

Addressing Rural Health Inequities Through the Private Sector: A Framework for Deployment

By

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For Pom Pom & Gandaddy

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LIST OF ABBREVIATIONS

ACA	Affordable Care Act
CDC	Center for Disease Control
SDoH	Social Determinates of Health
SEE	Social Entrepreneurship or Enterprise
VBC	Value-Based Care
VC	Venture Capital

INTRODUCTION: RURAL HEALTH IN THE UNITED STATES

As a result of the last three decades of political discourse and corporate growth, the United States is in an affordable healthcare crisis and rural Americans are more receptive and in need of private sector healthcare solutions now more than ever. After decades of decline in the health of the rural U.S. population, a new approach must be taken to deal with rural health inequities and needs. The private sector is uniquely positioned to step in and strategically analyze potential new collaborative solutions completely different from previous public or private sector attempts.

The dramatic health inequity between urban and rural individuals and communities in the United States is undeniable. With 20% of the U.S. population living in rural communities, it is a key and distinct portion of the American population.¹ In addition, according to the CDC, rural Americans are at a greater risk of cancer, heart disease, chronic lower respiratory illness, accidental injury, and stroke, than 75% of their urban and suburban counterparts.² The inequities are further increased when examined through the lens of healthcare access: rural areas only have a ratio of 39 physicians per every 100,000 people, revealing a large gap compared to the ratio for urban populations.³ Rural Americans live twice as far from their nearest hospital than their urban counterparts, doubling their time to care and inhibiting their overall ease of access.⁴ Additionally,

¹ Bureau, US Census. "What Is Rural America?" The United States Census Bureau. Accessed June 22, 2021. <https://www.census.gov/library/stories/2017/08/rural-america.html>.

² "About Rural Health | CSELS | OPHSS | CDC," March 25, 2020. <https://www.cdc.gov/ruralhealth/about.html>.

³ "About Rural Health Care - NRHA." Accessed March 15, 2021. <https://www.ruralhealthweb.org/about-nrha/about-rural-health-care>.

⁴ NW, 1615 L. St, Suite 800 Washington, and DC 20036 USA 202-419-4300 | Main 202-857-8562 | Fax 202-419-4372 | Media Inquiries. "How Far Americans Live from the Closest Hospital Differs by Community Type." *Pew Research Center* (blog). Accessed March 15, 2021. <https://www.pewresearch.org/fact-tank/2018/12/12/how-far-americans-live-from-the-closest-hospital-differs-by-community-type/>.

rural populations are typically older than urban populations, with 18% of rural residents being over the age of 65 compared to the 12% of urban residents over 65.⁵ The combination of geographic distance to care paired with the social determinants of health affecting rural populations, create the health disparities that exist in the rural US.

Rural health in the United States is defined in many ways and is often adapted to reflect the specific demographic or situation in focus. The U.S. Census Bureau defines a rural area as any territory or population outside an Urban Area or Cluster, which means any population with a density of less than 2,500 people.⁶ Whereas the Office of Land Management defines a rural population to be anything outside a metropolitan or micropolitan, anywhere with an urban core less than 10,000 people.⁷ The U.S. Census Bureau's definition overcounts rural populations, but the Office of Land Management's definition undercounts the rural U.S. population. If defining rural health as any healthcare needs or services for either defined rural population, the definition of rural health would be vague and inaccurate. In attempt to solve the issue of definition clarity for rural health, the Federal Office of Rural Health Policy created the "Rural-Urban Community Area" metric to determine rurality for a population. This metric measures the distance to services and population density to more accurately categorize a community as rural.⁸ With this metric, rural health is therefore defined as any healthcare need or service associated with a population deemed rural by the "Rural-Urban Community Area" metric. This definition assigns a

⁵ About Rural Health Care - NRHA." National Rural Health Association, Accessed March 15, 2021. <https://www.ruralhealthweb.org/about-nrha/about-rural-health-care>.

⁶ "Defining Rural Population," Official web site of the U.S. Health Resources & Services Administration, April 28, 2017, <https://www.hrsa.gov/rural-health/about-us/definition/index.html>.

⁷ "Defining Rural Population," Official web site of the U.S. Health Resources & Services Administration, April 28, 2017, <https://www.hrsa.gov/rural-health/about-us/definition/index.html>.

⁸ "Defining Rural Population," Official web site of the U.S. Health Resources & Services Administration, April 28, 2017, <https://www.hrsa.gov/rural-health/about-us/definition/index.html>.

quantifiable population size and location to associate with rural health, but it does not fully encompass the elements which make up the nature of rural health.

To further define rural health and the components of what makes rural health distinctive, the National Rural Health Association defines rural health in the United States by the issues plaguing rural health and the obstacles faced in attempting to address it. The National Rural Health Association describes rural health as a compellation of economic, cultural and social, educational, and political disparities combined with “sheer isolation,” which contributes to the situation defined as rural health in the United States.⁹ This study evokes this definition of rural health, which embodies the fundamental nature or situation of the rural health landscape in the U.S. throughout the discussion and analysis. However, as later highlighted, though this study does evoke the above definition of rural health, it focuses explicitly on the “isolation” or geographic proximity component of the definition in discussing the solutions.

Traditionally, rural health inequities are addressed through the public sector by a series of government programs, funding, and initiatives at both the structural and individual levels. While these approaches are still vital and needed, the growing private sector of innovative healthcare technologies and service companies provide different and new opportunities through which health inequities in the rural US can be addressed and solved.

Private sector health technology companies allow new flexibility in taking on the challenges and potentially rectify the problems that lead to rural health inequities. The ability for early-stage companies to focus on singular issues plaguing rural health and understand the true patient need allows for a focused and targeted approach that a public sector solution may not

⁹ “Thomas C. Ricketts, *Rural Health in the United States* (Cary: Oxford University Press, Incorporated, 1999).

have the ability to take. The new and growing industry of healthcare innovation has the potential to address rural health inequities independently, as well as in partnership with public sector efforts, in a way that has not been done before.

Additionally, today's Americans are more receptive to private sector involvement and craving technological solutions more now than any previous generation. After decades of politics tainting policy and government programs, Americans are wearier of government involvement in their lives than technology.¹⁰ Not only are Americans hesitant towards government solutions, but they are constantly looking towards technology and the private sector to solve society's biggest problems. Americans expect the solution to their healthcare problems to come from innovative technology, they expect technological solutionism.¹¹ The combination of Americans waning trust in government initiatives and growing expectation of technological solutionism, especially among rural populations, delivers the problems of rural health inequities to the doorstep of the private sector.

With the above context, the research question considers the definition of rural health and the implication of in addressing one health inequity there is potential to expose or create more, and asks "How can rural health inequities be addressed through a method this is both well received by the rural populations and does not expose or create additional inequities?" In response to the driving research question, the study presents a model which enables multi-company private sector solutions to collaboratively address rural health inequities without furthering existing problems.

¹⁰ "Key Findings about Americans' Declining Trust in Government and Each Other." *Pew Research Center* (blog). Accessed June 22, 2021. <https://www.pewresearch.org/fact-tank/2019/07/22/key-findings-about-americans-declining-trust-in-government-and-each-other/>.

¹¹ Morozov, Evgeny. *To Save Everything, Click Here: The Folly of Technological Solutionism*. New York: PublicAffairs, 2013.

SOCIOPOLITICAL CONTEXT

The United States is in an affordable healthcare crisis. With the ever-rising costs of care and insurance, citizens cannot afford the care they need. This trend is highlighted in the 2018 article “The U.S. Healthcare Crisis Continues: A Data Snapshot,” in which the authors discuss the state of affordable care in the United States, stating that as a result of the high cost-sharing requirements even those who have coverage often cannot afford care.¹ In 2020 the Commonwealth Fund published a report titled “The U.S. Health Insurance Coverage in 2020: A Looming Crisis in Affordability,” which discusses the issues of the large uninsured and underinsured population in the United States.² In the key findings, the report stated, “half of the adults who spent any time uninsured or who were underinsured reported problems paying medical bills or said they were paying off medical debt over time. A quarter of those who were continuously insured and did not meet the threshold for underinsurance also reported problems paying bills.”³ This finding highlights the dire situation of healthcare costs and how it is affecting Americans. The report further discusses the implications of these high health care costs and their impact on individuals, writing, “while insurance status is not the only determinant of whether a person has access to healthcare, it is the most important.”⁴ The finding points to the more significant implications of unaffordable insurance being unaffordable access to healthcare.

¹ Himmelstein, David U., Steffie Woolhandler, Mark Almgren, and Clare Fauke. “The U.S. Health Care Crisis Continues: A Data Snapshot.” *International Journal of Health Services* 48, no. 1 (January 1, 2018): 28–41. <https://doi.org/10.1177/0020731417741779>.

² “Health Coverage Affordability Crisis 2020 Biennial Survey | Commonwealth Fund.” Commonwealth Fund, Accessed June 18, 2021. <https://doi.org/10.26099/6aj3-n655>.

³ “Health Coverage Affordability Crisis 2020 Biennial Survey | Commonwealth Fund.” Commonwealth Fund, Accessed June 18, 2021. <https://doi.org/10.26099/6aj3-n655>.

⁴ “Health Coverage Affordability Crisis 2020 Biennial Survey | Commonwealth Fund.” Commonwealth Fund, Accessed June 18, 2021. <https://doi.org/10.26099/6aj3-n655>.

Unaffordable healthcare is not a new or unknown problem facing the United States. Instead, it is an ongoing crisis that has been plaguing Americans for decades. It is an issue that the government and public sector have continually attempted to address for the last forty years. However, the lack of success of such initiatives is not entirely a fault of the program designs but often the politics themselves.

As seen in Tennessee with the 1994 TennCare initiative, failure of the effectiveness and implementation of the program is not necessarily a result of the program design but rather the result of the heavy-handed politics looming over the policy from its inception. The nature of how politics impacted TennCare's success is discussed in the 2006 Health Affairs Article, "TennCare—A Failure of Politics, not policy." The article explores how the collapse of TennCare was a result of political agendas, which then created a negative connotation about the policies of TennCare for the general public. The article centers on an interview with TennCare designer and advocates Gordon Bonnyman. In the interview, Bonnyman states, "TennCare failed not because the original design and operations were flawed—they were successful—but because political decisions made by the state ultimately made it unsustainable."⁵ Though the reason for the failure of TennCare can be argued from both sides, the question of *why* it failed ultimately does not matter because either way, its failure shaped Tennesseans' perception of government involvement in healthcare.

In his 2018 book, *Dying of Whiteness*, Johnathan Metzler analyzes how the failure of TennCare shaped public perception of government-funded healthcare among Tennessee

⁵ Hurley, Robert E. "TennCare—A Failure Of Politics, Not Policy: A Conversation With Gordon Bonnyman: A Staunch Advocate of TennCare from Its Inception Speaks Frankly about the Political Forces That Contributed to the Novel Plan's Demise." *Health Affairs* 25, no. Suppl1 (January 2006): W217–25. <https://doi.org/10.1377/hlthaff.25.w217>.

residents. Metzl discusses how the lack of other supportive social services pushed “expenses past projections,” putting the state in trouble financially.⁶ As a result, politicians began creating the narrative of TennCare as a costly and sustainably impossible program. Metzl describes its impact on Tennesseans, as it ultimately collapsed, “it cut people—lots of people, jettisoned into the realms of the unsupported and the uninsured.”⁷ The lasting impact on average Tennesseans: a narrative of government healthcare programs as ineffective and expensive.

