# Enhancing Rural Population Health Care Access and Outcomes Through the Telehealth EcoSystem™ Model

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## Abstract

The article highlights the Telehealth Ecosystem™ model, a holistic cross sector approach for socioeconomic revitalization, connectivity, interoperability and technology infrastructure development to address health equity for rural underserved communities. Two guiding frameworks, *Community & Economic Development (CED) and Collective Impact,* provided the foundation for the *Telehealth Ecosystem™* model. Public and private organizational capacities are addressed by comprehensive healthcare and social service delivery through stakeholder engagement and collaborative decision-making processes. A focus is maintained on economic recovery and policy reforms that enhance population health outcomes for individuals and families who have economic challenges.

The *Telehealth EcoSystem™* utilizes an Intranet mechanism that enables a range of technologies and electronic devices for health informatics and telemedicine initiatives. The relevance of the Intranet to the advancement of health informatics is highlighted. Best practices in digital connectivity, HIPPA requirements, EHRs, and eHealth applications, such as patient portals and mobile devices *are* emphasized. Collateral considerations include technology applications that expand public health services.

The ongoing collaboration between a social science research corporation, a regional community foundation and an open access telecommunications carrier is a pivotal element in the sequential development and implementation of the Telehealth EcoSystem™ model in the rural southeastern region community.

**Key Words:** Community and economic development; collective impact; telehealth; care coordination; research; intranet

**Abbreviations:** HIPAA (Health Insurance Portability and Accountability Act), EHRs (Electronic Health Records), TMCCF (Tuskegee Macon County Community Foundation), CED (Community & Economic Development)

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## Introduction

Health equity is an essential element in the global quest for social justice, human rights and environmental sustainability.[1] Unfortunately, rural communities in the United States are often disproportionately impacted by socioeconomic conditions and health disparities. Approximately one-fifth of the U.S. population resides in rural America and health care providers encounter a patient base that is generally older, sicker, and less affluent than their urban counterparts[2/3/4]. According to a recent Rural Healthy People 2020 report, "rural health challenges are complex, reflecting both significant disparities across rural populations residing in the United States and unique regional, political and social differences"[5]. The former Director of the US Office of Rural Health Policy asserts that the country "lacks strong infrastructure in rural population health" and that "rural demography [can] seem as complex and locale-specific as fingerprints."[6] Community mobilization geared toward local and region-centric innovations and solutions is an optimal approach to addressing the variability in rural health care issues. "Understanding these differences is critical to taking steps to improve health and well-being in rural areas and to reduce health disparities among rural populations."[7]

Macon County, AL is one of several counties in the Black Belt Region[8] that is rich in historical events and legacies - particularly regarding African American communities - along with the topography and natural resources. Located in a southern rural region, the City of Tuskegee and Macon County Alabama (AL) continue to endure intractable socioeconomic hardships despite a rich and storied history of academic, entrepreneurial, cultural and scientific achievements. Economic distress is prevalent in multiple arenas including housing, commerce, unemployment, telecommunications, transportation infrastructure and health care access[9/10]**.** Wide scale disparities prevail as a result of a decades-long population exodus; diminishing financial and environmental infrastructure; and limited resources to address community needs.

The 'Black Belt' designation originally referenced the rich soil and verdant landscape that drew whites as landowners to the area and who built large plantations with an emphasis on growing cotton and other agricultural products. The regional descriptor evolved to later encompass the large concentration of African American residents who were slaves on those plantations and, upon emancipation, were left with an impoverished status that continues to this day[11/12/13]. This phenomenon is encapsulated in a Journal of Southern Space article which describes the *"historical-geographical Black Belt, beginning as a rich, dark-soil, cotton-growing region of Alabama occupied by slaveholders in the 1820s and 30s, and becoming, over time, a more generalized designation for a region or place with a majority black population. By the late twentieth century, the Alabama Black Belt as a region of insurgent African American aspirations made a strong claim to take over the meaning of the term from its older and other senses*".[14]

## Catchment Area Demographics

Macon County Alabama is situated in the east-central portion of the state and bordered by Elmore, Tallapoosa, Lee, Russell, Bullock, and Montgomery Counties. Macon's county seat is located in the city of Tuskegee, AL. Geographically, Macon County consists of 611 square miles comprising 1.2% of the total land area in the state. According to the US Census Bureau, total population estimates for Macon County are said to be approximately 18,963.[15] Demographic indices reflect the population composition as follows: 16.4% whites, 81.4% Black/African Americans, 0.3% American Indian, 0.5% Asian, 1.5% person with two or more races, 1.5% Hispanic or Latino, and 15.6% White Alone, not Hispanic.

## Historical Perspective

The Historic Black Belt's Conditions remain some of the worst in our nation[16]. Current indices clearly highlight significant cumulative demographic and economic changes that are indicative of disparities and marked distress factors. Robert Wood Johnson Foundation's (RWJF)[17] recent jurisdictional comparative study ranked Macon County 62nd of 67 Alabama counties in terms of population health outcome factors, predicated on weighted scores for health behaviors, clinical care, social, and economic data. Macon County was also ranked 54th out of 67 counties comparatively in the category of overall health factors in this RWJF report. The region also suffered historical declines in national and local agriculture/agri-business--including traditional and non-conventional farming, forestry, livestock commerce, and the export trade markets. Market deficits related to the agricultural industry in Macon County has impacted the African American and population in particular.[18]

Rural inequities such as these are an excellent example of the intersectionality of the factors that contribute to disparities[19]. The use of History and culture can be tremendous assets for rural communities and can be leveraged to improve health outcomes[20]. As noted earlier, Macon County enjoys a storied history of cultural, intellectual and enterprise achievement juxtaposed against the cumulative effects of decades-long socio-economic decline. Yet, multiple systemic factors and related disparities prevail in the region. The City of Tuskegee, in particular, boasts a number of historically black institutions, cultural icons and intellectual achievements. Highly recognized icons are world renowned Tuskegee Institute (now Tuskegee University) and the famed Tuskegee Airmen who served the country during periods of war and peace. On a more poignant note, the rich legacy of achievements during the Tuskegee Veteran's Administration Hospital's early years are too often overshadowed by the infamous, and highly publicized, syphilis research studies[21].

