healthcare resources for stroke care into an optimized model to create a model healthcare system that will provide improved care, even when facing high strain.

This optimized healthcare system model will be based on Shelby County, Tennessee's current healthcare system. This region was selected for its high prevalence of strokes, its size, and its wide variety of healthcare resources. The current gaps in the system's ability to treat stroke patients will be assessed by analyzing the resources available in Shelby County. All other healthcare resources will also be assessed; this data will be utilized in a data science approach to build a mathematically-based healthcare system model. The creation of this model will utilize operations research and optimization functions, and will be validated with the real-world constraints of cost, time, and geography that exist in Shelby County. Resilience for high-strain scenarios will also be incorporated into the model by first assessing how the current healthcare system addresses resilience metrics such as duration to failure, duration to recovery, and

performance before and after recovery (*System Resilience - SEBoK*, n.d.). These resilience techniques will then be added to the model through more operations research approaches and analysis. For this project, resilience within a healthcare system is defined in terms of the metrics listed here along with associated historical data. The final deliverables of a resilient regional healthcare system model optimized for stroke care and an associated technical report will allow for the establishment of a healthcare system that is both robust and resilient. A resilient healthcare system will have profound effects for those at risk of stroke and for those who are currently recovering from a stroke and need excellent care, no matter the situation.

A SCOT analysis of Home Cooking in American Culture

Americans are cooking less than ever before and increasingly eating food made away from home, with around one-third of daily calorie consumption occurring outside the home (*The Truth About Home Cooking*, n.d.). The decline in home-cooked meals is associated with obesity and poorer diet quality, and is caused by factors including a lack of access to healthy food, time constraints, lack of cooking skills, and increased female participation in the workforce (Wolfson & Bleich, 2015). America obsesses over food through the consumption of celebrity TV shows, cooking competitions, media posts, and blogs; however, people do not always like to participate in cooking themselves since the place food has been given in American culture does not match the place of food in day-to-day life (*The Truth About Home Cooking*, n.d.). This misalignment can lead people to avoid cooking.

Although these factors may cause home cooking frequency to be declining, many benefits of home cooking are becoming prominent. In The Seattle Obesity Study, higher quality diets at no extra cost resulted from more frequent home-cooked meals (Tiwari et al., 2017).

Besides health benefits, there are many perceived social and emotional benefits of home cooking, such as a sense of comfort, pride, or relaxation. Home cooking is also a social activity that strengthens relationships (*The Truth About Home Cooking*, n.d.). Higher cooking frequency clearly has many benefits, but it is not possible for everyone due to time constraints or unreliable transportation to grocery stores. For some, cooking at home is the only option since they lack the money to eat out (*The Problem with Home-Cooked Meals - Vox*, n.d.). Others simply feel it is important to cook and eat at home. Home cooking is deeply embedded in American culture and has strong associations with nostalgia, positive memories, and social interactions (S. D. H. Mills et al., 2020). Depending on the cultural, familial, and social contexts a person is familiar with, home cooking may be perceived as the expectation or the norm. Furthermore, the very meaning and value of home cooking differs depending on a person's social background, employment status, attitudes toward gender roles, and household characteristics (Daniels et al., 2012). To explore the prominent social and cultural perceptions of home cooking, the research of the final STS deliverable will seek to answer the following question: How is home cooking influenced by American culture?

The STS framework that will be utilized to analyze this question is the Social Construction of Technology (SCOT). SCOT's key concept is that technology is shaped by an interactive sociotechnical process, and that human action shapes technology. SCOT was selected as the analytical framework due to its underlying assertion that society shapes technology, which aligns clearly with the goal of the research question, unlike most other STS frameworks. SCOT's framework is composed of four components: interpretive flexibility, relevant social groups, closure and stabilization, and wider context. By working through an analysis of these four components in the listed order, an evaluation of various social groups' perceptions of a

technology can be realized and placed in a broader societal or cultural context. Many critics of SCOT argue that the wider context is usually under-valued as the relations between groups, and factors that lead to differences between them, are not considered (Klein & Kleinman, 2002). Other critics of SCOT argue that the coexistence of old and new technologies needs to be considered, since it brings out the politics of technology (Vannini, 2009). Sometimes, the meanings of an artifact change, causing the relevant social groups to change as well. Additionally, English STS researcher Stewart Russell identifies weaknesses in SCOT, with a particular focus on the idea that directly transferring concepts from a sociology of science to that of technology is not appropriate (1986). Clearly, SCOT has its limitations, but it will be a useful framework to analyze the stated research question. To do so, the alternative interpretations of home cooking by social groups will be considered. Next, the relevant social groups will be identified; possible social groups include home cooking media influencers, medical professionals, home cooks, and those who do not cook. Then, the achievement of closure surrounding home cooking will be demonstrated, with a discussion of how this closure is not permanent. Lastly, home cooking will be discussed in its broader context within American society and culture.

Since home cooking is frequently discussed, is prevalent in the media, and is often encouraged as part of a healthy lifestyle, identifying the social and cultural relationships that affect it is important to understanding the motivations for and outcomes of home cooking. This knowledge could be used to motivate public health initiatives to better encourage the use of home cooking, which would lead to improved health outcomes for Americans.

Research Question and Methods

The research question of this STS project is the following: How is home cooking influenced by American culture? To answer this question, current research will be organized and explained through the use of sources such as journal articles, magazine articles, and online posts written by food and health policy journalists. These sources have been identified through the use of Documentary Research Methods and the following keywords: home cooking, cooking, social, culture, diet, and health. These keywords were chosen due to their coverage of the many different aspects being considered in this analysis. The information gathered from the identified sources will be organized by theme, centering around the various social groups' perceptions and interpretations of home cooking. This specific research will provide information for the first two components of SCOT, allowing an analysis of what the relevant social groups are and the alternative interpretations they have. Once these different perceptions have been identified, they will be used to finish the discussion of the last two components of SCOT and ultimately answer the research question from the resultant analysis.

Conclusion

This paper covers an assessment of current gaps in a regional healthcare system's ability to treat stroke patients as well as different perceptions and relationships pertaining to home cooking in American culture. The technical portion of this paper describes how the team will analyze and assess the healthcare resources in Shelby County, TN and subsequently build and optimize a model using operations research and optimization techniques. The model will focus on improving stroke care and will incorporate resilience for high-strain scenarios, which will allow for improved patient outcomes no matter the situation. The STS analysis will result in an identification and discussion of the various sociotechnical relationships between American

culture and home cooking and will be completed by utilizing SCOT to identify varying perceptions and social groups, and to place home cooking in its wider context. By knowing these relationships, the motivations for home cooking and its subsequent outcomes will be understood, resulting in useful knowledge that could inform public health initiatives surrounding home cooking. With the implementation of well-informed initiatives, health outcomes, diet, and nutrition of Americans will improve, resulting in a healthier nation, both physically and mentally.

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