However, as government initiatives to address affordable healthcare in the U.S. continued to falter, the public profile of government involvement in healthcare continued to rise and continued its associated with heavy-handed politics and failure. Ultimately, the status of government healthcare initiatives received a widespread public perception of associating heavy-handed government involvement in healthcare as ineffective.

By the time of the introduction of the Affordable Care Act (ACA), much of the public’s perceptions of government healthcare initiatives, especially rural populations in places such as Tennessee who felt the impacts of past failures the most, are jaded. The ACA became further politicalized across party lines, with the conservative opposition creating a narrative that the ACA was a “handout” for “freeloaders.” Metzl further explored the sentiment of rural Americans towards the ACA and government help with healthcare through focus groups with white men from rural Tennessee. Metzl discusses an array of nuances surrounding the reasons behind these

⁶ Metzl, Jonathan. *Dying of Whiteness: How the Politics of Racial Resentment Is Killing America’s Heartland*. First edition. New York, NY: Basic Books, Hachette Book Group, 2019.

⁷ Metzl, Jonathan. *Dying of Whiteness: How the Politics of Racial Resentment Is Killing America’s Heartland*. First edition. New York, NY: Basic Books, Hachette Book Group, 2019.

men's aversion to the ACA, even if they would benefit from it themselves, each containing the sentiment of not wanting or needing government involvement.⁸

The narrative has been set, especially among rural communities, “no government involvement.” Is this an overall anti-establishment sentiment, or is it unique to governmental healthcare initiatives? Metzl uncovers the answer to this question: he found, “A somewhat contradictory relationship to authority also manifests men decry government or elitist interference or colonization in one breath and express deep brand or corporate loyalty (“I love my McDonalds's”) in the next.”⁹ Metzl's research defines the state rural Americans currently find themselves in: weary, if not outright opposed, to government involvement but widely receptive to private solutions.

Not only are rural US citizens more trusting of large private corporations' involvement in their life than the government, but their preference is to interact with and seek solutions through private corporations. In the 2021 article “Hollowed out Heartland, USA: how capital sacrificed communities and paved the way for authoritarian populism,” Author Marc Edelman discusses how communities need to appropriate wealth they produce in order to prosper.¹⁰ Edelman cites the demise of rural communities as being results of government financial restructuring and financialization, arguing that the decline of rural communities is often perceived as a direct result

⁸ Metzl, Jonathan. *Dying of Whiteness: How the Politics of Racial Resentment Is Killing America's Heartland*. First edition. New York, NY: Basic Books, Hachette Book Group, 2019.

⁹ Metzl, Jonathan. *Dying of Whiteness: How the Politics of Racial Resentment Is Killing America's Heartland*. First edition. New York, NY: Basic Books, Hachette Book Group, 2019.

¹⁰ Edelman, Marc. “Hollowed out Heartland, USA: How Capital Sacrificed Communities and Paved the Way for Authoritarian Populism.” *Journal of Rural Studies* 82 (February 1, 2021): 505–17. <https://doi.org/10.1016/j.jrurstud.2019.10.045>.

of government financial politics at play.¹¹ In short, Edelman’s findings on distrust of government giving rise to authoritarian populism mirrors what is happening with overall sentiment of government programs at large: distrust and aversion.

The reason for this preference is not only because of the lack of trust in government, but also because of a combination of human’s nature to compartmentalize and their inability to associate indirect consequences with the cause, leaving individuals blind to the larger reach and impact corporations actually have on their lives. While surprising and seemingly hypocritical relationship seems to exist between rural Americans and the large capitalistic corporations: rural Americans love their corporations. U.S. citizens are in a place of looking to private corporations, and specifically private technologies to solve their problems. Evgeny Morozov labels and discusses the phenomena in his book *To Save Everything Click Here: The Folly of Technological Solutionism*, creating the term “Technological Solutionism.” He defines technological solutionism as the idea that with the right technology all of mankind’s most complex problems, including healthcare can be solved.¹² However, Morozov is the first to critique this notion, arguing that in seeking solutions through technology may solve one problem, but can also create or expose others. It is Morozov’s argument that is key to consider when seeking solutions for rural health inequities through the private sector. While rural populations themselves maybe more receptive, and even eager, to technological solutions to health inequities from the private sector, receptiveness can be blinding, and the complications must be considered.

¹¹ Edelman, Marc. “Hollowed out Heartland, USA: How Capital Sacrificed Communities and Paved the Way for Authoritarian Populism.” *Journal of Rural Studies* 82 (February 1, 2021): 505–17. <https://doi.org/10.1016/j.jrurstud.2019.10.045>.

¹² Morozov, Evgeny. *To Save Everything, Click Here: The Folly of Technological Solutionism*. New York: PublicAffairs, 2013.

The U.S.'s history of unsuccessful government initiatives addressing healthcare and how those past attempts have shaped rural Americans, paired with the current political climate in which individuals have more trust in private business than the government, deliver rural healthcare to its current unique position. Beneficiaries of rural healthcare is primed and keen for a private sector-driven healthcare solution, but the inverse receptiveness must be reciprocated. Just because rural populations may be interested in private investment, that is not reason enough alone for the private sector itself to be interested in investing in rural health. What is the draw for the private sector?

As a result of the attempt to shift financial healthcare policy from a fee-for-service healthcare model to a value-based care (VBC) model there is an emergence of a “risk” financial model in healthcare. The national payment reform goals shift the U.S. to risk-based payment models in order to achieve VBC, lower costs, and healthier populations all in one.¹³ The new risk financial model forces the financial responsibility of the costs exceeding the pre-defined amount to the providers. Additionally, in order to effectively track and manage the financial risk, the providers must take on an additional financial and human capital burden.¹⁴ The financial risk and the associated costs required to manage it are often too much for independent providers, like those often practicing in the rural U.S. However, while the initial risk associated with VBS is steep, the long term financial and improvement in care returns are very fruitful.

¹³ “It’s Not Just Risk: Why the Shift to Value-Based Payment Is Also about Provider Flexibility,” Center for Health Care Strategies, March 21, 2019, <https://www.chcs.org/its-not-just-risk-why-the-shift-to-value-based-payment-is-also-about-provider-flexibility/>.

¹⁴ “It’s Not Just Risk: Why the Shift to Value-Based Payment Is Also about Provider Flexibility,” Center for Health Care Strategies, March 21, 2019, <https://www.chcs.org/its-not-just-risk-why-the-shift-to-value-based-payment-is-also-about-provider-flexibility/>.

The intention of VBC is to one, improve care processes, two, improve patient experience, and three, reduce the overall cost of healthcare per person.¹⁵ It is the third intention which requires the up-front risk but the ultimate long-term returns as a result of overall healthcare cost reduction. While carrying the financial risk is hard for any independent provider, it is especially hard for rural health providers who are often already strapped for capital resources and time, resulting in slower or less uptake of VBC among rural providers.¹⁶ This lag or gap in adoption of VBC among rural providers creates an opportunity for private sector investment into the rural health space by companies which can take on the short term financial risk for the rural providers in favor of waiting out the long-term benefits of VBC. Ultimately, the draw for private company investment in rural health is profitability. The private companies which can take the risk on the front end have the opportunity to financially profit on the back end.

It is the result of both the sociopolitical status of rural American culture today and the policy shift in financing healthcare which provide opportunity for the deployment of creative solutions to address rural health inequities in the United States. However, the opportunity can easily be misappropriated and for this reason a methodology which considers the negative impacts must be considered.

¹⁵ Douglas A. Conrad, “The Theory of Value-Based Payment Incentives and Their Application to Health Care,” *Health Services Research* 50, no. S2 (2015): 2057–89, <https://doi.org/10.1111/1475-6773.12408>.

¹⁶ A. Clinton MacKinney et al., “From Health Care Volume to Health Care Value-Success Strategies for Rural Health Care Providers,” *The Journal of Rural Health* 30, no. 2 (2014): 221–25, <https://doi.org/10.1111/jrh.12047>.

SOCIAL IMPACT THEORY

A social entrepreneurship or enterprise (SEE) is a private sector company which addresses social problems while making a profit as a private entity, not reliant on charitable giving or governmental grants for money.¹⁷ However, social impact theory discusses the potential negative implications of SEEs and highlights the consequences of utilizing SEEs to solve social problems. As this study examines the importance of considering the unanticipated outcomes of using private sector technology or services to solve health inequities, the lens of social impact theory provides beneficial context to think about the implications of private sector solutions in the creation of the deployment model.

Ideally, social impact should be SEEs creating a solution for the identified beneficiaries, prioritizing impact ahead of any profit. With this concept of social impact, charitable donations and grants should be seen as a welcomed value add to any existing profit, and the price to the community of beneficiaries should be minimal and scale-tied to each user's situation..¹⁸ However scholars argue that as a result of neoliberalism's impact on social impact and SEEs, many of today's SEEs are "market-driven social enterprises" not traditionally defined SEEs.¹⁹ Scholars argue that these "market-driven" SEEs see social problems as a "knowledge problem" opposed to a "power problem," meaning that "market -driven" SEEs's view social problems as something that can be solved by technological innovation opposed to something that can only be overcome

¹⁷ "Social Entrepreneurship: The Case for Definition (SSIR)," Stanford Social Innovation Review, accessed July 13, 2021, https://ssir.org/articles/entry/social_entrepreneurship_the_case_for_definition.

¹⁸ "A Neoliberal Takeover of Social Entrepreneurship? (SSIR)," Stanford Social Innovation Review, accessed July 12, 2021, https://ssir.org/articles/entry/a_neoliberal_takeover_of_social_entrepreneurship.

¹⁹ "A Neoliberal Takeover of Social Entrepreneurship? (SSIR)," accessed July 12, 2021, Stanford Social Innovation Review, https://ssir.org/articles/entry/a_neoliberal_takeover_of_social_entrepreneurship.

through structural and systematic change.²⁰ In the article “A Neoliberal Takeover of Social Entrepreneurship,” author Jyoti Sharma argues that “market-driven social entrepreneurship does not solve social problems in their entirety.”²¹ Social impact scholars agree that SEEs alone are not sufficient to enact structural social change.

The current scholarly debate of social impact theory closely relates to the concept of technological benevolence. Though not typically associated with the differing disciplinary camps each lies in, the terms provide insightful color to one another, providing additional angles to discussing SEEs and their potential dangers. Technological benevolence is the situation produced due to technological products and services, which are intended to fix social biases, ultimately deepening, or reproducing the same biases.²² Technological benevolence is a term coined by sociologist Ruha Benjamin in her work which looks at the intersection of race, technology, and justice. Both Benjamin’s book *Race After Technology: Abolitionist Tools for the New Jim Code* and the typical application of the term use the concept of technological benevolence in association with specific technologies and the coding behind such technologies. Technological benevolence results from the fact that humans unconsciously influence the technology with their existing individual biases in the creation of such technologies.²³ Suppose the technology exists in a social context. In that case, the social biases, such as racism, will be built into the technology (i.e., artificial intelligence or data code) and cannot be removed entirely. Specifically,

²⁰ Marshall Ganz, Tamara Kay, and Jason Spicer, “Social Enterprise Is Not Social Change,” *Stanford Social Innovation Review* (Stanford, United States: Stanford Social Innovation Review, Stanford University, Spring 2018).