While taking into consideration the disparity factors highlighted above, a foremost concern for the region involves insufficient access to health care—particularly emergency and specialty services. Tuskegee has not had a full service hospital for the public since the closing of John A. Andrew Hospital located on the campus of Tuskegee University[22]. In fact, Tuskegee/Macon County had three hospitals at one time; one for the county, one for the

public, and one for veterans. Each, over time, either closed or downsized significantly. Healthcare was a main economic driver for the community. As is so often the case in communities impacted by the loss of a rural hospital[23], the facility closing precipitated a slow deterioration of the community due to a loss of jobs, population and no viable economic replacement.

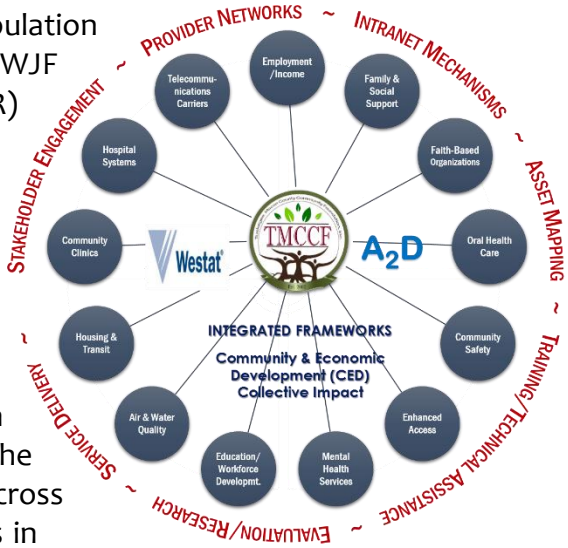
The Tuskegee Veterans Administration Hospital was a major, and historical, source of employment and served as a cornerstone of economic, intellectual, and public health innovations and stability. The hospital provided an aggregate of over 2000 employees and 23 medical services with training programs for nurses, medical doctors, psychiatrists, rehabilitation specialists, and other medical personnel. Overtime, the institution expanded in scope to include medical, psychiatric, and rehabilitation services for African American soldiers who served in World War I as well as World War II, Korean and Vietnam War veterans. Following a directive from President Dwight D. Eisenhower in the early 1950's, the hospital integrated and services were available to both black and white former soldiers[24]. Under a direct order from President Clinton to cut cost, a 1996 merger between the Tuskegee VA and the Montgomery VA resulted in unfavorable economic impacts--affecting not only the Tuskegee VA hospital proper, but surrounding cities and counties as well. As a consequence, major job losses occurred in a community previously dependent upon the Veteran's Hospital as a source of employment for almost 100 years. Renamed the East Campus of the Central Alabama Veterans Health Care System, the Tuskegee facility complex, joined the National Register of Historic Places in 2012[25].

**A Rural Underserved Population: Response to Prevailing Issues**

Preliminary assessments, augmented by the literature and empirical observation, suggest that broad-based, systemic, and sustainable efforts are needed in Macon County and surrounding Black Belt counties to bring about socio-economic parity and enhance population health outcomes. *Enhancing Rural Population Health Care Access and Outcomes through the Telehealth EcoSystem™ Model* is an initiative emanating from the visionary platform of the Tuskegee Macon County Community Foundation, Incorporated (TMCCF), a regional nonprofit in partnership with Westat, a social science research corporation and A2D, Inc. a telecommunications/engineering/open access carrier. TMCCF and Westat formed a partnership in early 2014 to collaborate on a shared vision for active pursuit of rural health and community & economic development (CED) initiatives in Macon County, AL and this partnership subsequently evolved to include A2D, Inc. in late 2014.

Two guiding theoretical frameworks, *Community & Economic Development (CED)*, *Collective Impact*, and the introduction of intranet and telemedicine technology, helped shape the conceptualization and implementation planning for the Telehealth™ Ecosystem™ model. As a catalyst for reform, the Telehealth™ Ecosystem™ model (See Figure 1 Below) offers a holistic cross sector mechanism for health and social services delivery, digital connectivity, interoperability and technology infrastructure enhancement. The schematic highlights the

underlying impacts of social determinants in population health outcomes and aligns with elements of the RWJF County Health Rankings & Roadmaps (CHR&R) Model[26].



(Figure 1) Telehealth Ecosystem™ Modell ~ Social Determinants of Health Factors

Knowledge of the region's historical context offers a deeper understanding of Tuskegee Macon County's protracted period of socioeconomic decline. Accordingly, the collaborative team focused on the importance of understanding health indices and health care within a local context and explored avenues to address the underlying causes of disparities within and across geographical areas. Predicated upon best practices in healthcare, evaluation research, health technology and collaborative engagement, the *Telehealth Ecosystem*™ model is designed for implementation in iterative phases. The focus of the effort is to strengthen and expand existing health systems, improve technological infrastructure and foster sustainable, community networks that drive change.