²¹ “A Neoliberal Takeover of Social Entrepreneurship? (SSIR),” *Stanford Social Innovation Review*, accessed July 12, 2021, https://ssir.org/articles/entry/a_neoliberal_takeover_of_social_entrepreneurship.

²² Ruha Benjamin, *Race after Technology: Abolitionist Tools for the New Jim Code* (Cambridge, UK ; Polity, 2019).

²³ Ruha Benjamin, *Race after Technology: Abolitionist Tools for the New Jim Code* (Cambridge, UK ; Polity, 2019).

technological benevolence furthers inequities due to human biases being written into their artificial intelligence code when presenting the technology as subjective, resulting in the perception that these inequities are natural and not a result of structural and social oppressions.

While technological benevolence is typically applied in the context of a specific technology or code and Social Impact Theory is used in the discussion of companies, this study takes the opportunity to use the terms in tangent in further thinking about the implications of anyone private-sector solution. For example, a SEE can follow a traditional definition of social impact but still be technologically benevolent because of the human involvement in the solution. Similarly, a solution can be cognitive of potential technological benevolent impacts but still be a “market-driven” SEE. In creating a model which attempts to holistically address rural health inequities without furthering others, both lenses of technological benevolence and social impact theory must be applied.

With the neoliberal social impact argument and technological benevolence in mind, this study does not seek to claim that any individual SEEs or even networks of SEEs are the sole solutions to solving more significant structural and systematic social problems. Instead, SEEs can and should, be consciously deployed to find specific solutions within the existing system. While SEEs cannot solve all layers of rural health inequities (race, SES, education, ext.), they can create solutions for a specific problem within rural health, such as geospatial access.

METHODS

For the study, the researcher conducted a three-phase methodology. The first phase created the *Skeleton Ecosystem Framework for Addressing Rural Health Inequities*. The *Skeleton Ecosystem Framework for Addressing Rural Health Inequities* (figure 1) is an outline identifying all the needs which must be solved when addressing rural health inequities. The second phase analyzed companies in the *Analytical Framework for Individual Company Analysis* (figure 2) to identify which companies should be considered for the third phase. The third phase produces the *Sample Ecosystem for Addressing Rural Health Inequities* (figure 3), which organizes the companies identified in phase two within the *Skeleton Ecosystem Framework for Addressing Rural Health Inequities* to provide an example of a final product using this methodology.

PHASE 1 METHODOLOGY

The intention of phase 1 of the methodology is to map out the needs of patients in rural areas due to the inequity of rurality. In order to map the needs of rural patients, the researcher applied a critical analysis to the process of accessing healthcare in the United States. For this step, the critical analysis process was defined as a process of thinking through each step of accessing healthcare to identify the typical consequential next steps in the process of receiving care and repeating this practice for each subsequent step of the healthcare process until complete care would ultimately be achieved for the patient. It was this process of critical analysis, as defined, which allows for the mapping of the resulting needs of rural health inequities.

Initially, the inequities affecting rural health needed to be mapped and outlined to understand the current needs for patients in rural areas. First, the researcher identified where to start mapping the needs of rural patients. The researcher chose the needs associated with the

most common entry points into navigating the U.S. healthcare system as starting points: providers/ and provider networks and care coordination. Then the researcher conducted a deep dive into what would be required for seamless access to these two core needs for rural populations. This deep dive created the Skeleton Ecosystem Framework for Addressing Rural Health Inequities for which existing companies were screened and analyzed to design the required ecosystem and fully build out the framework.

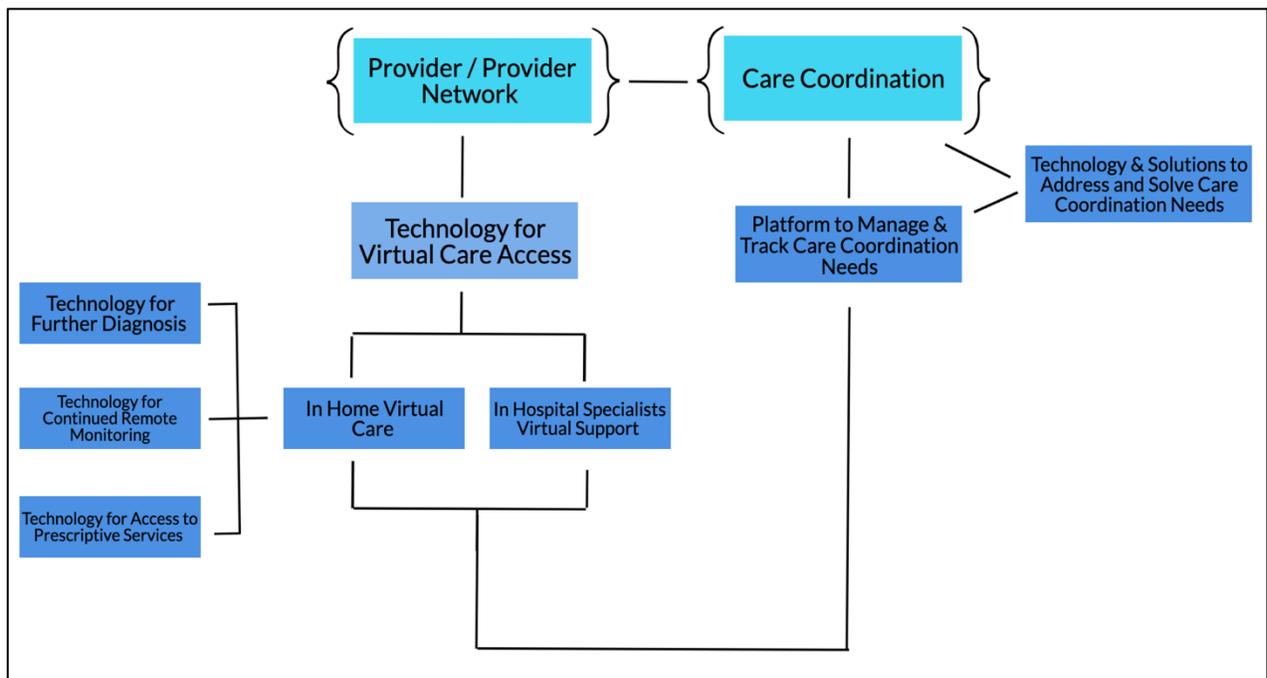


Figure 1. “Skeleton Ecosystem Framework for Addressing Rural health Inequities

PHASE 1 RESULTS & DISCUSSION

First, as discussed in the methodology section, the research required the creation of a *Skeleton Ecosystem Framework for Addressing Rural Health Inequities*. In creating this framework, researchers had to think through each immediate inequity facing rural health and, additional, inequities resulting from a solution for another inequity. For example, telehealth is the current champion for rural health access in the United States and abroad. But while telehealth does solve the problem of quick access to a primary care physician for an initial consultation, it is not a complete solution. What happens once the patient has the telehealth visit but the physician requires further diagnostic tests? The patient now knows little about their condition but still has to find transportation in order to travel far distances to a health facility that can administer such tests. Or, even if the telehealth physician can give a diagnosis virtually, and even prescribe the regiment of care or pharmaceutical drugs, the patient then still has to be able to access the treatment protocols, often having to travel for such access. And finally, a telehealth visit is excellent for immediate, easy diagnosis. Yet, inevitably individuals will need continued care and support, whether it be coordinating transportation, help accessing resources that address preventative health, or using technology to schedule and execute follow-ups virtually. Because these holistic or continued care factors are vital for a total improvement of health to adequately address rural health, a care coordination component, and all the add-on resources needed to execute full care coordination, are crucial to the rural health ecosystem.

Provider/ Provider Network Design

To create a fully flushed out ecosystem for addressing rural health inequities with innovative healthcare solutions, the study started with telehealth. If an individual in a rural area has a health concern, they can use any telehealth service for an initial virtual consultation with a

physician. The study then critically thinks through the follow-up steps and barriers to care for an individual living an hour from the nearest regional hospital, who is probably an even farther distance from a specialist or trauma hospital. It is important to note here that the study acknowledges additional infrastructure aspects, such as broadband access, are also critical at this point. But for research and critical analysis purposes, infrastructure is not addressed in this study and is assumed as a constant.

The study also assumes that an existing physician or physician network is working with, or integrated into, the telehealth platforms. There are many models for provider/ telehealth: telehealth companies with physicians on staff; independent physicians employing telehealth technology to connect with their own patients, provider networks utilizing a third-party technology or their own technology to connect physicians and patients in their own network, or any combination of these. For this analysis and the creation of the ecosystem framework there is no need to specify which physician/ provider model is required, but rather, assume that there is one in place or needed. This study focuses on the technological and innovative services ecosystem required to fully and equitably address rural health access, and therefore leaves the discussion of provider/ provider network solutions to other studies.

Assuming the patient has access to see the telehealth physician for their virtual visit, one then considers the additional needs for diagnosis or follow-ups. The question “if at an urban research hospital with no limitations, what would the next steps or needs be?” is continually asked at every step of the critical analysis. Suppose a patient were to see a physician in person. In that case, the physician might need further testing for diagnosis, continued monitoring of the

patient after diagnosis, and the ability to get the patient the prescriptive treatment required.²⁴ In identifying these three potential additional steps to the physician visit, the study identified three more components that are needed in the skeleton framework.

While providing support for patients in rural areas directly and increasing their access to healthcare resources in their area is vital for improving rural health inequities, it is only one side of the issue that needs to be addressed. The professionals servicing those patients are also isolated. Rural physicians, NPs and RN's need support that they are missing as a result of their remote isolation. In major US cities, if physicians need consultation and support from specialists, they can easily access ones in their network and often even their own hospital.²⁵ The physician can bring in the specialists immediately or set up a time shortly thereafter in the same vicinity. However, if a rural physician encounters something medically with which they are not familiar, they are often left to their own devices or have to refer their patient to an out of area specialist whom they may not know. If referred to a specialist in another city, the patient incurs the costs of travel and time. It also often removes the primary physician from the conversation. Therefore, it is just as vital to provide rural healthcare providers with their own virtual support, enabling direct and quick access to specialists in metropolitan hubs. The study labels this need as *Hospital Specialist Virtual Support* and identifies this capability as vital to supporting rural health and addressing access inequities in full.

²⁴ Gualandi, Raffaella, Cristina Masella, Daniela Viglione, and Daniela Tartaglini. "Exploring the Hospital Patient Journey: What Does the Patient Experience?" *PloS One* 14, no. 12 (2019): e0224899–e0224899. <https://doi.org/10.1371/journal.pone.0224899>.

²⁵ Mehrotra, Ateev, Forrest, Christopher B., and Lin, Caroline. "Dropping the Baton: Specialty Referrals in the United States." *The Milbank Quarterly* 89, no. 1 (2011): 39–68. <https://doi.org/10.1111/j.1468-0009.2011.00619.x>.

Care Coordinator Network Design

Like the assumptions put in place for this study surrounding physician/ provider networks, the study makes the same assumptions about care coordination. The study identifies that there needs to be some sort of care coordinator component to address overall rural health inequities adequately. As found in the 2021 study “Evaluation of an interprofessional care coordination model: Benefits to health professions students and the community served,” when a successful care coordination system is put in place there is an overall reduction in emergency room visits and hospital admissions among the population.²⁶ The research findings make a case for the utilization of a care coordination model to reduce reliance and drain on care resources.²⁷

Within the technology and service ecosystem, care coordination addresses several aspects of rural healthcare inaccessibility. Because individuals often live far from medical care and there are fewer healthcare providers in rural regions, follow-up care can be difficult. Care coordination includes scheduling appointments, transportation to/from in-person appointments, and navigating the technology for a virtual appointment.

While care coordination is assumed for this study, the need for a technological platform to aid in the streamlining and success of coordinated care is still a component of the ecosystem framework. The study next builds upon the need for a care coordination platform. The study identified the need for solutions that address transportation challenges, deficits in the

²⁶ Parsons, Pamela L., Patricia W. Slattum, Carla K. Thomas, Jennifer L. Cheng, Danah Alsane, and Jean L Giddens. “Evaluation of an Interprofessional Care Coordination Model: Benefits to Health Professions Students and the Community Served.” *Nursing Outlook* 69, no. 3 (May 1, 2021): 322–32. <https://doi.org/10.1016/j.outlook.2020.09.007>.

²⁷ Parsons, Pamela L., Patricia W. Slattum, Carla K. Thomas, Jennifer L. Cheng, Danah Alsane, and Jean L Giddens. “Evaluation of an Interprofessional Care Coordination Model: Benefits to Health Professions Students and the Community Served.” *Nursing Outlook* 69, no. 3 (May 1, 2021): 322–32. <https://doi.org/10.1016/j.outlook.2020.09.007>.

understanding of technology, lack of financial aid, and social isolation. Ultimately, identifying companies whose technologies or solutions address the social determinants of health plaguing rural communities.

PHASE 2 METHODOLOGY

A two-pronged methodology was conducted to study the existing success and shortfalls of companies that could be adapted to address rural health and participate in the sustainable ecosystem seeking to solve rural health inequities. First, an in-depth market analysis of chosen companies and their operational approach was conducted. Second, an ethnographic approach was taken to analyze digital communications associated with the company.

These data collection methods were analyzed in the *Analytical Framework for Individual Company Analysis* created for this study. This framework allows the researcher to understand the company's operational model, desired impact, intended and unintended consequences, and ability to address the needs of rural patients. The framework was created by combining portions of the CDC's "Program Evaluation Framework" and traditional methods for evaluating pre-revenue technology companies.²⁸

The CDC's "Program Evaluation Framework" informed the creation of the questions regarding desired impact and success within the *Analytical Framework for Individual Company Analysis*. Specifically, "Step 2: Describe the Program" from the CDC's "Program Evaluation Framework" employs the "logic model" for outlining a program's desired outcomes informed the types of questions the researcher asked in regard to interpreting a company's mission and related

²⁸ "Framework for Program Evaluation - CDC," Center for Disease Control, May 4, 2020. <https://www.cdc.gov/eval/framework/index.htm>; "Investment Checklist: 5 Things VCs Evaluate Before Funding Early-Stage Startups." Rocket Space, Accessed March 30, 2021. <https://www.rocket-space.com/tech-startups/investment-checklist-5-things-vc-evaluate-before-funding-early-stage-startups>.

outcomes.²⁹ The utilization of the “logic model” as presented by the CDC allowed the study to ensure the impact line of questioning produced insight into a company’s effectiveness in addressing health inequities.

In addition to the CDC’s “Program Evaluation,” the study also adopted methodology from Venture Capital valuation frameworks. The study specifically took from the VC “Scorecard” method which contains a list of criteria for which to evaluate the company against. The “scorecard” method then requires the user to assign a percentage score for each of the criteria. Ultimately, the “scorecard” method assigns a weight to each scoring criteria to create an overall score for the company under evaluation.³⁰ While much the criteria evaluated under the VC “scorecard” methodology is not relevant for this study, there are a few criteria components adopted to inform the company evaluation question regarding a company’s operational model, market need, and ultimate success. Specifically, the study adopted the “scorecard” method’s process for evaluating a company’s “product/ technology,” “competitive environment,” and “size of opportunity.”³¹ Utilizing the “scorecard” valuation method for the three selected criteria allows the study to measure a company’s potential for success past impact alone, but rather as a potentially profitable enterprise.

²⁹ “Framework Step 2 Checklist | Program Evaluation | CDC,” Center for Disease Control, April 12, 2021. <https://www.cdc.gov/eval/steps/step2/index.htm>.

³⁰ Hudson, Marianne. “Scorecard Helps Angels Value Early-Stage Companies.” Forbes. Accessed June 16, 2021. <https://www.forbes.com/sites/mariannehudson/2016/01/27/scorecard-helps-angels-value-early-stage-companies/>.

³¹ CB Insights Research. “How To Value A Company: An In-Depth Guide To The Business Valuation Process.” CB Insights, Accessed June 16, 2021. <https://www.cbinsights.com/research/report/how-to-value-a-company/>.

The analysis framework created as a result of combining the components of the CDC’s “Program evaluation framework” and the VC “scorecard” method stated above asks the following questions for each company:

1. What is the company’s stated purpose (statement of purpose)?
 - 1.1. Does it explicitly claim to address rural health?
 - 1.2. What is the need being addressed by the technology/offering?
 - 1.3. What are the expected effects of the technology/offering (what constitutes success? What are the intended results?)
2. What is the context in which the company operates?
 - 2.1. Geography?
 - 2.2. Population size?
 - 2.3. Average SES?
 - 2.4. What is the historical and political context in the regions and populations the company aims to target?
3. Is there a market fit/ risks for the company?
 - 3.1. Is there a need?
 - 3.2. How much resistance will it face?
 - 3.2.1. Is the company trying to change consumer behavior?
- 3.3. What are the risks?
4. What is the company’s operational model?
 - 4.1. What is the offering or technology?
 - 4.2. Flow chart of revenue stream/ logic model?
 - 4.3. What does the company actually do to enact change?
 - 4.4. What is the ROI?
5. Competitive Landscape:
 - 5.1. How is the technology compared to competitors?
 - 5.2. What is the company’s competitive advantage?
6. Stakeholders
 - 6.1. Who is the founding team?
 - 6.1.1. What is their interest or involvement in rural health?
 - 6.1.2. What is their experience?
 - 6.2. Who/what is the target demographic/ population?
 - 6.3. Are there payers or providers involved?
 - 6.3.1. What is each group’s receptiveness to new technologies/ offerings?
7. What additional/ new inequities does it expose?

The *Analytical Framework for Individual Company Analysis* allowed the study identified each company’s impact, scalability, and furthering/ solving of inequities to create a hierarchy. The hierarchy reflected which companies will have the most impact alone, which companies need to be considered as solutions in conversation with others, and which companies are ultimately not a solution for rural health inequities.

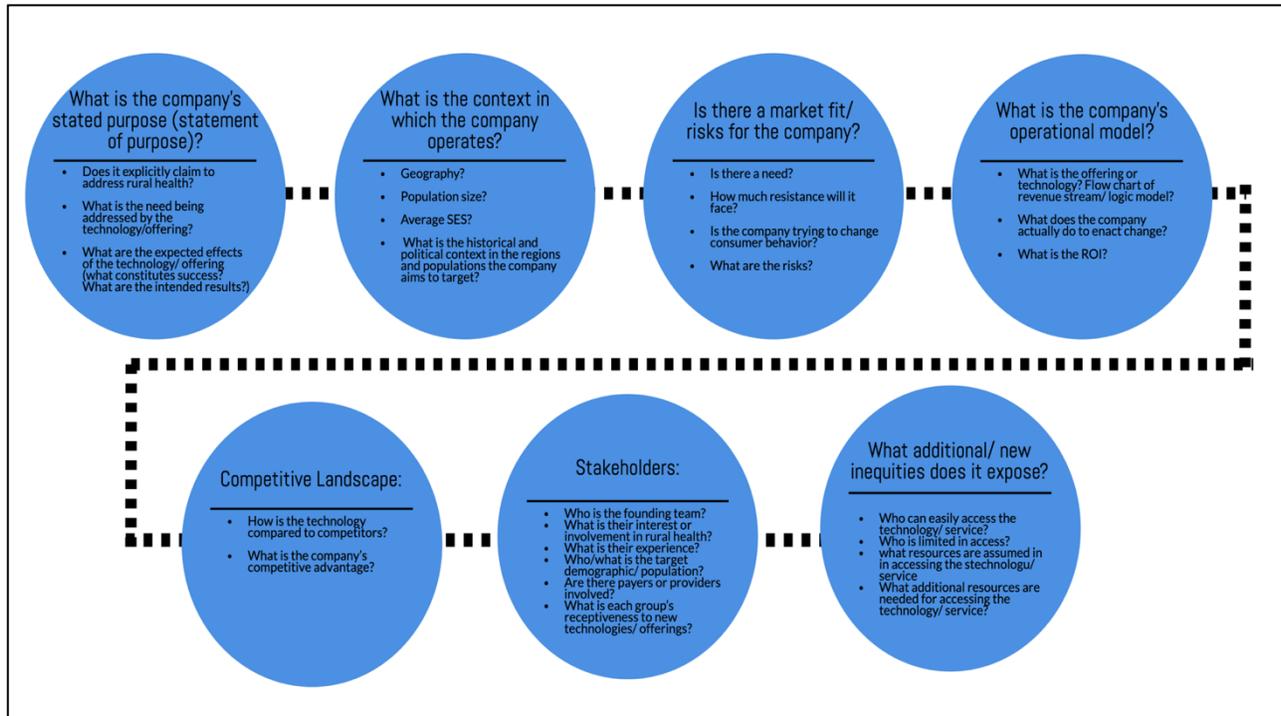


Figure 2. “Analytical Framework for Individual Company Analysis”

Market Analysis

Ultimately, twenty companies were identified for in-depth analysis in the above framework and as potential participants for the *build-out example ecosystem*, which provides a sample ecosystem that holistically addresses rural health inequities. These companies were chosen because their technological or service solutions uniquely solve a specific need. Each company claims to address a different ecosystem component or use a different technological approach to solve a specific component of the need framework.

Once the twenty companies were identified, an in-depth analysis of their existing operations was conducted using marketing materials, company reports, published case studies and white papers. Each company’s workflow was outlined, their existing offerings were analyzed for their adaptability, and what would be required for such, to rural health, and where they fail to address the needs of their target audience at large.

The analysis of each company then allowed for a clear breakdown of the successes and failures of each company's proposed solution. With the data found in the company analysis, a strategic framework for addressing rural health inequities through the private sector was fully built out and created.

PHASE 2 RESULTS & DISCUSSION

The *Skeleton Ecosystem Framework for Addressing Rural Health Inequities* (fig. 1), outlined in the methodology section, serves as the guiding map to analyze what kinds of companies are needed to build out the ecosystem. Additionally, the *Skeleton Ecosystem Framework for Addressing Rural Health Inequities* informed the questions asked in creating the *Analytical Framework for Individual Company Analysis* (fig. 2). The *Analytical Framework for Individual Company Analysis* was then leveraged to evaluate each company and place it in its respective position in the ecosystem. Using the *Skeleton Ecosystem Framework for Addressing Rural Health Inequities* as general guidance for identifying which types of companies are needed to build out the ecosystem, the study reduced the list of companies to evaluate within the criteria of the *Analytical Framework for Individual Company Analysis* to a list of 20 companies. Once thoroughly analyzed within the *Analytical Framework for Individual Company Analysis*, the study was able to identify 11 companies that were most appropriate for the ecosystem and the best to places to put them within the framework.