In Macon County, citizens who are relatively poor and suffer from chronic diseases are more likely to not visit their doctor regularly and wait until they have an emergency to get proper medical attention. Without a hospital, it relies primarily upon local clinics to provide primary health care services. Most of Macon County citizens have to commute 25- 40 miles to the nearest hospital in neighboring Lee or Montgomery Counties to get suitable specialty acute, emergency and follow up care. The average fixed/low income patient simply cannot justify spending the time/money/resources to commute long distances to the nearest hospital and wait hours solely for a 30 minute medical check-up[27]. Because there is no hospital available within reasonable proximity in this rural economically disadvantaged county, a viable alternative is to deploy technology solutions. Applications such as telemedicine[28], tele-dentistry[29], and eMobile health facilitate access to medical care can help lower the overall cost of healthcare while improving quality of service delivery and access to appropriate specialists. Importantly, there is a growing awareness among medical providers of the viability of electronic data platforms such as EHRs and health exchanges, health informatics applications and technology related mechanisms for improving population health outcomes[30].

To address this problem, TMCCF and its core partners embrace technology-enabled care such as telehealth and mobile health applications which aligns with best practices and emerging solutions in the relevant literature. A recent School, Health & Libraries Broadband Coalition (SHLB) website article highlights the viability of local and regionally-based telecommunications access initiatives. The article recommends *"community owned Internet infrastructure through municipalities, public utilities, co-ops, or public private partnerships . . . Community ownership can be easier and more profitable when telehealth and telemedicine is a*

*primary goal of the network"*[31]. Telemedicine can deliver care to patients regardless of their physical location. It is cost effective to not only families, but hospitals and clinics as well. Research has shown that patients who receive such care are more likely to have better health outcomes and less likely to be admitted or readmitted to the hospital. Thereby, curtailing unnecessary expenditures of funds and personnel through the misuse of emergency hospital services.

The Telehealth Ecosystem™ model's sequential development process is comprised of three Phases. Phase I entails incremental tailored development and expansion of a health and human service provider network to support the Telehealth Ecosystem™ model initiative. Initial Phase I efforts, to date, are yielding noticeable gains in cross-sectorial engagement including awareness building; outreach and partnership development along with a vertical network of organizational participants. Slated for implementation in Phase II, an Intranet mechanism that utilizes multiple technologies is a critical second stage component of the broad-based Telehealth Ecosystem™ model. This will incorporate Intranet technologies to facilitate equalitarian access to information[32] and services in underserved communities. Expanded iterations of the Telehealth Ecosystem™ model are slated for Phase II of the developmental process.

With an ever evolving industry and regulatory environment, Phase III will focus on replication and sustainability with an aim to harness the technical capacity to communicate, analyze, and disseminate user-centered multi-sector models for service provision as well as cost effective access and services. By virtue of its proposed configuration, upon full implementation, the Telehealth Ecosystem™ model will provide a platform to design, test, and evaluate the risks and rewards of locally conceived and/or replication of evidence-based approaches to rural health systems.

Phase I remains in the developmental stages and is the focus of this article. The Telehealth™ Ecosystem™ model will evolve along a continuum and a series of initiatives are also projected in future phases to support job creation in the health care, education, and housing sectors, along with interoperability connectivity for law enforcement and emergency first responders, in communities throughout Macon County, AL. It will bring also media to the people and help transcend transportation, digital connectivity and social barriers that might hamper some recipients. The Telehealth Ecosystem™ model will serve as a virtual community technology network that can be deployed to schools, community/youth centers, neighborhood associations, and other centrally located sites throughout the City of Tuskegee and the Macon County region. Satellite media centers can be equipped with a live television broadcast line and expansion capabilities with the addition of supplemental equipment and e-learning applications.

**The Core Partners**

***The Tuskegee Macon County Community Foundation (TMCCF)*** was founded in October 2002 and reorganized in June 2012 with the new mission of enhancing the quality of life in

disadvantaged communities in rural and urban areas. Currently, a particular focus is on a rural area region that includes the City of Tuskegee and other communities in Macon County. It sees as its major goals to develop appropriate partnerships that address critical issues and challenges in disadvantage communities, and build and sustain philanthropic capital. TMCCF sees as its fundamental responsibility to facilitate research and documentation as a means of improving lives by investigating cause and effect so that, where appropriate, models can be replicated in other economically stressed communities. Consistent with its mission, TMCCF plays an integral role in marshalling resources, both people and financial, to address a community's needs such as the reduction of health disparities. Community foundations have been recognized as vital champions in revitalization efforts in resource poor areas, especially in southern communities[33/34/35]. As a community foundation, TMCCF leverages its expertise and relationships with local, state, and national stakeholders to convene and engage key decision makers in dialogue and action-oriented planning focused on capacity-building, impacts, and outcomes. TMCCF also engages in outreach to diverse stakeholders to collaborate on the development of a strategic agenda for community and economic development particularly in rural and urban poor communities. To meet the goal of cost effective health and human service delivery in Tuskegee Macon County, TMCCF, Inc. engaged Westat, Inc. and A2D, Inc. as critical partners in meeting the healthcare challenges of the Tuskegee Macon County region that evolved into the Telehealth EcoSystem™ model.

Established in 1963, ***Westat*** is a nationally acclaimed social science research corporation, with a rich history of conducting multisector evidence-based research and evaluation projects of national and global significance. The firm's portfolio is varied—spanning a range of health, human service, and socio-economic domains, including those within the health disparities and health equity arena. Many of these efforts include studies that have contributed to the advancement of health equity and population health outcomes. Within Westat, the *Center on Health Disparities & Health Equity Research* engages in transdisciplinary research and works with the Center's resource network of diverse partners. The Center provides technical assistance and project development consultation with a focus on planning, stakeholder engagement, and information dissemination/project replication capacities. In doing so, the Center focuses on evidence-based practices and innovations that have proven helpful in reducing disparities and promoting health equity. Westat's Center helps to foster communication and stakeholder engagement; share and exchange best practices and experiences to strengthen community-based programming; and, advance the development of appropriate community-based tools and resources. Westat Center's guidance on performance measure development helps shape a 'real world' analytics platform so the Telehealth Ecosystem™ model that can be meaningfully assessed by policy, funding and regulatory decision makers. Westat, Inc. has been charged with developing an evaluation/assessment methodology that will provide clear insight into the Telehealth EcoSystem™ model in preparation for replication in both rural and urban underserved communities with low socioeconomic indices.