It is important to note that as a result of the limitations of this initial analysis being an academic study and a practice in building out an example of what a sustainable ecosystem of private sector companies and solutions addressing rural health look like. Due to the lack of traditional financial and operational requirements in this study, the companies identified as examples for building out such a desired ecosystem vary in size, revenue stage, and funding.

In this research, the study found very few companies that meet the desired criteria that specifically address or even stated that they address rural health. Therefore, most companies analyzed for this research and placed in the ecosystem do not have a rural health focus. Instead, each company offers to the general market the specific service or technology that the framework calls for, meaning they are capable of providing solutions that are crucial to solving the inequities facing rural health. For the companies analyzed, the study proposes areas where each selected company must expand to have a specific rural health offering or branch.

PHASE 3 METHODOLOGY

Company Analysis

To select the appropriate companies needed to fill out the example framework, the study conducted a more extensive analysis of all companies addressing each specific need identified in the *Skeleton Ecosystem Framework for Addressing Rural Health Inequities*. Identified companies were then placed in the *Company Decision Matrix* (appendix A). The *Company Decision Matrix* is an applied tool allowing for the utilization of the *Company Analysis Framework* which enabled the formulation of the capabilities and missions of each company, identifying which would be best for the sample ecosystem. The matrix compiles information regarding a description of each company's technology capabilities and services offered, size, and current valuation or funding amount. This information informed the study's selection of one or two companies to address each need identified in the framework, placing them then in the sample ecosystem.

For each of the eleven companies ultimately selected for the example build-out, a further in-depth analysis was conducted in an individual *Company Analysis Matrix* (appendix B), a tool for systematically applying the *Company Analysis Framework* to each individual company.

These *Company Analysis Matrixes* lend themselves to the same evaluation methods as the *Analytical Framework for Analyzing Individual Companies* (fig 2.) while allowing for individualized and in-depth evaluation for each company. In the individual company analysis, the study explored questions about the following areas of each company:

Claimed or stated purpose of the company

- Need being addressed by the service or technology
- Expected effects of the solution
- Context in which the company operates
- Operational model
- Stakeholders
- Action/ process/ technology to enact change
- Need/ market fit
- Competitor or similar technologies/ offerings
- Competitive advantage of company
- Return on Investment (ROI)
- Identified risks
- Additional inequities exposed as a result of the solution

The in-depth evaluation of each company allowed for confirmation of each company's position in the ecosystem. The results were then expanded upon by analyzing each through the lens of rural health inequities. For each initial result, the study then applied the question "How would the entity have to be adapted to address rural health?" allowing for further investigation into the additions, adjustments, or changes that would be needed to allow each solution to address rural health inequities specifically.

Finally, one last layer was added to the interpretation of each company and its role in the framework. The study took each answer and identified where there might be synergies with other companies in the ecosystem—solidifying the structure of the framework and each company's spot within.

The *Company Decision Matrix* and the *Company Evaluation Matrix* inform the selection and organization of filling in and completing the *Skeleton Ecosystem Framework for Addressing Rural Health Inequities* to create the *Sample Ecosystem for Addressing Rural Health Inequities*. The *Skeleton Ecosystem Framework for Addressing Rural Health Inequities* addresses rural health inequities holistically, providing consideration for both the central needs previously identified, *technology for access to virtual care* and *platform to manage & track care coordination needs*, and ensuring all solutions work in tangent with one another to solve the problem as a whole.

PHASE 3 RESULTS & DISCUSSION

The study found that the identified eleven companies allow for the creation of a robust network that addresses in exemplary form the holistic needs of rural health inequalities. While there are areas of opportunity to include more technologies and solutions that focus more on the gaps affecting specialists, this initial ecosystem serves as an example of all the facets that need to be addressed in order to be sustainable rather than an exhaustive list or examination of every healthcare need. The *Sample Ecosystem for Addressing Rural Health Inequities*, presented below in figure 3, is the product of the researcher's application of the *Skeleton Ecosystem Framework for Addressing Rural Health Inequities* model and the *Company Analysis Framework*. The *Sample Ecosystem for Addressing Rural Health Inequities* displays the identified eleven companies, which demonstrate what is required to address rural health thoughtfully without furthering more health inequities.

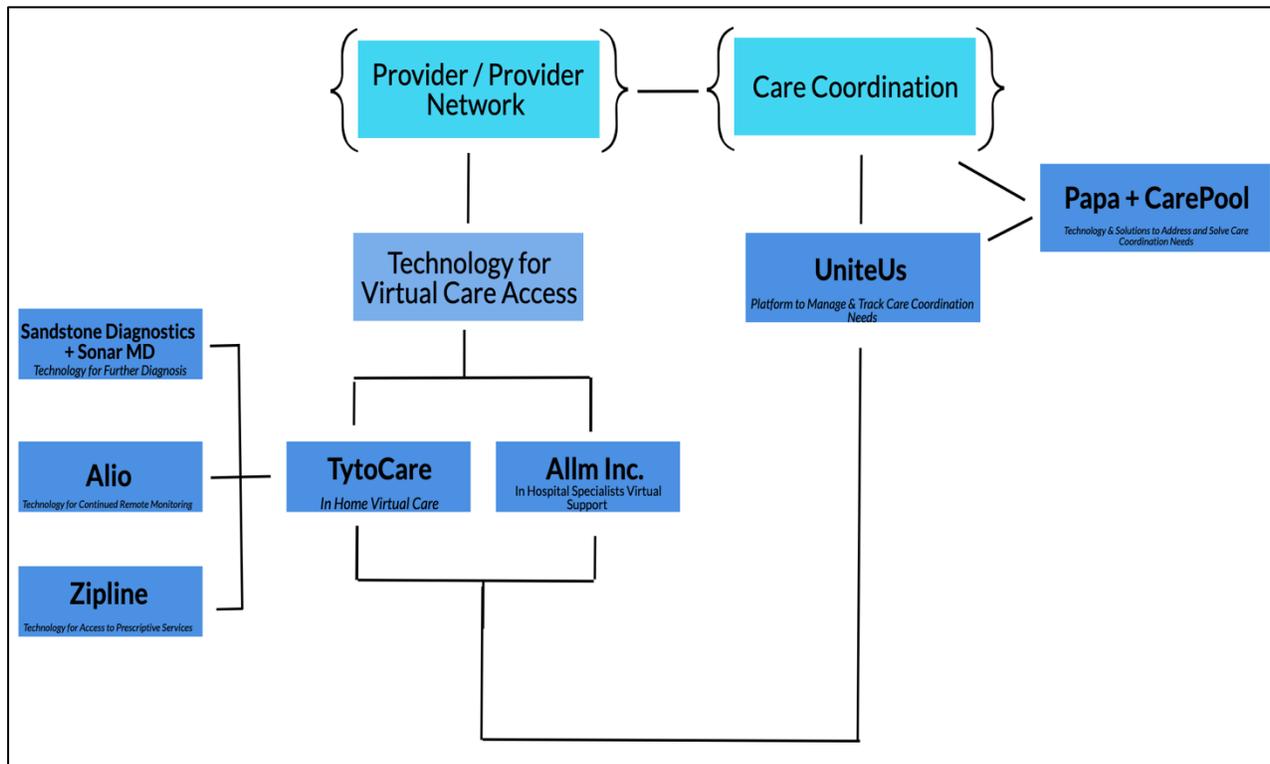


Figure 3. “Sample Ecosystem for Addressing Rural Health Inequities”

Technology for Virtual Care Access: In Home Virtual Care

Technology for virtual care access is widespread and populous in this day and age, so it is the natural place to start in constructing the sample ecosystem. Upon studying many companies that currently exist to enable telehealth or virtual care, based of operational model evaluation in the company decision matrixes, it is found that many have excellent connective capabilities and are easy to use for the patient However, Tytocare stands out from the others. Tytocare’s hardware technology enables deeper evaluation of the patient beyond the introductory face-to-face video. Additionally, its provider structure allows the client to access Tytocare’s in-house physicians or client’s own physicians via the Tytocare technology.¹ Using the individual

¹ TytoCare. “How TytoCare Works? | TytoHome Telehealth Exam Kit.” TytoCare, Accessed June 17, 2021. <https://www.tytocare.com/how-tyto-works/>.

company analysis matrix (appendix C), the study identified the opportunity to utilize Tytocare’s technology and business model, with only minor adaptations, to address rural health challenges and function within the proposed ecosystem.

In order to specifically address the rural health market, Tytocare needs to design the products and marketing tools with the rural demographic in mind. As discussed in the article “Why and When Consumers Prefer Products of User-Driven Firms: A Social Identification Account,” companies which consider and understand their target user have overall more success and impact on the population.² If the goal is to apply Tytocare to help solve rural health inequities, successful impact is vital.

There are two potential paths to roll out Tytocare with a rural focus: one, create a rural health arm that tweaks the product, UX design, and targeted marketing efforts with a focus on rural patients, or two, Tytocare partners with an existing rural health initiative (physician networks or hospital systems). The first path, Tytocare building out their rural health capability in-house, puts the ownership directly on Tytocare of ensuring the product is patient-centric and targets the specific needs of rural patients . Whereas partnering with an existing rural health initiative takes the need for ensuring alignment with rural patients off Tytocare and puts that responsibility on a party already focused on rural health.

The process of partnering with an organization or initiative focused on rural health is not novel to Tytocare. Tytocare partnered with The Center for Healthcare Innovation to conduct a case study focused on improving the access to care for students in rural schools within Burke

² Dahl, Darren W., Christoph Fuchs, and Martin Schreier. “Why and When Consumers Prefer Products of User-Driven Firms: A Social Identification Account.” *Management Science* 61, no. 8 (2015): 1978–88. <https://doi.org/10.1287/mnsc.2014.1999>.

County, North Carolina.³ For the case study Burke County schools provided school nurses with the Tytocare pro kit which enables virtual visits with a hand-held exam tool with can monitor ears, throat, skin, and lungs. When a sick child came in the nurse then initiated the virtual exam with a clinician located at a central hub. The clinician would then be able to virtually diagnose the sick child.⁴ The case study highlights the many benefits of the Burke County school system partnering with Tytocare including increased healthcare access and coverage for students in this rural county. While the outcomes of the case study speak highly to Tytocare’s potential for impact, the model of partnering with an existing rural health organization is key for this study, and Tytocare’s potential application within the *Sample Ecosystem for Addressing Rural Health Inequities*. The model of the case study provides an execution model for applying Tytocare within the proposed Ecosystem.

Care Coordination: Platform to Manage & Track Care Coordination Needs

The second key starting point at the core of building out a sample ecosystem is identifying a company with the best platform and model to run the care coordination successfully. The care coordination component of the ecosystem is vital to the prolonged and ongoing success of addressing rural health inequities. Without care coordination, it does not matter how excellent or impactful the technological solutions to ambulatory care are because continued care and overall improved health will never be sustainable. As previously mentioned, many coordinated care models exist: hospital systems, individual community-based care coordination not-for-profits, and private specialized coordinated care companies and services.

³ TytoCare. “The Center for Rural Health Innovation The School-Based Telehealth Revolution: How TytoCare is Transforming Remote Care in Rural Schools.” (New York: TytoCare, 2020.)

⁴ TytoCare. “The Center for Rural Health Innovation The School-Based Telehealth Revolution: How TytoCare is Transforming Remote Care in Rural Schools.” (New York: TytoCare, 2020.)