***A2D, Inc.,*** a competitive local exchange carrier (CLEC), is on the forefront of bridging the digital divide in rural and low income urban areas. A2D is uniquely able to connect citizens, who can't afford internet access, directly to community-based content, services and resources, without the internet. By removing the burden of affordability, community-based resources can now focus on providing services (in person and remotely) to all at-risk citizens. As a result, the fundamental goal of the collaborative team effort is developing replicable strategies to help multi-sector entities deliver social services across a no-cost digital medium (intranet) to help mitigate socio-economic disparities. Central to this thrust is enabling Macon County's healthcare provider resources to identify and secure public-private funding resources to a) modify existing programs; b) establish centralized data sharing and analytics depositories; and c) help analyze impact data to help refine how health resources can be delivered effectively to all citizens to enhance population health outcomes. A2D's network model has endured intensive vetting by a multitude of federal, state and municipal agencies. As such, A2D, has maintained a focus on making connectivity available to all citizens regardless of their economic status and working with social service providers to help them leverage the network to deliver enhanced services. Through the introduction of technology as an equalizer, the Telehealth EcoSystem™, powered by A2D's network, represents a realistic paradigm for digital connectivity in health care and human services delivery.

Additional early key stakeholder's and organizations included the Macon County Health Care Authority, the Tuskegee Macon County Community Development Corporation (CDC), Southern Christian Leadership Foundation (SCLF), Tuskegee University College of Engineering, The Tuskegee University Graduate Program for Public Health, The National Association of Nurses, Tuskegee Chapter, the Retired Nurses Association, the Community Hospital of Tallassee, The Telehealth Work Group of Alabama, Tuskegee University Bioethics and Medical Research Center, and the Department of Psychology and Sociology, Tuskegee University were among key collaborators in strategic planning and project development.

## Methods & Approach

The theoretical frameworks and methodological approach was based upon best practices from the literature, empirical observations and 'real world' experiences deemed successful in enhancing rural population health outcomes. *TMCCF, Westat's Center on Health Disparities & Health Equity Research,* and *A2D, Inc.,* embraced a *Community & Economic Development (CED)* framework with an unwavering fidelity to addressing social determinants of health. Augmentative theories such as organizational development, dissemination and adoption, and systems thinking align with the core partnership's objectives. A combined CED framework and Collective Action framework overlay was subsequently adopted. The overlay of an integrated CED and Collective Impact framework also helps to acknowledge the relationships among economic distress, social determinants of health, the geo-political landscape, and the needs assessments/asset mapping required to move from concept to action and sustainability. This composite approach currently drives the Telehealth Ecosystem™ model's rural initiative.

In rural America, the correlation between local healthcare systems and the vitality of the community is strong and high-quality healthcare indices can serve to leverage economic and community development initiatives[36]. In this context, population health status is viewed as an economic engine[37]—and can be a reciprocal driver for helping to bring about health equity. Health care industry efforts can also serve as a bridge between diverse sectors in CED initiatives. *Community development* has been operationally defined as a *"set of processes or efforts to create community change at the local level . . . increasing awareness of issues . . . . . and enhancing community member participation in addressing these issues"*[38]. A traditional *Community & Economic Development (CED)* approach levels strategic investments on a competitive-merit-basis to support economic development, foster job creation, and attract private investment in economically distressed areas.

Correlate concepts often associated with both CED and Collective Action frameworks include c*ulture and community engagement*, community organization, *community participation, capacity building, constituent engagement, community empowerment and coalition building*[39]. Initially introduced in the United States in 2011 by FSG, the *Collective Impact* concept "*provides a useful framework for community change and is situated within the broad frame of collaborative efforts focused on systems and policy change"*[40]. The Collective Impact framework is increasingly being applied to address socioeconomic disparities and the concept received wider dissemination in the literature in a Stanford Social Innovation Review Winter 2011 article[41].The Collective Impact approach is described as *"the commitment of a group of important actors from different sectors to a common agenda for solving a specific social problem".* In differentiating Collective Impact from other forms of collaboration, the Stanford Review authors contend that even though the *"social sector is filled with examples of partnerships, networks, and other types of joint efforts"* this approach is both distinct and flexible in format.

The core partnership team embraced the Collective Impact framework as an overlay to the foundational CED framework as this augmentation underscores TMCCF's efforts as the regional anchor organization. Supporting backbone infrastructure is essential to ensuring the collective impact effort maintains momentum and facilitates impact.[42] A defining feature of the Collective Impact framework is the utilization of a backbone, or anchor, organization--a separate entity dedicated to coordinating the various dimensions and collaborators involved in initiatives. Moreover, fundamental principles of the Collective Impact framework highlight the relevance of a common agenda, performance measurement development, sustainable activities, ongoing dialog, and having a core anchor, or nexus, to catalyze the efforts[43].

Case studies of select Collective Impact framework project applications underscore the vital role played by anchor institutions. The literature emphasizes the importance of *"nonprofit management organizations that have the skills and resources to assemble and coordinate the specific elements necessary for collective action to succeed . . . and that power of collective action comes not from the sheer number of participants or the uniformity of their efforts, but from the coordination of their differentiated activities through a mutually reinforcing plan of*

*action*[44]*".* Two leading Canadian-based organizational proponents of the Collective Impact framework and Adaptive Leadership concepts, the Tamarack Institute and Collaboration for Impact, contend that Adaptive Leadership principles are compatible relate to complex systemic issues: "*Adaptive problems . . . are complex . . . reaching an effective solution requires learning by the stakeholders involved in the problem, who must then change their own behavior in order to create a solution".* Adaptive Leadership proponents contend *that the role of leading and coordinating collaborations is vastly different . . . One requires us to respond, the other requires us to change"*[45]*.*

## Augmentative Theories & Principles

In addition to socioeconomic indices and geopolitical factors, human poverty is also contextual. Poverty and inequities cannot be measured just by statistical or quantitative methodology. But rather, must be evaluated in concert with those conditions that drastically impact the very quality of one's existence--and which are not solely dependent on socioeconomic variables. Determinants of health reach beyond the boundaries of traditional health care. As such, life expectancy, health status, lack of addictions, personal security, emotional well-being, access to knowledge, environment, personal security, and political empowerment are equally crucial[46/47]. *Social determinants of health* refer to access to power, money, and resources and the conditions of daily life that affect health and well-being for groups of people[48].

Social determinants of health also correlate with the set of factors that contribute to the social patterning of health, disease, and illness the interrelationships among these factors determine individual and population health status[49/50]. Systemic and structural inequities[51] such as economic disenfranchisement, racial disparities, sub-standard environmental conditions, illness and workforce related stressors can undermine one's overall health and wellbeing. Moreover, "*. . . dealing with these conditions from a position of limited control can result in chronic stress on individuals, which is an underlying cause of many health conditions*[52]*".* Education, housing, transportation, agriculture, and environmental sectors can be important allies in improving population health. Because of this, interventions that target multiple determinants of health are most likely to be effective.

Implementation planning and assessment processes, such as asset mapping, focus groups and participatory forums, align with emerging and best practices for engaging community leaders in participatory dialog that are designed to enhance the information landscape becomes critically important.[53/54] Social constructs such as *Lewin's Model of Change*[55] also informed the conceptualization of the Telehealth™ Ecosystem model--particularly regarding community engagement and health equity promotion aspects. *Lewin's Model* offers avenues to combat barriers to intersectoral collaboration via a "*process known as unfreezing . . . by understanding the "professional logic" of potential partners . . . pointing out the benefits of partnership to them".* This methodology, in essence, helps in "*overcoming inertia and dismantling the existing mindset*". [56]

**Perspectives on Digital Connectivity in Reduction of Health and Socioeconomic Disparities**

- The Telehealth Ecosystem™ model focuses on strengthening community capacities as a critical variable for disparities reduction and promotes discerning media access and consumption. The model also embodies select recommendations from a ***Knight Foundation Commission Report***[57] on media communications, information dissemination and civic engagement which called for: a) development of systematic quality measures of community information ecologies; b) assessment of impacts on social outcomes; c) support for information providers in reaching local audiences; d) dissemination of quality content through diverse media (e.g. mobile phones, radio, public access cable, new platforms); e) provision of continuous affordable high-speed Internet service; and, f) engagement of citizens in acquisition and knowledge sharing within and across social networks.

- A ***Stanford Social Innovation Review article*** entitled ***Tech and Innovation to Re-engage Civic Life*** provided the following caveats regarding the relevancy of information access to socioeconomic parity and community wellbeing: a] *"Sometimes even the best-intentioned policymakers overlook the power of people. And even the best-intentioned discussions on social impact and leveraging big data for the social sector can obscure the power of every-day people in their communities" and, b] "Well-structured civic engagement creates the space and provides the tools for people to exert agency over policies. When citizens have concrete objectives, access to necessary technology (whether it's postcards, trucks, or open data portals), and an eye toward outcomes, social change happens*[58]*".*

- A US Federal website blog article entitled ***Advancing Health Equity in the Digital Age***[59] highlighted the potential for health information technology (health IT) to improve chronic disease management and care coordination efforts as well as mitigate against health issues that disproportionately impact communities of color. Citing *". . . lack of access to quality, preventive health care, cultural and linguistic barriers, and limited patient-provider communication as factors that aggravate health disparities",* the author asserts that *" . . . limited financial capital and lack of systems that can communicate effectively with each other widen the digital divide between providers and other clinicians who provide health services to a significant number of minority communities"*

- Former Federal Communications Commission (FCC) ***Commissioner Mignon L. Clyburn*** spearheaded the establishment of the ***Connect2HealthFCC Task Force*** which is "a dedicated, interdisciplinary team, focused on the intersection of broadband, advanced technology, and health. Commissioner Clyburn's remarks at a recent NHIT-HIMSS Leadership Conference highlight the digital divide and resulting impacts on population health. Clyburn asserts that *". . . broadband deployment . . . provides the necessary foundation for creating the gateway to new and sustainable models for meeting longstanding health goals . . . These efforts can further spur the U.S. economy*

*and help to close the digital divide, while at the same time be an oasis in a health care and wellness desert . . The data clearly shows that the picture of health is vastly different in connected communities versus those in digitally-isolated areas. This holds true when it comes to access to care, quality of care, and health outcomes . . . almost half of U.S. counties are "double burden" counties, where there are elevated levels of chronic disease and lower levels of broadband connectivity. Perhaps it's time for us to evolve our thinking, grow our vision, and create a "broadband health safety net," for underserved groups in America"*[60].

## Results

Formalization of the Telehealth Ecosystem™ – The ecological network concept emerged as the Macon County Telehealth Ecosystem™ in 2014. Development of a charter served to codify and define the ecosystem's mission, membership, and operating guidelines. With its work undergirded by the integrated frameworks of CED and Collective Impact, the developing Telehealth Ecosystem™ model embraced collaborative processes that reflect a common vision, commitments to share information and resources, and active participation in contributing to ongoing developmental and capacity building efforts.