However, often, the care coordination is manual and a heavy lift for the service provider. Similarly, without technology or the appropriate platform to streamline care or track care success, it is harder for the service provider to display success and ultimately sustainably provide widespread and continued service for care coordination. Therefore, the study identifies the need for a robust care coordination platform/ technology at the core of the ecosystem.

With the need for a care coordination technology to anchor the sample ecosystem in mind, the study selected UniteUs as the solution for the *Sample Ecosystem for Addressing Rural Health Inequities*. UniteUs is a platform that enables care coordinators to develop networks for service and provides capabilities for tracking outcomes for internal or external reporting. In short, UniteUs allows care coordination networks to digitally and seamlessly provide for their clients at both the health and social levels.⁵ UniteUs’s current operational model centers on partnering with existing community coordinators, specifically those focusing on social determinants of health (SDoH). UniteUs then deploys a team to help the community care coordinators set up the platform and onboard social services in the area to provide referrals geographically quickly and share information easily.⁶

Placing UniteUs in the individual company analysis matrix (appendix D), the study analyzes how UniteUs best fits into the sample ecosystem and where and how it can best address rural health inequities. As a result of the existing operational model of UniteUs partnering with existing local care coordinators, the path to applying its technology to rural patients is clear and direct. The replication of UniteUs’s successful partnership model with community-based care coordinators is vital when partnering with the designated local rural care coordinator. Providing

⁵ Unite Us. “The Platform.” Unite Us, Accessed June 17, 2021. <https://uniteus.com/platform/>.

⁶ Unite Us. “The Platform.” Unite Us, Accessed June 17, 2021. <https://uniteus.com/platform/>.

the existing care coordinator with the UniteUs platform does not only help the care coordination organization but, more importantly, is not a burden on the organization. As a result of UniteUs's streamlined process of onboarding and fully supporting their care coordination partners, the onboarding burden is minimal. While UniteUs does not explicitly target rural healthcare coordinators, it has a strong track record of focusing on social determinants of health (SDoH) and partnering with care coordination organizations focused on many other SDoH. Therefore, working with an organization which addresses rural health inequities is not a far stretch from UniteUs's existing partnership work.

In fact, UniteUs has an existing partnership within the State of North Carolina, executed under North Carolina's 2018 CMS approved 115 waivers, when allowed for the transference from fee-for-service to a managed care program.⁷ With this approval, UniteUs partnered with the North Carolina Department of Health and Human Services and a number of non-profit agencies to establish a coordinated care network across the entire state. Ultimately, this scale is much larger than the ecosystem created for this study calls for, but given the demographics of North Carolina, the partnership's success demonstrates that UniteUs's technology is capable of integrating with a wide range of SDoH specifically for rural populations. This application of UniteUs is an example of the success and impact of a conscious public-private partnership, a format which is positions the initiative to receive wider acceptance.

While UniteUs currently works with their partners to aid in care coordination addressing SDoH, there is even more of a need for effective streamlines in rural care coordination. Disparities specific to rural patients in areas such as transportation and travel, can make access

⁷ Unite North Carolina. "A Playbook to Coordinate Care Across an Entire State." Unite Us, Accessed June 17, 2021. <https://northcarolina.uniteus.com/>.

complex and logistically difficult. These additional challenges that patients in rural areas face call for increased coordination, but specifically, additional models of tracking need to be created in order to reflect and report the success of care coordination addressing transportation and travel.

As a result of the operational model of UniteUs relying heavily on their partnerships, and the situation of the care coordination platform at the core of the ecosystem, there are many places where it is essential that UniteUs (or the chosen care coordination platform) works in tandem with other components of the ecosystem. As displayed in the *Sample Ecosystem for Addressing Rural Health Inequities* (fig. 3), if you have a private company such as Papa Health create a dedicated rural health offering, that company can then serve as the care coordinator, leveraging the care coordination platform (UniteUs) to coordinate care and specifically provide their specialized care coordination offering, such as “Papa Pals.”

Building Out From the Cores

As the technology for virtual care access and the care coordination platform, Tytocare and UniteUs, respectively, sit squarely at the core of the ecosystem, all other companies selected to build out the rest of the sample framework were spurred by these two. As described in the methods section, once the study narrowed down the number of potential companies to 20, the study conducted an individual analysis of each company using the *company analysis matrixes*. The matrix identifies which companies should fill each component of the ecosystem, where there is a need for two companies to address one solution thoroughly, and how each interacts with one another and the ecosystem at large.

While there are many companies currently operating in the world who could each fill a specific role within the framework for this example ecosystem, the study chose companies based

on their existing operational models, market fit, and competitive advantages. As further explored in the discussion section of this paper, one can apply this same framework using differing criteria in company selection or in looking only at a specific pool of companies. Either way, addressing all components of the *Skeleton Ecosystem Framework for Addressing Rural Health Inequities* will address rural health inequities through a lens of sustainability.

In-Home Virtual Care Solution: Technology for Further Diagnostics

First, building out from Tytocare as the *In-Home Virtual Care* solution, the study identifies companies to fill the need for *Technology for Future Diagnostics* selecting the combination of Sandstone Diagnostics and Sonar MD. As addressed in the methods section, there are several specific types of diagnostics tests and, therefore, many companies that address remote diagnostics for each, but for sample purposes, this study chose Sandstone Diagnostics and Sonar MD because of the common needs they specifically address.

Sandstone Diagnostics provides rapid blood testing diagnostics on the site of blood collection. Additionally, Sandstone Diagnostics has an at-home blood testing product that stabilizes high-quality plasma or serum immediately instead of waiting until at a lab site.⁸ Sandstone Diagnostics focuses on blood sample collection and immediate results. Their technology enables patients in rural areas to either have their blood collected at home or at least at a clinic closer to home, rather than having to travel far distances, multiple times, to have their blood drawn and then wait weeks for results.⁹ While some travel outside the home may be

⁸ Sandstone Diagnostics. "Sandstone - Clinical Diagnostics Anywhere, Anytime." Sandstone Diagnostics, Accessed June 17, 2021. <https://sandstonedx.com/>.

⁹ Sandstone Diagnostics. "Sandstone - Clinical Diagnostics Anywhere, Anytime." Sandstone Diagnostics, Accessed June 17, 2021. <https://sandstonedx.com/>.

required to leverage Sandstone Diagnostics technology, the technology, when required, enables further diagnosis past the initial virtual physician visit.

Sonar MD enables remote or virtual check-ups for GI issues, a process which traditionally required patients to go into a hospital or lab. The Sonar MD remote monitoring technology allows for more frequent GI check-ups and testing than the traditional model.¹⁰ Testing which has traditionally gone by the way-side due to the challenge of the testing typically requiring in-person visits. Because of the in-person requirement of GI tracking and monitoring, diagnostics for GI-related issues traditionally require travel and in-person visits for patients in rural areas. The ability to diagnose and track GI problems remotely allows for further diagnosis, easier access to diagnosis, and tracking earlier and more frequently, all which aid in the overall improvement of health for patients who would otherwise not easily be able to see a doctor for diagnosis due to travel.

In-Home Virtual Care Solution: Technology for Continued Remote Monitoring

While Sandstone Diagnostics and Sonar MD allow for follow-up diagnosis for patients receiving virtual care and therefore are essential for improving overall equitable access to healthcare for rural patients, continued remote monitoring is equally important. Remote monitoring is not unique to rural health, or even healthcare at large. Many remote monitoring devices are utilized by healthcare providers and non-healthcare providers alike. With that in mind, the study sought to identify a remote monitoring company to place in the ecosystem which focuses on monitoring the clinical health of its clients, is easy for patients to use, and has in-

¹⁰ “SonarMD – Care Coordination for High-Beta Chronic Conditions.” SonarMD, Accessed June 17, 2021. <https://sonarmd.com/>.

depth and diverse metric tracking capabilities. With these requirements in mind, the study selected the company Alio

Alio is a remote monitoring company that specifically focuses on chronic health; therefore, the technology seeks to prevent hospitalizations and provide better care. Alio's technology allows for remote monitoring of metrics such as skin temperature, oxygen saturation, pulse rate variability, blood pressure, potassium levels, hemoglobin/hematocrit values, and others.¹¹ While Alio is focused on addressing chronic health issues, their depth and breadth of monitoring metrics and focus on reducing hospitalizations align nicely with rural health needs. In monitoring patients remotely, physicians can catch negative health trends early before there is a need for travel to an in-person visit or hospital, enabling more frequent and direct access to the physician and reducing the need to travel for check-ins, follow-ups, and even hospitalization.

In-Home Virtual Care Solution: Technology for Access to Prescriptive Services

Finally, the last issue of access brought to the surface by using virtual care as a solution is the issue of access to prescriptive therapeutics and drugs. Once a doctor can diagnose a problem through virtual visits and remote diagnosis/monitoring, they then prescribe treatment. However, if it is something rare or a trial that is being prescribed, the rural patient is right back where they started concerning access to care but worse, restricted access with more knowledge about what they are missing. In order to solve the issue of access to the prescribed treatment, the study identified the company Zipline to fill the role of the *Technology for Access to Prescriptive Services*.

¹¹ Alio Medical. "Homepage." Alio Medical, Accessed June 17, 2021. <https://alio.ai/>.

Zipline’s US healthcare service model allows access to decentralized models of care, enabling patients to access specialty pharmaceuticals from their own homes through on-demand drone delivery. The on-demand delivery enables the delivery of the medical supplies and drugs needed for treatment to a home or a remote ambulatory facility.¹² The implication of this for rural patients is that they no longer have to travel far distances to medical centers or research institutions to receive specialized treatment or access to life-saving trials. All the drugs and equipment necessary can be delivered to their area and administered by a local healthcare provider. Zipline’s technology allows rural patients to have access to the many of the same treatment innovations as their urban counterparts without sacrificing time for travel or scrambling for transportation.

Identifying Sandstone Diagnostics, Sonar MD, Alio, and Zipline allows for an ecosystem that more broadly supports rural health patients past the virtual care received initially through Tytocare’s technology. This three-tiered support, created by utilizing these technologies in tandem with an *In-Home Virtual Care* technology, leverages technology to create a more feasible system that supports complete remote care for rural patients.

Technology for Virtual Care Access: Hospital Specialists Virtual Support

As previously noted, *Hospital Specialists Virtual Support* is just as vital to creating a robust rural health network as *In-Home Virtual Care*. While Tytocare has impressive technology for virtual care, it focuses on connecting physicians and patients in the patient’s own home or non-medical environment. There are different tools needed for physician support. *Hospital Specialists Virtual Support Needs* calls for a technology or platform specializing physician-to-

¹² “Zipline - Vital, On-Demand Delivery for the World.” Zipline, Accessed June 17, 2021. <https://flyzipline.com/us-healthcare/>.

physician or healthcare provider-to-healthcare provider virtual connection. For the sample built-out ecosystem, the study identified Allm Inc. to serve in this role. However, many companies and technologies exist with the same offerings, providing virtual connections across a network of healthcare providers. Many hospital systems also have their own in-house technology. The study selected Allm Inc precisely because of their operational focus on connecting all different types of healthcare providers through their diverse product offerings and not just a narrow focus on physician-to-physician virtual connection.