Overall impacts for Phase I, to date, include noticeable gains in cross-sectoral engagement including awareness building; outreach and partnership development. Several processes represented milestone information and dissemination opportunities and a pattern of meaningful results-oriented impacts in the evolution of the Telehealth Ecosystem—Health Equity Roundtable Forum and TMCCF Asset Mapping activities. These initiatives yielded a variety of meaningful results-oriented impacts that reflect opportunities for facilitating and disseminating vital information across disciplines, venues, and audiences in the health and human service sectors—with emphasis on what might be done jointly, through expanded collaborative efforts.

***Telehealth™ Ecosystem model*** derivatives in expanded phases are projected to include evaluation studies, development of regional CED performance measures, publications, conferences and dissemination of tools that inform policy and decision-making. Phases I through III expansion plans include:

- Programs such as telehealth, distance learning, social services and virtual workforce training
- The Intranet expansion will be designed to incorporate multiple stakeholders and organizations operating in tandem within an umbrella intranet and telehealth ecosystem to increase efficiency, effectiveness, and scale
- Participating entities will be connected to each other, to regional/state/national resources, and to the Internet at minimum costs. The development process will address not only the installation of digital connectivity and intra/internet equipment

for telehealth, but will address other issues that are important to developing a wholesome environment to live, work and play

The core partners used a tiered and phased approach to guide the developmental work of the telehealth ecosystem and operationalize processes in support of its mission. Methods used in Phase I of the Telehealth Ecosystem™ included the following activities.

**Federal, State, Local Government, Corporate Entity Consultation on Telehealth Initiatives**

Understanding the telehealth landscape at the Federal, state, and local levels was fundamental to codifying strategic plans and spurring the evolution of the Telehealth Ecosystem's approach to telehealth services in Macon County. Selected outcomes from these efforts included:

- Receipt of technical assistance from various Health Resources and Services Administration's (HRSA's) telehealth program offices
- Receipt of technical assistance support from Southeastern TeleHealth Resource Center (SETRC).
- SETRC intervention led to invitation for TMCCF to join Alabama Partnership for Telehealth (APT) state workgroup.
- Confirmation of financing and reimbursement guidelines and requirements from the Alabama Office of State Medicaid and Blue Cross Blue Shield Corporate offices.

Among other consultations in the private sector included exploration of various care coordination service models, such as the Pathways Community HUB Model. Other organizations played a key role as informants about the targeted population and the realties facing them. This included but is not limited to the Retired Nurses Association, Macon County Nurses Organization, Macon County Health Care Authority, Tuskegee University Department of Sociology and Psychology, Tuskegee Housing Authority, Macon County Ministers Association, Tuskegee Medical and Surgical Center, and A2D, Inc. All of the named organizations had a major role as part of the strategy to improve connections of at risk populations to health and human services needed to optimize their access to care and subsequent health outcomes.

**Public and Private Sector Partnerships/Engagement of Diverse Stakeholders**

As the champion of this effort, TMCCF recruited and engaged multi-sector provider and stakeholder organizations as members of a vertical network. As the membership of this network expanded, its operations increasingly aligned with those of a coalition. Specifically, operations focused on embracing a common vision and using collaborative decision-making processes to inform our strategic approach.

Other information dissemination activities were conducted using various forums and media (i.e., radio talk shows, printed flyers, public TV) to heighten awareness of the problems that

providers and researchers identified to be addressed. Information dissemination and community outreach efforts were conducted to provide the community with an opportunity to have their voices heard in decision-making. Such conversations were also used to ensure that the preliminary assessments and priorities identified resonated with the priorities that the community asserted were important. At the same time, the community would have an opportunity to gain insight into how the telehealth initiative could result in a range of benefits that were not limited to transforming the service delivery system, but also to improving the quality of patient centered care, reinvesting in the local economy.

**Formal Workgroup Development**

Cross sector discussions were achieved through participation in local organizational meetings, a national roundtable series, community conversations and who would bring unique perspectives drawn from the diverse disciplines that they represented. Engaging Ecosystem members in an asset-based resource mapping activity to identify available resources and service gaps was an important step in model development.

**Health Equity Roundtable Event IV**

***Dissemination of Information and Outreach to the Community –*** Engaging the community was pivotal to this effort in light of the localized nature of the telehealth initiative. The Community's participation in a televised roundtable event on April 26th, 2017 co-sponsored by *Westat's Center* and the *Rockville Institute* invited the *Tuskegee Macon County Community Foundation, Inc. (TMCCF)*, and the *National Center for Bioethics in Research and Health Care at Tuskegee University* to participate as collaborators. This April 26th 2017 event, *"Innovations in Health Policy & Practice: A Conversation in Reinvesting in Rural Health",* explored processes by which ideas and methods transform into policy and practice within CED and *Collective Impact Roundtable IV* culminated Westat's national roundtable series. This approach was perhaps the most unique among the previous events because it engaged directly healthcare providers, citizens, government officials, university students and faculty as well as ordinary citizens in a rich dialogue for the first time in generations.

The forum provided a unique and compelling 'point of entre' for audience engagement and dialog. It brought together a diverse group of 70 or more local leaders, stakeholders and laypersons — men and women of all ages from the public, private and nonprofit sectors, including representatives from local and state government, media, businesses, academia, nonprofits, universities, health providers and schools. Discussions highlighted current and emerging programs for addressing health disparities and current and emerging programs for addressing health disparities and health equity. The roundtable events served as a motivation for presenters, facilitators and attendees (virtual and on-site) to explore other major programs and sectors as potential partners and to examine models, strategies, and tools for use in existing cross sector programs.

Community processes are most successful when they encourage the richest possible dialogue among participants[61]. An interactive, multi-sector, community-based conversational forum was deployed to spawn momentum in anticipation of 'action-oriented' responses. The insights gleaned from this this event provided a great platform for civic engagement and action. It explored processes by which ideas and methods transform into policy and practice within CED and Collective Impact frameworks. The robust dialog that ensued from session IV served as a catalyst for future brainstorming, strategic planning and focused reflection. Capturing new ideas in real time is one way to sustain the momentum of the changes that people want in their communities. Multiple accounts to date continue to inform us that roundtable session IV participants left the convening feeling energized, and hopeful, about the opportunities ahead even in the face of formidable challenges. As noted earlier, while a rich and storied history provided a historical context for this event, Macon County continues to face significant socioeconomic and population health challenges with insufficient resources to address these deficits. Yet, the community abounds with creativity and commitment to transform the current state of affairs. This roundtable represented an opportunity for a rural community to articulate health challenges as well as make a cursory assessment of its resources, which would inform action steps.

With TMCCF's leadership, local stakeholder engagement for Event 4 began with recruitment of innovators to participate as panelists and enlisting local media personalities to help educate the community about the event and planned agenda topics. Radio and community television promotional events were held leading up to Event. Outreach efforts were augmented by TMCCF through various academic departments at Tuskegee University as well as TMCCF/Westat in-person meetings with local Tuskegee leaders and with the Director of the Tuskegee University's Archives, Collectively, these efforts provided additional historical context for roundtable preparatory activities and information for ongoing strategic planning efforts. These preliminary conversations also helped to heighten awareness and encourage community participation in the event.

Westat, Inc. and TMCCF, met with A2D, Inc. to gain insight and understanding about the role of technology and how it can be deployed to reach the goals of connectivity to provide a comprehensive healthcare service for a rural community. Several meetings were held in Atlanta, GA in the office of A2D to gain hands-on exposure to the process by which underserved communities can receive direct benefits through broadband connection. These sessions brought into sharp focus how the Telehealth EcoSystem can be a viable and practical model for health service delivery.

**Health Asset Mapping Group**

A major outcome of the Roundtable event was the development of a **Health Asset Mapping Group**. The Asset Mapping Group consisted of an informal gathering of healthcare providers who engaged in participatory dialog to share their programs, projects, activities and concerns. What started out as a one-time meeting to develop a formal description of

healthcare resources, became a regular monthly meeting. Participants included retirees from the healthcare profession. Everyone felt that it was important to play a part in the revitalization of the City of Tuskegee and Macon County at large and acknowledged that having reliable and competent healthcare services were critical in making this rural community a better place to live.

The group begin meeting monthly in June 2017 via rotational tours of their provider facilities—sharing programs, services and resources. One of the critical outcomes of the Mapping Group is learning about each individual therefore engendering trust. Gaining trust fostered participatory engagement and collaboration--a signature requirement in developing the Telehealth EcoSystem™. The Mapping Group has become the foundation for initiating the Vertical Network and utilizing the Collective Impact theory.

**Technical Assistance: Needs Assessment, Identification of Effective Practices, Performance Measurement**

Westat's Center on Health Disparities & Health Equity Research provided guidance on performance measure development and helped shape a 'real world' analytics platform for meaningful assessment of the Telehealth Ecosystem™ model and dissemination of outcomes for review by policy, funding and regulatory decision makers. The importance of community context in health and social science research and evaluation studies is highlighted in the summary proceedings from a workshop entitled *Applying a Health Lens to Decision Making in Non-Health Sectors,* highlight. The sparseness of the population in rural communities can make it more difficult than in urban areas to gather data and expand programs that address health disparities[62]. This is particularly so in scenarios involving randomized trials and control studies.

Our needs assessment approach is flexible and predicated upon community-based participatory research methods undergirded by digital connectivity and telehealth applications. A shared measurement system is a fundamental element of the Collective Impact framework. *"Agreement on a common agenda is illusory without agreement on the ways success will be measured and reported"*[63]. The publication emphasizes the *"complex interactions between these factors"*; the relevance of adaptive management "taking actions and defining metrics, and then making adjustments to those actions based on feedback over time"; and noting *"Impact assessment is not about making definite predictions"*.[64]

Examples of Westat-led technical assistance activities conducted in Phase I and slated for Phases II through III include:

**Phase I**

- An environmental literature scan
- Analysis of secondary demographic and health data to document need
- Website Analytics: website performance metrics (including data on web traffic and/or click-throughs)

- Social Media Analysis: Assessment of reach, engagement and/or sentiment expressed on social media platforms (e.g. Facebook, Twitter, Flickr and YouTube)
- Online Polls: Questions delivered to readers or users to gather data on knowledge, attitudes, or behaviors.
- Identifying and creating structures for communication and collaboration among Stakeholders

**Phase II-III**

- Process and Outcome Evaluation
- Intervention Research
- Service Delivery Research

## Discussion

The Telehealth Ecosystem™ model concept emanated from TMCCF's fundamental vision for restoration and socioeconomic renewal in Macon County and was facilitated by partnership engagement. The model is a dynamic evolutionary approach to embracing health informatics and related technologies as vital elements in wide-scale systems change. Envisioned as a vehicle to address health disparities, the Telehealth Ecosystem™ Model advances multi-sector engagement, implementation planning and novel Intranet technologies for communication and interoperability between public and private health and social service organizations. Informed by best practices in health care and information technology, business, health care and human service sectors derive mutual benefits from the alignment of resources for digital connectivity and access[65]. The Telehealth Ecosystem™ model's Phase II Intranet mechanisms will enable provider networks to:

- Explore collaboration as content experts
- Engage in mutually sponsored health equity promotional efforts
- Develop health equity products for dissemination within the digital community
- Explore project-based partnerships
- Explore participation in expanded inter- and external organizational networks

Promoting individual and organizational engagement entails generating opportunities and motivation for involvement. Fulfillment of basic information needs is paramount, including information about jobs, housing, taxes, safety, education, transportation, recreation, entertainment, food, shopping, utilities, child care, health care, religious resources, and local news. Seeking to contribute to overall information ecology, our Telehealth Ecosystem Model embraces health and media literacy best practices[66] and aligns with systems theory and information dissemination constructs. A definitive report from the OECD Directorate for Employment, Labour and Social Affairs recommends that legislative strategies aimed at socio-economic disparities reduction should be grounded in policies that foster wide and equal access to education, information and high-quality public services.[67]

Current implementation planning strategies for the *Telehealth Ecosystem™* model are derivatives of a shared vision for restoration of a once vibrant Tuskegee Macon County community. The team's approach aligns with promising and emerging best practices in stakeholder engagement, care coordination, systems thinking, dissemination and adoption of theories and health equity promotion. *"When a wider vision incorporating concepts of well-being and taking a more societal view is deployed, the patterns of relationships with other sectors change, reflecting the need for the work of the sector(s) to be ordered by the needs of people and not by sectoral objectives"*[68].

The integrated CED framework/Collective Impact framework overlay enables sustainable change in the Tuskegee Macon County healthcare system by bringing together stakeholders from multiple sectors that may appear to have conflicting approaches, but agree to set aside their personal or organizational agenda for the purpose of accomplishing an agreed-upon goal.[69/70]. The advocacy is a holistic approach to problem solving and it will take the minds and concerns of everyone working together diligently and consistently to solve the myriad of issues and problems of healthcare in a rural community. This focus is particularly timely. In a University of Georgia publication entitled "An Economic Analysis of Georgia's Black Belt Counties" authors Brigid Doherty and John McKissic highlight the demographics, health and socio-economic disparities[71] indices *that plague the Black Belt region.* The academic literature reflects the Black Belt as an area of keen focus for public health, economic development and educational researchers, legislators and policy analysts[72].

*"The promotion of good health is necessary across the lifespan and cannot be achieved without joint efforts and partnerships with stakeholders.[73]* Collaboration can provide opportunities for determining the catchment areas and groups for resources by: collecting data about specific deficits in specific services; creating differentiated strategies to address the identified catchment areas; developing resources for evaluating the success of strategies; spreading those strategies that are shown to work; and sustaining the efforts of the collaborative. *"Stakeholder engagement is very important in addressing the social determinants of health and health inequities . . . Tackling health inequalities and ensuring equity from the start is an ambitious and complex task that requires coordinated action from a wide range of stakeholders . . . it requires shared responsibilities across sectors.[74]"* Importantly, a collaborative can connect providers, share techniques for retaining workers, and identify promising practices in a range of areas.

## Conclusion

Over a period of years along a continuum, stakeholder engagement, implementation planning, technical assistance, and organizational collaboration laid the groundwork for a virtual Telehealth provider network infrastructure (Telehealth Ecosystem) to facilitate future digital connectivity and health services delivery.

We have determined that an Intranet-based solution is the cost-effective and efficient solution for this rural community. This preliminary work will inform future expansion of the Telehealth Ecosystem's virtual Intranet mechanism through its multi-dimensional operational features and functions with particular relevance to health informatics applications. Examples of its anticipated uses include enhanced medical care coordination by clinicians, quality of care assessments for quality improvement initiatives by clinical provider organizations, disease surveillance by public health agencies, HIPAA compliant data management and access for clinical research and evaluation by the academic research community, and community engagement by community-academic partnerships.

The collective impact of these foundational action steps has helped to advance understanding of the needs and capacity of the rural underserved community population and the health centers that serve them, improve health outcomes, reduce health disparities, and increase access to health care for underserved populations. These formative steps will be pivotal to the Telehealth Ecosystem Model's next phase of work. Key action steps during Phase II will involve leveraging the Telehealth Ecosystem's capacity using the Intranet as a means to create a responsive system of health care for Macon County residents.

## Operational Definitions

**Black Belt counties** The Black Belt is a region in the southern United States. The literature notes that the term originally described the prairies and dark soil of central Alabama and northeast Mississippi and now references a broad agricultural region in the American South characterized by historical agriculture in the 19th century and a high percentage of African American residents.

**Community (locality) development.** Community development is a set of processes or efforts to create community change at the local level. It involves strengthening social ties, increasing awareness of issues affecting the community, and enhancing community member participation in addressing these issues[75].

**Health disparities** refer to differences in the existence and frequency of health conditions and health status among groups. **Health disparities** are referred to as health **inequities** when they are the result of the systematic and unjust distribution of these critical conditions. **Health inequities** are "avoidable inequalities in health between groups of people within countries and between countries" (World Health Organization, 2010). **Health equity,** then, is when everyone has the opportunity to "attain their full health potential" and no one is "disadvantaged from achieving this potential because of their social position or other socially determined circumstance."[76]

**Media advocacy.** Media advocacy refers to the strategic use of print, broadcast, and social media to encourage social, economic, or environmental change.

**Social determinants of health** refer to access to power, money, and resources and the conditions of daily life that affect health and well-being for groups of people (Solar, Irwin, WHO 2010)[77].

**Telehealth** is generally defined as: "the practice of healthcare delivery using telecommunications technology including but not limited to diagnosis, consultation, treatment, transfer of medical data, education, dissemination of public health alerts and/or emergency updates". The term **telemedicine**, on the other hand, usually references a more specific . . . "use of telecommunications technology to deliver clinical diagnosis, services and patient consultation".

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