Allm Inc has a host of product lines focused on connecting an array of healthcare providers, from EMS workers to at-home nurses to research MDs. Specifically, their Team product enables communication and connection across an entire healthcare community.¹³ Allm Inc’s technology enables rural physicians, NPs, and RNs alike to connect with specialists or each other directly from their rural practices and clinics. It gives medical providers the support they need in their own local clinics and allows providers to give their patients a higher quality of care in their own community for second opinions and specialist support, similar to that of their urban counterparts.

A Note on the Care Coordination Side of the Framework

Transitioning over to the *Care Coordination* side of the framework, the study took the same approach as was done with *Virtual Care*, building out from the core with UniteUs. However, the *Care Coordination* portion of the ecosystem is found to be slightly more convoluted upon digging into which companies should build out the framework. Many companies provide support to the primary care coordinator, and their offerings are offshoots of care coordination, serving a particular patient demographic. Therefore, the care coordinator

¹³ “Allm | Team.” Allm, Accessed June 17, 2021. <https://www.allm.net/en/team-en/>.

would use UniteUs to organize these additional offerings provided by a number of other companies. Many companies provide specific services such as access to quality food, exercise, education, and transportation. Defining which of these services are needed is unique to each community or even individual. For this reason, these specific services and needs are not addressed in the *Skeleton Ecosystem Framework*, and specific companies that provide these services are not identified for the *Sample Ecosystem for Addressing Rural Health Inequities*. It is understood that it is the community coordinator's role, with the help of a platform, to track and manage care coordination, understand and identify those specific needs, and refer the patient to the appropriate local resources.

However, there are some specific service gaps that broadly exist when addressing rural health. Transportation/ travel challenges and isolation both widely impact healthcare patients in rural areas. Because of their breadth of impact on rural healthcare, these issues are reflected as vital components within the *Skeleton Ecosystem Framework*, and companies which can meet these needs were identified to place within the *Sample Ecosystem for Addressing Rural Health Inequities*. Some companies which address these care coordination needs, in turn, have a quasi-care coordination component of their operations which could be enacted when a local care coordination organization does not exist.

Care Coordination: Technology & Solutions to Address and Solve Care Coordination Needs

In order to address the needs of transportation/travel and isolation, the study selected two companies: Papa Health and CarePool. CarePool provides reliable and safe transportation with a healthcare professional for rural patients needing to travel for healthcare appointments and procedures.¹⁴ Papa Health seeks to solve isolation for the elderly population, partnering their

¹⁴ CarePool. "Home." CarePool, Accessed June 17, 2021. <https://www.carepool.us>.

patients with selected and trained young adults to provide companionship and a resource to help when navigating the healthcare process. Both companies have an internal operational model which enables in-house care coordination, in some capacity, for their patients. However, Papa Health is explicitly partnering with its clients and is best positioned to help patients navigate their overall healthcare journey.

CarePool's core operational model is focused on providing safe transportation for rural patients of all ages. It is the only company in the entire sample ecosystem whose overall mission and focus is solely on rural healthcare. Therefore, there is nothing different or additional CarePool has to do or adapt to fit within the framework to specifically address rural health. It is simply a matter of the care coordinator connecting the client with CarePool and helping them utilize CarePool's services.

On the other hand, Papa Health, though focused primarily on elderly isolation, an issue frequently associated with rural healthcare, is not a rural health-specific company. Additionally, it does not have a specific rural health offering. While their operational model could be easily adapted for rural patients, a few nuances would have to be kept in mind when rolling out an offering for rural communities. The primary issues once again boil down to geography and proximity. Papa Health currently operates in metropolitan areas which have a multitude of young adults eager to participate. For expanding to rural communities, Papa Health would either have to recruit from the limited number of adults in these communities or have them travel out to their patients. The factor of a limited number of young adults in rural communities is not a deal-breaker for leveraging Papa Health in rural communities. It is simply an additional factor to be considered in the building of a rural solution.

Papa Health is also uniquely positioned to potentially fill the role of care coordinator themselves. Through its broad expanse of resources and operational model of patient pairing called “Papa Pal,” Papa Health creates a direct and close relationship with the patient. The “Papa Pal” is intimately familiar with the patients’ needs and healthcare record, providing the opportunity for “Papa Pal” to serve in a care coordinator role or work directly with the care coordination organization to make sure the patient’s needs are met. Papa Health exemplifies a company with overlap between the *Care Coordinator Platform to Manage and Track Care Coordination Needs* and *Technology and Services to Address and Solve Care Coordination Needs*, which is vital to supporting the desired sustainable ecosystem to address rural health inequities by the private sector.

Limitations & Further Applications

As noted in the results section, this study does not identify specific providers/provider networks or care coordinators/care coordination networks for the *Built-Out Skeleton Ecosystem* as both core components of the framework are specific to the designated locale or targeted needs the application of the framework is seeking to address. By identifying in a specific provider/provider network, it limits the potential use case. In leaving the role of provider/provider open within the sample ecosystem, it allows for the option of an existing rural health provider to fill that role and use the ecosystem to build out their own solution. Inversely, there is the opportunity for larger networks with existing local providers to extend their rural health offerings and leverage the framework in sustainably doing so.

Also mentioned in the results section, recognizing the need for care coordination to sit at the center of addressing health inequities in order to create a sustainable and lasting impact and change is not a novel idea. Studies and projects have focused on care coordination and its impact

on improving health inequities, but often care coordination is approached in isolation or only in terms of SDoH. The framework created in this study addressed care coordination uniquely by placing it centrally in the ecosystem and in tandem with the need for virtual care.

Along the same line of discussion, rural health inequities and how to address them as a whole is an issue academics and policy makers alike have been concerned with for a long time. However, attempts to address such issues have historically been made by the academic and public sector. The concept of private healthcare companies seeking to solve this issue is a more recent approach. As a result of the emergence of private healthcare technology and services companies targeting rural health inequities, new ideas have come to the forefront, but these companies typically look to solve one specific problem facing rural health such as remote care, access, or transportation. As seen with companies like CarePool trying to solve the issue of transportation for rural patients, rural health inequities are finally getting attention in the world of healthcare technology, but it usually results in one-off solutions.¹⁵ It is within this emerging class of solutions, all independently looking to solve rural health inequities, where is an opportunity for a framework which enables a collaborative and holistic approach that does not inadvertently further fragment rural healthcare or perpetuate inequities. This holistic approach is much harder than attempting to solve singular problems within rural health, which is why this study presents the framework or ecosystem model which relies on collaboration among companies with complimenting synergies. It would be a much larger undertaking for one company to address it all, larger than an early-stage private company could traditionally take on.

For the framework, the study specifically focuses on the issues directly touching the healthcare process. It is not to discount the larger structural inequities which also contribute to

¹⁵ CarePool. "Home." CarePool, Accessed June 17, 2021. <https://www.carepool.us>.

rural health but is to enable the creation of a clear framework which can be a starting point for further mapping of solutions needed to address rural health in full. The care coordination arm of the framework allows for a place to identify larger structural inequities impacting patients in rural areas and find solutions for them. For example, quality virtual care is not possible without stable broadband access. If a patient does not have quality broadband access, they cannot even begin their virtual care journey. The corresponding coordinated care components allow for this need of the patient to be identified and addressed so that broadband access is not the hard stop for the patient's access to healthcare. It is the coordinated care side of the framework which keeps the ecosystem flexible and open to addressing larger inequities and not shutting down as a result of them.

CONCLUSION

Conscious application of the *Skeleton Ecosystem Framework for Addressing Rural Health Inequities* allows for the creation of a private sector sustainable ecosystem of complementary companies to address rural health inequities. When utilized, the framework enables the consideration of implications beyond the immediate inequities in addressing the remote care and care coordination needs of rural communities.

Ultimately, the product of this study is the *Skeleton Ecosystem Framework*, which is just that, a framework to serve as a guideline for equitably addressing rural health inequities for any party attempting to do so. In turn, the *Sample Ecosystem for Addressing Rural Health Inequities* is a general sample of what it would look like if a party utilized the framework and built it out accordingly. The desired outcome of the creation of this framework is that it provides a vehicle for others to consider when attempting to solve rural health inequities, either for a specific locale

or the country at large, and they can then apply their own criteria on top of the framework when utilizing it.

There are entities which can utilize and benefit from this framework application: a designed venture capital fund, a government-private collaborative initiative, an existing hospital system addressing rural health, or a private company wishing to create a complete solution. Each of these entities would apply their own criteria when utilizing the framework: A venture capital fund looking to specifically address rural health would apply specific valuation and revenue criteria. A government-private collaborative may only want to work with companies and technologies which have existing rural health initiatives or focuses but may not care if the services are fully private or not. The intention of the framework having a skeleton nature is to enable diverse use, where the user can apply their own criteria while consciously approaching rural health inequities without indirectly exacerbating other inequities.

As briefly noted in both defining rural health in the United States and the discussion of social impact theory, many layers contribute to rural health inequities, race being primary. The race of an individual or community brings an additional set of health inequities into the discussion of barriers to access to healthcare in the United States. The study recognizes the nuances required for considering each extra layer of rural health, including but not limited to education, race, SES, gender identity, ext. Concerning the depth necessary for the analysis of each of these layers, the study narrows in and focuses on geographic proximity to access to care for the analysis.

Finally, this study is specific in looking at health inequities through a rural geographic lens. This focus is a result of the need to narrow down the purview of inequities and issues. The narrow scope of rural health inequities enables the creation of a framework which can focus on

specific needs such as remote care and transportation. However, it should not be discounted that a similar process can be applied to create a sustainable framework for addressing any sort of health inequity. Applying the same critical thinking steps and research lens to other populations facing health inequities, such as metropolitan low-income populations, allows for a similar product: the creation of a framework which considers both overt and unanticipated health inequities and offers solutions.

APPENDIX A
COMPANY DECISION MATRIX

Company Name:	Description:	Location:	Funding:	Good? (1,2,3)	Rural health?	Use?
UniteUS	Developer of care coordination and outcome tracking platform built to connect healthcare and social service providers. The company's platform allows providers to send and receive secure referrals, track every person's total health journey and report on tangible outcomes across a full range of services in a centralized, cohesive and collaborative ecosystem, enabling clients to optimally measure impact, improve health and track outcomes at scale.	New York, NY	\$150 Million	3	SDoH + In NC but not rural alone	yes
Papa	A digital platform to connect older adults with both a health advocate to help them navigate digital health and doctors	Miami, FL	\$91 Million	2	Looks for SDoH but no focus on rural health play	
NowPow	A personalized community referral platform for every need and every person. We build community referral networks that power care for all people, drive measurable impact, and deliver data to bridge gaps in community care.	Chicago, IL	n/a	2	Not necessarily built out for rural areas, would have to be adopted...Does look at SDoH	No (See Aunt Bertha)
CityBlock Health	24/7 360 digital care support and access: Virtual + Brick and mortar. Community Health partner to help you access resources, transportation, housing, ext.	Brooklyn, NY	\$352 Million	2	SDoH (preemptive care) (would it actually be feasible in rural areas b/c of reliance on resources in community	No Combine papa + aunt bertha + carepool
Socially Determined	a health care technology and analytics company focused on measuring the impact of the Social Determinants of Health (SDOH). The company's purpose-built analytic platform, SocialScage ®, quantifies and visualizes risk exposure and impact using the nation's largest curated repository of SDOH and social risk intelligence.	Washington, DC	3.15 Million	1	SDoH would be used by another company to ensure appropriate implementation	

Icario	The technology is supported by a team of health care and public health leaders who provide deep expertise in SDOH strategy, implementation, and evaluation. combines state-of-the-art machine learning with sophisticated consumer marketing profiles to develop personalized messaging at scale. They know how to push your buttons to make sure you get a flu shot or, importantly in the year ahead, get vaccinated against Covid-19.	Minneapolis, MN	\$37 Million	2				
Aunt Bertha	a free, one-stop resource for people seeking programs and service providers that provide mental and physical wellness resources to those hit hardest by the social, economic, and health impacts stemming from the pandemic. Aunt Bertha's platform lists more than 1,200 social services across every county in the U.S. , making them the largest closed referral search tool available on a non-commercial basis. Aunt Bertha isn't just making introductions, either, but is boosting patient visibility by giving caregiver teams a more complete view of a patient's global support environment.	Austin, TX	\$22 Million	3				
Lifesprk	Lifesprk's sells a suite of technologies to senior centers, health plans, and other providers, using both an array of traditional medical and atypical health inputs such as access to quality nutrition, transportation, and social networks to keep older Americans living longer and more fulfilling lives while staying independent. For example, Lifesprk might discover that an elderly individual's frequent hospital emergency room visits were being driven by a lack of transportation options to regularly visit his primary care doctor. By setting up the patient with access to a ride-sharing program, enabling	St. Louis Park, MN	\$16.1 Million	2			Does not address rural health or SDOH but if paired with the right other company could be a good tool	

	him to see his doctor on a more regular basis, Lifesprk drastically reduced costly and — particularly during Covid — risky ER visits.						
Carrus	Provides two digital education tools to their users: CareerStep, a student training platform for those seeking to enter and advance their career in the healthcare field, and CareerCert, a certification-management platform for already-established medical professionals to continue their education. Carrus is ensuring we have a vibrant and well-trained corps of frontline healthcare workers — a group that is still bearing the blunt force trauma of the pandemic on a daily basis.	Lehi, UT		2			yes
Tytocare	handheld exam kit and app that lets you perform guided medical exams with a healthcare provider, anytime, anywhere.	New York, New York	\$155 Million	2			yes
SonarMD	Survey-based GI remote monitoring health tracking platform to be an invaluable tool in a world where routine in-person medical check-ups cannot happen as easily or frequently	Chicago, IL	\$10 Million	3			yes
Sandstone Diagnostics	Offers patients instantaneous blood processing when (and where) blood samples are collected. As healthcare continues to shift toward virtual and remote care models, Sandstone's in-home blood labs are laying track for a post-pandemic environment in which decentralized access to tests and diagnostic settings becomes the new normal. No more needless trips to the clinic for needless blood workups — particularly for patients who have a habitual need to monitor their blood. Sandstone's small and portable Torg Zero Delay Centrifuge System easily fits in the palm of your hand and stabilizes high-quality plasma or	Maple Grove, MN	\$10.9 Million	3			yes

	serum at the point of collection rather than waiting for samples to arrive at labs.							
Clearstep	in-depth analysis combining symptom-checking with screening for potential virus exposure by analyzing users' responses to a few multiple-choice questions before determining if immediate care was warranted. Clearstep is processing approximately 10,000 symptom checks per day .	Chicago, IL		1				
NightWare	Digital therapeutic platform, which is delivered via an Apple Watch, detects nightmare occurrences during sleep, gently coaxing sufferers out of a nightmare without waking them, enabling them to get a full night's sleep and awake, rested and rejuvenated	Minneapolis, MN		2				
Intermountain Healthcare	uses secure video and audio technology to connect care providers in smaller health care facilities with specialists in large hospitals and to directly reach individual patients for primary care visits.	Salt Lake City, UT	Mormon-owned non-profit hospital system	3		Rural focused providing virtual support for rural hospitals and patients alike		yes
Carepool	Serves individuals with disabilities and the aging population by connecting them with transportation to employment, medical visits, and more. Our goal is to empower individuals to lead lives with the highest level of independence possible. Our drivers are competent, consistent and reliable with unconditional positive regard for our passengers. We are committed to relationship-driven independence through mobility.	Madison, WI	\$500,000			Yes, while it does function in urban areas, it specializes in rural areas		
Access.mobile	HIPAA compliant web-based application, amHealth , enables tailored and optimized	Denver, CO	n/a	2		Culturally conscious		yes

	<p>mobile communication. Adapted across mobile channels, anUHealth automates insight-driven communication leveraging micro-segmentation and real-time feedback.</p>	San Francisco, CA	n/a	1	approach, no rural focus but could be applied,	yes
<p>Alio</p>	<p>Remote Clinical Monitoring, specifically for chronic health</p> <p>wearable technology intended to facilitate better care and reduce avoidable hospitalizations. The company's technology uses remote patient monitoring and a device to measure metrics like skin temperature, oxygen saturation, pulse rate variability, blood pressure, potassium, hemoglobin/hematocrit, and more, enabling physicians with actionable real-time data to make the most informed medical decisions possible.</p>	San Francisco, CA	n/a	1	No rural focus just remote monitoring	
<p>Anura</p>	<p>Remote Monitoring via AI recognition on your phone to track and monitor vital signs and chronic risks</p>	Toronto, Ontario	\$150,000	1	No rural Focus	

APPENDIX B

INDIVIDUAL COMPANY ANALYSIS MATRIX

Company:		How would have to be adapted to address rural health inequities:	Where there are synergies with other companies:
Claimed or stated purpose:			
Need being addressed:			
Expect effects:			
Context in which the company operates:			
Operational model:			
Stakeholders:			
Action/ process/technology to enact change:			
Need/ market fit:			
Competitors or similar technologies/offerings:			
Competitive advantage:			
ROI:			
Founding team:			
Risks:			
Additional Inequities exposed or created:			

APPENDIX C

TYTOCARE MATRIX ANALYSIS

Claimed or stated purpose:	Expanded telehealth – virtually connects patients with providers and leverages suite of technology to enable a more in-depth virtual consultation, diagnosis, and exam	Virtual primary care visits for things such as colds, flu, ext		Where there are synergies with other companies: Instead of creating a specific rural health arm, TytoCare could partner with Care Coordinators already addressing rural health inequities to then leverage the TytoCare technology in their offering
Need being addressed:	Virtual urgent care, partner with providers to offer own host of doctors, but also give the capability for an individual to use the technology and send to their own primary care provider. Typically, market to those who frequent emergency rooms or urgent care. Or busy moms who don't want to risk taking their kids into the emergency room or doctor	Allow patients to be seen by a primary care physician without having to travel and go into an actual brick and mortar doctor's office or emergency room		
Expect effects:	Virtual urgent care, partner with providers to offer own host of doctors, but also give the capability for an individual to use the technology and send to their own primary care provider. Typically, market to those who frequent emergency rooms or urgent care. Or busy moms who don't want to risk taking their kids into the emergency room or doctor		TytoCare would need to partner with existing rural health physicians or systems to attempt to connect patients in rural areas to primary care providers closest to them, even if that be farther away.	
Context in which the company operates:	If insurance cover's telehealth it is covered. Patient buys the technology online nor bestbuy to then sync with smart phone or tablet. They then seek to connect you with your own provider/network if possible. If not, you are connected with a TytoCare physician using the TytoHub.		As with above, TytoCare needs to either partner with local/ rural health physicians/ systems or set up a dedicated rural health Hub which specializes in connecting rural patients with the closest providers if needed.	
Operational model:	TytoHub.	TytoCare, Patients, Providers (physicians hospital systems ext.), Payers		
Stakeholders:				
Action/ process/technology to enact change:	Technologies to diagnoses and enable virtual visit, Software to enable video streaming and connection, network of physicians to provide care			
Need/ market fit:	There is a high demand to technology to enable better and all-encompassing virtual health visits—TytoCare addresses that.		Great market fit for rural patients either in their homes, or partnering with school nurses, rural pharmacists, ext.	
Competitors or similar technologies/offerings:	While there are obvious competitors with telehealth platforms which enable the patient to remotely connect with the doctor, there are no other devices which aid in this proves. Similarly, there are technologies to monitor			

	health remotely, but they are not active in the telehealth visit and diagnosis.		
Competitive advantage:	The combination of the hardware technology, the virtual platform, and the network of providers uniquely		
ROI:	Keeps patients out of ERs and hospitals allowing for earlier less costly diagnosis, and allows doctors to see more patients daily	Reduces or eliminates travel time for basic diagnoses. Enabling rural patients to see a doctor when needed sacrificing as much time off work or travel expenses	
Founding team:			
Risks:	If the visit requires more than the diagnosis technologies allows, patients will still need to go into an office, also relies on patients to understand and know how to use the technology	Same risks as already exist but magnified for rural patients who would have to travel great distances to a hospital or clinic	Partnering with a Care Coordinator would allow for the ease of some of the implementation risks and eventual transportation and coordination risks.
Additional Inequities exposed:	Access to a location with further diagnosis tools, access to pharmacy to get prescriptions, cost of product, digital literacy to set up and use product, access to smartphone & broadband	Same inequities exposed, but once again magnified.	Care Coordinator and transportation solutions can partner with LyloCare to address the next-step inequities exposed by LyloCare .

APPENDIX D

UNITEUS MATRIX ANALYSIS

			How would have to be adapted to address rural health inequities:	Where there are synergies with other companies:
Claimed or stated purpose:	Platform to develop Care Coordination networks, and outcome tracking platform, enabling providers and payers to report on impact		Need to work with a Care Coordinator in a rural area or specifically addressing rural health.	Is Papa creates a dedicated rural health are they could serve as the care coordinator leveraging the <u>UniteUS</u> platform to coordinate care for patients and provide papa pals
Need being addressed:	Enabling care coordination networks to digitally and seamless provide for their <u>patients</u> needs at both the health and social levels			
Expect effects:	Allow Care Coordinators to more effectively and easily address patient's needs			
Context in which the company operates:	Partners with all types of care coordinators, specifically those focusing on SDoH to enable ease of geographic referrals, information sharing, and success tracking		Will need to partner with a care coordinator in individual rural areas or focused on rural health coordination overall who are connected and tap into the respective rural health services	
Operational model:	Partner with community coordinators to help set-up their platform and on-board social services in the areas so that the community coordinator can provide care and referrals all through the platform			
Stakeholders:	Care Coordinators, social services, patients, providers, UniteUs			
Action/ process/technology to enact change:	Care Coordination platform to allow streamlined and better coordination and care for the Care Coordinators			
Need/ market fit:	There is a need for Care coordinators to digitize their referrals and tracking, the key here is there must be an existing care coordinator		Because of the additional disparities facing rural patients such as transportation, travel, and access there is even more of a need for effective streamlines care coordination systems	
Competitors or similar technologies/offerrings:	Socially Determined covers aspects of the tracking and need identifying but do not have a digitized platform for care coordinators			
Competitive advantage:	Existing technology and experience onboarding and setting up the platform for care coordinators			
ROI:	Allows for a streamlined approach to care coordination, investing in the individual's health holistically and upfront ultimately reducing emergency room visits and preventing long-term health problems.			
Additional Inequities exposed:	Through leveraging this platform Care Coordinators will identify where there is an inequity in the health ecosystem and refer the patient to resources meant to address such inequity		Will have to be more virtual as a result of the patients potentially living farther from care coordinator, therefore with expose inequities in technology and digital literacy ...will have to find support in these areas	Papa, can be leveraged as a resource to support patients with technological assistance, will need to leverage companies that address specific social inequities such as CarePool

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